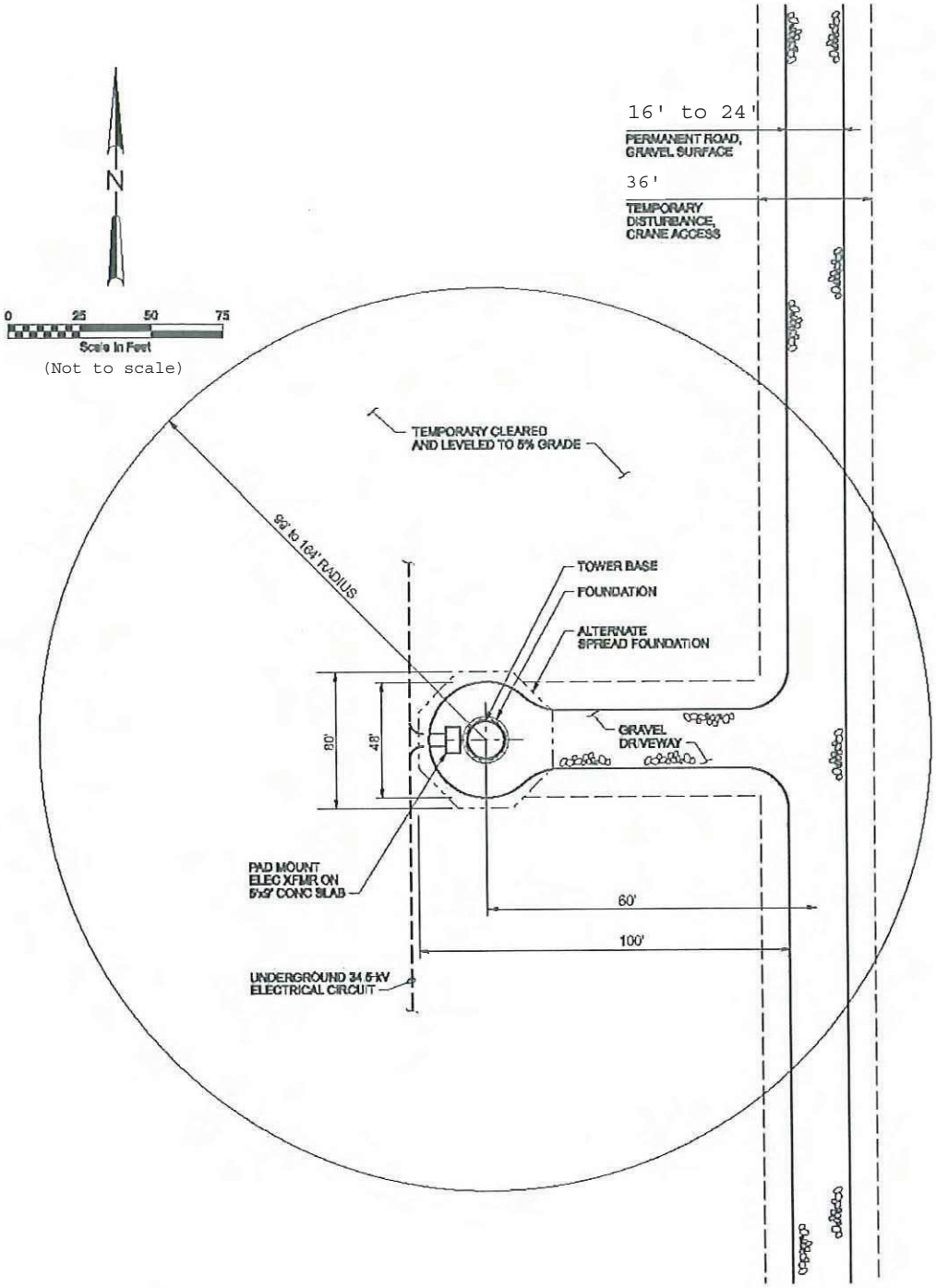
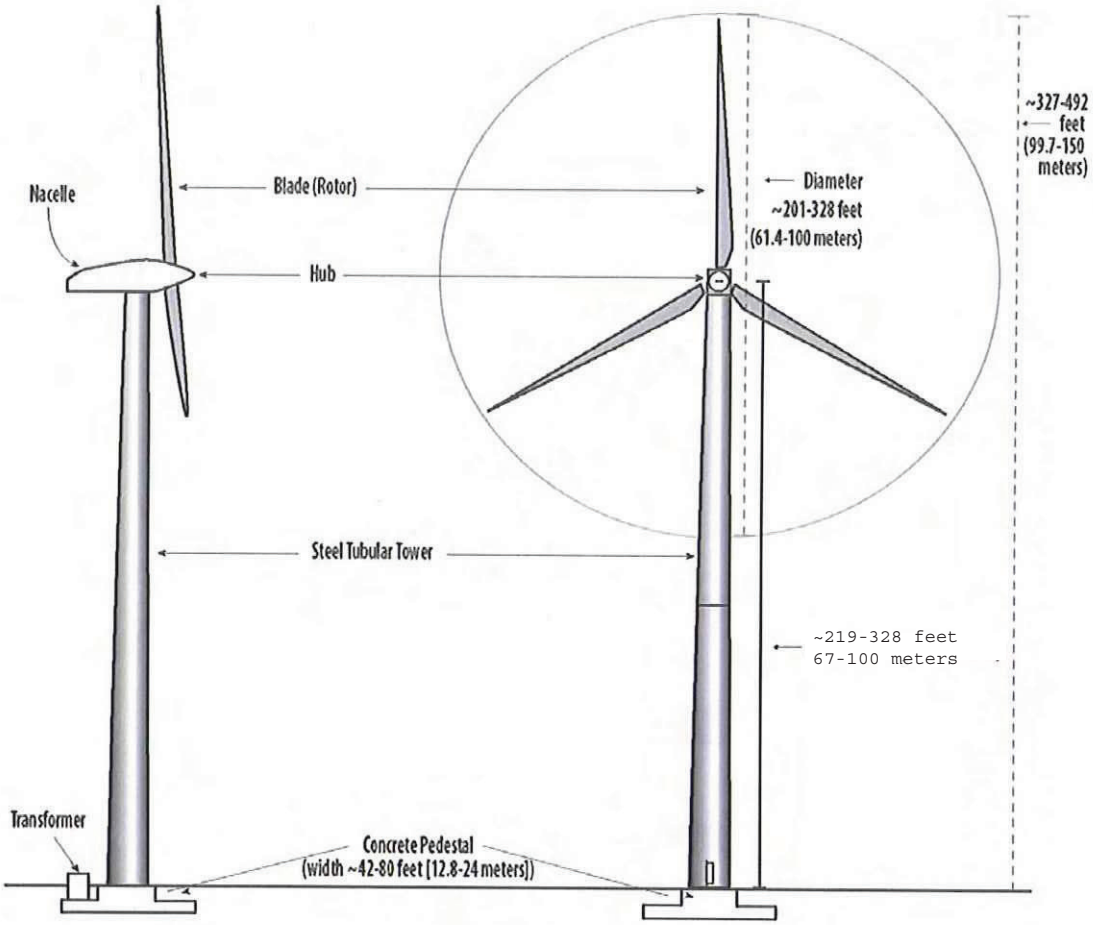


Turbine Site



Turbine Schematic

Scientific Resources Associated
1328 Kaimalino Lane
San Diego, CA 92109

To:	Patrick O'Neill HDR	**From:**	Valorie Thompson
Re:	Tule Wind Project Air Quality Analysis	**Date:**	February 22, 2011

This technical memorandum presents the results of an air quality analysis of the proposed Tule Wind Project to be located in eastern San Diego County.

The Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Tule Wind Project was prepared in December 2010. Since the preparation of that analysis, the project description for the project has changed. Accordingly, an updated analysis was prepared to update the project description and to address revisions to the air quality analysis.

The main source of air emissions associated with the Tule Wind Project is construction activities. To address the potential for impacts associated with construction of the project, it was assumed that overall project construction would require 24 months. Emissions from the project were originally calculated based on several assumptions that were updated in this analysis; namely:

- Emissions from heavy construction equipment (off-road equipment) have been updated to utilize recent emission factors from the ARB's OFFROAD Model, as developed by the South Coast Air Quality Management District. These emission factors represent the current fleet of construction equipment within southern California and provide more accurate estimates of emissions than the use of Tier 0 emission factors.

- Emissions from all phases of project construction were included in the analysis.

- Emissions of fugitive dust were modified to (a) include initial grading fugitive dust for the site and for access roads, and (b) to account for paved road dust based on typical dust loadings for limited-access roadways, where the majority of the vehicle trip length will occur.

- Based on information from the project applicant, emissions from the construction of the transmission line were removed because it was assumed that these emissions would not be simultaneous with tower construction/finish work.

A summary of the maximum daily construction emission estimates is provided below. This analysis is based on the maximum construction scenario.

Table 1
Tule Wind Project Estimated Daily Construction Emissions

Emission Source	Pounds per Day					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Rough Grading/Tower Base Work						
Construction Equipment	6.6	23.9	57.7	0.1	2.5	2.2
Worker Commute Trips	0.5	2.6	17.3	0.0	0.1	0.1
Paved Road Dust	—	—	—	—	6.1	0.9
Fugitive Dust	—	—	—	—	141.4	29.7
Maximum Daily Emissions	**7.1**	**26.5**	**75**	**0.1**	**150.1**	**32.9**
Significance Criteria	75	250	550	250	100	55
Exceeds Threshold?	No	No	No	No	Yes	No
Underground Utilities/Tower Work						
Construction Equipment	3.1	11.1	24.7	0.0	1.4	1.3
Concrete Batch Plant	—	—	—	—	7.0	4.7
Concrete Batch Plant Generator	1.9	5.8	7.2	0.0	0.4	0.4
Worker Commute Trips	1.3	5.4	38.3	0.1	0.2	0.2
Delivery and Other Trucks	10.6	235.0	99.2	0.3	7.1	7.1
Paved Road Dust	—	—	—	—	141.4	21.2
Maximum Daily Emissions	**16.9**	**257.3**	**169.4**	**0.4**	**157.5**	**34.9**
Significance Criteria	75	250	550	250	100	55
Exceeds Threshold?	No	Yes	No	No	Yes	No
Tower Construction/Finish Work						
Construction Equipment[1]	4.4	14.5	29.1	0.0	1.9	1.7
Worker Commute Trips	1.3	5.4	38.3	0.1	0.2	0.2
Delivery and Other Trucks	10.6	235.0	99.2	0.3	7.1	7.1
Paved Road Dust	—	—	—	—	141.38	21.2
Maximum Daily Emissions	**16.3**	**254.9**	**166.6**	**0.4**	**150.58**	**30.2**
Significance Criteria	75	250	550	250	100	55
Exceeds Threshold?	No	Yes	No	No	Yes	No

Sources: Iberdrola Renewables 2010. Additional calculations are provided in Appendix 8, Air Quality Calculations.
Note:
[1] Maximum daily emissions for off-road equipment would occur during the Tower Construction/Finish Work phase.

The analysis within the EIR/EIS was updated accordingly to reflect the revised project description and calculation assumptions. Emission calculation tables are provided as an attachment to this memorandum.

Valorie L. Thompson, Ph.D.

Principal

Table A-1
Heavy Equipment Emissions
Tule Wind Project

Construction Off-Road Equipment Emissions		SCAQMD OFFROAD Emission Factors, lbs/hr						
Emission Factors	Horsepower	ROG	CO	NOx	SOx	PM10	CO2	CH4
Tractor/Loader/Backhoe	108	0.0833	0.3589	0.5288	0.0006	0.0478	51.7	0.0075
Dozer D4	84	0.0833	0.3589	0.5288	0.0006	0.0478	51.7	0.0075
Dozer D6	150	0.1135	0.5873	0.8955	0.0011	0.0530	101	0.0102
Dozer D8	310	0.2500	0.8065	2.4813	0.0039	0.0877	345	0.0226
Hydraulic Crane	399	0.1726	0.6137	1.6493	0.0018	0.0627	180	0.0156
Scraper	313	0.3488	1.4023	3.2148	0.0032	0.1286	321	0.0315
Excavator	44	0.0684	0.2411	0.2428	0.0003	0.0198	25.5	0.0062
Water Truck	189	0.1550	0.4101	1.4773	0.0019	0.0515	167	0.0140
Concrete Truck	189	0.1550	0.4101	1.4773	0.0019	0.0515	167	0.0140
Dump/Haul Trucks	479	0.2372	0.7058	2.1240	0.0027	0.0785	272	0.0214
Skid-Steer Loader	44	0.0684	0.2411	0.2428	0.0003	0.0198	25.5	0.0062
Paver	100	0.1551	0.5163	0.9242	0.0008	0.0819	69.2	0.0140
Roller Compactor	95	0.1126	0.4136	0.7005	0.0007	0.0612	59.0	0.0102
Welder	45	0.1157	0.2949	0.2683	0.0003	0.0275	26.0	0.0104

			Emissions, lbs/day							Emissions, tons/year						
	Quantity Used	Duty Cycle (hrs/day)	ROG	CO	NOx	SOx	PM10	CO2	CH4	ROG	CO	NOx	SOx	PM10	CO2	CH4
Rough Grading/Tower Base Work																
Dozer - D6 Cat	2	6	0.68	3.52	5.37	0.01	0.32	608.32	0.06	0.07	0.34	0.52	0.00	0.03	58.40	0.01
Dozer - D8 Cat	2	8	2.00	6.45	19.85	0.03	0.70	2758.83	0.18	0.19	0.62	1.91	0.00	0.07	264.85	0.02
Tractor/Loader/Backhoe	2	8	0.67	2.87	4.23	0.00	0.38	413.82	0.06	0.06	0.28	0.41	0.00	0.04	39.73	0.01
Water Truck	2	4	0.62	1.64	5.91	0.01	0.21	666.18	0.06	0.06	0.16	0.57	0.00	0.02	63.95	0.01
Mini Excavator (Skid Ste	1	4	0.27	0.96	0.97	0.00	0.08	102.08	0.02	0.03	0.09	0.09	0.00	0.01	9.80	0.00
Dump Truck	4	4	0.95	2.82	8.50	0.01	0.31	1089.34	0.09	0.09	0.27	0.82	0.00	0.03	104.58	0.01
Scraper	1	4	1.40	5.61	12.86	0.01	0.51	1285.71	0.13	0.13	0.54	1.23	0.00	0.05	123.43	0.01
Total			**6.58**	**23.88**	**57.69**	**0.07**	**2.52**	**6924.28**	**0.59**	**0.63**	**2.29**	**5.54**	**0.01**	**0.24**	**664.73**	**0.06**
Underground Utilities Construction/Tower Work																
	2	6	0.50	2.15	3.17	0.00	0.29	310.37	0.05	0.05	0.21	0.30	0.00	0.03	29.80	0.00
Dozer - D4 Cat	2	6	0.50	2.15	3.17	0.00	0.29	310.37	0.05	0.05	0.21	0.30	0.00	0.03	29.80	0.00
Tractor/Loader/Backhoe	1	6	0.50	2.15	3.17	0.00	0.29	310.37	0.05	0.05	0.21	0.30	0.00	0.03	29.80	0.00
Water Truck	1	4	0.62	1.64	5.91	0.01	0.21	666.18	0.06	0.06	0.16	0.57	0.00	0.02	63.95	0.01
Concrete Truck	16	0.5	0.08	0.21	0.74	0.00	0.03	83.27	0.01	0.01	0.02	0.07	0.00	0.00	7.99	0.00
Dump Truck	2	4	0.95	2.82	8.50	0.01	0.31	1089.34	0.09	0.09	0.27	0.82	0.00	0.03	104.58	0.01
Total			**3.14**	**11.13**	**24.66**	**0.03**	**1.41**	**2769.89**	**0.28**	**0.30**	**1.07**	**2.37**	**0.00**	**0.14**	**265.91**	**0.03**
Tower Construction/Finish Work																
Skid Steer Loader	1	6	0.41	1.45	1.46	0.00	0.12	153.11	0.04	0.04	0.14	0.14	0.00	0.01	14.70	0.00
Hydraulic Crane	1	4	0.69	2.45	6.60	0.01	0.25	720.41	0.06	0.07	0.24	0.63	0.00	0.02	69.16	0.01
Water Truck	1	4	0.62	1.64	5.91	0.01	0.21	666.18	0.06	0.06	0.16	0.57	0.00	0.02	63.95	0.01
Welding Rig	1	4	0.46	1.18	1.07	0.00	0.11	103.83	0.04	0.04	0.11	0.10	0.00	0.01	9.97	0.00
Dump Truck	6	0.5	0.12	0.35	1.06	0.00	0.04	136.17	0.01	0.01	0.03	0.10	0.00	0.00	13.07	0.00
Paver	1	8	1.24	4.13	7.39	0.01	0.66	553.57	0.11	0.12	0.40	0.71	0.00	0.06	53.14	0.01
Roller	1	8	0.90	3.31	5.60	0.01	0.49	471.91	0.08	0.09	0.32	0.54	0.00	0.05	45.30	0.01
Total			**4.44**	**14.51**	**29.10**	**0.03**	**1.87**	**2805.18**	**0.40**	**0.43**	**1.39**	**2.79**	**0.00**	**0.18**	**269.30**	**0.04**
Maximum Tons/Year	(assumes grading occurs first, utilities and tower construction could occur in same year)									**0.73**	**2.46**	**5.16**	**0.01**	**0.31**	**535.21**	**0.07**

Table A-2
On-Road Vehicle Emissions
Tule Wind Project

EMFAC 2007 Year 2012 Emission Rates

	Running Emission Factors, grams/mile at 45 mph					
	ROG	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Light Duty Autos (LDA)	0.055	0.253	1.937	0.003	0.008	0.008
Light Duty Trucks (LDT)	0.057	0.391	2.416	0.003	0.017	0.017
Medium Duty Trucks)MDT)	0.087	0.796	2.552	0.005	0.018	0.018
Motorcycles (MCY)	2.642	1.504	30	0.002	0.024	0.024
Heavy Duty Trucks (HDT)	0.402	8.884	3.75	0.013	0.27	0.27

Rough Grading/Tower Base Work

					Emissions, lbs/day			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		63						
Light Duty Autos (LDA)	72.40%	46	0.33	1.54	11.79	0.02	0.05	0.05
Light Duty Trucks (LDT)	20.40%	13	0.10	0.67	4.15	0.01	0.03	0.03
Medium Duty Trucks)MDT)	6.70%	4	0.05	0.42	1.35	0.00	0.01	0.01
Motorcycles (MCY)	0.50%	0	0.00	0.00	0.00	0.00	0.00	0.00
	100.00%		**0.48**	**2.63**	**17.29**	**0.03**	**0.09**	**0.09**

					Emissions, tons/year			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		63						
Light Duty Autos (LDA)	72.40%	46	0.03	0.15	1.13	0.00	0.00	0.00
Light Duty Trucks (LDT)	20.40%	13	0.01	0.06	0.40	0.00	0.00	0.00
Medium Duty Trucks)MDT)	6.70%	4	0.00	0.04	0.13	0.00	0.00	0.00
Motorcycles (MCY)	0.50%	0	0.00	0.00	0.00	0.00	0.00	0.00
	100.00%		**0.05**	**0.25**	**1.66**	**0.00**	**0.01**	**0.01**

Underground Utilities Construction/Tower Work and Tower Construction/Finish Work

					Emissions, lbs/day			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		125						
Light Duty Autos (LDA)	72.40%	91	0.66	3.05	23.32	0.04	0.10	0.10
Light Duty Trucks (LDT)	20.40%	26	0.20	1.34	8.31	0.01	0.06	0.06
Medium Duty Trucks)MDT)	6.70%	8	0.09	0.84	2.70	0.01	0.02	0.02
Motorcycles (MCY)	0.50%	1	0.35	0.20	3.92	0.00	0.00	0.00
	100.00%		**1.30**	**5.43**	**38.25**	**0.05**	**0.18**	**0.18**
Truck Trips	**% of ADT**	**ADT**						
Heavy Duty Trucks (HDT)	100%	200	10.64	235.03	99.21	0.34	7.14	7.14
Total On-Road Vehicles			**11.93**	**240.46**	**137.46**	**0.40**	**7.32**	**7.32**

					Emissions, tons/year			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		125						
Light Duty Autos (LDA)	72.40%	91	0.10	0.48	3.64	0.01	0.02	0.02
Light Duty Trucks (LDT)	20.40%	26	0.03	0.21	1.30	0.00	0.01	0.01
Medium Duty Trucks)MDT)	6.70%	8	0.01	0.13	0.42	0.00	0.00	0.00
Motorcycles (MCY)	0.50%	1	0.05	0.03	0.61	0.00	0.00	0.00
	100.00%		**0.20**	**0.85**	**5.97**	**0.01**	**0.03**	**0.03**
	% of ADT	**ADT**						
Heavy Duty Trucks (HDT)	100%	200	1.66	36.66	15.48	0.05	1.11	1.11
Total On-Road Vehicles			**1.86**	**37.51**	**21.44**	**0.06**	**1.14**	**1.14**
Total Annual Workers			**0.25**	**1.10**	**7.63**	**0.01**	**0.04**	**0.04**
Total Annual Trucks			**1.66**	**36.66**	**15.48**	**0.05**	**1.11**	**1.11**

Operations

					Emissions, lbs/day			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		12						
Light Duty Autos (LDA)	72.40%	9	0.07	0.30	2.31	0.00	0.01	0.01
Light Duty Trucks (LDT)	20.40%	2	0.02	0.10	0.64	0.00	0.00	0.00
Medium Duty Trucks)MDT)	6.70%	1	0.01	0.11	0.34	0.00	0.00	0.00
Motorcycles (MCY)	0.50%	0	0.00	0.00	0.00	0.00	0.00	0.00
	100.00%		**0.09**	**0.51**	**3.28**	**0.01**	**0.02**	**0.02**

					Emissions, tons/year			
Worker Trips	**% of ADT**	**ADT**	**ROG**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
		12						
Light Duty Autos (LDA)	72.40%	9	0.01	0.05	0.36	0.00	0.00	0.00
Light Duty Trucks (LDT)	20.40%	2	0.00	0.02	0.10	0.00	0.00	0.00
Medium Duty Trucks)MDT)	6.70%	1	0.00	0.02	0.05	0.00	0.00	0.00
Motorcycles (MCY)	0.50%	0	0.00	0.00	0.00	0.00	0.00	0.00
	100.00%		**0.01**	**0.08**	**0.51**	**0.00**	**0.00**	**0.00**

Table A-3
Fugitive Dust Emissions
Tule Wind Project

Emission Factor[1]

$E = k * (sL)^{0.91} * (W)^{1.02}$ (maximum day)

$E = k * (sL)^{0.91} * (W)^{1.02} * (1 - P/4N)$ (annual)

			Rough Grading/ Tower Base Work	Underground Utilities Construction/Tower Work and Tower Construction/Finish Work		
		Units	Worker Trips	Delivery and Other Trucks	Worker Trips	
k	particle size multiplier (PM10)	lb/VMT	0.016	0.016	0.016	
k	particle size multiplier (PM2.5)	lb/VMT	0.0024	0.0024	0.0024	
sL	silt loading[2]	g/m^2	0.015	0.015	0.015	
W	weight (empty)	tons		20		
	weight (loaded)	tons		40		
	weight (mean)	tons	2.4	30	2.4	
E	emission factor (PM10)	lb/VMT	0.0009	0.0112	0.0009	
	emission factor (PM2.5)	lb/VMT	0.0001	0.0017	0.0001	
P	days of rainfall > 0.01 inch		18	18	18	
N	days in period		365	365	365	
	One-way trip distance	miles	30	30	30	
	Average vehicle trips	ADT	63	200	125	
	VMT/day	miles	3780	12000	7500	**Total**
	PM10 emissions	lbs/day	3.23	134.96	6.42	141.38
	PM2.5 emissions	lbs/day	0.49	20.24	0.96	21.21
	PM10 emissions	tons/year	0.50	21.05	1.00	22.05
	PM2.5 emissions	tons/year	0.08	3.16	0.15	3.31

Site Disturbance			**Daily Distubance**
	Site Area	acres	725.32
	Daily Disturbance	%	3%
	Emission Factor[3]	lbs/acre-day	20
	Control	%	61%
	PM10 emissions	lbs/day	141.4374
	PM2.5 emissions	lbs/day	29.701854
	PM10 emissions	tons/year	13.58
	PM2.5 emissions	tons/year	2.85

1. Emission factors from EPA AP-42, Section 13.2, Paved Roads
2. Silt loading from EPA AP-42, ubiquitious baseline for limited access roadways with 10,000 ADT
It was assumed that the main portion of vehicle trips would occur on I-8.
3. Fugitive dust for site disturbance from URBEMIS Model, Version 9.2.4.

Geo-Logic
ASSOCIATES
Geologists, Hydrogeologists and Engineers

MEMORANDUM

TO: Patrick O'Neill, HDR

FROM: Sarah J. Battelle, Geo-Logic Associates

DATE: February 28, 2011

SUBJECT: **MODIFIED CONSTRUCTION WATER SUPPLY EVALUATION**
TULE WIND PROJECT
EAST SAN DIEGO COUNTY, CALIFORNIA

At your request, this memorandum is being provided to supplement the Tule Wind Farm Groundwater Investigation Report (Geo-Logic, 2010), and to address the change in anticipated water needs for the Tule Wind Project construction based on recent revisions to the project description, which reduces the number of wind turbines from 134 to 128.

1. Water Capacity Analysis in Groundwater Investigation Report

The conclusions reached in the Groundwater Investigation (Geo-Logic 2010) remain valid. The groundwater investigation revealed that the combined groundwater resources on Tribal land and Rough Acres Ranch are sufficient to accommodate the maximum anticipated pumping rate of 130 gallons per minute (gpm) during the construction of the Tule Wind Project.

2. Water Supply Analysis

The purpose of our groundwater investigation was to evaluate the available groundwater resources in the area to support project construction based on initial gross water supply needs for various construction elements associated with a 134 wind turbine project as provided by Iberdrola Renewables, Inc. (IRI). The Groundwater Investigation Report assumed the total volume of extracted groundwater to support the construction of the 134-turbine Tule Wind Project conservatively could be approximately 65 to 125 acre-feet (approximately 21 to 41 million gallons). This analysis utilized a conservative estimate of the anticipated total volume of extracted groundwater to assess whether groundwater resources had sufficient capacity to support the maximum total required project water demand over the estimated nine (9) month construction period. The report concluded that there was sufficient groundwater to support the project water needs (Geo-Logic, 2010).

However, following additional discussions with project members, subsequent to the release of the Groundwater Investigation Report, as described below, the Tule Wind Project's anticipated construction water supply demand is significantly less than that estimated in the Groundwater Investigation Report, and in line with the 17.5 million gallon estimate included in the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

2.1. Calculating the Tule Wind Project's Water Supply Demand

Based on information provided by IRI (2010) the estimated water demand has been refined. Table A (below) summarizes the project construction activities that require water (IRI, 2010). The table provides estimated water use totals for the original 134 wind turbine project, and the more recently proposed 128 wind turbine project, during the construction period. Analysis of groundwater resources in the area available for construction activity is provided in the Groundwater Investigation Report (Geo-Logic, 2010).

As provided by IRI, construction activities include turbine foundation construction, new and modified access road construction, and associated dust suppression. The construction period for these activities is anticipated to be approximately nine (9) months in length. Table A identifies the estimated water demand based on IRI's construction experience. In addition, the water demand estimates provided in the table include filling four (4) 10,000 gallon water tanks one time for fire suppression. The San Diego Rural Fire Protection District will be responsible for maintaining water tank levels for the life of the Project.

2.2. Project Construction Activities – Estimated Water Demand

1. ***Road Construction*** – Up to 120,000 gallons per day (gpd) will be required over an approximate 72-day construction period, or approximately 8,640,000 gallons of water for road construction. This amount is not anticipated to change for the 128 turbine project.

2. ***Turbine Foundation Concrete Mixing*** – Turbine foundation construction is estimated to require 7,500 to 15,000 gallons of water per foundation, depending on the size of the wind turbine selected (larger turbines require more water for their foundations). Assuming construction of two foundations per day, water demand will be approximately 15,000 to 30,000 gpd. However, if larger turbines are used (such as a 3.0 MW turbine), then less turbines would be built to create a 201 MW project. For purposes of estimating total water demand for this construction activity, 15,000 gpd (67 days for 134 turbine foundations), or approximately 1,005,000 gallons is estimated for turbine foundation concrete mixing. This amount would decrease slightly by approximately 45,000 gallons (6 turbines x 7,500 gallons per foundation) for the 128 turbine project.

3. ***Dust Suppression During Turbine Foundation Construction –*** Dust suppression activities during turbine foundation construction is estimated to require 100,000 gpd for a maximum of 67 days for 134 turbines, or approximately 6,700,000 gallons. This amount would decrease slightly by approximately 300,000 gallons (2 foundations per day, 6 less foundations x 100,000 gpd) for the 128 turbine project.

4. ***Dust Suppression During Turbine Erection*** – An estimated sixty (60) days for turbine erection will be required. During this period of turbine erection, approximately 50,000 gpd will be required for dust control on project roads, or approximately 3,000,000 gallons. This amount would decrease slightly by approximately 100,000 gallons (2-3 turbines erected per day x 50,000 gpd).

5. ***Fire Protection (Four 10,000 gallon tanks)*** – 40,000 gallons total, which constitutes a one-time filling of all four (4) 10,000 gallon tanks. There would be no change in this water supply estimate under either the 134 or 128 turbine project.

Table A (below) summarizes the anticipated water demand for the 134 and 128 wind turbine projects.

Table A
Estimated Project Construction Water Supply
for 134 Wind Turbines versus 128 Wind Turbines

134 Turbines	Daily rate (gpd)	Days	Gallons	128 Turbines	Daily rate (gpd)	Days	Gallons
Road construction	120,000	72	8,640,000	Road construction	120,000	72	8,640,000
Turbine Foundations	15,000	67	1,005,000	Turbine Foundations	15,000	64	960,000
Dust Suppression During Foundation Construction	100,000	67	6,700,000	Dust Suppression During Foundation Construction	100,000	64	6,400,000
Dust Suppression During Turbine Erection	50,000	60	3,000,000	Dust Suppression During Turbine Erection	50,000	58	2,900,000
Fire Protection - 4 tanks		1	40,000	Fire Protection - 4 tanks		1	40,000
		Total (gals)	**19,385,000**			**Total (gals)**	**18,940,000**
		Total (acre-feet)	**59.5**			**Total (acre-feet)**	**58.0**

2.3. Analysis of Construction Water Demand Reduction with 128 Turbine Project

As presented in the table above, a reduction of six turbines will reduce construction water demand during turbine foundation construction by approximately 45,000 gallons (at 7,500 gallons per turbine foundation), dust suppression during foundation construction by approximately 300,000 gallons (3 days at 100,000 gpd), and dust suppression during turbine erection by approximately 100,000 gallons (2 days at 50,000 gpd), for a total reduction of approximately 445,000 gallons (approximately 1.4 acre-feet).

The Draft EIR estimates that the construction of the Tule Wind Project would require approximately 17.5 million gallons of water (approximately 53.7 acre-feet). (Draft EIR/EIS, 2010). The modified 128 turbine project would exceed this estimate by approximately 8%, or 1,440,000 gallons (approximately 4.4 acre-feet).

The Groundwater Investigation Report conservatively assumed that construction water supply required would be 65 to 125 acre-feet and concluded that there would be a sufficient water supply available to serve this demand. Based on the revised analysis presented above, the identified groundwater supply will be sufficient to serve either the 134 or 128 turbine projects.

3. Operations

Future operational needs for the project associated with the turbine operations and maintenance (O&M) have been estimated at 2,500 gallons per day, equivalent to about two (2) gallons per minute supplied by a well to be drilled in the vicinity of the O&M building. No change in water demand associated with operation of the wind project is anticipated due to the reduction of six wind turbines.

4. Conclusion

Based on the assumptions used for the project water needs, as provided by IRI (2010) and presented herein, when comparing the 134 turbine project (analyzed in the Draft EIR/EIS) to the 128 turbine project, the reduction in wind turbines will result in an estimated reduction of approximately 445,000 gallons. The existing analysis included in our Groundwater Investigation Report dated December 2010, which evaluated a more conservative, higher water demand, supplemented by the analysis herein associated with a lesser demand and smaller impact to the local groundwater resource, demonstrates that there is a sufficient water supply available to serve the 128 turbine project. Accordingly, the conclusions reached in the Groundwater Investigation (Geo-Logic 2010) remain valid, as supplemented by the information and analysis provided herein. If you have any questions, please call me at (858) 451-1136.

SAN DIEGO RURAL FIRE PROTECTION DISTRICT

November 3, 2010

Patrick Brown, Project Planner
County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, CA 92123

RE: Tule Wind Project

Dear Patrick:

This letter is to inform you that the San Diego County Rural Fire Protection District (the "District") at its November 2, 2010 meeting approved the enclosed Fire Services Agreement (the "Agreement"), including the Fire Protection Plan revised as of November, 2010, to incorporate the District's comments, attached as Exhibit "D" to the Agreement (the "FPP").

The District is responsible for providing fire and emergency protection services to almost all of the wind turbines included in the Project, as noted in the enclosed Agreement. The District's approval of the FPP is based in part on Iberdrola's agreement to include fire suppression systems in each of the wind turbine nacelles, and to provide 200 foot vegetation clearance around the base of each turbine. The fire suppression systems will address fire risk associated with the nacelles, and will limit their potential as a source of wildland fire. Their inclusion illustrates Iberdrola's effort to address the fire risks of the Project.

The District has determined that Iberdrola's satisfaction of each of the requirements of the FPP and satisfaction of each of Iberdrola's obligations under the Agreement will adequately mitigate for the potential impacts to the District's resources and to potential fire risks reasonably foreseeable as a result of that portion of the Project that is proposed to be located within the District's jurisdiction and which will be provided services under the Agreement. The District has determined that no additional mitigation is required from Iberdrola for these potential impacts (to the District's resources and to potential fire risks reasonably foreseeable as a result of that portion of the Project for which services will be provided under the Agreement), provided that the Project conforms in all respects to the Project Description attached as Exhibit "B" to the Agreement (except that the number of wind turbines to be located within the District's jurisdiction may change, as provided for in the Agreement).

Please do not hesitate to contact me if you have any questions.

Sincerely,

David Nissen, Division Chief
San Diego Rural Fire Protection District

Cc: Cynthia L. Eldred, Esq. Tule Wind, LLC, attention Ms. Harley McDonald

14024 Peaceful Valley Ranch Road • Jamul, California 91935 • (619) 669-1188 Fax (619) 669-1798

To: Applicant Tule Wind, LLC
Attn: Ravy Raviv or Trevor Mihalik
1125 NW Couch Street, Suite 700
Portland, OR 97209
Telephone No. (503) 796-7000
Facsimile No. (503) 796-6906

With a copy to: Latham & Watkins LLP
Attn: Christopher W. Garrett, Esq.
600 W. Broadway, Suite 1800
San Diego, CA 92101
Telephone No. (619) 236-1234
Facsimile No. (619) 696-7419

Any such notice or demand shall be deemed served at the time of delivery if delivered in person, by facsimile transmission, or electronic mail, or on the business day following deposit thereof in the U.S. Mail where sent by registered or certified mail.

"Applicant"

Tule Wind, LLC

By: _____
Ravy Raviv
Authorized Representative

By: _____
Doug Wilkinson
Authorized Representative

"District"

San Diego Rural Fire Protection District

By: _____
David Nissen
Fire Marshal/Fire Chief

AGREEMENT FOR PROVISION OF FIRE AND EMERGENCY PROTECTION SERVICES

THIS AGREEMENT FOR PROVISION OF FIRE PROTECTION AND EMERGENCY SERVICES ("Agreement") dated as of November 2 2010 (the "Effective Date"), by and between SAN DIEGO RURAL FIRE PROTECTION DISTRICT, a legal agency formed by the Board of Supervisors of the County of San Diego under the Fire Protection Law of 1961 (the "District"), and TULE WIND, LLC (the "Applicant") (sometimes referred to individually as a "Party" and collectively as "the Parties").

RECITALS

WHEREAS, the Applicant leases certain real property located within the unincorporated area of County of San Diego and within the District's jurisdiction (the "Property"), as more particularly described on the attached Exhibit "A" incorporated herein by reference; and

WHEREAS, the Applicant has applied to the County of San Diego (the "County") to construct the Tule Wind Project on the Property (the "Project"), as more fully described on the attached Exhibit "B" incorporated herein by reference; and

WHEREAS, as a condition of the County's approval of the Project, the Applicant is required to procure fire and emergency protection services for the Project; and

WHEREAS, the Applicant desires to contract with the District for fire and emergency protection services for the Project; and

WHEREAS, the District desires to provide fire and emergency protection services for the Project as agreed herein.

NOW, THEREFORE, in consideration of the foregoing, the Parties hereby agree as follows:

1. The Project

The description of the Project site is contained in Exhibit "B" attached hereto and incorporated by this reference.

2. Scope of Services

Provided that the Applicant timely complies with each of its obligations under this Agreement, the District agrees to provide fire and emergency protection services to the Project, as more fully set forth in the Scope of Services attached hereto as Exhibit "C" and incorporated by this reference (the "Services"). The District will issue a will-serve letter to the Applicant for the Project upon receipt of all of the following: (a) the Applicant's signature on this Agreement; (b) confirmation that the Deposit (as defined below) has been delivered to the Escrow Depository (as defined below); (c) documentation that establishes legal access to the Property as provided in

Section 7, below; and (d) a Fire Protection Plan approved by the District, attached hereto as Exhibit "D" and incorporated herein by this reference, that incorporates the changes to the Applicant's Fire Protection Plan, dated October 2010, as set forth in the District's letter to the County, dated October 18, 2010.

3. Term

This Agreement shall be effective upon the Effective Date. The initial term of this Agreement shall begin upon Commencement of Construction (as defined below) of the Project and be in effect for a period of ten (10) years thereafter (the "Initial Term"). The Applicant shall give notice to the District at least thirty (30) calendar days prior to the Commencement of Construction pursuant to items (a), (b), or (c) of this paragraph. "Commencement of Construction" shall be the first to occur of: (a) any ground disturbance of any portion of the Property in connection with the Project, except for geotechnical investigation or other environmental analysis required as part of the permitting process; (b) delivery of any materials to any portion of the Property in connection with the Project; (c) delivery of any equipment, including but not limited to a construction trailer, but excluding meteorological tower(s), to the Property in connection with the Project; or (d) notice by the District to the Applicant that the District is aware that any of items (a), (b), or (c) of this paragraph have occurred. The notice by the Applicant to the District pursuant to items (a), (b), or (c), above, or the notice by the District to the Applicant pursuant to item (d), above, shall each be referred to as the "Construction Notice". The Construction Notice shall set forth the number of wind turbines approved in the Approvals (defined in Section 5, below) for the Project.

This Agreement shall be automatically renewed following the Initial Term for consecutive five (5)-year periods (each referred to as a "Renewal Term") for the life of the Project. The Applicant may terminate this Agreement by providing the District sixty (60) calendar days prior written notice if: (aa) the Applicant fails to obtain the Approvals described more fully in Section 5, below on or prior to June 30, 2016; or, (bb) Project operations on the Property entirely cease subsequent to issuance of the Approvals and the Applicant removes all Project improvements from the Property.

4. Annual Compensation

A "Fiscal Year" means the period starting on July 1 and ending on the following June 30. For the Fiscal Year 2010-2011, the Applicant shall pay to the District $996.44 per acre (or any portion of an acre) multiplied by the whole number of acres (or any portion of an acre) occupied (the "Base Rate") for the Services. The Base Rate shall increase by three percent (3%) each Fiscal Year thereafter (i.e., the rate in effect for the prior Fiscal Year multiplied by 1.03 to obtain the following Fiscal Year's rate). The Applicant anticipates obtaining Approvals to construct and operate 103 wind turbines on the Property, however, the actual number of turbines approved may be more or less. The Parties agree that each wind turbine will be located on one acre (or a portion thereof). If the Approvals allow the Project to be developed with 103 wind turbines to be constructed on the Property, and Commencement of Construction occurs in Fiscal Year 2010-2011, the Applicant shall pay to the District for Fiscal Year 2010-2011 the amount of $102,633.32, prorated for the number of days for the period beginning with the date of

Commencement of Construction and ending on June 30, 2011. If the Approvals allow fewer than 103 wind turbines to be constructed on the Property, or greater than 103 wind turbines to be constructed on the Property, then the Parties shall make an adjustment of annual compensation based on the number of wind turbines allowed by the Approvals to be constructed on the Property. The Applicant hereby agrees to pay to the District for the Services, in advance, for each Fiscal Year, an amount equal to the Base Rate, increased by 3% for each Fiscal Year thereafter. Payment shall be as follows.

Concurrently with execution of this Agreement, the Applicant shall: (a) execute irrevocable escrow instructions substantially in the form attached hereto as Exhibit "E", incorporated by this reference (the "Irrevocable Escrow Instructions"); (b) deliver the signed Irrevocable Escrow Instructions to the Escrow Depository defined therein, with a copy to the District; and (c) deposit with the Escrow Depository the amount of $102,633.32 (the "Deposit"). The Applicant acknowledges and agrees that the Escrow Depository shall release the Deposit to the District without further action by the Applicant upon the delivery of the Construction Notice to the Escrow Depository by either the Applicant or the District.

If, on June 30, 2013, this Agreement remains in effect and the Construction Notice has not yet been delivered to the Escrow Depository, then the Applicant shall make an additional deposit (the "Additional Deposit") to the Escrow Depository equal to $16,346.83, which is the difference between the Deposit increased by three percent (3%) per Fiscal Year from Fiscal Year 2011-12 through 2015-2016 ($118,980.15), less the Deposit ($102,633.32). The Applicant acknowledges and agrees that the Escrow Depository shall release the Additional Deposit to the District without further action by the Applicant upon the delivery of the Construction Notice to the Escrow Depository by either the Applicant or the District.

Upon the release of the Deposit to the District, and Additional Deposit, if applicable, the District shall: (aa) calculate the number of days remaining in the current Fiscal Year by determining the days from and including the date of the Construction Notice to and including the next following June 30 (the "Remainder"); (bb) determine the Base Rate for the Services applicable to the Fiscal Year in which the Remainder is calculated (the "Rate"); (cc) multiply the applicable Base Rate times a fraction, the numerator of which is the Remainder, and the denominator of which is 365, which is equal to the proportionate amount of the Base Rate due for the portion of the Fiscal Year in which Commencement of Construction begins (the "Stub Year Amount"); (dd) subtract the Stub Year Amount from the Deposit to calculate the amount of the Deposit remaining (the "Following Year Amount") to be applied to the next following Fiscal Year (the "Following Year"); (ee) calculate the Base rate applicable to the next following Fiscal Year (the "New Rate"); (ff) subtract the Following Year Amount from the New Rate to obtain the "Amount Due For the Following Year". The District shall calculate all of the above and give notice thereof to the Applicant. The Applicant shall pay, on or before July 1 of the Following Year the Amount Due for the Following Year. Thereafter, on or before July 1 of each year the Applicant shall pay to the District the amount equal to the Base Rate increased by 3% per Fiscal Year.

5. Approvals

The Parties agree that the Applicant may terminate this Agreement if the Applicant is unable to obtain all governmental licenses, permits, and/or approvals required of or deemed necessary or appropriate by the Applicant or the County in order to begin Commencement of Construction of the Project, including without limitation applications for zoning variances, zoning ordinances, amendments, special use permits, and construction permits (collectively, the "Approvals") on or before June 30, 2016. The Applicant acknowledges and agrees that the District has no duty or obligation to obtain any such Approvals on behalf of the Applicant

6. Indemnification

The Applicant shall indemnify, defend (with Counsel acceptable to District in its good faith judgment) and hold the District harmless from and against any and all injury, loss, claims of whatsoever character, nature, and kind, including without limitation the Applicant's negligence or willful misconduct whether directly or indirectly arising from or connected with an act or omission of the Applicant or any agents of the Applicant or other persons acting by or on behalf of Applicant, damages, liabilities, costs, and expenses (including reasonable attorney's fees and court costs) arising from or related to or claimed to be caused by the installation, use, maintenance, repair, removal, and/or any other work or service for or in connection with the Project, except to the extent attributable to the bad faith or gross negligence of the District, its employees, agents, or the District's independent contractors. The Applicant's obligations under this Agreement shall be effective upon the Effective Date, regardless of whether any or all approvals and/or actions of the County regarding the Project remain valid or are invalidated by any court. The Applicant's obligations to indemnify, defend, and hold the District harmless shall survive the termination of this Agreement, but shall be limited to events that occurred during the term of this Agreement.

7. Access

At all times during the term of this Agreement, the Applicant shall ensure that the District will have twenty-four (24) hours per day, seven (7) days per week, pedestrian and vehicular access to, over, around, and across the Property for purposes of providing the Services as provided by this Agreement. As a condition of this Agreement, prior to the Effective Date of this Agreement, the Applicant shall demonstrate to the satisfaction of the District that the District, its employees, agents, volunteers, representatives, contractors, successors and assigns, and all other local, state, and federal fire-fighting and/or emergency response agencies and their respective employees, agents, volunteers, representatives, contractors, successors and assigns, will have legal access to the Property that will allow fire and emergency personnel and apparatus entry onto the Property for the purpose of providing the Services during the term of this Agreement.

The Parties acknowledge that this Agreement is not intended to expand, limit, or modify in any way the District's independent rights as a governmental agency to access the Property for purposes of providing the Services described in this Agreement.

8. Site Maintenance

The Applicant agrees to keep and maintain the Property in good condition and clear of hazardous substances (other than hazardous substances used or useful in the construction, operation, or maintenance of the Project in accordance with applicable law) at all times so as to avoid and prevent the creation and/or maintenance of fire or emergency hazards.

9. Assignment

The Applicant may assign this Agreement if the Applicant is transferring all or substantially all of the Project to the assignee; provided, however, to be valid, (a) any such assignment shall be in writing substantially in the form of Exhibit "F" ("Form of Assignment of Agreement For Provision of Fire and Emergency Protection Services") (the "Assignment") attached hereto and incorporated by this reference; (b) the Assignment provides for the Applicant's assignment of all of its obligations under this Agreement to the assignee and the assignee assumes all of such obligations; (c) the Applicant is not released of its obligations to the District under this Agreement that existed prior to the date of the Assignment but is otherwise released; (d) the Assignment contains the name, address, telephone number, facsimile number, and contact person for the assignee; and (e) the District has provided the Applicant and the assignee with written acknowledgement of receipt of the Assignment signed on behalf of the Applicant and the assignee. Any attempted assignment in violation of the foregoing provision shall be void and a material default by the Applicant of this Agreement.

10. Project Site Safety

Unless otherwise provided by the Scope of Services in this Agreement, the District, its employees, agents and independent contractors are not responsible for any condition of the Property or Project site conditions during the term of this Agreement. The Parties acknowledge and agree that the Applicant has responsibility for all conditions of the Property and all Project site conditions, including safety of all persons and property.

11. Breach

Failure to abide by any terms of this Agreement shall constitute a breach of this Agreement. The Party asserting a breach must notify the other Party in writing pursuant to Section 20 below. Each Party shall have the right but not the obligation or duty to cure any breach by the other Party of the terms of this Agreement. An "Event of Default" shall exist if: (a) the breach can be cured solely by the payment of money and the breach is not cured within five (5) business days after the notifying Party delivers notice (a "Breach Notice") thereof to the breaching Party; (b) the breach concerns the District's access to the Property, is within the Applicant's control, and the breach is not cured within five (5) business days after the notifying Party delivers a Breach Notice thereof to the breaching Party; (c) the breach concerns the District's access to the Property, is not within the Applicant's control, and the breach is not cured within thirty (30) days after the notifying Party delivers a Breach Notice thereof to the breaching Party (nothing in this agreement is intended to limit the District's authority to access the Property); or (d) the breach cannot be cured solely by the payment of money and does not

concern the District's access to the Property and the breach is not cured within thirty (30) days after the notifying Party delivers a Breach Notice thereof to the breaching Party. If an Event of Default occurs, the notifying Party shall be entitled to any and all remedies available at law. Should the notifying Party unilaterally elect to cure any such breach by the breaching Party, the breaching Party shall promptly reimburse the notifying Party for all costs and expenses incurred by the notifying Party to effectuate such cure.

12. Jurisdiction and Venue

The venue for any suit or proceeding concerning this Agreement, the interpretation or application of any of its terms, or any related disputes shall be in the County of San Diego, State of California.

13. Successors in Interest

This Agreement and all rights and obligations created by this Agreement shall remain in full force and effect whether or not any Parties to the Agreement have been succeeded by another entity, and all rights and obligations created by this Agreement shall be vested and binding on such Party's successor in interest.

14. Integration

This Agreement and the Exhibits and references incorporated into this Agreement fully express all understandings of the Parties concerning the matters covered in this Agreement. No change, alteration, or modification of the terms or conditions of this Agreement, and no verbal understanding of the Parties, their officers, agents, or employees shall be valid unless made in the form of a written change agreed to in writing by both Parties or by a written amendment to this Agreement agreed to by both Parties. All prior negotiations and agreements are merged into this Agreement. The Parties acknowledge and agree that the Recitals set forth above are true and correct and are hereby incorporated by reference.

15. No Third Party Beneficiaries

The Parties hereto agree that there shall be no third-party beneficiaries to this Agreement. This Agreement is not intended to and shall not confer any rights or remedies hereunder upon any other party other than the Parties to this Agreement and their respective successors in interest.

16. Counterparts

This Agreement may be executed in counterparts, which when taken together shall constitute a single signed original as though all Parties had executed the same page. The Parties agree that a signed copy of this Agreement transmitted by one Party to the other Party by facsimile transmission or electronic mail as a PDF, shall be binding upon the sending Party to the same extent as if it had delivered a signed original of this Agreement.

17. No Waiver

No failure of any Party to require strict performance by the other Party of any covenant, term or condition of this Agreement, nor any failure of any Party to exercise any right or remedy consequent upon a breach of any covenant, term, or condition of this Agreement, shall constitute a waiver of any such breach of such covenant, term or condition. No waiver of any breach shall affect or alter this Agreement, and each and every covenant, condition, and term hereof shall continue in full force and effect regardless of any existing or subsequent breach. A waiver of any such breach shall not be interpreted to mean that any Party has waived its right to demand in the future the full and complete performance by the other Party of its duties and obligations under this Agreement.

18. Signing Authority

The representative for each Party signing on behalf of a corporation, partnership, joint venture, or governmental entity hereby declares that authority has been obtained to sign on behalf of the corporation, partnership, joint venture, or governmental entity and agrees to indemnify and hold the other Party hereto harmless if it is later determined that such authority does not exist.

19. Attorneys' Fees

In the event any action or proceeding is initiated to challenge, invalidate, enforce, or interpret any of the terms of this Agreement, the prevailing party shall be entitled to all attorneys' fees and litigation fees, costs, and expenses in addition to any other relief granted by law. For purposes of this Agreement, "prevailing party" means the party who substantially receives the remedy or award it requested.

20. Notices

All letters, statements, or notices required pursuant to this Agreement shall be deemed effective upon receipt when personally served, transmitted by facsimile machine or electronic mail, or sent certified mail, return receipt requested, to the following addresses:

To: District
San Diego Rural Fire Protection District
Attn: Fire Chief David Nissen
14024 Peaceful Valley Ranch Road
Jamul, CA 91935
Telephone No. (619) 669-1188
Facsimile No. (858) 362-8448

With a copy to:
Cynthia L. Eldred, Esq.
Law Office of Cynthia L. Eldred
2481 Congress Street
San Diego, CA 92110
Telephone No. (619) 233-7366
Facsimile No. (619) 233-7390

To: Applicant Tule Wind, LLC
Attn: Ravy Raviv or Trevor Mihalik
1125 NW Couch Street, Suite 700
Portland, OR 97209
Telephone No. (503) 796-7000
Facsimile No. (503) 796-6906

With a copy to: Latham & Watkins LLP
Attn: Christopher W. Garrett, Esq.
600 W. Broadway, Suite 1800
San Diego, CA 92101
Telephone No. (619) 236-1234
Facsimile No. (619) 696-7419

Any such notice or demand shall be deemed served at the time of delivery if delivered in person, by facsimile transmission, or electronic mail, or on the business day following deposit thereof in the U.S. Mail where sent by registered or certified mail.

"Applicant"

Tule Wind, LLC

By: _____
Ravy Raviv
Authorized Representative

By: _____
Doug Wilkinson
Authorized Representative

"District"

San Diego Rural Fire Protection District

By: _____
David Nissen
Fire Marshal/Fire Chief

Exhibit "A"

Legal Description of the Property

(subject to modification and supplement as project design is finalized)

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

The Southwest Quarter of the Southeast Quarter; the East Half of the Southwest Quarter and the Southeast Quarter of the Northwest Quarter of Section 28, Township 16 South, Range 7 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to United States Government Survey approved August 27, 1880.

Excepting all the coal or other minerals in said land as reserved in Patent from the United States of America, recorded in Book 15, Page 26 of Patents.

Assessor's Parcel Number: **529-110-01**

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

The South Half of the Southeast Quarter; the Northwest Quarter of the Southeast Quarter; the West Half of the Northeast Quarter of Section 33, Township 16 South, Range 7 East, San Bernardino Base and Meridian, in the County of San Diego, State of California.

Excepting all the coal or other minerals in said land as reserved in Patent from the United States of America, recorded in Book 15, Page(s) 26 of Patents.

Assessor's Parcel Number: **529-140-01**

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

The South Half of the South Half of Section 34, Township 16 South, Range 7 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to United States Government Survey approved August 27, 1880.

Excepting all the coal or other minerals in said land as reserved in Patent from the United States of America, recorded in Book 15, Page(s) 26 of Patents.

Assessor's Parcel Number: **529-150-01**

Exhibit "B"

Project Description

1.1.2 Project Description

IBR is proposing to construct and operate the Tule Wind Project located near Boulevard, California, shown **in Figure 1**. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an O&M building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, a temporary laydown (staging) areas, and meteorological towers.

The Tule Wind Project will consist of the following components:

- Up to 134 wind turbines, ranging in size between 328 and 492 feet in height and generating capacity between 1.5 megawatts (MW) and 3.0 MW, to produce 200 MW of electricity;
- A 34.5 kilovolt (kV) transmission collector cable system linking each turbine to the next and to the project collector substation, which will run principally underground except in select areas where cultural, environmental, or logistical conditions require an overhead line;
- A 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation;
- A 5-acre collector substation site and 5-acre O&M building site;
- Access roads between turbines, as well as improvements to existing roadways and new roadways to accommodate construction and delivery of equipment;
- A temporary batch plant for construction located on a 5 acre area;
- A 10-acre parking area;
- Nineteen 2-acre temporary lay down areas; and
- Two permanent meteorological towers and one sonic detection and ranging (SODAR) unit.

The maximum build-out of the project allows for up to 200 MW of installed wind turbine capacity. This 200 MW could consist of as many as 134 1.5 MW turbines, as little as 67 3.0 MW turbines, or some intermediate mix of turbines ranging in output from 1.5 MW to 3.0 MW. Turbines with a smaller output can be spaced closer together, whereas turbines with a larger output require larger spacing. At this time, the 134-turbine layout proposes 97 wind turbines on BLM land, 17 turbines on Tribal lands, 7 turbines on State lands, and 13 turbines on privately-owned land, commonly known as Rough Acres Ranch.

The project will include an approximate 5,000 square foot, pre-engineered metal O&M building, located next to the collector substation to house operations personnel and critical spare parts. A typical O&M Building is illustrated in **Figure 4**.[1] The O&M building will include a foundation, with electrical and heating, ventilation, and air conditioning (HVAC) systems. The O&M building will also include a septic system and well to provide up to 5 gallons per minute of potable water throughout operations. Once the project is operational, the O&M facility will use approximately 2,500 gallons per day of water.

The only staffed structure as part of the project is the proposed O&M building. The project is expected to be supported by up to 12 full time employees on the O&M staff. Typically, O&M staff will be present on-site during normal business hours.

---

[1] Note: Figure 4 is a typical example and does not identify the required fuel modification zone. However, as described within this Conceptual Draft FPP, a minimum 100-foot radius fuel modification zone will be provided.

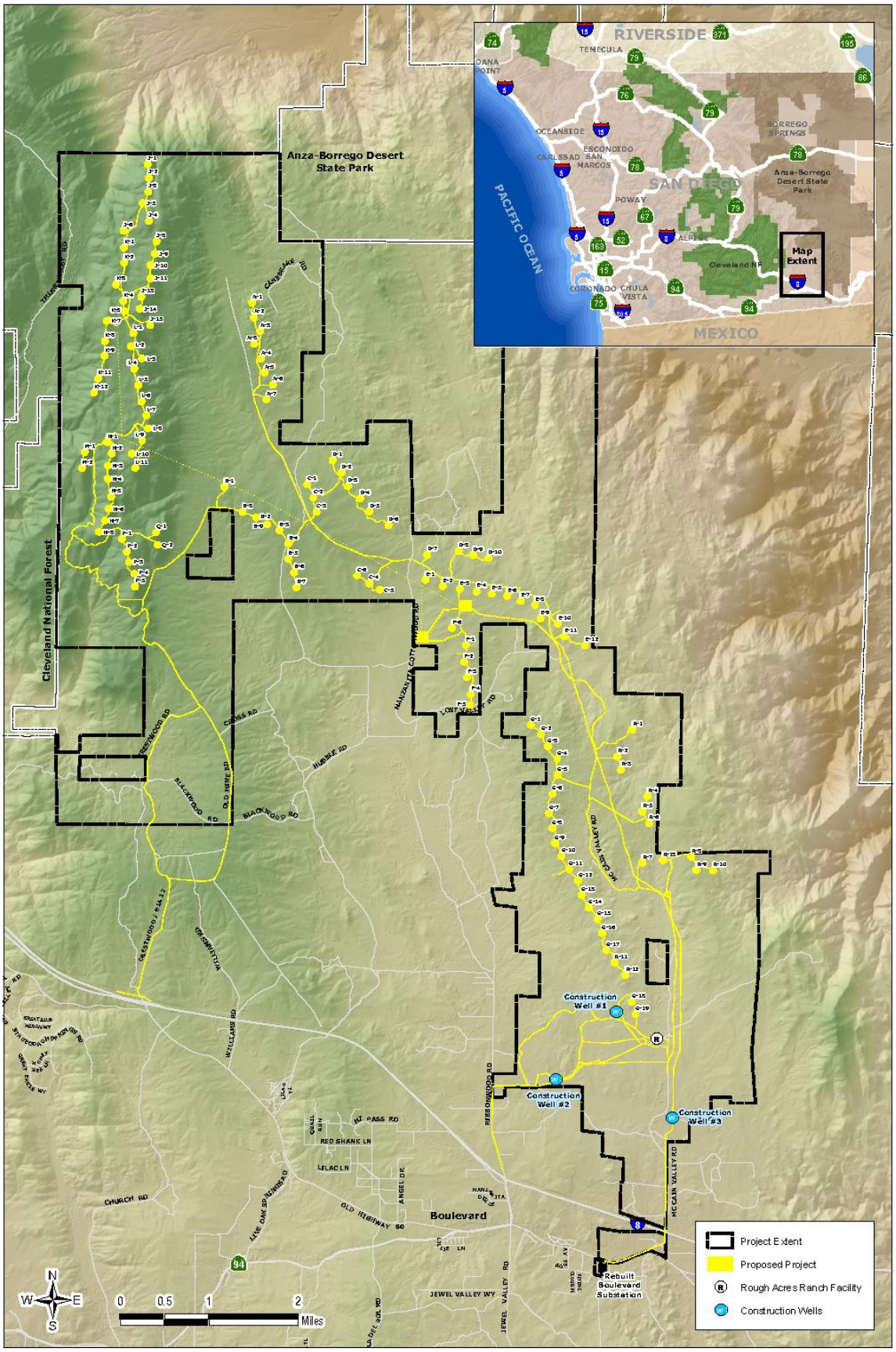
The proposed location for the project collector substation is shown on **Figure 2**. Construction will generally consist of the installation of concrete pads and electric transformers. Areas not covered by concrete pads will be surfaced with gravel to minimize erosion and surface runoff, and to provide fire protection through prevention of weedy growth. The collector substation will be fenced with security fencing to minimize the potential for entry by non-authorized personnel. A typical substation site is included as **Figure 5**.[2]

Proposed turbine locations are shown on **Figure 2**. The wind tower foundations will be approximately 60 feet in diameter, and 7 to10 feet deep. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the 200-foot radius area would be performed, annually prior to May 1 and more often as needed. A typical turbine tower design is illustrated in **Figure 6**. A typical turbine site is illustrated in **Figure 7**. A typical turbine nacelle with labeled internal equipment is illustrated in **Figure 8**.

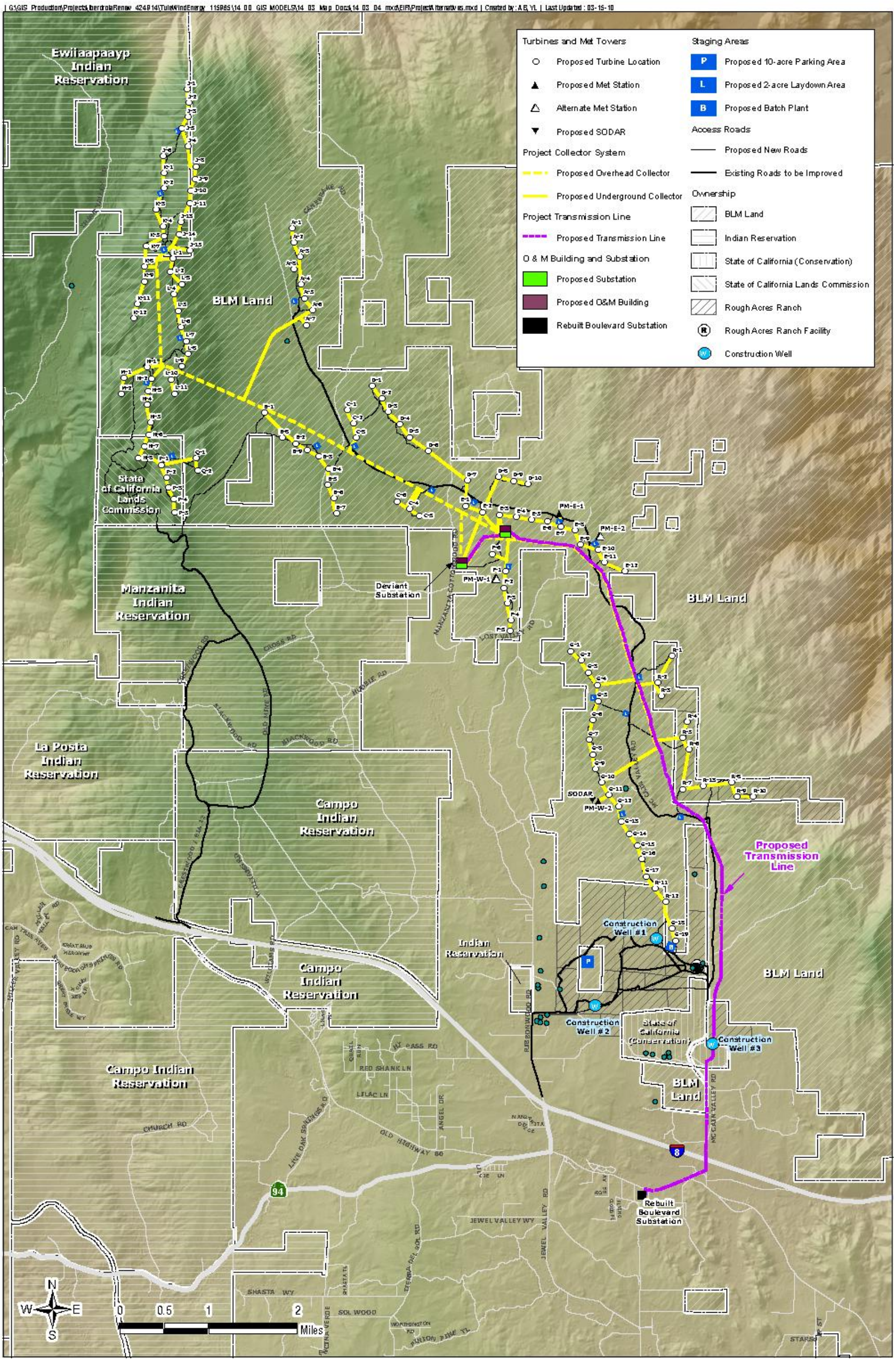
Two permanent meteorological towers will also be installed; their locations are noted on **Figure 2**. The towers will be free standing (no guy wires) and approximately 196 feet high with a concrete foundation. Installation will follow all safety measures contained in IBR's Health and Safety Manual. A permanent sonic detection and ranging SODAR unit will also be placed on-site and fenced.

Electricity generated by the wind turbines will be collected through 34.5kV collector lines and delivered to the project collector substation. The 34.5kV collector lines will principally be placed underground, except in locations where site-specific conditions require that they run aboveground.
After the electricity is stepped up to 138 kV at the project collector substation, an approximate 9.7-mile long 138 kV transmission line will interconnect the project collector substation with SDG&E's proposed Rebuilt Boulevard Substation, which is part of the SDG&E ECO Substation Project.

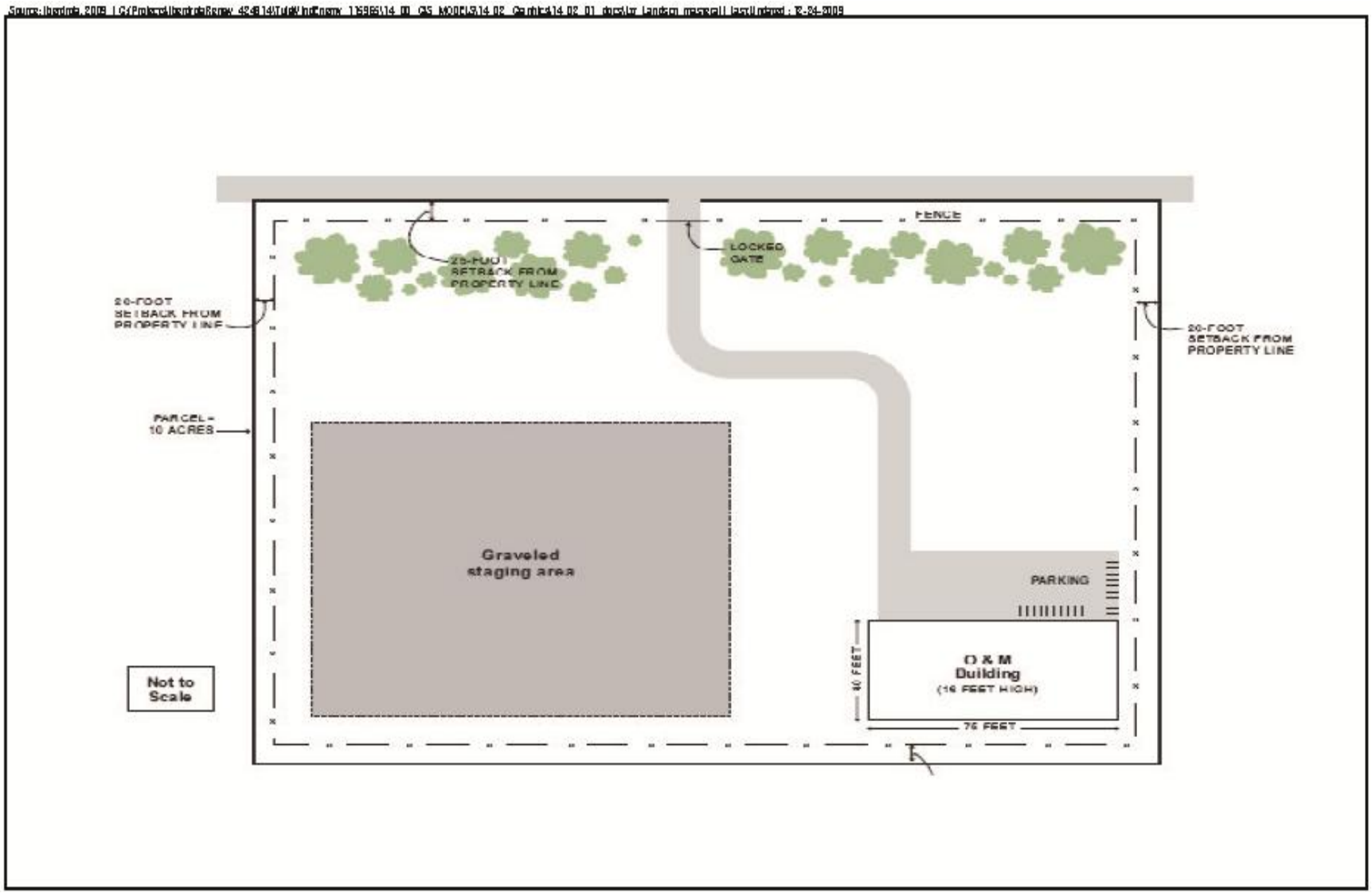
[2] Note: Figure 5 is a typical example and does not identify the required fuel modification zone. However, as described within this Conceptual Draft FPP, a minimum 100-foot fuel modification zone will be provided.



Region and Vicinity **Figure 1**

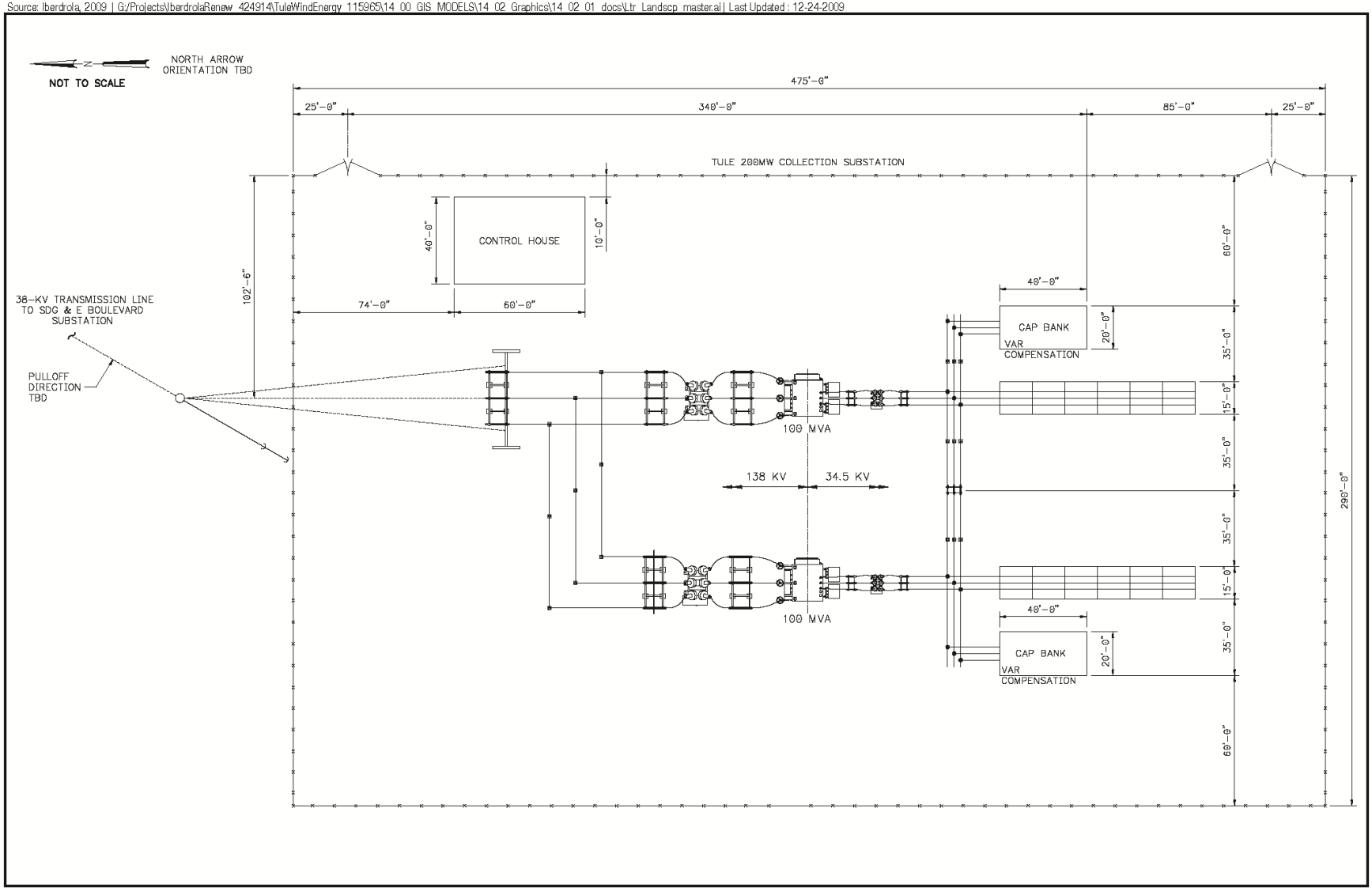


Proposed Project **Figure 2**

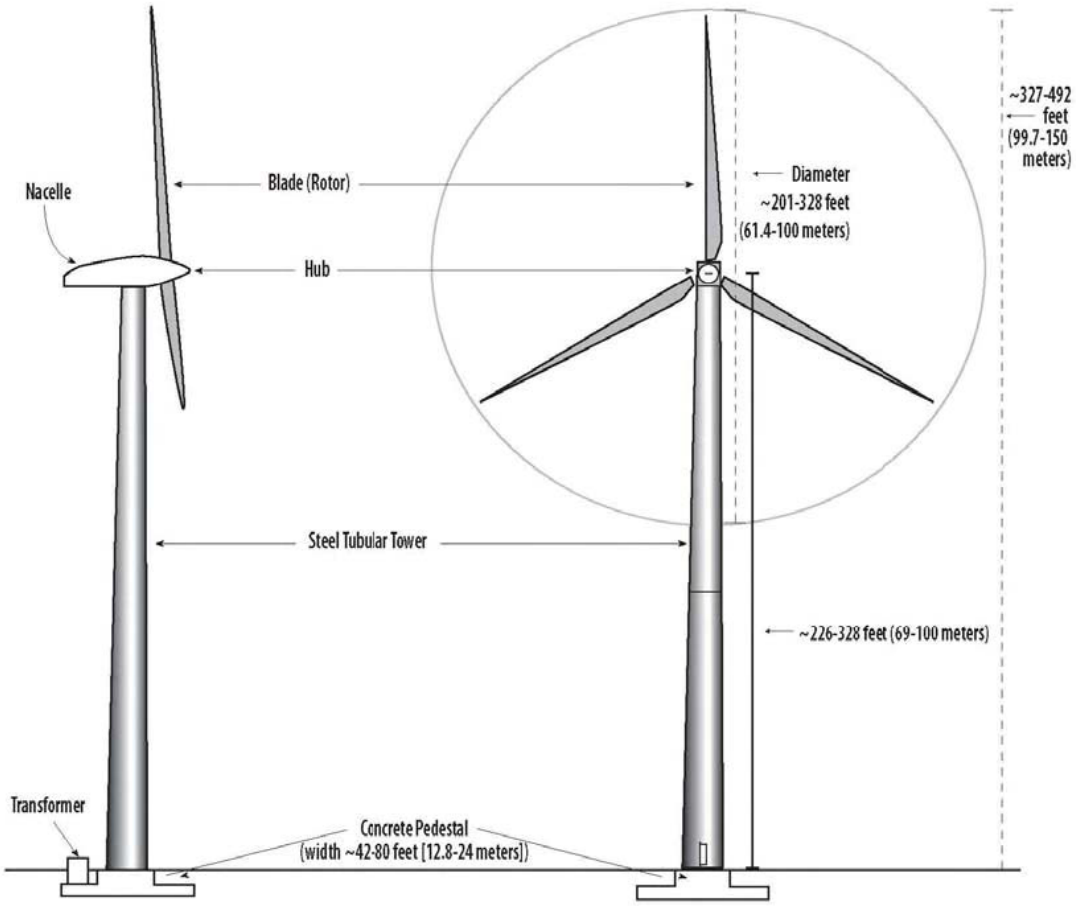


Typical Operations and Maintenance Facility Site **Figure 4**

Source: Iberdrola, 2009 | G:/Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_02_Graphics\14_02_01_docs\Ltr_Landscp_master.ai | Last Updated : 12-24-2009

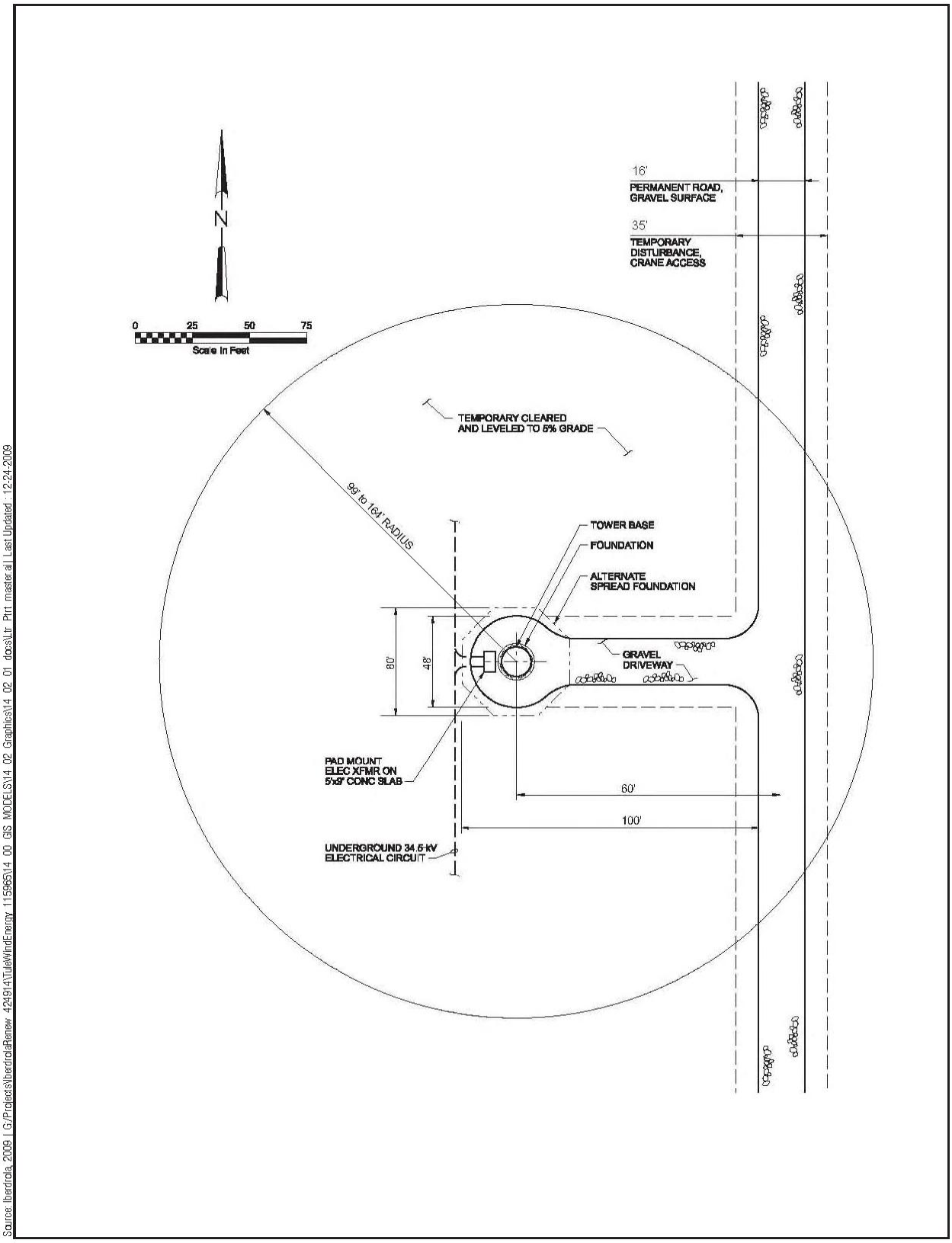


200 MW Collection Plan Station View **Figure 5**



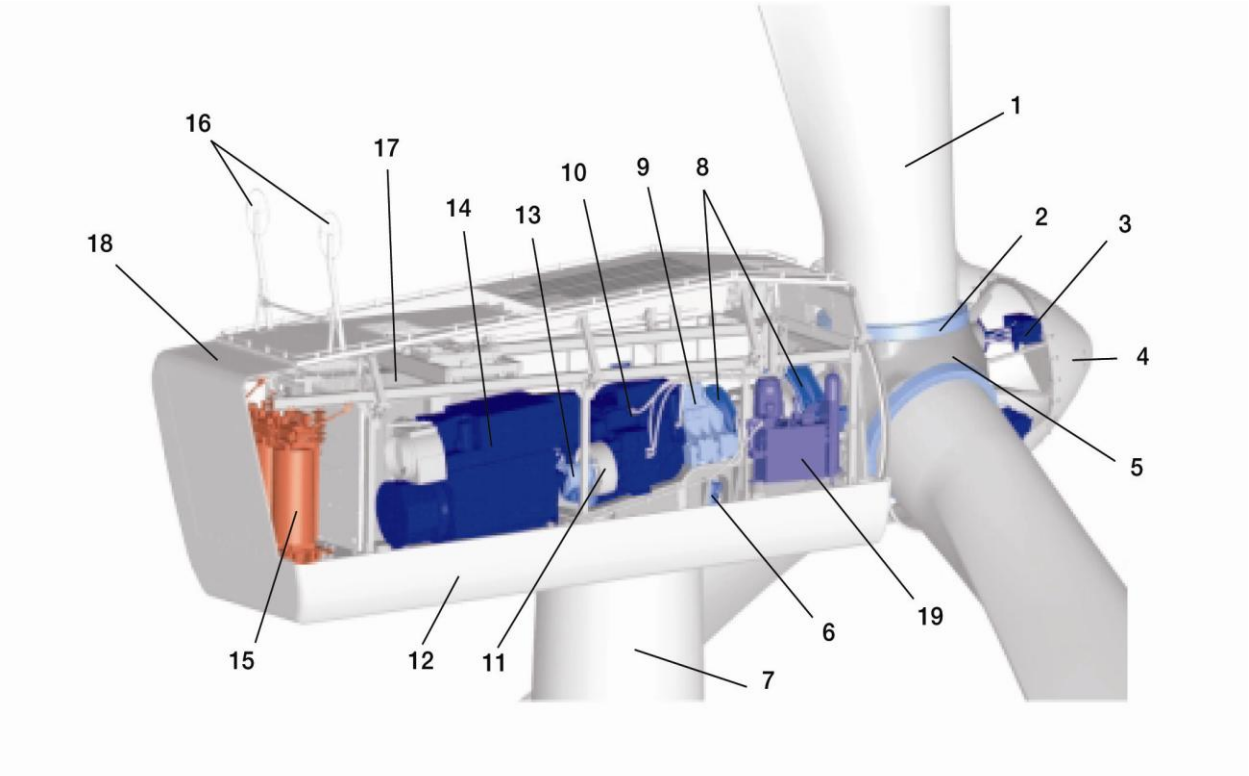
Source: Iberdrola, 2009 | G:/Projects/IberdrolaRenew 424914/TulaWindEnergy 115986\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prt masterail | Last Updated : 12-24-2009

Preliminary Turbine Tower Design **Figure 6**



Source: Iberdrola, 2009 | G:/Projects\IberdrolaRenew 4249141\TulelWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prt master.aii | Last Updated : 12-24-2009

Typical Turbine Site **Figure 7**



1. Blade
2. Blade bearing
3. Hydraulic pitch actuator
4. Hub cover
5. Hub
6. Active yaw control
7. Tower
8. Main bearing house
9. Gear tie rod
10. Gearbox
11. Main disc brake
12. Nacelle support frame
13. Cardan or composite shaft
14. Doubly fed generator
15. Transformer
16. Anemometer and wind vane
17. Top controller
18. Nacelle cover
19. Hydraulic unit

Figure 8

Exhibit "C"

Scope of Services

The District will provide necessary fire suppression and emergency medical support services as the first responder provider and will stand by in a state of readiness to perform these duties when not engaged in active fire suppression or emergency services.

The District will engage in the control or extinguishment of a fire of any type and perform activities which are required for and directly related to the control and extinguishment of fires.

The District has the right to review all building plans to ensure that the plans comply with all applicable fire codes and regulations. The District's fire prevention inspectors may conduct periodic inspections of construction activities or facilities to ensure that business operations are conducted in a safe manner and are consistent with all applicable fire suppression rules and regulations.

Exhibit "D"

Applicant's Approved Fire Protection Plan

Exhibit "E"

Form of Irrevocable Escrow Instructions

San Diego Rural Fire Protection District
Attn: Fire Chief David Nissen
14024 Peaceful Valley Ranch Road
Jamul, CA 91935
Telephone No. (619) 669-1188
Facsimile No. (858) 362-8448

IRREVOCABLE ESCROW AGREEMENT

This Irrevocable Escrow Agreement ("**Escrow Agreement**") is made and entered into as of _____, 2010 ("**Effective Date**"), by and among Tule Wind, LLC (the "**Applicant**" or "**Provider**"), the San Diego Rural Fire Protection District, a legal agency formed by the Board of Supervisors of the County of San Diego under the Fire Protection Law of 1961 (the "**District**" or "**Escrow Holder**").

R E C I T A L S

A. The Applicant and the District have entered into that certain Agreement for Provision of Fire and Emergency Protection Services as of the Effective Date, _____, 2010 ("**Fire Services Agreement**").

B. The Fire Services Agreement provides that the Applicant will deposit certain funds with an Escrow Holder. The Applicant and the District have designated the District to act as such Escrow Holder and wish to provide joint written instructions to the District as to the conditions under which the Deposit and any Additional Deposit (as defined below) will be held.

C. The District has agreed to act as the Escrow Holder provided that it is understood that this is a limited escrow only and is being opened solely for the purposes set forth, and is subject only to the terms and conditions contained, in this Escrow Agreement.

NOW, THEREFORE the parties agree as follows.

A G R E E M E N T S

1. **Incorporation of Recitals**. The recitals set forth above are incorporated and by this reference are made a part of this Section 1 as if said recitals were set forth in full as warranties and covenants.

2. **Fire Services Agreement**. The Applicant and the District agree that, as between themselves, to the extent that any terms in this Escrow Agreement vary from the terms in the Fire Services Agreement, the terms of the Fire Services Agreement shall govern.

3. **Deposit**. Concurrently with execution of this Escrow Agreement and delivery of signatures to District, Provider will deposit the sum of **$102,633.32,** (the "**Deposit**") with the Escrow Holder. Upon receipt of the Deposit, the Escrow Holder will do the following:

A. **Invest Funds** Place the Deposit into an interest bearing account with all interest accruing to the account of the Applicant. Concurrently with the deposit of a signed copy of this Escrow Agreement, the Applicant will provide the Escrow Holder with the required IRS Form W-9 and Investment Instructions required to establish such account.

B. **Give Notice** The Escrow Holder will send a written notice to Provider and to District at the address shown, confirming that the Deposit has been received by Escrow Holder:

To the Applicant:
Tule Wind, LLC
Attn: Ravy Raviv or Trevor Mihalik
1125 NW Couch Street, Suite 700
Portland, OR 97209
Telephone No. (503) 796-7000
Facsimile No. (503) 796-6906

With a Copy to:
Latham & Watkins LLP
Attn: Christopher W. Garrett, Esq.
600 W. Broadway, Suite 1800
San Diego, CA 92101
Telephone No. (619) 236-1234
Facsimile No. (619) 696-7419

To the District:
San Diego Rural Fire Protection District
Chief Dave Nissen
San Diego Rural Fire Protection District
14024 Peaceful Valley Ranch Road
Jamul, CA 91935
Phone: (619) 669-1188
Facsimile: (619) 669-1798
Email: dave.nissen@fire.ca.gov

With a Copy to:
Cynthia L. Eldred, Esq.
The Law Office of Cynthia L. Eldred
2481 Congress Street
San Diego, CA 92110
Telephone: (619) 233-7366
Fax: (619) 233-7390
Email: cindy@eldredlaw.com

4. **Additional Deposit**. If, on June 30, 2013, the Fire Services Agreement remains in effect and the Construction Notice has not yet been delivered to the Escrow Depository, then the Provider will deposit the sum of **$16,346.83,** (the "**Additional Deposit**") with the Escrow Holder. Upon receipt of the Additional Deposit, the Escrow Holder will take the same actions described in Section 3.A and 3.B, above.

5. **Release of Cash Deposit**. The Escrow Holder shall immediately release the Deposit, and Additional Deposit, if applicable, upon the occurrence of one or more of the following events:

A. **Release to District** The Escrow Holder will immediately, and without requirement for any further instructions, release the Deposit to the District upon the earlier to occur of the following:

(1) **Applicant Notice** Written notice from the Applicant to the Escrow Holder that Commencement of Construction has occurred or is about to occur on the Applicant's Tule Wind Project (the "Project"); or

(2) **District Notice** Written notice from the District that Commencement of Construction has occurred on the Project.

B. **Joint Instructions** At any time, or from time to time, the Applicant and the District may provide a joint written notice ("Joint Notice") to the Escrow Holder as to the release of all or a portion of the Deposit and the interest thereon. Upon receipt of such Joint Notice, the Escrow Holder shall release the Deposit or portions thereof, as provided in the Joint Notice.

C. **Court Order** Upon the Escrow Holder's receipt of a conformed copy of an order from a court of competent jurisdiction, which specifically instructs the Escrow Holder to disburse the funds, the Escrow Holder will disburse the funds as provided in such order.

D. **Release on June 30, 2016** If, as of June 30, 2016 (the "**Outside Termination Date**"), the Deposit or any portion thereof, and/or the Additional Deposit or any portion thereof, remains in escrow, then this escrow shall automatically terminate and the Escrow Holder shall release to the Applicant the Deposit, and the Additional Deposit, if applicable, and any interest accrued thereon less any amounts owing to the Escrow Holder. It is understood that the Escrow Holder shall not be responsible for "calendaring" the Outside Termination Date, and if the Escrow Holder discovers after such date that the escrow terminated, then at such later date the Escrow Holder will disburse the funds to the Applicant.

6. **Limited Escrow**. It is understood and agreed that the obligations and responsibilities of the Escrow Holder shall be **strictly limited to those specifically set forth in this Escrow Agreement**. The Escrow Holder shall have no liability or concern for any acts not specifically described in this Escrow Agreement, including any acts to any third party or beneficiary. The Escrow Holder is accepting this escrow based on the following representations of the Applicant and the District.

A. **Legal Counsel** The Escrow Holder has accepted this escrow based on the representations of the Applicant and the District that each is represented by legal counsel.

B. **Action in Interpleader** In the event of a controversy involving this escrow, the Escrow Holder reserves the right, at the Escrow Holder's option, to file an Action in Interpleader.

7. **Escrow Holder's Fee**. The Escrow Holder shall charge no fee for services herein.

8. **General Conditions**.

A. **Counterparts** This Escrow Agreement may be executed in any number of identical counterparts, and each counterpart shall be deemed to be an original instrument, but all counterparts taken together shall constitute but a single instrument. The Parties agree that a signed copy of this Escrow Agreement transmitted by one Party to the other Party by facsimile transmission or electronic mail as a PDF, shall be binding upon the sending Party to the same extent as if it had delivered a signed original.

B. **Amendments** No amendments to this Agreement shall be effective unless they are in writing, executed by all parties and deposited into this escrow.

IN WITNESS WHEREOF, this Escrow Agreement has been executed by the parties effective as of the date indicated above.

"Applicant"

Tule Wind, LLC

By: _____
Ravy Raviv
Authorized Representative

By: _____
Trevor Mihalik
Authorized Representative

"District"

San Diego Rural Fire Protection District

By:_____
David Nissen
Fire Marshal/Fire Chief

"Escrow Holder"

San Diego Rural Fire Protection District

By:_____
David Nissen
Fire Marshal/Fire Chief

Exhibit "F"

Form of Assignment of Agreement For Provision of Fire and Emergency Protection Services

ASSIGNMENT OF AGREEMENT FOR PROVISION OF FIRE AND EMERGENCY PROTECTION SERVICES

THIS ASSIGNMENT OF AGREEMENT FOR PROVISION OF FIRE AND EMERGENCY PROTECTION SERVCIES (this "Assignment") is entered into as of _____, 20__ by and between TULE WIND, LLC, an Oregon limited liability company ("Assignor"), and _____, a _____ ("Assignee").

W I T N E S S E T H:

WHEREAS, Assignor is a party to that certain Agreement For Provision of Fire and Emergency Protection Services, dated as of _____ (the "Agreement"), pursuant to which the San Diego Rural Fire Protection District ("District") provides fire and emergency protection services to the Tule Wind Project ("Project") constructed on certain real property located within the unincorporated area of County of San Diego and within the District's jurisdiction (the "Property"), including certain real property in the unincorporated area of San Diego County;

WHEREAS, Assignor hereby represents and warrants to the District that it is selling, transferring, and assigning to Assignee all of its right, title, interest, powers and privileges in, to and under the Project, including the Agreement, and Assignee intends hereby to accept the assignment and to assume as and to the extent provided below the obligations of Assignor with respect to the Agreement;

WHEREAS, Assignee hereby represents and warrants to the District that it is buying and receiving from Assignor all of Assignor's right, title, interest, powers and privileges in, to and under the Project, including the Agreement, and Assignee intends hereby to accept the assignment and assume as and to the extent provided below the obligations of Assignor with respect to the Agreement;

NOW, THEREFORE, in consideration of the mutual covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. **Assigned Agreement**. Assignor hereby sells, transfers and assigns to Assignee all of its right, title, interests, powers and privileges in, to and under the Agreement. Assignee hereby accepts and agrees to perform all of the terms, covenants and conditions of the Agreement, and to make all payments when due with respect thereto, in each case due to be performed or made on or after the date hereof but not prior hereto (which prior obligations and payments Assignor agrees to perform and pay).

2. **Successors and Assigns**. This Assignment shall inure to the benefit of, and be binding upon, the successors, executors, administrators, legal representatives and assigns of the parties hereto.

3. **Governing Law**. This Assignment shall be governed by, and construed and interpreted in accordance with, the laws of the State of California, without regard to conflict of law principles that would result in the application of any law other than the law of the State of California. **EACH OF THE PARTIES HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL PROCEEDING ARISING OUT OF OR RELATING TO THIS ASSIGNMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.** Any legal action or proceeding with respect to this Assignment or any of the transactions contemplated herein may be brought in the courts of the State of California located in San Diego County or of the United States of America for the State of California, and, by execution and delivery of this Assignment, each of the parties hereto hereby accepts generally and unconditionally, the exclusive jurisdiction of the aforesaid courts. Each of the parties hereto hereby irrevocably waives, in connection with any such action or proceeding, any objection, including, without limitation, any objection to the laying of venue or based on the grounds of forum non conveniens, which it may now or hereafter have to the bringing of any such action or proceeding in such respective jurisdictions.

4. **Attorneys' Fees**. In the event of a proceeding or action by one party against the other party with respect to the interpretation or enforcement of this Assignment, the prevailing party shall be entitled to recover reasonable costs and expenses, including reasonable attorneys' fees and expenses, whether at the investigative, pretrial, trial or appellate level. The prevailing party shall be determined by the court based upon an assessment of which party's major arguments or position prevailed.

5. **Miscellaneous**.

a. This Assignment may be executed, including executed by facsimile or electronic signature, in any number of counterparts and it shall be sufficient that the signature of each party appear on one or more such counterparts. All counterparts shall collectively constitute a single agreement. A facsimile or electronic signature to this Assignment shall be sufficient to prove the execution hereof by any person.

b. Any provision of this Assignment that is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof, and any such prohibition or unenforceability in any jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

6. **Further Assurances**. In case at any time after the date hereof any reasonable further action is necessary to carry out the purposes of this Assignment, including, without limitation, the delivery of any consents, the Agreement, or any written notices, plans, studies, drawings, specifications or other documentation to Assignee, Assignor and Assignee will take or cause to be taken such further action (including the execution and delivery of such further instruments and documents) as the other party reasonably may request, all without further consideration.

7. **Notices**. Unless otherwise provided in this Assignment, any notice or request ("Notice") shall be in writing to the address provided below and delivered by hand delivery, United States mail, overnight courier service, facsimile, or electronic mail. Notice by facsimile, electronic mail, or hand delivery shall be effective at the close of business on the day received, if the entire document was received during business hours on a Business Day, and otherwise shall be effective at the close of business on the next Business Day after it was sent for "next-day delivery" or its equivalent by a nationally-recognized overnight courier or personally delivered. Notice by overnight courier service shall be effective on the next Business Day after it was sent. Notice by United States mail shall be effective on the day it was received. A Party may change its address by providing Notice of same to the other Party in accordance with this Section 7.

To Assignor:

Tule Wind, LLC
1125 NW Couch Street, Suite 700
Portland, OR 97209
Attn: Ravy Raviv or Trevor Mihalik
Telephone No. (503) 796-7000
Facsimile No. (503) 796-6906

To Assignee:

_____
_____
_____
Attention: _____
Telephone: _____
Facsimile: _____

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

IN WITNESS WHEREOF, this Assignment has been duly signed and sealed by the parties as of the date set forth above.

ASSIGNOR	ASSIGNEE
Tule Wind, LLC,	_____,
an Oregon Limited Liability Company	a _____
By: _____	By: _____
Ravy Raviv	Name:_____
Authorized Representative	Its:_____
By: _____	
Trevor Mihalik	
Authorized Representative	

The San Diego Rural Fire Protection District hereby acknowledges the receipt of the foregoing Assignment.

By: _____
Name:_____
Its:_____

FIRE PROTECTION PLAN

for the

Tule Wind Project

Prepared for the County of San Diego

May 2010, Revised November 2010
Major Use Permit Application Number: MUP 3300-09-019
Environmental Review Number: 3910-1000001

Submitted to the San Diego Rural Fire Protection District

The San Diego Rural Fire Protection District hereby approves and accepts this Fire Protection Plan (FPP) prepared for the Tule Wind Project.

Date: 11-3-10

By: _____
David Nissen
Division Chief – CAL FIRE
San Diego Rural Fire Protection District

Prepared for: HDR Engineering, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123

and

Tule Wind, LLC
1125 NW Couch Street, Suite 700
Portland, OR 97209

Prepared by: RC Biological Consulting, Inc.
P.O. Box 1568
Lemon Grove, CA 91946-1568
(619) 463-1072

Robin Church
Robin Church
County Approved Fire Consultant

Technical review and contributions by:

Hunt Research Corporation
Jim Hunt, President
P.O. Box 291
Solvang CA 93464
805-688-4625

TABLE OF CONTENTS

ACRONYMS iv

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 2
- **1.1 Project Location, Description, and Environmental Setting** 3
  - **1.1.1 Project Location** 3
  - **1.1.2 Project Description** 3
  - **1.1.3 Environmental Setting** 6
- **1.2 Fire Agency Jurisdiction** 7
  - **1.3.1 Federal Regulations and Nationally Recognized Standards** 9
  - **1.3.2 State Regulations and Standards** 12
  - **1.3.3 Regional and Local Regulations and Standards** 15

2.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE 16

3.0 ANALYSIS OF SOURCES OF WIND FARM FIRE RISK AND PROJECT DESIGN FEATURES TO MINIMIZE FIRE RISK 17
- **3.1 Sources of Wind Farm Fire Risk** 17
- **3.2 Construction** 17
- **3.3 Electrical 34.5 kV Collection and 138 kV Transmission System** 17
- **3.4 Wind Turbines** 19
- **3.5 Operations and Maintenance** 23
- **3.6 Project Design Features** 26
  - **3.6.1 Construction** 26
  - **3.6.2 Electrical Collection and Transmission System** 32
  - **3.6.3 Wind Turbines** 34
  - **3.6.4 Operations and Maintenance** 36

4.0 ANALYSIS OF PROJECT EFFECTS 40
- **4.1 Adequate Emergency Services** 41
- **4.2 Fire Access** 45
- **4.3 Water** 46
- **4.4 Fire Fuel Assessment** 47
- **4.5 Ignition Resistant Construction and Fire Protection Systems** 48
  - **4.5.1 Wind Turbines** 48
  - **4.5.2 Operations and Maintenance Building** 49
  - **4.5.3 Substation Transformers** 50
  - **4.5.4 Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels** 51
- **4.6 Fire Behavior Modeling** 51
- **4.7 Defensible Space and Vegetation Management** 54
- **4.8 Significance Conclusions - County of San Diego Wildland Fire and Fire Protection Guidelines for Determining Significance** 54

4.9 Cumulative Impact Analysis 69
4.10 Analysis of Additional County Guidelines for Determining Significance 71
4.10.1 Can the Project Demonstrate Compliance With Fire Regulations? .. 71
4.10.2 Has a Fire Protection Plan Been Required and Will the Project Be Consistent With Its Recommendations, Including Fuel Modification? 71
4.10.3 Can the Project Meet the Emergency Response Objectives Identified in the Public Facilities Element of the County General Plan, or Offer Same Practical Effect? 72
4.11 Additional Questions Considered By the California Public Utility Commission and Bureau of Land Management 72
4.11.1 Would the Presence of Project Facilities (Overhead Transmission Lines, Overhead Collector Lines, and/or Wind Turbines) Significantly Increase the Probability of a Wildfire? 72
4.11.2 Would Project Construction and/or Operation and Maintenance and Decommissioning Activities Significantly Increase the Probability of a Wildfire? 73
4.11.3 Would the Presence of the Overhead 138 kV Transmission Lines, Overhead 34.5 kV Collector Lines, and/or Wind Turbines Reduce the Effectiveness of Firefighting?..... 74
4.11.4 Would Project Activities Contribute to an Increased Ignition Potential and Rate of Fire Spread Through the Introduction of Non-Native Plants? 75

5.0 IMPACTS, PROJECT DESIGN FEATURES, MITIGATION MEASURES, AND SIGNIFICANCE CRITERIA 76

6.0 CONCLUSION 77

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED.....77

8.0 PERSONS AND ORGANIZATIONS CONTACTED 77

9.0 REFERENCES.....78

10.0 PREPARERS' LIABILITY STATEMENT.....80

TECHNICAL APPENDICES.....113

FIGURES, TABLES AND APPENDICES

LIST OF FIGURES

Figure 1 Region and Vicinity 81
Figure 2 Proposed Project 83
Figure 3 Fire Facilities and Fire District Areas 85
Figure 4 Typical Operations and Maintenance Facility Site 87
Figure 5 200MW Collection Plan Station View 89
Figure 6 Preliminary Turbine Tower Design 91
Figure 7 Typical Turbine Site 93
Figure 8 Typical Turbine Nacelle 95
Figure 9a Typical Overhead 34.5 kV Single Circuit Collector Line 97
Figure 9b Typical Overhead 34.5 kV Double Circuit Collector Line 99
Figure 10 Typical 138kV Steel Tangent Pole 101
Figure 11 Topographic Map 103
Figure 12 County of San Diego Fire Hazard Severity Map 105
Figure 13 Fire Threat Map 107
Figure 14 Fire History Map 109
Figure 15 County Roadway Improvements 111

LIST OF TABLES

Table 1. Construction Fire Risk, Project Design Features and Code Requirements 18
Table 2. Electrical Collector and Transmission System Fire Risk, Project Design Features and Code Requirements 20
Table 3. Wind Turbine Fire Risk, Project Design Features, and Code Requirements 24
Table 4. Operations and Maintenance Fire Risk, Project Design Features and Code Requirements 27
Table 5. Fire and Emergency Services Agencies, Equipment, and Staff 42
Table 6. Emergency Response Travel Times 43
Table 7. Estimated Travel Time from Nearest Fire Departments 44
Table 8. Impacts, Project Design Features, Mitigation Measures, and Significance Criteria 56

LIST OF APPENDICES

Appendix A Biology Resource Maps
Appendix B *Estimate of Water Availability* memorandum, Geo-Logic Associates September 7, 2010.

ACRONYMS

AFFF	Aqueous Film Forming Foam
ANSI	American National Standards Institute
BLM	Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
CBC	County Building Code
CCR	California Fire Code
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CSA	County Service Areas
CSD	Community Service District
CSLC	California State Lands Commission
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FMZ	Fire Management Zone
FMP	Fire Management Plan
FPP	Fire Protection Plan
GO	General Order
gpm	Gallons per minute
HVAC	Heating, ventilation, and air conditioning
I-8	Interstate 8
IBR	Iberdrola Renewables, Inc.
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Fire Code
kV	Kilovolt
MW	Megawatt
NCC	National Control Center
NEPA	National Environmental Protection Act
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
O&M	Operations and maintenance
PDF	Project Design Feature
ROW	Right-of-Way
SanGIS	San Diego Geographic Information Source
SCADA	Supervisory Control and Data Acquisition System
SDFCA	San Diego County Fire Authority
SDRFPD	San Diego Rural Fire Protection District
SODAR	Sonic detection and ranging
SRA	State Responsibility Areas
TVMP	Transmission Vegetation Management Program

EXECUTIVE SUMMARY

Tule Wind, LLC, a wholly owned subsidiary of Iberdrola Renewables, Inc. (IBR) is proposing to construct and operate the Tule Wind Project (proposed project) near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an operations and maintenance (O&M) building, transportation haul routes and access roads, a temporary concrete batch plant, a temporary parking area, temporary laydown staging areas, and meteorological towers. The project is proposed on lands administered by the Bureau of Land Management (BLM), California State Lands Commission (CSLC), Tribal lands, and privately-owned lands under the jurisdiction of the County of San Diego.

The project is located in an area with varied topography with gentle to moderate slopes, and a range in elevation between 3,600 to 5,600 feet above mean sea level. Vegetation includes a variety of types of scrub, chaparrals, and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area. The project area has been identified by California Department of Forestry and Fire Protection (CAL FIRE) as being located in a high to very high fire hazard severity area. However, there have been no fires mapped in the project area in recent history.

Fire Agency Jurisdiction: The responsibility for fire suppression within the project area is shared by the San Diego County Fire Authority (SDFCA), San Diego Rural Fire Protection District (SDRFPD), CAL FIRE, BLM and Tribal governments. The portions of the project area located on privately owned lands fall within the jurisdiction of the SDCFA County Service Areas (CSA) 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within State Responsibility Areas (SRA).

Emergency Response to the project area is provided by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement, the area is located in an SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands.

Fire Protection Plan (FPP): The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

The FPP evaluates the potential for adverse effects of construction, and operations and maintenance of a proposed project that may result in a wildland fire occurring on or adjacent to the project. The FPP also evaluates the positive environmental effects that may occur due to the development of this project.

The Project Design Features (PDFs) and proposed plans are presented in the FPP to exhibit how the potential fire impacts to the surrounding area and the community will be mitigated. The project addresses the applicable federal, state, and local fire regulations, including the California

Fire Code and the County Consolidated Fire Code. The project is consistent with the County of San Diego Department of Planning and Land Use recommendations including fuel modification.

As a mitigation measure to reduce the potential for fire ignition within the wind turbine nacelle to a level less than significant, a fire suppression system shall be provided in each wind turbine nacelle and in the operation and maintenance facility, which includes the on-site control room. Fire Suppression technology in the nacelle is in development and IBR will be an early adopter of this technology. At this early stage, IBR does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

The project components effects' have been analyzed using California Environmental Quality Act (CEQA), County of San Diego's Wildland Fire and Fire Protection Guidelines, and California Public Utilities Commission (CPUC) Guidelines to determine the potential for fire ignition. Based on application of the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance, it has been determined that construction and operation and maintenance of the proposed project would result in a less than significant impact with the implementation of PDFs and required Mitigation Measures. In addition, the project's contribution to cumulative impacts with the implementation of PDF and identified mitigation measures are less than cumulatively considerable.

1.0 INTRODUCTION

This FPP has been prepared for the proposed project. IBR is proposing to construct and operate the proposed project near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and 138 kV transmission line, a project collector substation, an operations and maintenance building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, temporary laydown (staging) areas, and meteorological towers. The majority of the project would be built on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the California State Land Commission (CSLC), and privately-owned lands under the jurisdiction of the County of San Diego. The BLM is the Lead Agency under National Environmental Protection Act (NEPA), the CPUC is the Lead Agency under CEQA, and the County of San Diego is the permitting agency for the Major Use Permit and Building Permits.

The largest owner/operator of wind generation in the world, IBR owns and operates over 2,600 wind turbines at 43 wind farms totaling 4.8GW of wind generating capacity across the United States. IBR has over 49 million operating hours on its U.S. fleet.

Since fire danger in the project area is a significant concern, the project is being designed to eliminate or minimize potential ignition sources. IBR has participated in numerous meetings with fire agency personnel from various agencies, including CAL FIRE, the SDCFA, the SDRFPD, and BLM Fire, to discuss the overall approach to providing appropriate fire prevention, protection, and suppression as part of the project, neither consultant preparing these documents were in attendance at these meetings. A site meeting was conducted at IBR's Dillon

Wind Farm in Palm Springs, California on August 12, 2010 and included staff from the SDCFA, SDRFPD, and CAL FIRE, as well as Mr. Jim Hunt of Hunt Research. The meeting included a briefing by the site manager of the Dillon Wind Farm. The site manager provided a briefing on the Supervisory Control and Data Acquisition System (SCADA) system and how it is linked to the on-site monitoring system and to IBR's National Control Center (NCC) in Portland, Oregon, which is staffed 24-hours per day. The operational system implemented at the Dillon Wind Farm would be very similar to the system implemented for the proposed project. To address potential sources of ignition risk, the project is being designed with features and components to reduce the risk of wildland fire below a level of significance.

The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. As part of the assessment, the property location, topography, geology, combustible vegetation (fuel types), climatic conditions, and fire history were all taken into consideration in developing the FPP. The FPP addresses water supply, access (including secondary/emergency access where applicable), structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The FPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect one or more-at-risk communities and essential infrastructures.

1.1 Project Location, Description, and Environmental Setting

1.1.1 Project Location

The general project location is shown in **Figure 1**. The project area lies in the McCain Valley in the In-Ko-Pah Mountains, just north of U.S. Interstate-8 (I-8) and Live Oak Springs. The area is accessible via the Crestwood Road, Ribbonwood Road, and McCain Valley Road exits off of I-8. The primary access routes to the project area will be from Ribbonwood and McCain Valley Roads. The majority of the project is proposed on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the CSLC, and privately-owned lands under the jurisdiction of the County of San Diego.

The proposed wind turbines will be located on a series of north-to-south and northwest-to-southeast ridges. The project site layout is shown in **Figure 2**. The majority of the area is composed of undeveloped land. The project area encompasses approximately 24,500 acres; however, the construction footprint of the project would impact approximately 772.7 acres, and does not include the entire parcels.

The fire agencies' jurisdictional responsibilities are shown in **Figure 3** and outlined in more detail in Section 1.2.

1.1.2 Project Description

IBR is proposing to construct and operate the Tule Wind Project located near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground

electrical collection system and transmission line, a project collector substation, an O&M building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, a temporary laydown (staging) areas, and meteorological towers.

The Tule Wind Project will consist of the following components:

- Up to 134 wind turbines, ranging in size between 328 and 492 feet in height and generating capacity between 1.5 megawatts (MW) and 3.0 MW, to produce 200 MW of electricity;
- A 34.5 kilovolt (kV) transmission collector cable system linking each turbine to the next and to the project collector substation, which will run principally underground except in select areas where cultural, environmental, or logistical conditions require an overhead line;
- A 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation;
- A 5-acre collector substation site and 5-acre O&M building site;
- Access roads between turbines, as well as improvements to existing roadways and new roadways to accommodate construction and delivery of equipment;
- A temporary batch plant for construction located on a 5-acre area;
- A 10-acre parking area;
- Nineteen 2-acre temporary lay down areas; and
- Two permanent meteorological towers and one sonic detection and ranging (SODAR) unit.

The maximum build-out of the project allows for up to 200 MW of installed wind turbine capacity. This 200 MW could consist of as many as 134 1.5 MW turbines, as little as 67 3.0 MW turbines, or some intermediate mix of turbines ranging in output from 1.5 MW to 3.0 MW. Turbines with a smaller output can be spaced closer together, whereas turbines with a larger output require larger spacing. At this time, the 134-turbine layout proposes 97 wind turbines on BLM land, 17 turbines on Tribal lands, 7 turbines on State lands, and 13 turbines on privately-owned land, commonly known as Rough Acres Ranch.

The project will include an approximate 5,000 square foot, pre-engineered metal O&M building, located next to the collector substation to house operations personnel and critical spare parts. A typical O&M Building is illustrated in **Figure 4**.[1] The O&M building will include a foundation, with electrical and heating, ventilation, and air conditioning (HVAC) systems. The O&M building will also include a septic system and well to provide up to 5 gallons per minute of potable water throughout operations. Once the project is operational, the O&M facility will use approximately 2,500 gallons per day of water.

The only staffed structure as part of the project is the proposed O&M building. The project is expected to be supported by up to 12 full time employees on the O&M staff. Typically, O&M staff will be present on-site during normal business hours.

[1] Note: Figure 4 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot radius fuel modification zone will be provided.

The proposed location for the project collector substation is shown on **Figure 2**. Construction will generally consist of the installation of concrete pads and electric transformers. Areas not covered by concrete pads will be surfaced with gravel to minimize erosion and surface runoff, and to provide fire protection through prevention of weedy growth. The collector substation will be fenced with security fencing to minimize the potential for entry by non-authorized personnel. A typical substation site is included as **Figure 5**.[2]

Proposed turbine locations are shown on **Figure 2**. The wind tower foundations will be approximately 60 feet in diameter, and 7 to10 feet deep. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the 200-foot radius area would be performed, annually prior to May 1 and more often as needed. A typical turbine tower design is illustrated in **Figure 6**. A typical turbine site is illustrated in **Figure 7**. A typical turbine nacelle with labeled internal equipment is illustrated in **Figure 8**.

Two permanent meteorological towers will also be installed; their locations are noted on **Figure 2**. The towers will be free standing (no guy wires) and approximately 196 feet high with a concrete foundation. Installation will follow all safety measures contained in IBR's Health and Safety Manual. A permanent sonic detection and ranging SODAR unit will also be placed on-site and fenced.

Electricity generated by the wind turbines will be collected through 34.5kV collector lines and delivered to the project collector substation. The 34.5kV collector lines will principally be placed underground, except in locations where site-specific conditions require that they run aboveground. Typical overhead 34.5 kV single circuit collector line is shown in **Figure 9a** and a typical overhead 34.5 kV double circuit collector line is shown in **Figure 9b**.

After the electricity is stepped up to 138 kV at the project collector substation, an approximate 9.7-mile long 138 kV transmission line will interconnect the project collector substation with SDG&E's proposed Rebuilt Boulevard Substation, which is part of the SDG&E ECO Substation Project. A typical 138kV steel tangent pole is shown in **Figure 10**.

[2] Note: Figure 5 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot fuel modification zone will be provided.

1.1.3 Environmental Setting

1.1.3.1 Topography

The topography of the area is gently-to-moderately sloping with an elevation ranging between about 3,600 and 5,600 feet above mean sea level. Given the site location and size, slopes are widely variable with aspects in every direction. Tule Creek is the primary drainage feature in the project vicinity and drains the central portion of McCain Valley, towards the southeast as shown in **Figure 11**.

1.1.3.2 Climate and Fire History

San Diego County is an extremely fire-prone landscape. San Diego County is dominated by a Mediterranean-type climate with mild, wet winters and hot, dry summers. The County is divided into five climate zones from the coast to the desert (Climates of San Diego County, Agricultural Relationships, University of California, Agricultural Extension Service, and U.S. Weather Bureau). These climate zones are determined by several factors: proximity to the ocean, terrain, elevation, and latitude. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area.

The climate in central San Diego County supports dense, drought-adapted shrublands that are highly flammable, especially in the fall as fuel moistures reach very low levels. The combination of the climate and drought adapted shrubs results in a fire season that is year around. Most critically, winds originating from the Great Basin, locally known as Santa Anas, which create extreme fire weather conditions characterized by low humidity, sustained high-speed winds, and extremely strong gusts. Santa Ana winds typically blow from the northeast over the Peninsular Range. As the air is forced through coastal mountain passes, wind speeds of 40 miles per hour (mph) at measured at ground level can be maintained for hours with gusts from 70 to 115 mph possible (Schroeder et al., 1964). Santa Ana winds create extremely dangerous fire conditions and have been the primary driver of most of Southern California's catastrophic wildfires.

Santa Ana winds are at their peak during fall and early winter months, which marks the height of fire season. Because of the presence of dense, dry fuels and periodic Santa Ana winds, southern California has been characterized as having one of the most fire-prone landscapes in the world. **Figure 12** presents a map of San Diego County overlain with Fire Hazard Severity Zones, defined as a measure of the likelihood that an area will burn combined with the severity of burn behavior characteristics (such as intensity, speed, and embers produced).

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on **Figure 13**. The fire history of the area was reviewed and is depicted on **Figure 14**. Fire history information was derived from CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size, however not all historic fires may be documented. No fires have been mapped within the project area.

A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, and Poomacha fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events.

Recent reports by CAL FIRE and the CPUC have highlighted the fire risks associated with powerlines. CAL FIRE documented their analysis of the causes associated with the Witch, Guejito, and Rice fires of 2007 (http://www.fire.ca.gov/fire_protection/fire_protection_firereports.php) in a series of published reports. Key findings indicate that winds in the vicinity of the fire area peaked at velocities approaching 50 mph. In each case the fires started when the lines came in contact with each other, vegetation, or other wires, causing sparks that ignited dry vegetation. The Witch Fire was associated with a 69 kV line, and the Guejito and Rice fires were associated with 12 kV lines. The CPUC report (http://docs.cpuc.ca.gov/published/Graphics/87470.PDF) also documents peak winds in the 50 to 60 mph range. The CPUC reports conclude that winds in that velocity range are not unusual for the area.

1.1.3.3 Vegetation and Fuels

The native vegetation type within the project area is predominantly chaparral and related shrublands. The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A,** Biological Resources Maps). Vegetation included a variety of types of scrub, chaparrals and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. Overall the chaparrals dominate the project area. Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in Southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

1.2 Fire Agency Jurisdiction

The responsibility for fire suppression within the project area is shared by the SDCFA, SDRFPD, CAL FIRE, BLM and Tribal governments. The portions of the project located on privately-owned lands fall within the jurisdiction of the SDCFA CSA 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within SRAs. Fire Responsibility Areas and fire stations are shown in **Figure 3**.

San Diego County Fire Authority (SDCFA)

The San Diego County Fire Authority was created by the County Board of Supervisors in July 2008 to improve fire protection and emergency medical services in the region. The goal of the SDCFA is to unify the administrative support, communications and training of 15 rural fire agencies and extend around the clock protection to 1.5 million acres of the unincorporated County lands that previously had either limited, or part-time on-call protection, by 2012.

San Diego Rural Fire Protection District (SDRFPD)

The San Diego Rural Fire Protection District was formed on May 18, 1983 through the consolidation of 13 East County volunteer fire departments. SDFPD, under a cooperative fire protection agreement with CAL FIRE, protects an area of approximately 720 square miles and provides emergency medical services, structural fire protection and rescue services. SDRFPD also responds to wildland fires; although wildland fire protection within this area is primarily the responsibility of CAL FIRE and the United States Forest Service (USFS).

California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE is the state's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CAL FIRE has joined with federal and local agencies to form a statewide mutual aid system. This system insures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction.

County Service Areas (CSA)

CSAs are organized under the authority of the Board of Supervisors to provide a level of emergency response within a defined jurisdictional boundary by using volunteers. CSAs have defined boundaries and most participate in the Fire Mitigation Fee program, which funds facilities and equipment, but the CSAs lack the authority to adopt a fire code or provide official response to planning and building projects. A portion of the project is located within CSAs 135 and CSA 111.

Bureau of Land Management (BLM)

BLM has land use jurisdiction throughout the majority of the project area. However, BLM has no local emergency response resources.

The BLM maintains several programs in the disciplines of fire suppression, preparedness, fuels management, prevention and education, community assistance, and protection and safety, all of which are intended to safely protect the public, natural landscape, and wildlife habitat from fire-related damage. The various programs of the BLM are discussed briefly below.

- The Fire and Aviation Directorate Program is tasked with providing aerial firefighting support for fires occurring on BLM lands. Aircraft used by the BLM are BLM-owned and contracted.
- The Community Assistance and Protection Program includes mitigation and prevention, education, and community outreach. Experts within this program are typically deployed to fire-prone areas before a fire starts to educate the community regarding fire management and suppression activities.
- The Fuels Management Program focuses on protecting communities and natural resources while providing for local economic opportunities. Through this program, fuels are

effectively managed through collaboration with local communities and agencies in the form of community wildfire protection programs, fuels treatment, biomass utilization, and local fuels management contracts.

It should be noted that in addition to maintaining these programs, the BLM provides funding for firefighting efforts (through Community Assistance Grants) in the rural areas of San Diego County. In the past, funding has been used for wildfire training to local volunteers responsible for responding to fires on BLM lands. In San Diego County, BLM lands are under a Direct Protection Agreement with CAL FIRE, which specifies that CAL FIRE provides fire response resources and is responsible for conducting investigations regarding the recovery of fire suppression costs (CPUC and BLM 2008a).

The project is located within the California Desert District Planning Area and in the El Centro Fire Management Zone (FMZ) of the BLM. The current Fire Management Plan (FMP) for the California Desert District was developed in 1998 and was designed around a "fire management zone" concept based on distinct vegetation communities and the strategies for fire suppression within each of those communities. The intent was for objectives and constraints identified for fire-suppression activities to be developed by Land Use Plan decisions associated with resources. The FMP categorized the Planning Area as FMZ 6, which is a CAL FIRE Direct Protection Area. CAL FIRE is the primary fire protection agency for BLM-administered lands in the area (CPUC and BLM 2008a).

The primary objective of CAL FIRE is to suppress all vegetation fires of 10 acres or less upon initial attack, based on "assets at risk analysis," which favors protection of structures in the urban interface. CAL FIRE and BLM operate under a Cooperative Fire Protection Plan that implores CAL FIRE to consider BLM's resource protection standards in order to develop the least-cost/least-damaging suppression strategy possible. BLM is required to send a resource advisor to work directly with the CAL FIRE incident commander to ensure resource values are fully protected or at least mitigated. This requirement is applicable to all vegetation fires occurring in the Planning Area.

Tribal Lands

Emergency response to fires on tribal lands is provided by the Campo Indian Reservation Fire Department by agreement with the other tribes. The Fire Department has one Type III brush fire engine, and staffing is variable from day to day. They are dispatched as part of the first alarm fire assignment to the project area, as described in Adequate Emergency Services, Section 4.1.

1.3 Applicable Regulations, Plans, and Standards

This section summarizes federal, state and local regulations, plans and standards relevant to fire suppression and fire prevention.

1.3.1 Federal Regulations and Nationally Recognized Standards

This section provides a description of the regulations and guidance pertinent to the project. As described in the following sections, a wide range of standards are used throughout the industry.

The BLM is the federal lead agency under the National Environmental Policy Act (NEPA). This FPP will serve as part of the analysis in the Environmental Impact Statement (EIS). The NEPA analysis will be based upon the Council on Environmental Quality (CEQ) regulation for implementing NEPA (40 Code of Federal Regulations [CFR] 1500 et seq.), and the BLM NEPA Handbook (H-1790-1).

According to a 2004 Federal Energy Regulatory Commission (FERC) report, the vast majority of transmission owners follow the National Electrical Safety Code (NESC) rules or American National Standards Institute (ANSI) guidelines, or both when managing vegetation around transmission system equipment. The NESC manages electric safety rules, including transmission wire clearance standards, whereas the applicable ANSI code manages the practice of pruning and removal of vegetation. However, in California, the CPUC has adopted General Order (GO) 95 rather than NESC as the key electric safety standard for the state. The following standards, guidelines, rules and regulations identify requirements and suggested practices for vegetation management in transmission line corridors.

In addition the National Fire Protection Association (NFPA) has prepared a Standard (guidance document) on Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations (NFPA 850) that contains relevant information.

National Electric Safety Code 1977, 2006

The NESC is a national code covering a variety of basic provisions regarding electric supply stations, overhead electric supply and communication lines, and underground electric supply and communication lines. It contains work rules for construction, maintenance, and operation of electric supply and communication lines and equipment. The NESC must be adopted by states, and the State of California has adopted its own standard (GO 95; discussed in Section 1.3.2) governing overhead transmission lines in the State. Therefore, the NESC is not discussed further.

North American Electric Reliability Council (NERC)

NERC is a nonprofit corporation whose members are ten regional reliability councils. NERC's function is to maintain and improve the reliability of the North American integrated electric transmission system, including preventing outages from vegetation located on transmission right-of-ways (ROWs), minimizing outages from vegetation located adjacent to ROWs and maintaining clearances between transmission lines and vegetation along transmission ROWs. As a result of the recommendations following the August 14, 2003 blackouts on the East Coast, NERC was charged with developing a vegetation management standard that would be applicable to all utilities and that would provide greater specificity than the NESC and ANSI standards.
Standard FAC-003-1, Transmission Vegetation Management Program (TVMP), became effective April 7, 2006, and mandatory for all utilities, pursuant to Section 1211 of the Energy Policy Act of 2005. This standard applies to all transmission lines operated at 200 kV and above and to any lower voltage lines considered critical to the reliability of the electric system in the region. The transmission line owner must prepare, and keep current, a formal TVMP. The TVMP must identify and document clearances between vegetation and overhead, ungrounded supply conductors, taking into consideration transmission line voltage, the effects of ambient

temperatures on conductor sag under maximum design loading, and the effects of wind velocities on conductor sway. Minimum clearance distances must be no less than those set forth by the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003.

Institute of Electrical and Electronics Engineers Standard 516-2003

The IEEE is a leading authority in setting standards for the electric power industry. Standard 516-2003, Guide for Maintenance Methods on Energized Power Lines, provides minimum vegetation-to-conductor clearances to maintain electrical integrity.

National Fire Protection Association (NFPA) Codes, Standards, Practices and Guides

NFPA® codes, standards, recommended practices, and guides ("NFPA Documents"), are developed through a consensus standards development process approved by ANSI. This process brings together professionals representing varied viewpoints and interests to achieve consensus on fire and other safety issues. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection but are not law or "codes" unless adopted as such or referenced as such by the California Fire Code or the Local Fire Agency.

- NFPA 850, Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010: NFPA 850 was prepared for the guidance of those charged with the design, construction, operation, and protection of electric generating plants and high voltage direct current converter stations that are covered by the scope of this document. This document provides fire hazard control recommendations for the safety of construction and operating personnel, the physical integrity of plant components, fire protection systems and equipment, and the continuity of plant operations.
- NFPA 10, Fire Extinguishers: A long-standing standard, which specifies the types, sizes, rating and locations for portable fire extinguishers. It also provides information on how to calculate the number and size of portable fire extinguishers needed.
- NFPA 11, Fire fighting foam (Low, Medium, and High Expansion Foam): NFPA 11 is a longstanding standard, which provides recommendations for design and installation of firefighting foam systems and portable equipment. It also provides recommendations regarding calculating the amount of foam concentrate and solution needed on a flammable or combustible liquid fire.
- NFPA 13, Standard for Installation of Sprinkler systems: NFPA 13 is the standard for design and installation of fire sprinkler systems in a building. It provides the requirements for the type of system needed in a particular occupancy, water supply, sprinkler head flow and pressures, the locations of sprinkler heads, and installation of the system. This standard is referenced by the California Fire Code.
- NFPA 22, Standard for water tanks for private fire protection: Provides recommendations for the design, construction and installation of water storage tanks for private fire protection systems.

- NFPA 30, Flammable and Combustible Liquids Code: This standard provides recommendations for storage, use and handling of flammable and combustible liquids. It provides detailed information regarding tank storage, spacing, dispensing of liquids, portable containers and other related operations. NFPA 30 is referenced by the California Fire Code.
- NFPA 70, National Electrical Code: NFPA 70 is the standard for the design and installation of electrical systems. It includes recommendations for various types of occupancies and also provides recommendations and criteria for the location and installation of "explosion proof" electrical systems.
- NFPA 72, National Fire Alarm and Signaling Code: NFPA 72 is the standard for the design, installation and operation of fire alarm systems in various occupancies. This standard is used by fire alarm system designers when designing and installing a system. It is utilized also by Fire Agencies when reviewing plans for new systems.
- NFPA 497, Classification of Flammable liquids, Gases and Vapors, and for Electrical Area Installations in Chemical process areas: NFPA 497 is the standard, which is utilized along with NFPA 70 to determine flammable gas, flammable liquid and combustible liquid hazards and recommend the areas which require explosion proof electrical systems. It also sets forth the extent of the classified areas. Although the title says chemical process areas, it is used as a standard for explosion proof electrical as it defines various risks and contains numerous diagrams to help the electrical system designer.

International Fire Code (IFC)

The IFC is published by the International Code Council, is a code which may be adopted by a jurisdiction. It forms the basis of the current California Fire Code (CCR Title 24, part 9). The IFC is the underlying nationally recognized code that sets standards and requirements to safe guard against the threat fires may pose to public health, safety, and the environment. The IFC, when adopted by a jurisdiction, regulates the planning, construction, and maintenance of development in all areas.

International Wildland-Urban Interface Code

The International Wildland-Urban Interface Code is published by the IFC, and is a model code addressing wildfire issues.

1.3.2 State Regulations and Standards

This section provides a description of the regulations and guidance pertinent to the to management of vegetation as they relate to the reliability of electric transmission systems as regulated by the CPUC, GO 95, CAL FIRE objectives to reduce wildfire and hazard clearance standards, the California Code of Regulations (CCRs), and CAL FIRE recovery costs project.

California Public Utilities Commission

GO 95: Rules for Overhead Electric Line Construction

GO 95 is the key standard governing the design, construction, operation, and maintenance of overhead electric lines in the State. It was adopted in 1941 and updated most recently in 2006. GO 95 includes safety standards for overhead electric lines, including minimum distances for conductor spacing, minimum conductor ground clearance, standards for calculating maximum sag, and vegetation clearance requirements. The latter, governed by Rule 35, is summarized here.

GO 95: Rule 35, Tree Trimming, defines minimum vegetation clearances around power lines. Rule 35 guidelines specify, at the time of trimming require:

- 4 feet radial clearances are required for any conductor of a line operating at 2,400 volts or more, but less than 72,000 volts;
- 6 feet radial clearances are required for any conductor of a line operating at 72,000 volts or more, but less than 110,000 volts;
- 10 feet radial clearances are required for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts (this would apply to the project);
- 15 feet radial clearances are required for any conductor of a line operating at 300,000 volts or more.

GO 95 has been periodically updated over the last six decades. Under Public Utilities Code Section 1708.5, any person may petition the Commission to amend the regulation.

CAL FIRE

CAL FIRE has a primary objective of reducing wildfire occurrence and enforcing fire hazard clearance standards around structures and utilities in order to protect the public from loss of life property and resources. Within CAL FIRE jurisdiction areas, the LE-38 Fire Safety Inspection Program is implemented for community outreach enforcement of fire safe codes. These laws include the California Public Resources Codes (PRC) 4291, 4292, and 4293 that define defensible space clearance requirements around private structures and aboveground power lines.

CCR, Title 14 Section 1254 (described below) applies to minimum clearances around utility poles. CAL FIRE inspections of utility facilities entail making notes on violations and defects in the infrastructure. Joint inspections of electrical facilities by CAL FIRE and the utility company are encouraged for the mutual benefit of fire prevention on the part of each entity. Violations identified during inspections must be brought into compliance before the utility follow-up inspections otherwise the responsible party could face misdemeanor charges for violating fire safety laws. In the event that a fire safety violation results in a fire, the inspection records can be used later in fire-cause investigations to determine the liable party. The responsible party could pay for the resulting damage of the wildfire through the CAL FIRE Civil Cost Recovery Program, described below.

In the section of Southern California where the project is proposed, the power line hazard reduction standards are applicable year round due to the scope of the fire season. More detailed descriptions of the applicable codes and regulations and images of exempt and non-exempt power line structures may be found in CAL FIRE Power Line Fire Prevention Field Guide (CAL FIRE 2008).

- PRC § 4291, Reduction of Fire Hazards Around Buildings, requires 100 feet of vegetation management around all buildings, and is the primary mechanism for conducting fire prevention activities on private property within CAL FIRE jurisdiction.
- PRC § 4292, Powerline Hazard Reduction, requires clearing vegetation inside a 10-foot circumference of such pole or tower which supports a switch, fuse, transformer, lightning arrestor, line junction, or which is a dead end or corner pole.
- PRC § 4293, Powerline Clearance Required presents guidelines for line clearance.
- CCR, Title 14 Section 1254 presents guidelines for minimum clearance requirements around utility poles.

CCR, Title 14 Section 1254

The firebreak clearances required by PRC § 4292 are applicable within an imaginary cylindrical space surrounding each pole or tower on which a switch, fuse, transformer or lightning arrester is attached and surrounding each dead-end or corner pole, unless such pole or tower is exempt from minimum clearance requirements by provisions of CCR, Title 14 Section 1255 or PRC § 4296.

The radius of the cylindroids is 10 feet measured horizontally from the outer circumference of the specified pole or tower with height equal to the distance from the intersection of the imaginary vertical exterior surface of the cylindroid with the ground to an intersection with a horizontal plane passing through the highest point at which a conductor is attached to such pole or tower. Flammable vegetation and materials located wholly or partially within the firebreak space shall be treated as follows:

- At ground level – remove flammable materials, including but not limited to, ground litter, duff and dead or desiccated vegetation that will propagate fire;
- From 0 to 8 feet above ground level – remove flammable trash, debris or other materials, grass, herbaceous and brush vegetation. All limbs and foliage of living trees shall be removed up to a height of 8 feet;
- From 8 feet to horizontal plane of highest point of conductor attachment – remove dead, diseased or dying limbs and foliage from living sound trees and any dead, diseased or dying trees in their entirety.

CCR, Title 14, Forest Practice Rules Article 8, Rule #918 Fire Protection

The requirements of Title 14, Section 918 applies to all vegetation operations in SRAs. This includes patrols for two hours subsequent to vegetation removal activities to ensure that the activity has not sparked a fire.

CAL FIRE Civil Cost Recovery Program

The CAL FIRE Civil Cost Recovery Program was established to recover the cost of fighting fires caused by people (or entities) that violate the law or were negligent in their actions. For overhead electric lines, these violations are generally related to non-compliance with vegetation clearance requirements.

California Code of Regulations - California Building and Fire Codes

California Code of Regulations, Title 24 parts 2 & 9, (http://osfm.fire.ca.gov/). Title 24 contains several International Codes that address fire safety including the International Fire Code, International Building Code. Additional safety regulations adopted by the California Building Standards Commission include the Uniform Mechanical Code, and Uniform Plumbing Code, which are also part of the California Code of Regulations.

California Environmental Quality Act

The CPUC is the state lead agency under CEQA. This FPP will serve as part of the basis for analysis in the Environmental Impact Report (EIR). Appendix G of CEQA Guidelines does not specify evaluation criteria for identifying potentially significant impacts regarding for fire fuel management. Section 15382 of the *CEQA Guidelines* states that a significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air and water. The CEQA analysis will be conducted pursuant to Section 15060-15065 of the *CEQA Guidelines*.

1.3.3 Regional and Local Regulations and Standards

CAL FIRE San Diego Unit "Pre-Fire Management Plan 2009"

As directed by the California State Fire Plan, the CAL FIRE San Diego Unit has prepared a "Pre-fire Management Plan" that encompasses 1,237,201 acres of SRA within San Diego County and Western portions of Imperial County. This document was last updated in 2005. Of particular concern to the unit is the continuation of drought induced tree and vegetation mortalities caused by bark beetle infestations. By proclamation of the Governor, CAL FIRE has taken steps to reduce the fire hazard by allowing the immediate removal of dead and dying trees from landowners' properties. This proclamation also directs CAL FIRE to protect public safety by clearing effective evacuation and emergency response routes and by establishing fire safe evacuation centers. In order to facilitate these projects, CAL FIRE San Diego is to coordinate and cooperate with all agencies involved. Areas of high priority that will be focused on for future fire prevention activities will be determined based on ignition trends and fire history. The overall goal of the San Diego Pre-Fire Management Plan is to protect public safety and assets by reducing wildfire ignitions and increasing initial attack successes.

County of San Diego

The County of San Diego Department of Planning and Land Use (DPLU) is the permitting authority for the Major Use Permit (MUP) and Building Permits. The main entities that are

responsible for ensuring the health and public safety in unincorporated areas of the County are provided by San Diego County and fire protection districts (FPDs). The enforcement responsibilities within CAL FIRE and the FPDs are by any person designated by the FPD's Chief to exercise the powers and perform the duties of the fire code official as set forth in their respective fire code as ratified by the Board of Supervisors. In the unincorporated areas of the County outside of a FPD, the enforcement responsibility lay with the person designated by the Chief Administrative Officer of San Diego County or his/her authorized representative.

County of San Diego Building and Fire Codes (Title 9, Divisions 1, 2 and 6, San Diego County Code of Regulatory Ordinances).

Following the October 2003 and fall 2007 wildfires, assessments were made of damaged and destroyed homes in an effort to identify areas where codes could be strengthened in order to enhance the chances of a structure surviving a wildfire. As a result, in February 2008, the County further amended the Fire Code and Building Code to include strengthened ignition-resistive construction requirements, modifying the previous two-tiered system and requiring "enhanced" standards for all new construction.

The County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are described in detail in the next section of this FPP.

2.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The FPP must evaluate the adverse environmental effects that a proposed project may have from wildland fire and properly mitigate those impacts to ensure that development projects do not unnecessarily expose people or structures to a significant risk of loss, injury or death involving wildland fires. Detailed guidelines for the determination of significance are identified in the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance (see http://www.co.san-diego.ca.us/dplu/docs/Fire-Guidelines.pdf), as are guidelines for preparing Fire Protection Plans (*see* http://www.co.san-diego.ca.us/dplu/docs/Fire-Report-Format.pdf).

This section of the FPP must include the following Guidelines for the Determination of Significance:

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

2. Would the project result in inadequate emergency access?

3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

3.0 ANALYSIS OF SOURCES OF WIND FARM FIRE RISK AND PROJECT DESIGN FEATURES TO MINIMIZE FIRE RISK

This section describes potential sources of fire risk associated with the proposed project and identifies PDFs that minimize fire risk and provide fire protection and prevention as it relates to the potential sources of fire risk associated with the project.

3.1 Sources of Wind Farm Fire Risk

The potential sources of fire risk associated with the proposed project include the following and are discussed in detail below.

- Construction activities;
- Electrical 34.5 kV collection and 138 kV transmission system;
- Wind turbines; and
- Operations and maintenance activities.

3.2 Construction

For purposes of identifying potential sources of fire risk from the proposed project, the following issues have been identified as having the potential to elevate the risk of fire ignition. **Table 1** below identifies the sources of fire risk associated with particular construction activities. Additionally, **Table 1** identifies and briefly describes PDF that avoid and/or minimize the potential for fire risk associated with the particular construction activities. Detailed discussion of the PDF is provided below in Section 3.6.1.

3.3 Electrical 34.5 kV Collection and 138 kV Transmission System

The project's electrical system will consist of three key elements: (1) an underground and overhead collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line that will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

The electrical collection and distribution system will be designed to be in compliance with Rule 250 of the NESC, which covers all wind and ice loading requirements for overhead lines. Pole design will comply with the Avian Powerline Interaction Committee (APLIC) "Suggested Practices for Avian Protection on Power Lines" and anti-perching devices will be utilized where poles are within 0.5 miles of turbines.

Table 1. Construction Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Section 3.6.1) and Code Requirements
Hot Work occurring during a Red Flag Alert.	**PDF-1:** Hot Work Procedure (Section 3.6.1)
Pioneering Work (initial brush clearing by bulldozer, which can result in ignition to vegetation from engine sparks or bulldozer blade strikes against rocks)	**PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan
Some areas may require blasting to obtain the required roadway profiles and to install power poles, underground collector cables, and install turbine foundations.	**PDF-3:** Blasting Plan **PDF-4:** County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability.
Construction waste, consisting of wood waste from wood forms used for concrete foundation construction, additional wastes, consisting of erosion control materials such as straw bales and silt fencing, and packaging materials for associated turbine parts and other electrical equipment could create a fuel hazard.	**PDF-5:** Construction Waste Disposal. As a standard practice, IBR does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.
Chemicals such as lubricating oils and cleaners for the turbines create a fuel hazard.	**PDF-6:** *Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels.* The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC).
Adequate water supply onsite to meet firefighter flow requirements in case of wildfire.	**PDF-7:** See Section 4.3. Based on the well pump tests performed at wells on Rough Acres Ranch and the Ewiiaapaayp Native American Reservation and other off-site water source options, an ample water supply exists for the project construction period. If a fire were to occur in the project area, during construction activities, construction activities would cease and the groundwater available from these sources could be used to for fire fighting, in addition to the water tanks identified above. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources could be utilized for firefighting purposes (HDR communication with County Fire Authority).
Inadequate fire or emergency services capacity.	**PDF -8:** Fire and Emergency Service Agreement. A Fire and Emergency Protection Services Agreement for the project shall be executed between IBR and the SDRFPD, and other agencies as appropriate.

34.5 kV Overhead Collector System

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.4 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 29 miles in length. Only 30 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

138 kV Transmission Line

The overhead 138 kV transmission line will begin at the project collector substation and run south on either side of McCain Valley Road, and across I-8 to the SDG&E proposed Rebuilt Boulevard Substation located on Old Highway 80. The transmission line will be constructed as a single circuit without any under build attachments and would be a maximum of 9.7 miles.

A maximum of 116 steel galvanized or weathered steel finish transmission poles will be necessary to support the 138 kV transmission line. The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. The table below identifies the sources of fire risk associated with power lines. Additionally, **Table 2** identifies PDFs that minimize the potential for fire risk associated with power lines. Detailed discussion of each PDF is provided below in Section 3.6.2.

3.4 Wind Turbines

Wind turbines have a number of safety features that minimize the potential for fire ignition. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The project will be monitored IBR's proprietary wind turbine monitoring Supervisory, Control and Data Acquisition system (SCADA). This system will be located in the Operations and Maintenance building (O&M) and will collect operation, performance data, and allow for remote operation of the wind turbines. In addition, this system informs personnel at IBR's NCC in Portland, Oregon. The monitoring system for the SCADA will have a backup emergency power source.

Table 2. Electrical Collector and Transmission System Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Section 3.6.2) and Code Requirements
Vegetation contact with conductors resulting in arcing.	**PDF-9:** The 34.5 kV overhead collector lines as well as the 138 kV transmission lines will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact. For example, the 138kV transmission line will have a minimum clearance from the conductor to the ground of 30 feet and the 34.5 kV overhead collector lines will have a minimum of 18.5 feet. Although, IBR's standard practice is to place the lines at a greater distance apart (e.g., 25 feet). Based on regular visual inspections, vegetation removal and management will be conducted below the lines to ensure this clearance is maintained.
Malfunctioning hardware such as transformers and capacitors or arcing from pole mounted hardware.	**PDF-10:** The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base. No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation, including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.
Avian contact with power lines.	**PDF-11:** The design of the power lines will comply with APLIC "Suggested Practices for Avian Protection on Power Lines" which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart, and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet Vertical feet and 5 feet horizontal feet apart.
Conductor-to-conductor contact or floating/wind-blown debris contact with conductors or insulators.	**PDF-12:** The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.

Source of Fire Risk	Project Design Feature (Section 3.6.2) and Code Requirements
Wood support poles being blown down in high winds.	**PDF-13:** Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.
Dust or dirt on insulators.	**PDF-14:** Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.
Airplane and/or helicopter contact with conductors or support structures.	**PDF-15:** Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

For purposes of identifying potential sources of fire risk, as it relates to the wind turbines, the following issues have the potential to elevate the risk of fire ignition:

- Nacelle Fire resulting from:
  - Electrical components and wiring;
  - Flammable gear and bearing lubricants;
  - Overheating due to blade over speed, wind or vibration; and
  - Lightning.
- Electrical Components elsewhere in the turbine.

Nacelle Fire

The turbine system is equipped with an arc flash detection sensors optical technology to detect the presence of the initial arc flash, over-current sensing transducers and smoke detectors. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-or-range condition, the turbine will shutdown and will disengage from the electrical collection system. In addition, the SCADA system will alarm. The following two types of turbine electrical components are proposed for the project:

1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components that are included and mounted on key power cables within the nacelle. The fire detection and safety features include:

- Smoke detectors;
- Arc-flash sensors – Provide a clear arc flash measurement. Since the light emitted during an arc flash event is significantly brighter than normal background light, optical

technology can easily detect the light present at the initiation of the flash. If an arch-flash is detected, the turbine will immediately command a shutdown; and,

- Over-current sensing transducers – All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. If any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower; however the same potential for a fire within the electrical components and transformer exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions of the turbine and improved fire access to the site. For the down-tower turbine type, there is a very low potential of an electrical fire escaping the turbine and causing a wildland fire.

A fire in the nacelle can melt and ignite the fiberglass enclosures and burning debris can drop to the ground, igniting other fires. Portions of the turbine could ignite and could fall to the ground. However, the project is proposing up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the cleared area would be revegetated using low fuel vegetation in a spacing and height configuration approved by the Fire District for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The environmental analysis conducted for the project assumed a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed annually prior to May 1 and more often as needed.

Based on IBR's experience, burning debris from a nacelle fire could fall up to 100-feet from the turbine; however, this is speculative as the distance that debris would fall is dependant upon the wind conditions of that particular day. Burning material could travel in a windy condition and start a vegetation fire. Burning embers in wind driven vegetation fires can also travel distances from the main fire and start spot fires.

As a supplement to the fire detection and protection features (smoke detectors, arc-flash sensors, over-current sensing transducers, SCADA system, fuel modification, fire extinguishers) provided as part of the turbine design, IBR will provide one tank at the O&M building and four (4) water tanks with locations to be confirmed with the SDRFPD. Water tanks would be located within portions of the project area that the agencies feel are strategic from a firefighting perspective.

Water tanks will be installed and maintained by IBR, with the SDRFPD maintaining adequate water levels to support fire protection services.

It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

It is unlikely that fire ignition in the nacelle due to blade over speed would occur due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibrations sensors that automatically shut the turbines down if vibrations exceed the normal operating conditions.

Lightning

Wind turbines are vulnerable to lightning strikes due to their height and location on elevated features such as ridges. Turbine blades are manufactured from fire resistant components, composites, fiberglass, carbon fiber, or a combination of all. However, to address this issue, the wind turbines being considered for this project include "grounding" features within the wind turbine blades to reduce the potential for fire due to lighting.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 3** below identifies the sources of fire risk associated with wind turbines. Additionally, the table identifies PDF that minimize the potential for fire risk associated with wind turbines. Detailed discussion of the PDF regarding turbine components and the tower itself is provided below in Section 3.6.3.

3.5 Operations and Maintenance

Maintenance activities will be limited to areas accessible by the permanent access roads. Typical turbine maintenance activities involve deploying personnel to the turbine to service parts within the turbine, but may also include temporarily deploying a crane within the previously disturbed construction area around the turbine, removing the turbine rotor, replacing generators, and bearings. See discussion below in Section 3.6 regarding IBR's Hot Work Procedure that would be implemented during any operations and/or maintenance activities that occur during Red Flag Alerts.

Table 3. Wind Turbine Fire Risk, Project Design Features, and Code Requirements

Source of Fire Risk	Project Design Feature (Section 3.6.3) and Code Requirements
Nacelle Fire – Electrical • Electrical components and wiring • Flammable gear and bearing lubricants Nacelle Fire – Braking • Overheating due to turbine blade over speed, wind, and vibration	**PDF-16:** **1) Up-Tower -** Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components mounted on key power cables within the nacelle. The fire detection features include: • Smoke detectors, • Arc-flash sensors, • Over-current sensing transducers; and • Portable fire extinguishers. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine, disengage it from the electrical collection system, and send a notice through the SCADA system to the NCC in Portland, Oregon. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower. The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, IBR's NCC in Portland, Oregon monitors and can control all of IBR's wind turbines through the SCADA and is staffed 24 hours a day. Both IBR's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. **(2) Down-Tower -** This type of turbine being considered for the project has the medium voltage electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage

Source of Fire Risk	Project Design Feature (Section 3.6.3) and Code Requirements
	transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However this turbine style still has the same risk of a fire associated with electrical components as the Up-Tower style does. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions of the turbine and improved fire access to the site. For the down-tower turbine type, there is a very low potential of an electrical fire escaping the turbine and causing a wildland fire. The potential for fire ignition in the nacelle due to blade over speed, wind or vibration is limited due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine in high wind conditions. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibrations sensors that automatically shut the turbines down if vibrations exceed the normal operating conditions.
Lightning	**PDF-17:** All wind turbine models for this project will incorporate blade lightning protection systems. In general, these systems consist of: air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth.

As described previously, the project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, IBR's NCC in Portland, Oregon monitors and can control all of IBR's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both IBR's on-site staff and staff at the NCC will have the

emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 4** identifies the sources of fire risk associated with operations and maintenance activities. Additionally, the table identifies PDF that minimize the potential for fire risk associated with operations and maintenance activities. Detailed discussion of the PDF is provided below in Section 3.6.4.

3.6 Project Design Features

Included below is a detailed discussion of the PDF's identified above.

3.6.1 Construction

PDF-1 Hot Work: IBR will comply with the applicable sections in NFPA 51-B "Fire prevention during welding, cutting and other hot work" and CFC Chapter 26 "Welding and other Hot Work". During Red Flag Alerts, operations involving cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, use of torches, or other similar activity during construction or maintenance activities will be conducted according to NFPA 51-B. Red Flag Warnings are issued by the U.S. National Weather Service based on humidity of less than or equal to 25 percent, temperature greater than 75 F degrees and a sustained wind average of 15 miles per hour or greater. The project area is located in the National Weather Service San Diego Mountain (CA 258) zone.

IBR will implement a Hot Work Procedure on-site to minimize the potential for fire ignition. Components of the Hot Work Procedure will include:

- Prior to hot work activity commencing, the on-site IBR fire safety coordinator will monitor daily the National Weather Service Red Flag Alert system.
- In the event of a Red Flag Alert, prior to hot work activity commencing, the on-site IBR fire safety coordinator will contact the local fire agency to determine the level of alert specific to the project area.
- The on-site IBR fire safety coordinator will require all hot work to be conducted according to NFPA 51-B.
- IBR will require all employees and/or sub-contractors who perform hot work during Red Flag Alerts to be trained under the applicable sections of NFPA 51-B.
- The on-site IBR fire safety coordinator will have the authority to modify hot work activities associated with construction and/or maintenance activities to the degree necessary to prevent fire ignition.

Table 4. Operations and Maintenance Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Section 3.6.4) and Code Requirements
Off-road vehicle use • Pioneering Work • Sparks from road grading equipment	**PDF-18:** • No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009). • Hot Work Procedure (PDF-1). • Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2). • Road maintenance activities requiring the use of grading equipment will be suspended during red flag events. • Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.
On highway activities located in particularly hazardous fuel conditions • Idling or parked vehicles and equipment in areas of brush, grass, vegetation.	**PDF-19:** No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.
Chain saw use of any kind	**PDF-1:**Hot Work Procedure (Section 3.6.1)
Operation of generators, pumps, augers, two-cycle motors, or other equipment capable of producing sparks or ample exhaust heat to cause ignition	**PDF-20:** Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 100-foot radius surrounding the turbine in which vegetative fuel reduction will take place. **PDF-1:** Hot Work Procedure (Section 3.6.1)
Tree removal equipment including but not limited to grinders, chippers, skidders, excavators, etc.	**PDF-1:** Hot Work Procedure (Section 3.6.1) **PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2). **PDF-20:** Tree removal not anticipated for O&M period.
Grinding and welding	**PDF-1:** Hot Work Procedure (Section 3.6.1)
Working on energized electrical equipment or facilities	**PDF-21:** Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.
Smoking	**PDF-22:** Limited to cleared areas around the O&M building.
Red Flag Warnings	**PDF-1:** Hot Work Procedure (Section 3.6.1)
Turbine Fire – Human Activity	**PDF-1:** Hot Work Procedure (Section 3.6.1)

Source of Fire Risk	Project Design Feature (Section 3.6.4) and Code Requirements
(Hotwork)	
Inadequate Site Access	**PDF-23:** Existing access roads will be improved and new access roads will be constructed.
O&M Building Fire Risk	**PDF-24:** O&M building construction will include fire prevention and protection. • Construction to comply with County Building Code (CBC). • O&M building to be surrounded by 4-acre cleared area, with a minimum of 100 feet of fuel management. Structure will comply with County Code Title 9 for defensible space. • Batteries will have secondary containment and required ventilation. • Sprinkler systems installed, with the exception of the control room. • SCADA monitoring system will have emergency power source. • CFC and CBC compliance for fire separation. • Control room will have 1-hour fire rated walls. • Building will be equipped with smoke detectors. • Building will be equipped with a Knox box on the exterior by the main door.
Substation, Transformers, or Electrical Fire Risk	**PDF-25:** Transformers walls will have secondary containment adequate to contain the total amount of oil plus firefighting water for 15 minutes. To be approved by SDRFPD and SDCFA.
Inadequate Fire or Emergency Services Capacity	**PDF-8:** Fire and Emergency Service Agreement.
Combustible Storage	**PDF-26:** • Minimize the accumulation of combustible material. Storage of flammable materials in fire rated cabinets. • Perform periodic housekeeping inspections and unsure employees are trained in the use of fire extinguishers. • Combustible storage and trash will be removed from site as soon as possible.

PDF-2: Construction Activities **-** Develop and implement a Construction and Maintenance Fire Prevention/Protection Plan. IBR shall develop a multi-agency Construction and Maintenance Fire Prevention Plan. Plan reviewers shall include: CPUC, CAL FIRE, BLM, CSLC, and the County of San Diego. IBR shall provide a draft copy of this Plan to each listed agency at least 90 days before the start of construction activities. Comments on the Plan shall be provided by

IBR to all other participants, and IBR shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, SDRFPD and the SDCFA. The final Plan shall be submitted to CAL FIRE, SDRFPD and SDCFA at least 30 days prior to the initiation of construction activities. IBR shall fully implement the Plan during all construction and maintenance activities. All construction work on the project shall follow the Construction Plan guidelines and commitments, and Plan contents are to be incorporated into the standard construction contracting agreements for the construction of the project. Primary Plan enforcement and implementation responsibility will remain with IBR.

At a minimum, Plan contents will include the requirements of Title 14 of the California Code of Regulations, Article 8 #918 "Fire Protection" and the elements listed below:

1. During the construction phase of the project, IBR shall implement ongoing fire patrols. IBR shall maintain fire patrols during construction hours and for 1 hour after end of daily construction, and hotwork.
2. Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), IBR shall update in writing the 24-hour contact information and onsite fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the CAL FIRE, SDRFPD, SDCFA, CPUC, BLM, and to state and federal fire agencies.
3. During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and Local Responsibility Areas (LRA), all non-essential, non-emergency construction and maintenance activities shall cease. Utility and contractor personnel will be informed of changes to the Red Flag event status as stipulated by CAL FIRE.
4. All construction crews and inspectors shall be provided with radio and cellular telephone access that is operational along the entire length of the approved route to allow for immediate reporting of fires. Communication pathways and equipment shall be tested and confirmed operational each day prior to initiating construction activities at each construction site. The radio shall allow communications with other IBR vehicles and construction trailer. All fires will be reported immediately upon detection.
5. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards will be updated and redistributed to all crewmembers as needed, and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect.
6. Each member of the construction crew shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats.
7. Water storage tanks and access roads shall be installed and operational at time of start of construction.

PDF-3: Blasting – As part of the project design, a blasting plan will be prepared. The blasting plan will include identification of planned blasting locations, a description of the planned blasting methods, an inventory of receptors potentially affected by the planned blasting, and to determination the area affected by the planned blasting. Blasting methods will take into consideration the high wildland fire hazard conditions in and surrounding the project area.

Precautions to prevent fire will be included in the blasting plan will include requirements to have all blasting charges capped with soil and/or other materials that are not combustible.

Blasting activities are required to be observed by a Blasting Inspector. A Blasting Inspector is a person on the Sheriff's approved list of inspectors authorized to conduct inspections, before and after a blast. To be on the Sheriff's approved list, an inspector shall be certified by or registered with the International Conference of Building Officials, the International Code Counsel/Counsel of American Building Officials, the Building Officials & Code Administrator or the Southern Building Code Congress International.

PDF-4: County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability – The project will comply with the County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability. The Fire Code requires a permit application to be issued prior to the start of blasting activities. Blasting activities shall be limited to Monday through Saturday between the hours of 7:00 a.m. and 6:00 p.m. or one-half hour before sunset, whichever occurs first, unless issuance of grant approval. Surrounding residents within 600 feet will be notified in writing within 600 feet of any major blast location or 300 feet from any minor blast location.

PDF-5: Construction Waste Disposal – As a standard practice, IBR does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.

PDF-6: Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels – As part of the project construction and operations, chemicals such as oils and cleaners for turbines will be properly storage, used, and handled as regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and will have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and "No Smoking" signs shall be posted.

PDF-7: Water Availability – Based upon the *Estimate of Water Availability* memorandum (Geo-Logic Associates September 7, 2010 – **Appendix B**), on the conservative peak water use requirements of 250,000 gallons per day (associated with road construction, concrete mixing and dust control activities), an estimated continuous supply of water (24 hours per day, 7 days per week) will be required from wells pumping at a cumulative continuous rate of 124 gpm.

Although there are several wells on the project site, two wells on the project site have been identified as readily available for project use:

1. One well is located on Rough Acres Ranch approximately one to two miles north of I-8 between Ribbonwood Road and McCain Valley Road. Drilled in 2009, data provided on the well log for this well indicates that the estimated well yield is 60 gallons per minute (gpm); however, with the current pump in this well, the Ranch Manager indicates that the well produces at a rate of 50 gpm. A 72-hour constant rate aquifer pumping test was performed at this well at 50 gpm. Based on the current preliminary test data, there was very little response from pumping in the adjacent observation well, about 30 feet from the pumping well, and therefore it is reasonable to assume that sustained pumping at 50 gpm, at a minimum can be achieved from this well. Further, with a higher volume pump it may be possible to pump at greater volumes without significant impacts to other adjacent groundwater users;

2. One well is located on the Ewiiaapaayp Reservation, about 7 miles north of Interstate 8 on La Posta Road. A 72-hour constant rate aquifer pumping test was conducted at this well at 80 gpm. Based on the preliminary test results it is reasonable to assume that sustained pumping at 80 gpm is feasible at this well location.

Therefore, based on the preliminary data from two recent pumping tests with a combined total pumping rate of 130 gpm, it is likely that the necessary water supply requirements for the project (124 gpm of continuous pumping, seven days a week) can be met from these two wells.

There are four potential additional water supply sources available for the project. The State Correctional Facility is located about one half mile north of Interstate 8 off of McCain Road. This correctional facility maintains two wells with estimated production of 45 and 65 gpm. The Live Oak Springs Resort located south of Interstate 8 on Old Highway 80 about ¾-mile northwest of the intersection with Highway 94 may provide a source of water supply. This resort (and water company) operates a well that pumps about 40,000 gallons per day (25 to 30 gpm) and maintains a 100,000 gallon pond, and two large tanks with an additional 50,000 gallons of storage capacity. They have committed to providing 40,000 for immediate use and up to 80,000 gallons per day with additional storage tanks (pers. comm., September 8, 2010); equivalent to 28 to 55 gpm. The Jacumba Community Service District (CSD) also has indicated that their well produces 200 gpm and they will commit up to 40,000 gallons per day to the project (pers. comm., September 8, 2010); equivalent to about 28 gpm. Finally, the City of El Centro has indicated that they are willing to sell wastewater plant effluent to the project for use during the construction phase.

In summary, as outlined above, the available on-site groundwater can provide the required project water requirements through continuous pumping at a rate of 124 gpm. Current pumping test results indicate at least 130 gpm can be achieved from the two tested wells, and potential greater volumes with a higher volume pump at the Rough Acres Ranch test well. However, with off-site water from the State Correctional Facility, Live Oak Springs Resort, and Jacumba CSD for purchase, an additional 80,000 to 120,000 gallons of water per day, or approximately 55 to 83 gpm of water could be available to support the project water supply needs; ample water for the

nine-month construction period. With these additional off-site sources, the combined on-site and off-site water could be equivalent to an estimated 213 gpm could be made available in support of the project.

If a fire were to occur in the project area, construction activities utilizing ground water would cease and the groundwater available from these sources could be used for firefighting purposes. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources would be utilized for firefighting purposes (HDR staff, Pers. Comm.).

IBR will provide four (4) additional water tanks to the SDRFPD to place at strategic locations throughout the site. The tanks will be installed and maintained by IBR, with SDRFPD maintaining adequate water levels for fire protection services. The water tanks will provide a supplemental water source that can be utilized for additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The same wells will provide the source of water during operations. When the project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

3.6.2 Electrical Collection and Transmission System

The project's electrical system will consist of three key elements: (1) an overhead and underground collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line which will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.4 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 29 miles in length. Only 15 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

The overhead transmission system is proposed to be a 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation. IBR will utilize steel poles for the transmission lines and IBR is considering the use of wood and/or steel poles for 34.5 kV distribution lines. The length (in miles) of the proposed 138 kV transmission line totals 9.74 miles with 7.42 miles on BLM lands, 0.36 miles of State of California lands, and 1.96 miles on County of San Diego lands, with no transmission lines located on tribal lands. The following describes the 138 kV transmission line and 34.5 collector line design:

- 138 kV Transmission and 34.5 kV collector line designs will include longer insulators to support the wires. The long insulators assure adequate conductor separation to prevent

arcing during high-wind conditions. This design also protects raptors with wide wingspans.

- No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing.
- The transmission line will be designed so under all load conditions, the line will be no closer to the ground than 25 feet. In areas where a distribution circuit is also placed on the pole at a lower elevation, the minimum clearance for the distribution circuit to the ground is 25 feet. The distance between the transmission and distribution circuits is a minimum of 10 feet, assuming worst case conditions maximum sag for the transmission circuit and minimum sag for the distribution circuit.
- Self supporting poles for both 138 kV and 34.5 kV lines will generally be used at locations where the line changes direction rather than guy wires and anchors. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-8: Execute a Fire and Emergency Protection Services Agreement - A Fire and Emergency Protection Services Agreement for the project shall be executed between IBR and the SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

IBR will educate the construction crew and maintenance employees as to potential dangers that may occur during construction and maintenance of the project. To reduce the possibility of fire ignition during hot work, IBR will implement the Hot Work Procedure and coordinate with local fire authority regarding the specific conditions in the project area. The PDFs discussed in Section 3.6 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable.

PDF-9: Overhead collector lines (138 kV and 34.5 kV) transmission lines - Will be designed in accordance with CPUC GO 95 "Rules for Overhead Electric Line Construction" and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact.

PDF-10: The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base.

No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation,

including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.

***PDF-11*:** The design of the power lines will comply with APLIC "Suggested Practices for Avian Protection on Power Lines" which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart, and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet vertical feet and 5 feet horizontal feet apart.

PDF-12: The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.

PDR-13: Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-14: Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.

PDF-15: Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

3.6.3 Wind Turbines

The turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at IBR's NCC in Portland, Oregon. Both IBR's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

PDF-16 Nacelle Fire Risk Reduction

There are two basic wind turbine designs:

(1) Up-Tower - Electrical equipment in the nacelle; and
(2) Down-Tower - Electrical equipment mounted at ground level.

On the site tour of IBR's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

(1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, the turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

- Smoke detectors;
- Arc-flash sensors; and
- Over-current sensing transducers.

Should any of these devices register an out-of-range condition, the device immediately commands a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, IBR's NCC in Portland, Oregon monitors and can control all of IBR's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC.

(2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However the same risk of a fire associated with electrical components exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions of the turbine and improved fire access to the site. For the down-tower turbine type, there is a very low potential of an electrical fire escaping the turbine and causing a wildland fire.

In addition, a potential fire risk associated with wind turbines is improperly installed electrical equipment (e.g., technical defects or components in the power electronics, failure of power switches, failure of control electronics, high electrical resistance caused by insufficient contact surface with electrical connections, such as loose connections, insufficient electrical protection concept with respect to the identification of insulation defects and the selectivity of switch-off units, no pole mounted disconnected switches, inadequate surge protection, inadequate grounding due to incorrect design or improper installation).

If fire ignition occurred within the Up-Tower or Down-Tower turbine type due to improperly installed electrical equipment, the fire protection and prevention features identified above would be triggered and the device that registered an out-of-range condition would immediately shutdown and an alarm would be indicated on the wind farm SCADA as well as on screens at IBR's NCC in Portland, Oregon. In addition signage will be posted at the NCC to call a 10 digit 24/7 landline phone number to emergency dispatch center in San Diego County in the case of an emergency.

PDF-17: Lightning - Although a final decision on the type of wind turbine has not been made, the majority of turbine manufacturers have imbedded "grounding" systems within the turbine blades to prevent ignition of a fire due to lighting. All wind turbine models being considered for this project will incorporate blade lightning protection systems. In general, these systems consist of air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth. As mentioned earlier, IBR has nearly 50 million operating hours on its U.S. fleet, and over that time, lightning-induced fire has not occurred.

To provide separation of installed equipment from combustible vegetation, gravel will be placed in and around substation, O&M building, wind turbines, and transformers. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

3.6.4 Operations and Maintenance

IBR's NCC in Portland, Oregon monitors and controls all of IBR's wind turbines and is staffed continuously. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the plant, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both IBR's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Construction related activities that occur during operations and maintenance activities will be conducted according the same Hot Work Procedure identified above under the PDF. This will minimize the potential for fire ignition.

PDF-18:

- No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas.

As part of the project design, existing access roads will be improved and new access roads are proposed;

- Hot Work Procedure (PDF-1);
- Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2).
- Road maintenance activities requiring the use of grading equipment will be suspended during red flag events;
- Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.

PDF-19: No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.

PDF-20: Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 200-foot radius surrounding the turbine in which vegetative fuel reduction will take place.

PDF-21: Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.

PDF-22: Smoking is limited to cleared areas around the O&M building.

PDF-23: Existing and New Access Roads - As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009) where they occur on County lands with the exception of spurs that serve turbines only (See Section 4.2 Fire Access). These improvements will have the effect of decreasing fire response times to the project area and general area, in the event of a fire or other emergency.

The proposed access road improvements will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood and McCain Valley Road is proposed as a private road; however, it will not be gated. As a result this road will be available to the community in the event of an emergency. This road will be improved to meet County of San Diego private road standards. Additionally, the turbine roads will improve access allowing fire crews and tanker trucks faster initial response in the project area. Fire and other emergency vehicles will also be able to utilize the access roads to improve response times to remote areas. BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 5.1.

PDF-24: Operations and Maintenance Facility

The O&M facility is the only new structure proposed that will include IBR staff during business hours. The O&M building will include the PDF that provide fire prevention and protection.

- The facility construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code (CBC) Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.
- The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project will provide a minimum of 100 feet of fuel management.
- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.
- Sprinklers with exception of control room, which may have an alternative suppression system. Fire Sprinkler system will be supervised by IBR's Portland Control center and to the offsite 24/7 alarm monitoring company. Determination will be made by IBR as to supervision by the alarm monitoring company. Supervision to a Fire District approved remote alarm monitoring company required based on number of sprinkler heads. Twenty heads requires electrical supervision of all valves in system, pumps, water tank level, etc. CFC Section 903.4.
- The SCADA monitoring system will have emergency power source at the O&M building, in addition to 24/7 monitoring at the NCC. Both IBR's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety and will have exterior exits.
- The building will have smoke detectors, which are supervised in control room, activate an alarm on exterior of building, and are supervised to the NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on exterior by main door for use by firefighters.

Per the requirements of PRC 4291, *Reduction of Fire Hazards Around Buildings*, the project will provide 100 feet of fuel modification around all buildings, and is the primary mechanism for conducting fire prevention activities on property within CAL FIRE jurisdiction.

In addition, IBR will implement a brush management plan at its project O&M facility, turbine pads, and substation. This plan will be consistent with the following County Consolidated Fire Code:

- Under the County Consolidated Fire Code, brush is to be modified within 100 feet (31 meters) of structures in radius, called defensible space (Section 4707.2a). There are two zones to be aware of when creating a defensible space for fire mitigation.
- Zone 1, From structure out to a minimum of 50 feet: "The area within 50 feet (15 meters) of a building or structure shall be cleared of vegetation that is not fire resistant and/or replanted with fire-resistant plants" (County Fire Code Section 4707.2a).
- Zone 2, Between 50 to 100 feet from structures: "In the area between 50 to 100 feet (15 to 31 meters) from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50 percent of the square footage of this area" (County Fire Code, Section 4707.2a).

PDF-25: Substation Transformers

Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6, provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located approximately 50 feet from the O&M building and will a minimum of 100 feet of fuel management. The substation is proposed to be located adjacent to the O&M building on a 5-acre parcel and will be surrounded by a 3-acre graveled parcel providing a minimum of 100 feet of fuel management around the substation.

Transformers will utilize fire walls for exposure protection and will have secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes. Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% Aqueous Film Forming Foam (AFFF) concentrate is used, and the application rate is 0.16 gpm/sq. ft. for 15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain polychlorinated biphenyls (PCBs) or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by IBR and submitted to SDRFPD and SDCFA for approval.

PDF-26: Combustible Storage

Prevention and minimization of fire risk is a primary concern for IBR. Other typical best management practices related to combustible storage that will be implemented on the project site include:

- Minimizing accumulation of combustible material, only allow storage of flammable materials in fire rated cabinets, ensure all combustible waste material is collected and disposed of properly including the storage of oily rags in approved containers, maintain a list of potential fire hazards at the plant including how sources of ignition will be controlled for each of these potential hazards.
- Perform periodic housekeeping inspections to find and mitigate any fire hazards found, ensure employees and sub-contractors are trained in fire prevention, and ensure employees are trained in the use of fire extinguishers.
- Combustible storage and trash on site during construction and operation phases will be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage will be orderly and be removed from the site as soon as possible.

4.0 ANALYSIS OF PROJECT EFFECTS

Section 15382 of the State *CEQA Guidelines* states that a "significant effect on the environment" means a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

This FPP analyzes the project's potential effects on wildland fire and fire protection along three lines of inquiry. The County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are described as follows:

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

2. Would the project result in inadequate emergency access?

3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

These significance guidelines are analyzed in Sections 4.1 through 4.9, and consider emergency services, fire access, water, ignition resistant construction and fire protection, fire fuel assessment, defensible space and vegetation management, and cumulative impacts.

Second, the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance explain that an affirmative response to or confirmation of any one of

the following Guidelines will generally be considered a significant impact related to wildland fire and fire protection as a result of project implementation, in the absence of scientific evidence to the contrary. These additional Guidelines would become significant where:

1. The project cannot demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code.

2. A comprehensive FPP has been required and the project is inconsistent with its recommendations including fuel modification.

3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect.

These significance guidelines are analyzed in Section 4.10.

Third, the CPUC and BLM are considering potential project effects according to the following four guidelines, which overlap with the previously described County guidelines. The CPUC Guidelines are as follows:

1. Would the presence of project facilities (overhead transmission lines, overhead collector lines, and/or wind turbines) significantly increase the probability of a wildfire?

2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?

3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?

4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants?

The CPUC/BLM significance guidelines are considered in Section 4.11. The significance determinations made through all three lines of inquiry are summarized within each section, and presented together in the Conclusion, Section 6.0.

4.1 Adequate Emergency Services

Emergency dispatch is handled by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement the area is located in a SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands. The following describes the identified fire entities providing service for the project area including: response times, travel distance, travel time, and compliance/non-compliance with the Public Facilities Element of the San Diego County General Plan.

Table 5 describes the agencies, equipment and staffing for the areas in the vicinity of the Project.

Table 5. Fire and Emergency Services Agencies, Equipment, and Staff

Station/Agency	Equipment	Staff
CAL FIRE – Whitestar (Campo)	• Five engines • One bulldozer • Two air tankers • Two helicopters	• Four firefighters • One Battalion Chief • Two hand crews
Boulevard Fire Department Station # 87 (San Diego County Fire Authority)	• One Type I engine • Two Type II engines, • One Type III engine, • One water tender (1,000 gallons)	• Two stipend firefighters
Campo Fire Department	• One water tender; or • One engine company	• Two firefighters
Campo Indian Reservation	• One Type III engine	• Day-to-day staffing varies
Jacumba Fire Station Station # 43 (San Diego Rural Fire Protection District)	• Engine • 1,500-gallon tender	• Two stipend firefighters
Lake Morena Fire Station Station #42 (San Diego Rural Fire Protection District)	• One engine; or • Water tender	• Two firefighters
Bureau of Land Management	• None	• None
U.S. Forest Service – Cameron, Cottonwood, or Glencliff	• Two engine companies	• Four firefighters per company

For a building fire, the dispatch would be:

- Two or three CAL FIRE engine companies;
- Boulevard Fire Department;
- Campo Volunteer Fire Department;
- San Diego Rural Fire Protection District;
- Campo Indian reservation.

Travel times will vary depending on the responding entity, response route and location of the fire. Travel times have been determined for the following responding entities: Boulevard Fire District, CAL FIRE Whitestar station and Cal FIRE Campo station (see **Figure 3** for station locations).

Emergency response time standards for land use categories in Table 1 the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are provided in three categories shown in the **Table 6**.

Table 6. Emergency Response Travel Times

Land Use Category	Maximum Travel Time	Land Use Category Defined
Town	5 minutes	Single-family residential lots of less than two acres, or more intensive uses such as multi-family residential includes all industrial development and all commercial development except neighborhood commercial.
Estate	10 minutes	Single-family residential lots from two to four acres in size, Includes neighborhood commercial development.
Rural	20 minutes	Large lot single-family residential and agricultural development. Lot sizes of grater than four acres.

The Project areas within the County of San Diego are designated in the County General Plan as General Agriculture 1 du/10, 40 acres (one dwelling unit allowed per 10 or 40 acres), and is zoned as A72 – Agricultural, or S80 Open Space. Because neither the "Town" (1 du per 2 ac.) nor "Estate" (1 du per 2-4 ac.) land use categories defined above would apply to the Project area, the closest applicable land use category is "Rural" with a maximum travel time of 20 minutes.

All land uses within the County are classified into a limited number of "use types," based on common functional, product, or compatibility characteristics. The project is considered to be a Civic Use Type– Major Impact Services and Utility per Section 1350 of the County of San Diego Zoning Ordinance. Emergency response travel times, as found in the County General Plan, were intended to apply to habitable development such as residential and commercial. The only portion of the project which will be occupied on a regular basis is the O&M Building. The 20 minute maximum travel time standard applies to the County portions of the Project alone, but not to those portions of the Project that lie on BLM, SLC, or Ewiiaapaayp tribal land.

Travel times for the Project have been calculated from the nearest station to the following points in the Project: (1) the entrance of the Project site (defined as the intersection of McCain Valley Road and Rocky Knoll Road); (2) the northern County boundary of the Project; (3) the O&M Building on BLM land; and (4) turbine J1, which is the furthest turbine at the terminus of the northern-most string of turbines on Ewiiaapaayp tribal land. Travel times were calculated using NFPA 1142 Table C.11 (b), or based on personal conversations between Jim Hunt and the applicable agency personnel.

The nearest fire station to the entrance of the project area is the Boulevard FD. The next nearest fire stations are the Whitestar CAL FIRE station in Boulevard, on Del Sol road, and the SDRFPD fire station in Jacumba. There is also a CAL FIRE station in Campo on Highway 94 and Buckman Springs Road. **Table 7** identifies the travel times for the stations that would be the first to respond.

Table 7. Estimated Travel Time from Nearest Fire Departments

Station	Location	Route	Distance (miles)	Rate of Speed (MPH)	Travel Time* (minutes)
Boulevard FD Station 87	Entrance	Old Hwy 80 / McCain Valley	**2.9**	35	**5.75**
	Northern County Boundary	Old Hwy 80 / McCain Valley/Turbine Road	5.65 3.7 **Total 9.35**	35 25	10.25 9.53 **Total 19.78**
	O&M Building	Via Ribbonwood / McCain Valley	3.6 7.7 **Total 11.3**	35 25	6.77 19.13 **Total 25.9**
	Turbine (Turbine J1)	Interstate 8 / Crestwood / Turbine Roads	5.87 9.47 **Total 15.34**	35 25	10.6 23.4 **Total 34**
CAL FIRE White Star	Entrance	Tierra Del Sol / Hwy 94 / McCain Valley	**6.2**	35	**11.2**
	Northern County Boundary	Tierra Del Sol / Hwy 94 / McCain Valley/Turbine Road	8.95 3.7 **Total 12.65**	35 25	15.9 9.53 **Total 25.43**
	O&M Building	Tierra Del Sol / Ribbonwood / McCain Valley	6.2 7.7 **Total 13.9**	35 35	11.2 19.13 **Total 30.3**
	Turbine (Turbine J1)	Tierra Del Sol / Interstate 8 / Crestwood / Turbine Roads	6.39 9.47 **Total 15.86**	35 25	11.5 23.4 **Total 34.9**
Jacumba Fire Station # 43	Entrance	Old Hwy 80/McCain Valley	**6.9**	35	**12.4**
	Northern County Boundary	Old Hwy 80/McCain Valley/Turbine Road	9.7 3.7 **Total 13.4**	35 25	17.1 9.53 **Total 26.6**
	O&M Building	Old Hwy 80/McCain Valley	9.7 7.3 **Total 17**	35 25	17.1 18.2 **Total 35.3**
	Turbine (Turbine J1)	Old Hwy 80/Interstate 8 / Crestwood / Turbine Roads	14 9.47 **Total 23.47**	35 25	24.5 23.4 **Total 47.9**

As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of enhanced fire resistive materials, and have automated and remotely supervised fire detection and suppression systems (see PDF-24). Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDF and mitigation measures to reduce the risk of fire, as summarized in Section 5.0. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

As discussed previously, a Fire and Emergency Protection Services Agreement for the project shall be executed between IBR and the SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access) for additional information.

4.2 Fire Access

The project area is accessible via the Crestwood, Ribbonwood, and McCain Valley Road exits off of I-8. The primary access routes will be Ribbonwood and McCain Valley Roads. Additional access is provided by Crestwood Road and Old Mine Road and will primarily serve the western portion of the project area including the western ridgeline. Access road locations are shown on **Figure 2**.

To facilitate construction activity, existing and new access road improvements will include widening from approximately 16 to 20-foot widths to 36-foot widths to accommodate large cranes and equipment delivery. The access roads will be restored from the 36-foot temporary width (accommodates large equipment and deliveries) to the widths identified below, after the turbines have been installed.

Upon completion of construction activities, existing and proposed access roads located on land under the jurisdiction of the County of San Diego will be improved to comply with the Department of Public Works Private Road Standard of 24 feet (28 foot graded extent). The main project roads (Ribbonwood Road and McCain Valley Road) throughout the project site will be improved to a maximum of 20 feet to comply with the California Fire Code Standards on lands outside of the County's jurisdiction. Spur roads to the turbines (on land under any jurisdiction) will be improved to a maximum of 18 feet wide to comply with SRA Fire Safe Regulations. These requirements were provided by the SDCFA (personal communication, James Pine, Fire Marshal). A detailed map of County roadways to be upgraded is shown in **Figure 15**.

Thirty feet of fuel management shall occur adjacent to the access roads for the proposed facilities including the turbine roads. This shall be the reduction or where reclaimed of high fuel vegetation to less than 50% cover.

Appropriate site mapping, showing roads, turbines, structures, substation, power line route, and water tank locations will be provided to the SDRFPD and other local response agencies for use during emergencies. Maps will also be kept in a KNOX data box at the main entrance to facility. The maps shall be submitted to the SDRFPD for approval. The KNOX box will also contain a copy of the Emergency Response Plan and Emergency action checklists, and IBR 24/7 contact information.

4.3 Water

IBR will need to construct a well and septic system on-site to obtain water for potable and sewer use at the O&M building. The proposed O&M building will be approximately 5,000 square feet in size, and will include a well to provide up to 5 gallons per minute of potable water and a septic system. It is anticipated that the O&M facility will use approximately 2,500 gallons of water per day. In addition to the water required for use by the facility water must be available in conformance with Sec. 508.2.2 of the County of San Diego Consolidated Fire Code - Water tanks.

The water will be stored in aboveground metal tanks complying with the requirements of the SDRFPD. The tank installation, including all notes on the SDRFPD standard drawing, will be complied with. In addition the tank shall comply with NFPA 22, Private Fire Protection Water Tanks. The water capacity of each tank shall be 10,000 gallons which is the maximum required by the SDRFPD tank standard. In order to allow firefighting aircraft to dip into the tank and obtain water, the top of the tank will be left open.

The capacity of the water tank at the substation will be based upon the demand for the fire sprinkler system plus hand lines for the O&M building (estimated to be 33,000 gallons for a one hour supply to an ordinary Group 2 system per NFPA 13, 2002 ed., Chapter 11), plus hand lines, plus a reasonable allocation for water supply for Fire Engine to generate firefighting foam for 15 minutes at an application density of 0.16 gpm/sq ft from a hose line using a 3% AFFF concentrate, for use on an oil fire in transformer containment. A conceptual estimate at this point, prior to detailed design, is 250 gpm for 15 minutes (3,750 gallons of water) plus 112.5 gallons of foam concentrate for oil firefighting. The actual amount of stored water is to be determined upon detailed design of the substation, transformer secondary containment, and O&M building, and distance of the O&M building from transformers. The actual size of the water tank will be determined by the fire sprinkler contractor and the appropriate agencies, at time of detailed system design. This tank will need to be on an elevated plane or have an approved pump for fire sprinkler supply. A procedure for ongoing inspection, maintenance and filling of tanks will be in place.

IBR will provide four (4) additional 10,000 gallon water tanks to the SDRFPD for SDRFPD to place at strategic locations based on its expert knowledge throughout the project area. The tanks will be installed and maintained by the IBR with SDRFPD maintaining adequate water supply

for fire protection services. The supplemental water can be utilized as additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The tank and fire engine connection for water tanks shall be located on the side of the road. The width of the road at that point should be at least 18 feet (travel width) plus an additional 10 foot width, for a distance of 50 feet, to allow for fire engine to park and connect to the tank, while leaving travel lanes open. Tanks shall be labeled "Fire Water: 10,000 gallons. Open top" in reflective paint.

The purpose of the tank is to allow a fire engine or water tender to refill it's on board water tank and to allow firefighting helicopters to dip into the tank.

Conceptually, the following tank locations could be employed by SDRFPD:

- Near main entrance to site on side of main trunk road; and/or
- At main intersections of access roads; and/or
- On roads to turbine pads, located subject to approval of the SDRFPD and SDCFA Fire Marshal, upon submittal of a detailed drawing; and/or
- At the substation for water supply for fire sprinklers in the O&M building and for water supply for foam making.

Actual tank locations shall be approved by the SDRFPD, and SDCFA Fire Marshal, based on a tank location drawing to be submitted by IBR Engineers. Drawings shall show tank location, road, and shall include the SDRFPD tank standard drawing and notes.

4.4 Fire Fuel Assessment

The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A** – Biological Resources Maps). Approximately 96 percent of project area include the following vegetation communities include: upper Sonoran sub-shrub scrub; montane buckwheat scrub; big sagebrush scrub; northern mixed chaparral; semi-desert chaparral; chamise chaparral; redshank chaparral; scrub oak chaparral; upper Sonoran manzanita chaparral; southern north slope chaparral; coast live oak woodland; mule fat scrub; southern willow scrub; southern riparian woodland; and non-native grassland. The remaining four percent of the project area supports land use in the form of rural residential development, agriculture, heavily disturbed land, roads, and non-vegetated channels.

Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, shown on **Figure 12**. The fire history of the area was reviewed and is depicted on **Figure 14**. The source of the fire history information is CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size; however, not all historic fires may be documented. No fires have been mapped within the project Area.

4.5 Ignition Resistant Construction and Fire Protection Systems

The section provides a discussion of the ignition resistant construction materials and fire protection systems associated with components of the proposed project. These specific components include the potential ignition sources associated with the project. These include: (1) wind turbines; (2) O&M building; (3) substation transformer; and (4) storage, use and handling of oils, flammable liquid, hazardous materials, and vehicle fluids.

4.5.1 Wind Turbines

As described previously in Section 3.6, the turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at IBR's National Control Center in Portland, Oregon. The monitoring system for the SCADA will have an emergency power backup. A fire suppression system shall be provided in each wind turbine. Fire suppression technology in the nacelle is in development and IBR will be an early adopter of this technology. At this early stage, IBR does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle.

There are two basic wind turbine designs:

1. Electrical equipment in the nacelle (Up-Tower).
2. Electrical equipment mounted at ground level (Down-Tower).

On the site tour of IBR's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

1. Up-Tower Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, in one turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

    - Smoke detectors;
    - Arc-flash sensors; and
    - Over-current sensing transducers.

Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system, and send an alarm to the on-site O&M facility and the NCC. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

2. Down-Tower turbines being considered for this project have the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions of the turbine and improved fire access to the site. For the down-tower turbine type, there is a very low potential of an electrical fire escaping the turbine and causing a wildland fire. In this configuration, the probability of an uncontained electrical fire is extremely remote, as there are no combustible materials inside the tower. As with the Up-Tower turbine type, a tower-based circuit breaker electrically protects the entire machine.

Turbine blades are manufactured from composites, fiberglass, carbon fiber, or a combination of each. Given the components of the turbine blades, they are not considered a flammable source.

A fire suppression system shall be provided in each wind turbine nacelle. Fire suppression technology in the nacelle is in development and IBR will be an early adopter of this technology. At this early stage, IBR does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

4.5.2 Operations and Maintenance Building

To provide separation of the building and installed equipment from combustible vegetation, gravel will be placed in and around O&M building. The O&M building and the substation will have a minimum of 100 feet of fuel management.

The O&M building is the only new structure proposed that will include IBR staff during business hours. The O&M building will include the following ignition resistant construction features and fire protection systems:

Ignition Resistant Construction

- The building construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.

- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.

Fire Protection Systems

- Sprinklers with exception of control room, which may have an alternative suppression system. Fire Sprinkler system will be supervised by IBR's NCC and to the offsite 24/7 alarm monitoring company. Determination will be made by IBR as to supervision by the alarm monitoring company. If there are twenty heads or more, remote supervision of all valves is required by a Fire District approved 24/7 monitoring company. Both IBR's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The SCADA monitoring system will have emergency power backup.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety and will have exterior exits.
- The building will have smoke detectors, which are supervised in control room, activate an alarm on exterior of building, and are supervised to the Portland NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on the exterior by the main door for use by firefighters.

4.5.3 Substation Transformers

Ignition Resistant Construction

Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6., provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located a minimum of 50 feet from the O&M building and any other buildings, and will have a minimum of 100 feet of fuel modification.

Fire Protection Systems

The transformers will utilize fire walls for exposure protection and secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% AFFF concentrate is used, and the application rate is 0.16 gpm/sq ft for

15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain PCB or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by IBR and plans submitted to SDRFPD and SDCFA for approval.

4.5.4 Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels

Ignition Resistant Construction

The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and shall have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Fire Protection Systems

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems, shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and “No Smoking” signs shall be posted.

4.6 Fire Behavior Modeling

As discussed in Section 4.4 the project is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE. A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, and Poomacha fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events. As a result of the fact that the site is known to occur within a high fire hazard severity zone, recent fires illustrating the results of fires occurring within these zones, and the project being a linear non-residential, primarily non-human occupied project fire modeling utilizing the Behave software was not performed. Instead, the fireshed approach that was performed for the Sunrise Powerlink, a similar type project is being utilized.

According to **Figure 12**, the proposed project would be located primarily within a very high fire hazard severity zone (CAL FIRE 2010). CAL FIRE uses Fire Hazard Severity Zones to classify the anticipated fire-related hazard for SRAs. Fire hazard measurements take into account the following elements: vegetation, topography, weather, crown fire production, and ember production and movement. The very high fire hazard severity designation can be attributed to a variety of factors including highly flammable, dense, drought-adapted desert chaparral

vegetation, seasonal, strong winds, and a Mediterranean climate that results in vegetation drying during the months most likely to experience Santa Ana winds.

Firesheds

"Firesheds" are defined as regional landscapes that are delineated based on a number of fire-related features including fire history, fire regime, vegetation, topography, and potential wildfire behavior (CPUC and BLM 2008a). The fireshed concept is one way to evaluate fire risk across a given landscape and in relation to proposed projects. As defined in the Sunrise Powerlink EIR/EIS, the Tule Wind Project is primarily in the La Posta Fireshed with southern portions in the Boulevard Fireshed. The following sections describe the firesheds.

Boulevard Fireshed Description

The Boulevard Fireshed is located in the extreme southeastern corner of San Diego County. Nearby communities include Boulevard, Manzanita, and Jacumba, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). Terrain varies throughout the fireshed with elevations ranging from below 1,700 feet amsl to nearly 4,700 feet amsl. Vegetation throughout the fireshed varies, but large portions are dominated by sparse, semi-arid vegetation including desert scrub, chaparral, juniper woodland, and oak woodland. Land ownership within the fireshed includes BLM lands, State lands, tribal lands, and private holdings. Population density is a sparse 34 people per square mile.

Fire History

Fire history within the Boulevard Fireshed indicates that over the last roughly 50 years, 29 wildfires have been recorded. Most fires have been small, either due to lack of fuel or quick response and control. Only three fires have grown to 500 to 1,000 acres and another three fires are considered "major" fires of over 1,000 acres. Large portions of the fireshed have not burned in the last 50 years. The xeric environment within the fireshed supports sparse vegetation, which is likely the primary limiting factor for wildfire ignition and spread. However, invasive annual grasses are establishing throughout the fireshed and may, over time, cause a shift to more frequent and larger fires (CPUC and BLM. 2008a). Recorded ignitions within the fireshed include a variety of sources, including equipment use, vehicles, campfires (including fires from illegal immigrants), debris burning, lightning, smoking, and powerline-related ignitions.

Fire Suppression

The Boulevard Fireshed is divided between the SDRFPD, CAL FIRE, and the SDCFA, Boulevard and Campo Fire Stations. The Boulevard Fireshed is covered by the CAL FIRE Whitestar Station, Boulevard Fire Station, Campo Fire Department, and Jacumba Fire Station. Between these agencies, there are significant firefighting resources to serve the area's wildfire potential, especially with CAL FIRE's air attack capabilities that can reach the area within 20 minutes.

Wildfire Modeling Results

The Boulevard Fireshed was modeled (CPUC and BLM. 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE's Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). The proposed project occurs in varying classification areas, but generally occurs within areas ranked high, very high, or extreme (CAL FIRE 2010).

La Posta Fireshed Description

The La Posta Fireshed is located directly to the west of the Boulevard Fireshed in southeastern San Diego County and includes the northern portion of the Tule Wind Project. Nearby communities include Boulder Grove, Live Oak Springs, Cuyapaipe, and La Posta, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). The La Posta Fireshed is generally at higher elevations than the Boulevard Fireshed, with elevations ranging from nearly 4,000 feet amsl to nearly 6,000 feet amsl. Vegetation throughout the fireshed varies, with coniferous forests at the higher elevations and sparse chaparral and sagebrush communities in the eastern portions of the fireshed. Land ownership within the fireshed includes USFS lands, BLM lands, State lands, City of San Diego lands, SDG&E lands, County of San Diego lands, and private holdings. Population density is higher than the Boulevard Fireshed at 56 people per square mile.

Fire History

Fire history within the La Posta Fireshed indicates that over the last 50 years, 36 wildfires have been recorded. Most fires have been small, either due to lack of continuous fuels or quick response and control. A total of five fires have grown to 500 to 1,000 acres and another four fires are considered "major" fires of over 1,000 acres. Of note, the 1970 Laguna Fire in this fireshed was ignited by a downed electrical distribution line. Over the 13-year period between 1995 and 2008, there have been 419 reported ignitions. Lightning, campfire, equipment use, vehicle fires, and arson are among the primary causes.

Fire Suppression

Fire suppression responsibilities are tasked to SDRFPD, CAL FIRE, SDCFA and USFS within the La Posta Fireshed. These agencies include significant firefighting resources to serve the area's wildfire potential, especially with the combined CAL FIRE and USFS air attack capabilities that can reach the area within 20 minutes or less.

Wildfire Modeling Results

The La Posta Fireshed was modeled (CPUC and BLM 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior

modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE's Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). Fire Threat classifications vary over the project extent and include rankings of high, very high, or extreme (CAL FIRE 2007a).

4.7 Defensible Space and Vegetation Management

The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

In conformance with the Section 4702.2 of the County of San Diego Consolidated Fire Code IBR will provide a minimum of 100 feet of Fuel Management adjacent to buildings (primarily proposed for human habitation) associated with the O&M building and project collector substation.

The area within 50 feet of a building or structure shall be cleared of vegetation that is not fire resistant and re-planted with fire-resistant plants. In the area between 50 to 100 feet from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50% of the square footage of this area. Trees may remain in both areas provided that the horizontal distance between crowns of adjacent trees and crowns of trees and structures is not less than 10 feet.

4.8 Significance Conclusions - County of San Diego Wildland Fire and Fire Protection Guidelines for Determining Significance

Based on the foregoing analysis in Sections 3.1 through 4.7, the following determinations regarding the first line of inquiry can be made.

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on Figure 11. As described in Section 3.0, the potential sources of fire risk associated with the proposed project include the following. An analysis of potential impacts associated with each fire risk is provided below.

- ***Construction Activities*** – Fire ignition risks and PDFs that address those risks are identified in Section 3.2, Table 1. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1 through PDF-8), a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FPP-1 through FPP-7 (**Table 8**) will reduce this impact to a level less than significant.

  Electrical 34.5 kV Collection and 138 kV Transmission System - Fire ignition risks and PDFs that address those risks are identified in Section 3.3, Table 2. Based on the high and very high fire hazard conditions in the project area, even after application of the PDF (PDF-9 through PDF-15), a significant impact related to potential fire ignition associated with the electrical collection and transmission system will occur. Implementation of the Mitigation Measures FPP-8 and FPP-9 (Table 8) will reduce this impact to a level less than significant.

- ***Wind Turbines*** - Fire ignition risks and PDFs that address those risks are identified in Section 3.4, Table 3. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FPP-10 and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.

- ***Operations and Maintenance Activities*** - Fire ignition risks and PDFs that address those risks are identified in Section 3.5, Table 4. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1, 2, 18 through 26) a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FPP-1 through FPP-7, and FPP-11 (Table 8) will reduce this impact to a level less than significant.

2. Would the project result in inadequate emergency access?

   As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of enhanced fire resistive materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Table 8. Impacts, Project Design Features, Mitigation Measures, and Significance Criteria

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
First Line of Inquiry – County of San Diego Guidelines			
1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	***Construction Activities*** (PDF 1-8) ***Electric Collector and Transmission*** (PDF 15) ***Wind Turbine*** (PDF 16 and 17) ***Operations and Maintenance*** (PDF 1, 2, 18–26)	***Construction Activities*** **FPP-1:** Develop and implement a Construction and Maintenance Fire Prevention/Protection Plan. IBR shall develop a multi-agency Construction and Maintenance Fire Prevention Plan. Plan reviewers shall include: CPUC, CAL FIRE, BLM, CSLC, and the County of San Diego. IBR shall provide a draft copy of this Plan to each listed agency at least 90 days before the start of construction activities. Comments on the Plan shall be provided by IBR to all other participants, and IBR shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, SDRFPD and the SDCFA. The final Plan shall be submitted to CAL FIRE, SDRFPD and SDCFA at least 30 days prior to the initiation of construction activities. IBR shall fully implement the Plan during all construction and maintenance activities. All construction work on the project shall follow the Construction Plan guidelines and commitments, and Plan contents are to be incorporated into the standard construction contracting agreements for the construction of the project. Primary Plan enforcement and implementation responsibility will remain with IBR.	***Construction Activities*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Electric Collector and Transmission*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact will be less than significant with the installation of fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		At a minimum, Plan contents will include the requirements of Title 14 of the California Code of Regulations, Article 8 #918 "Fire Protection" and the elements listed below: 1. During the construction phase of the project, IBR shall implement ongoing fire patrols. IBR shall maintain fire patrols during construction hours and for 1 hour after end of daily construction, and hotwork. 2. Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), IBR shall update in writing the 24-hour contact information and onsite fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the CAL FIRE, SDRFPD, SDCFA, CPUC, BLM, and to state and federal fire agencies. 3. During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and Local Responsibility Areas (LRA), all non-essential, non-emergency construction and maintenance activities shall cease or be required to operate under IBR's Hot Work Procedure. Utility and contractor personnel will be informed of changes to the Red Flag event status as stipulated by CAL FIRE.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		4. All construction crews and inspectors shall be provided with radio and cellular telephone access that is operational along the entire length of the approved route to allow for immediate reporting of fires. Communication pathways and equipment shall be tested and confirmed operational each day prior to initiating construction activities at each construction site. The radio shall allow communications with other IBR vehicles and construction trailer. All fires will be reported immediately upon detection. 5. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards will be updated and redistributed to all crewmembers as needed and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect. 6. Each member of the construction crew shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats. 7. Water storage tanks and access roads shall be	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		installed and operational at time of start of construction. **FPP-2:** Develop a Wildland Fire Prevention and Fire Safety Guide. IBR shall prepare and adopt a Wildland Fire Prevention Plan and Fire Safety Guide. The Plan will, at a minimum, include all of the provisions of the Construction Fire Prevention Plan (as described above). The Plan will be revisited and updated once every five years to incorporate new regulations, practices, technologies, and fire science research. IBR shall submit the Plan for review and comment by the following agencies at least 90 days prior to energizing the proposed project: CPUC, BLM, CAL FIRE, SDRFPD, SDCFA, and the CSLC. IBR will submit the Plan (with agency comments incorporated) for review and approval by CAL FIRE, SDRFPD and the SDCFA at least 60 days prior to commencing construction for the proposed project. **FPP-3: MOU -** Ensure coordination for emergency fire suppression. IBR shall ensure that personnel, construction equipment, and aerial operations do not create obstructions to firefighting equipment or crews. The following provisions shall be defined based on consultation with CAL FIRE and the SDRFPD. a. Onsite IBR and contracted personnel shall coordinate	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		fire suppression activities through the active fire agency designated Fire Incident Commander, and emergency ingress and egress to construction-related access roads will remain unobstructed at all times. Construction and/or maintenance work shall cease in the event of a fire within 1,000 feet of the work area. The work area includes the transmission ROW, construction laydown areas, pull sites, access roads, parking pads, turbines, O&M building, and substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored. **FPP-4:** Remove hazards from the work area. IBR shall comply with PRC 4291, *Reduction of Fire Hazards Around Building*, to provide 100 feet fuel modification around all buildings, and the County Code Title 9 regarding brush management. IBR and/or its contractor shall clear brush and dead and decaying vegetation from the work area prior to starting construction and/or maintenance work. The work area includes only those areas where personnel are active or where equipment is in use or stored, and may include portions of the transmission ROW, construction laydown areas, pull sites, access roads, parking pads,	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		turbine pads, O&M building, substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored. **FPP-5:** Helicopter Use: IBR shall contact CAL FIRE and the SDRFPD dispatch centers two days prior to helicopter use and will provide dispatch centers with radio frequencies being used by the aircraft, aircraft identifiers, the number of helicopters that will be used while working on or near SRA lands at any given time, and the flight pattern of helicopters to be used. Should a wildfire occur within one (1) mile of the work area, upon contact from a CAL FIRE Incident Commander and/or Forest Aviation Officer, helicopters in use by IBR will immediately cease construction activities and not restart aerial operations until authorized by the appropriate fire agency. **FPP-6:** Roads: Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box. **FPP-7, Combustible Storage: (CFC Chapter 3):** Combustible storage and trash on site during construction and operation phases shall be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage shall be orderly and be removed from the site as soon as possible.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		Electric Collector and Transmission **FPP-8:** Perform climbing inspections. IBR shall perform climbing inspections on 10 percent of project structures supporting overhead lines annually, such that every project structure has been climbed and inspected at the end of a 10-year period, for the life of the project. In addition, IBR will keep a detailed inspection log of climbing inspections, and any potential structural weaknesses or imminent component failures shall be acted upon immediately. The inspection log will be maintained on-site and available for review by CAL FIRE/SDRFD upon request. **FPP-9: Line Clearance.** For the 138 kV transmission line, IBR shall establish and maintain adequate line clearance in conformance with CPUC GO 95. Only trees or vegetation with a mature height of 15 feet or less shall be permitted within the transmission right of way except where the transmission line spans a canyon. In addition, tree branches that overhang the ROW within 10 horizontal feet of any conductor shall be trimmed or removed, as appropriate, including those on steep hillsides that may be many vertical feet above the facility. Conductor clearance of 10 radial feet under maximum sag and sway will be maintained at all times. Cleared vegetation shall be removed to	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		comply with requirements of the County of San Diego. During the life of the project, IBR shall maintain adequate conductor clearances by inspecting the growth of vegetation along the entire length of the overhead transmission line at least once each spring and documenting the survey and results. The inspection log shall be maintained on-site and available for review by CAL FIRE/SDRFPD upon request. ***Wind Turbine*** **FPP-10:** Fire Suppression in the Nacelles **-** IBR shall provide a manufacturer or aftermarket fire suppression system in each wind turbine nacelle, including the associated electrical equipment in the nacelle. ***Operations and Maintenance*** **FPP-1 through FPP-7.**	
2. Would the project result in inadequate emergency access?	As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?	As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.
4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	PDF-7	No mitigation is required.	Yes, sufficient water supplies are available. A less than significant impact is identified.
Second Line of Inquiry – County of San Diego Guidelines			
1. Can the project demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	No mitigation is required.	Yes, a less than significant is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
2. Will the project be consistent with the recommendations of the Fire Protection Plan, including fuel modification?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	The project will be consistent with the requirements of this plan	Yes, a less than significant impact is identified.
3. Can the project meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect?	As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	Yes, a less than significant impact is identified.
Third Line of Inquiry – CPUC / BLM Guidelines			
1. Would the presence of project facilities (overhead transmission lines, and/or wind turbines) significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Electric Collector and Transmission*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact is less than significant with the installation of a fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
			reduced to a level less than significant after implementation of mitigation.
2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Decommissioning*** – These activities are very similar to Construction discussed above. Yes, impact reduced to a level less than significant after implementation of mitigation measures.
3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?	PDF-9 through PDF-15	**FPP-11:** De-Energize Electrical System - IBR shall immediately de-energize the electrical collector and transmission systems during fire emergencies in which SDG&E de-energizes its local 138 kV system. Appropriate fire agencies shall be immediately notified of the line de-energizing. Additionally, IBR shall provide all appropriate local, state, and federal fire	Potential impact reduced to a level less than significant after implementation of PDFs and mitigation measures.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. The transmission line shall be de-energized prior to and during fire suppression activities within 1 mile of the transmission corridor to maintain firefighter safety, and re-energizing shall require notification and approval of all the responsible fire agencies. **FPP-12:** Site Maps - All responsible agencies shall be provided with maps indicating the location of the water tanks, turbines, access roads, and project layout and towers. **FPP-13:** Communication Devices - In order to easily communicate immediate fire incidence during construction, operation or maintenance of the project, all crews and inspectors shall be equipped with operational communication equipment and open communication pathways shall be established.	
4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants		**FPP-14:** Noxious Weed and Invasive Species Control Plan and Habitat Restoration Plan will be completed prior to construction.	No, with the implementation of the Noxious Weed and Invasive species Control Plan a less than significant impact is identified.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and a mitigation measure to reduce the risk of fire, as summarized in Section 5.0. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2, Fire Access for additional information). A less than significant impact is identified for this issue.

3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

   As described above, the project will comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access for additional information). The project will not result in substantial adverse impacts associated with the provision of new or physically altered governmental facilities that would cause a significant environmental impact. However, the project is required to upgrade access roads and to provide adequate fuel modification areas to meet fire code requirements. Additionally IBR shall enter into a Fire and Emergency Protection Services Agreement with the SDRFPD, and other agencies as appropriate. These aspects of the project will result in impacts to biological resources, which area addressed separately as part of the Biological Technical Report (August 2010). This issue will result in a less than significant impact.

4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

   As discussed in Section 3.6.1, Construction, the project has sufficient water supplies available to meet the peak construction demand, and operational demand. A less than significant impact is identified for this issue.

4.9 Cumulative Impact Analysis

CEQA and NEPA require an analysis of cumulative impacts. Cumulative impacts to fire and fuels management would impact area fire service providers. The SDCFA, portions of the County Service Area 135, the SDRFPD, CAL FIRE, BLM and Tribal governments service the surrounding area. The project is located in an area that has the potential for wildfires. The project area has been identified in the County of San Diego Draft General Plan Update (April 2010) as having moderate to very high in the majority of the project area and extreme potential for wildland fires in the western portion of the project area.

There currently are several energy projects within the general vicinity. There are five energy projects, nine transmission and other renewable projects, ten federal development projects, and 39 County Development projects located in the general vicinity of the Tule Wind Project area. The proposed project is considered a connected action with the SDG&E ECO Substation project which is proposing upgrades to the existing substation and a double-circuit 230 kV or a single-circuit 500 kV transmission line and the Energia Sierra Jaurez United States Transmission Generation Tie Line project (ESJ) which proposes either a double circuit 230 kV or a single circuit 500 kV transmission line. The project area is also identified as a proposed transmission route for the Sunrise Power Link project. This would add an additional 230 kV double-circuit or single circuit along McCain Valley Road. In addition to the energy projects, the Campo Indian Reservation is in the process of adding an additional 80 turbines to the existing 25 turbines. These additional energy projects could have a cumulative effect on the surrounding area due to wildfire and wildfire management. Other projects in the area are composed of residential developments, mining operations, cell towers, and commercial development.

The components of the area energy projects may have an affect on fire fighting capability due to the transmission lines and turbines absent implementation of PDFs and Mitigation Measures. Cumulative impact research was conducted for the Tule Wind Project, and three private projects were identified as having impacts due to wildland fire hazards.
The following cumulative impacts have the potential to occur:

- Introduction of non-native plants which can contribute to fire spread rate.

  IBR will implement a Noxious Weed and Invasive Species Control Plan to reduce the introduction of non-native plants into the project area. Given natural state of the project area consideration of the combined energy projects that are scheduled for development, it is anticipated that collectively non-native plants will be introduced into the area. However, the implementation of the Invasive Species Plan that will be in place for the project will render the project's contribution to this impact less than cumulatively considerable by preventing non-native species from being introduced.

- Alter the natural fire system.

  The project area is considered to be in a high to very high fire danger area and historically has not experienced a catastrophic fire in recent history. The vegetation in the area will be altered due to the construction of the turbines, the roadways, and structures. The mitigation measures that will be in place for the project, including a Disturbed Area Revegetation Plan, will render the project's contribution to this impact less than

cumulatively considerable by minimizing the potential for ignition which would result in an alteration to the natural fire system.

- Impact natural resources.

  The project and cumulative projects will impact vegetation communities due to the construction of transmission lines, turbines, and structures. IBR will implement several Mitigation Measures, including a Disturbed Area Revegetation Plan, which will render the project's contribution to this impact less than cumulatively considerable because temporary impacts to vegetation communities will be revegetated to pre-construction conditions and permanent impacts will be mitigated. A comprehensive analysis is provided in the Biological Technical Report for the project (HDR 2010).

- Impact firefighting effectiveness due to the project components (turbines, transmission lines).

The project and cumulative projects will include wind turbines, transmission lines, and non-residential structures that absent mitigation could hamper firefighting effectiveness. Helicopter use likely will not be limited in the area during a wildland fire because the wind turbines can be shut-down from the on-site O&M building and/or IBR's NCC in Portland, Oregon, which is staffed continuously. Turbines and transmission structures will include any required FAA lighting and markings, which will make them visible reducing the potential for contact from aerial fire fighting. The transmission lines are spaced far enough apart to not restrict aircraft maneuverability and significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground otherwise known as the "150 foot drop zone". The transmission towers are proposed to be 75 feet in height, less than half the height of the drop.

Ground based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. In order to prevent this, IBR shall immediately de-energize the electrical collector and transmission systems during fire emergencies in which SDG&E de-energizes its local 138 kV system. Appropriate fire agencies shall be immediately notified of the line de-energizing. Additionally, IBR shall provide all appropriate local, state, and federal fire dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. The transmission line shall be de-energized prior to and during fire suppression activities within 1 mile of the transmission corridor to maintain firefighter safety, and re-energizing shall require notification and approval of all the responsible fire agencies (FPP 11). The project is also improving existing access roads and constructing new roads which will improve access for firefighting.

In addition FDF-8, A Fire and Emergency Protection Services Agreement for the project shall be executed between IBR and the SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project. This will

prevent the project from contributing to a decrease in service through the additional demand of services from the project.

The PDFs discussed in Section 3.6 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable. Therefore, the project's contribution to this impact is less than cumulatively considerable.

4.10 Analysis of Additional County Guidelines for Determining Significance

Based on the foregoing analysis in Sections 3.1 through 4.7, the following determinations regarding the second line of inquiry can be made.

4.10.1 Can the Project Demonstrate Compliance With Fire Regulations?

The project will comply with California Fire Code, California Code of Regulations, County Fire Code and the County Consolidated Fire Code as listed in Section 1.3. Accordingly, the project will have a less than significant wildland fire impact.

4.10.2 Has a Fire Protection Plan Been Required and Will the Project Be Consistent With Its Recommendations, Including Fuel Modification?

An FPP has been required for the proposed project. The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

As part of this FPP, as it relates to the topics identified above, the plan identifies PDFs and mitigation measures to comply with the County of San Diego Consolidated Fire Code, including fuel modification.

As described in Section 3.5.4, the O&M building will have a 4-acre cleared area surrounding building and the substation facility, and the building will be placed such that a 100' fuel modification zone will give adequate spacing form transformers and potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the area would be performed, annually prior to May 1 and more often as needed.

In addition, IBR will implement a brush management plan for the O&M building and substation facility in accordance to Title 9 of the San Diego County Code to clear brush away from structures.

Accordingly, the project will have a less than significant wildland fire impact.

4.10.3 Can the Project Meet the Emergency Response Objectives Identified in the Public Facilities Element of the County General Plan, or Offer Same Practical Effect?

As discussed in Section 4.1 Adequate Emergency Services, the project is serviced by several fire entities; CAL FIRE; Boulevard Fire Department; Campo Volunteer Fire Department; San Diego Rural Fire Protection District; and Campo Indian reservation.

As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of enhanced fire resistive materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and mitigation measures to reduce the risk of fire, as summarized in Section 5.0. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area. Therefore, the project will have a less than significant wildland fire impact.

4.11 Additional Questions Considered By the California Public Utility Commission and Bureau of Land Management

Based on the foregoing analysis in Sections 3.1 through 4.7, the following determinations regarding the third line of inquiry can be made.

4.11.1 Would the Presence of Project Facilities (Overhead Transmission Lines, Overhead Collector Lines, and/or Wind Turbines) Significantly Increase the Probability of a Wildfire?

34.5 kV Overhead Collector Lines and 138 kV Transmission Lines

The majority of the 34.5 kV collector lines are proposed to be undergrounded and would not significantly increase the probability of a wildfire. The overhead collector system is approximately 9.4 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 29 miles in length. Only 30 percent of the collector system is planned to be overhead.

The presence of the turbines and overhead 138 kV transmission line may create a new source of potential wildfire ignitions. Line faults could occur as a result of any of the reasons identified in Section 3.3 and the fire hazards associated with the turbines is discussed in Section 3.4. Any line

faults or turbine related events that create sparks that ignite vegetation could result in a wildland fire if the ignition was to occur during extreme weather conditions. Due to the existing high-fire hazard conditions in and surrounding the project area, construction of the project components (transmission line and turbines) could increase the risk of fire. This impact is considered significant because certain ignition sources are unavoidable, for example contact with floating or windblown debris.

The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

Due to the potential for ignitions related to the 34.5 kV overhead lines, 138 kV transmission and lines, or turbines during extreme fire weather, construction and operation of the project within area could significantly increase the likelihood of a fire. A significant impact is identified related to this issue.

The risk of ignitions and risk of damage from a project-related ignition can be reduced to a level of less than significant through the application of PDF-8 through PDF-15 and the Mitigation Measures (**Table 8**).

Wind Turbine **-** It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

Fire ignition risks and PDFs that address fire ignition risks associated with wind turbines are identified in Section 3.4, **Table 3**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FPP-10 and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.

4.11.2 Would Project Construction and/or Operation and Maintenance and Decommissioning Activities Significantly Increase the Probability of a Wildfire?

Construction activities associated with the proposed project would include, but not be limited to, use of vehicles and heavy equipment for vegetation removal and grading, the construction of transmission tower pads and towers, construction of collector tower and tower pads, and the installation of conductors. Additional heavy equipment, vehicles, and tools would be used for preparation construction of the turbine pads, of staging areas, and new roads. The use of heavy equipment along with the personnel required to construct, repair, and maintain the project features line introduce the potential for a variety of wildfire ignition sources to surrounding vegetation fuels and combustible materials (such as diesel fuel and herbicide) associated with project activities.

The use of heavy equipment and the presence of personnel may increase the wildfire ignition potential in the project construction areas compared with existing conditions.

Maintenance activities would include the periodic use of vehicles and presence of personnel and could also include the use of heavy equipment for repairs or replacement of project components. These activities would be far less intensive than construction activities; however, they would recur periodically over the life of the project, supplying an ongoing source of ignitions for 30 years or more. Project-related ignitions within the proposed project corridor have the potential to escape initial attack containment and become catastrophic fires. The areas with heavy fuel loads, steep topography, and exposure to Santa Ana winds would have a higher burn probability and a higher potential for an ignition to escape.

During the operations and maintenance phase of the project, smoking would be limited to the cleared areas around the O&M building and as with the construction phase of the project hot work would be limited during Red Flag alerts.

Decommissioning – These activities are very similar to Construction discussed above. Impacts would be reduced to a level less than significant after implementation of mitigation measures.

The proposed project would require construction and maintenance activities that will increase the risk of fire to communities, firefighter health and safety, and natural resources. This issue is considered a significant impact. This increase can be mitigated to a level that is less than significant through the application of the PDF-1 through PDF-8 and PDF 17 through PDF22 and the implementation of Mitigation Measures FPP-1 through FPP-7 (**Table 8**).

4.11.3 Would the Presence of the Overhead 138 kV Transmission Lines, Overhead 34.5 kV Collector Lines, and/or Wind Turbines Reduce the Effectiveness of Firefighting?

As described previously, the project design will upgrade roadway widths to provide better infrastructure to the area for fire emergency vehicles. The project would increase the amount of overhead transmission lines, overhead collector lines, but they would be located along roadways and would not impede firefighting apparatus. In addition, the transmission lines will be at a height of approximately 74 feet with a typical span of 600 feet and a maximum of 700 feet, which would give adequate clearance for emergency vehicles and fire truck ladders. Turbines will have a maximum of 328 feet for the steel tower, with a rotor diameter of 328 feet for a maximum height of 492 feet. The turbines will be connected by an access roadway, located approximately one-quarter mile from each other.

Fire and Emergency Access: The project's upgraded access roads, which include County roads, BLM roads and turbine roads, will serve to improve access to areas that are currently not accessible by fire-fighting vehicles and reduce response times.

The project roads will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently, the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood Road and McCain Valley Road is proposed as a private road, however will not be gated. As a result this road will be available to the community in the event of an emergency. Additionally the

turbine roads will improve access allowing fire crews and tanker trucks faster initial response to remote portions of the BLM land and/or the project area. Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 5.1.

Aerial and Ground-based Firefighting: Aerial firefighting efforts would not be compromised by implementation of the project. The turbines are located approximately one-quarter mile apart which would allow helicopters to navigate between the towers. Furthermore, the turbines and towers will be equipped with safety lighting as required by the FAA.

The transmission lines are spaced far enough apart to not restrict aircraft maneuverability and significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground otherwise known as the "150 foot drop zone". The transmission towers are proposed to be 75 feet in height, less than half the height of the drop. Ground based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. Any reduction in the ability of fire fighting/suppression activities to occur during extreme weather conditions could, in part, restrict fire fighting/suppression. Implementation of PDFs and Mitigation Measures FPP-11 through FPP-13 will be implemented to further reduce impacts to below a level of significance.

Prepare and Implement a Multi-agency Fire Prevention MOU

A Memorandum of Understanding (MOU) for the project shall be created and implemented between IBR and the SDCFA, CAL FIRE, BLM, and other agencies as appropriate. The MOU shall be adopted by all parties prior to energizing the new transmission line. The purpose of this Multi-agency Fire Prevention MOU is to efficiently coordinate all aspects of agency and utility fire prevention plans and practices. The MOU will integrate the following components of the IBR fire plan with existing agency fire plans: fire prevention, firefighter safety, and emergency communication, firefighter training of both ground and aerial utility personnel, and others as appropriate.

4.11.4 Would Project Activities Contribute to an Increased Ignition Potential and Rate of Fire Spread Through the Introduction of Non-Native Plants?

Project activities create the potential for the introduction and spread of non-native, invasive plants. Non-native plants are often spread by human and vehicle vectors in areas of large-scale soil disturbance and importation. These actions along with the opening of the vegetation canopy through the clearing of trees and shrubs involved with the construction and maintenance of the proposed project could contribute to the introduction and proliferation of non-native, invasive plants. Certain invasive plants, like cheatgrass, medusa head and Saharan mustard, can contribute to changes in wildfire frequency, timing and spread (Cal-IPC, 2007). Cheatgrass and medusa head, for example, dry out earlier in the season than native grasses creating fine fuels that are easily ignited. These fine fuels contribute to wildfires igniting earlier in the year and an increased level of fire recurrence. In addition, non-native grasslands have a "spotting" effect during a wildfire, where embers from these grasslands are blown ahead of the fire line, contributing to an

increased rate of fire spread. Invasive annual grasses also influence fire spread by creating a fine fuel continuum between patchy, perennial shrubs allowing wildfires to expand further into otherwise sparsely vegetated wildlands (USGS, 2007). Saharan mustard creates dense stands of dry vegetation in desert scrub and coastal sage scrub communities which increases the fire fuels in these otherwise low fire risk areas (Cal-IPC, 2007). The introduction and spread of specific invasive plants within the proposed project ROW would adversely influence fire behavior by increasing fuel load, fire frequency, and fire spread.

The project has been designed to place gravel on roads and around the base of the turbines. This will reduce the area in which invasive weeds can invade in these locations.

The introduction of non-native plants with an increased ignition potential and rate of wildfire spread. To minimize fire impacts due to non-native plants mitigation measure FFP-17 will be implemented, with the preparation and implementation of a Noxious Weed and Invasive Species Control Plan. The plan addresses monitoring, education of personnel on weed identification, and methods for treating infestations.

IBR will prepare and implement the Noxious Weed and Invasive Species Control Plan for pre-construction and long-term invasive weed abatement. The plan will be prepared prior to construction. Where IBR owns the ROW property, the Plan will include specific weed abatement methods, practices and treatment timing developed in consultation with the San Diego County Agriculture Commissioner's Office and the California Invasive Plant Council (Cal-IPC**)**, or the tribal government, as appropriate. On the ROW easement lands administered by public agencies (BLM, CSLC), and Wildlife Agencies the Noxious Weed and Invasive Species Control Plan will incorporate all appropriate and legal agency-stipulated regulations. The Plan will be submitted to the ROW land-holding governmental entities for final authorization of weed control methods, practices, and timing prior to implementation of the plan on public lands. For those ROW easements located on private lands IBR will work with the landowners to obtain authorization of the weed control treatment that is required.

In addition to the Noxious Weed and Invasive Species Control Plan, a Habitat Restoration Plan will also be developed upon the completion of the biological technical report and in compliance with the report to minimize or mitigate negative impacts on vulnerable plants and wildlife to the project area. The combination of these two monitoring plans will help to ensure that both revegetation and weed control efforts are successful. Based on implementation of Mitigation Measure FPP-14, the Noxious Weed and Invasive Species Control Plan and Habitat Restoration Plan, would reduce impacts to less than significant for the potential for ignitability of fuels through the introduction of non-native plants during construction and/or maintenance is identified.

5.0 IMPACTS, PROJECT DESIGN FEATURES, MITIGATION MEASURES, AND SIGNIFICANCE CRITERIA

The fire impacts, PDFs, proposed mitigation measures, and level of significance after implementation PDFs and mitigation measures are presented below in **Table 8.**

6.0 CONCLUSION

As is shown previously in **Table 8**, the impacts due to the construction and the operations and maintenance of the project would be reduced to a level of less than significance with the implementation of the proposed project design features and required mitigation measures, provided suppression systems are provided in the nacelle, including the associated electrical equipment in the nacelle. All impacts under the first, second, and third lines of inquiry to the significance guidelines have been determined to be a less than significant impact after implementation of project design features and mitigation measures that could expose people and/or structures to a significant risk of loss, injury or death involving wildland fires.

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

Robin Church
Principal
RC Biological Consulting, Inc.
P.O. Box 1568
Lemon Grove, CA 91946-1568

Technical Input:
Jim Hunt
Hunt Research Corp.
P.O. Box 291
Solvang, CA 93464

8.0 PERSONS AND ORGANIZATIONS CONTACTED

- Chief Nissen, Rural Fire Protection District
- Chief Hendrie, Rural Fire Protection District
- CAL FIRE Monte Vista Dispatch Center
- Boulevard Fire Department
- CAL FIRE Boulevard Fire Station
- James Pine, San Diego County Fire Authority
- FireTrace International

9.0 REFERENCES

Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11

CAL FIRE. 2009. "San Diego County Fire Hazard Severity Zones in SRA." March, 2010. Accessed at: http://frap.cdf.ca.gov/webdata/maps/san_diego/fhszs_map.37.jpg

CAL FIRE (California Department of Forestry and Fire Protection) website http://frap.cdf.ca.gov

CAL FIRE 2008. Power Line Fire Prevention Field Guide November 2008

California Building Code 2007. Chapter 7A.

California Code of Regulations. Title 14 of the California Code of Regulations (14 CCR), Chapter 7. Fire Protection, Article 4. Fire Prevention Standards for Electrical Utilities

California Fire Code 2007. California Code of Regulations Title 24, Part 9.

County of San Diego 1979. General Plan – Safety Element.

County of San Diego 2009. Consolidated Fire Code. Adopted 2009.

County of San Diego 2008. Guidelines For Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire Code, Ordinance No. 9915, new series.

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire and Building Code, Ordinance No. 9915, new series.

CPUC and BLM. 2008a. *Final Environmental Impact Report/Environmental Impact Statement and Proposed Land Use Amendment for the Sunrise Powerlink Project*. SCH # 2006091071; DOI Control # FES-08-54. Prepared by Aspen Environmental Group for CPUC and BLM. Agoura Hills, California: Aspen Environmental Group. October 2008. Declercq, Janm Dr, and Raymond Van Schevensteen. *Performance and Fire Behavior of Step-up Transformers in Wind Turbines*. Belgium

FERC 2004. Utility Vegetation Management and Bulk Electric Reliability Report from the Federal Energy Regulatory Commission, September 7, 2004. htp://www.ferc.gov/industries/electric/ indus-act/reliability/veg-mgmt-rpt-final.pdf

Johnson, M. L.J. Rew, B.D. Maxwell and S. Sutherland. 2006. The Role of Wildfire in the Establishment and Range Expansion of Nonnative Plant Species into Natural Areas: A review of current literature

Keeley, J.E. 1998. Postfire ecosystem recovery and management: the October 1993 large fire episode in California. Pages 69-90 in J. M. Moreno, editor. Large forest fires. Backhuys Publishers, Leiden, The Netherlands.

Keeley, J.E. 2002. Native American impacts on fire regimes of the California coastal ranges. Journal of Biogeography, vol. 29, pp.303-320.

Keeley, J.E. 2004. Invasive Plants and Fire Management in California Mediterranean-climate Ecosystems. In M. Arianoutsou (ed) 10th MEDECOS – International Conference on Ecology, Conservation and Management, Rhodes Island, Greece, electronic, no page numbers.

Keeley, J.E. and C.J. Fotheringham. 2003. Impact of past, present and future fire regimes on North American Mediterranean shrublands, pp.218-262. In T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam (eds.), Fire and Climatic Change in Temperate Ecosystems of the Western Americas. Springer-Verlang, New York.

Keeley, J.E., and C.J. Fotheringham. 2006. Wildfire Management on a Human-Dominated Landscape: California Chaparral Wildfires in The Wildfire Reader: A century of Failed Forest Policy, George Wuerthner, Ed. 116-131.

Keeley, J.E., C.J. Fotheringham, and Moritz. 2004. Journal of Forestry. "Lessons from the October 2003 Wildfires in Southern California." October/November.

National Fire Protection Association (NFPA) 2010. NFPA® 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations 2010 Edition. NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471

Public Utilities Commission (PUC) of the State of California. 2006. GENERAL ORDER No. 95 January 2006

SDG&E Electric Standard Practice Draft Fire Plan 7/6/06

San Diego Geographic Information Source (SanGIS) www.sangis.org

San Diego Rural Fire Protection District. Fire Code – Ordinance 2002-03

U.S. Dept. of Health & Human Services, National Institute for Occupational Safety and Health (NIOSH): *Firefighters Exposed to Electrical Hazards During Wildland Fire Operations: Hazard ID 15*, Jan.2002.

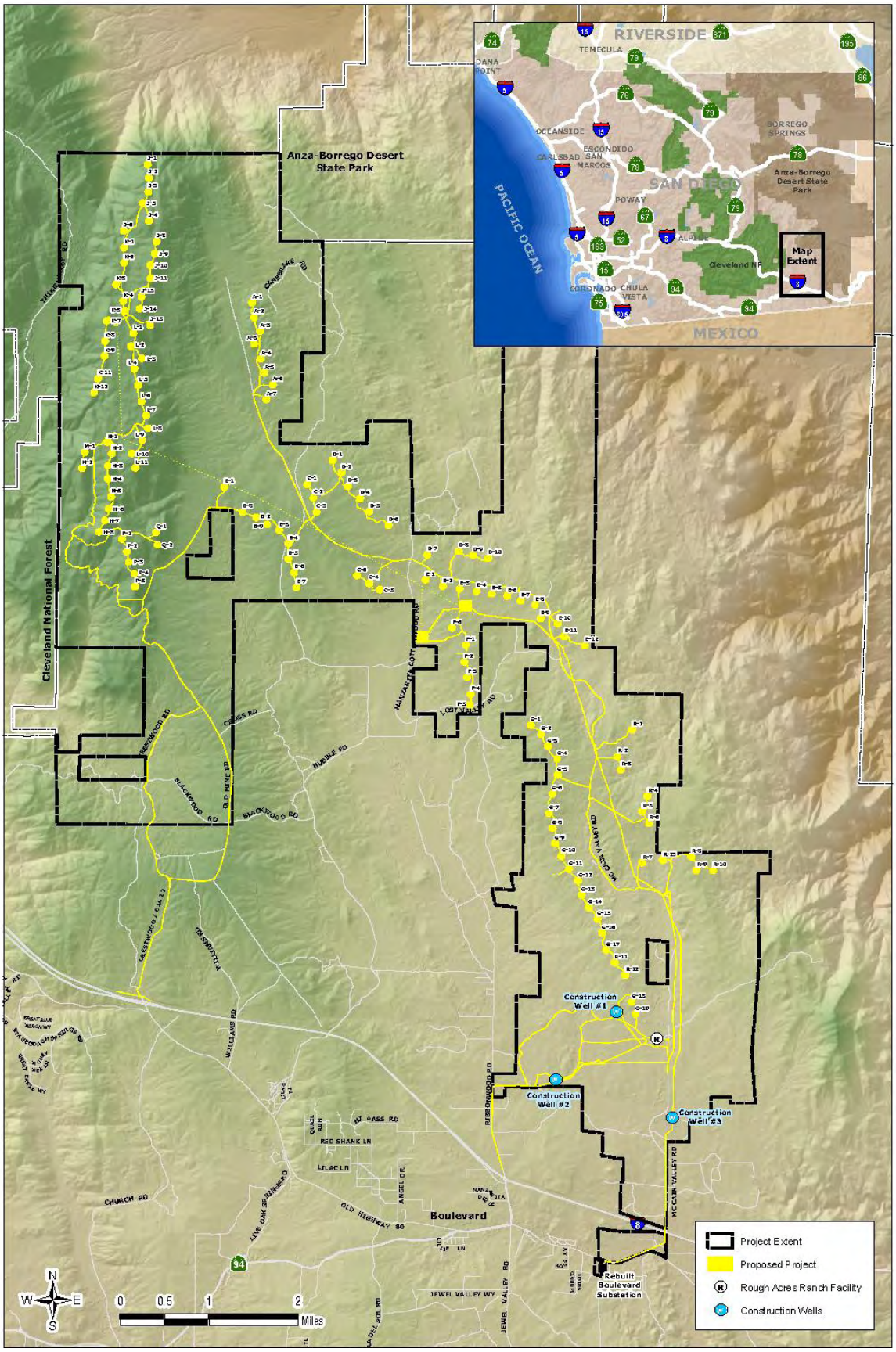
VdS 3523en : 2008-07 (01). Wind Turbines Fire Protection Guidelines

10.0 PREPARERS' LIABILITY STATEMENT

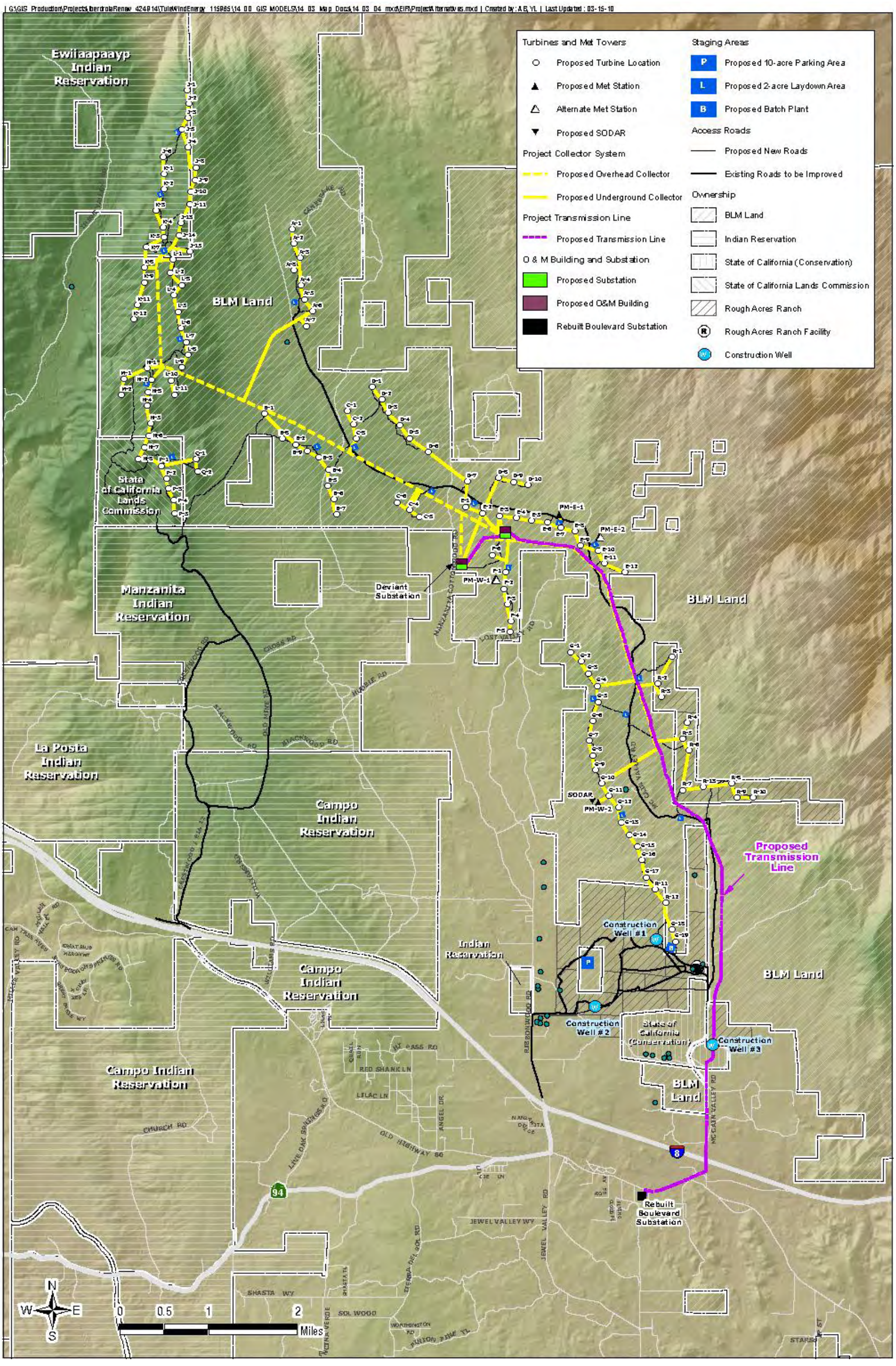
RC Biological Consulting, Inc. disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document by IBR, or any regulatory or permitting agency.

Technical Input Liability Statement:

As fire is dynamic and unpredictable, the technical information provided by Hunt Research Corporation does not guarantee that a fire will not occur or will not cause property damage, injury or loss of life. No expressed or implied guarantees are made regarding the adequacy or effectiveness of the recommendations and requirements in those sections for all situations. Engineering, architecture and construction are out of the scope of Jim Hunt with Hunt Research Corporation.



Region and Vicinity **Figure 1**



Proposed Project **Figure 2**

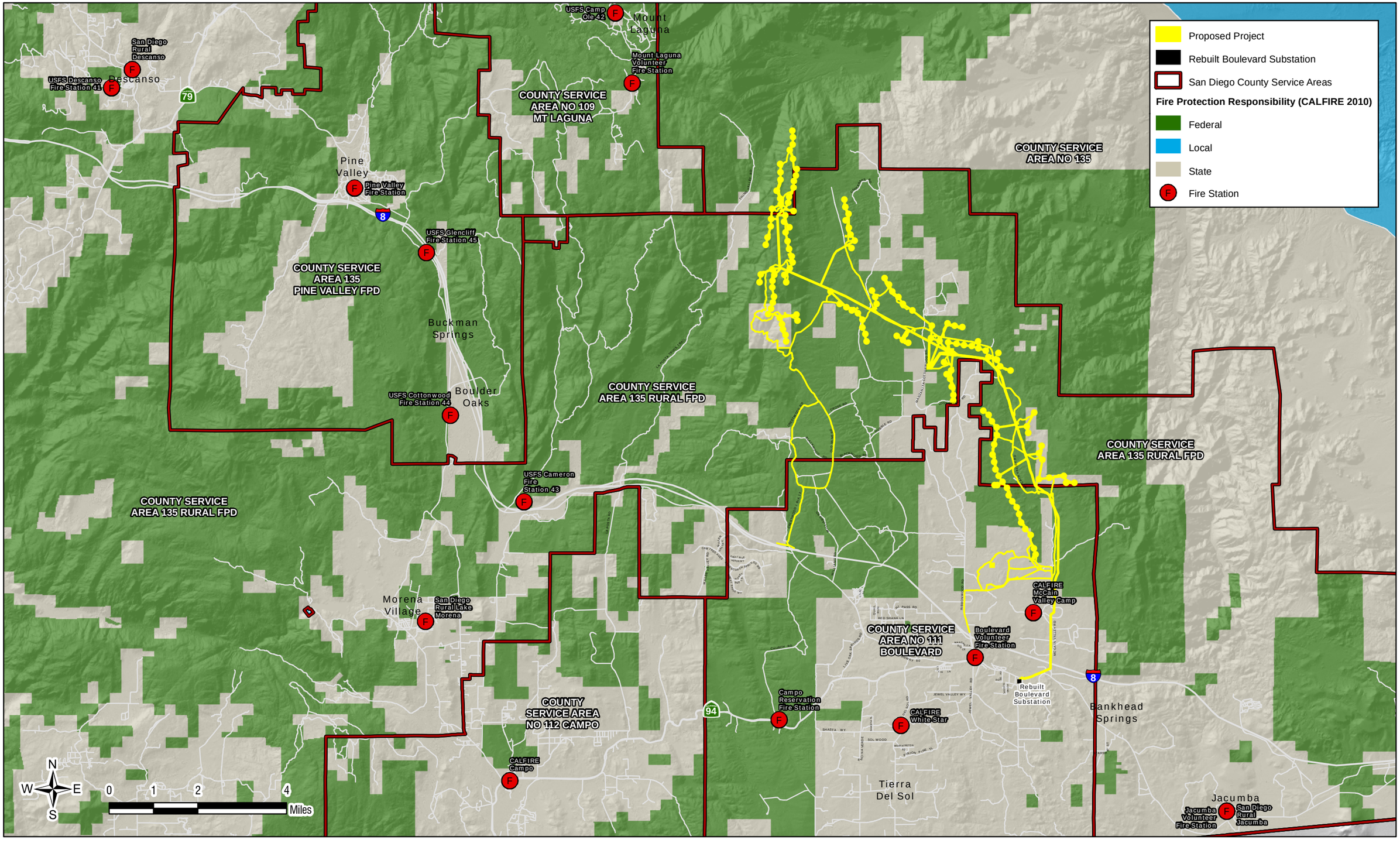
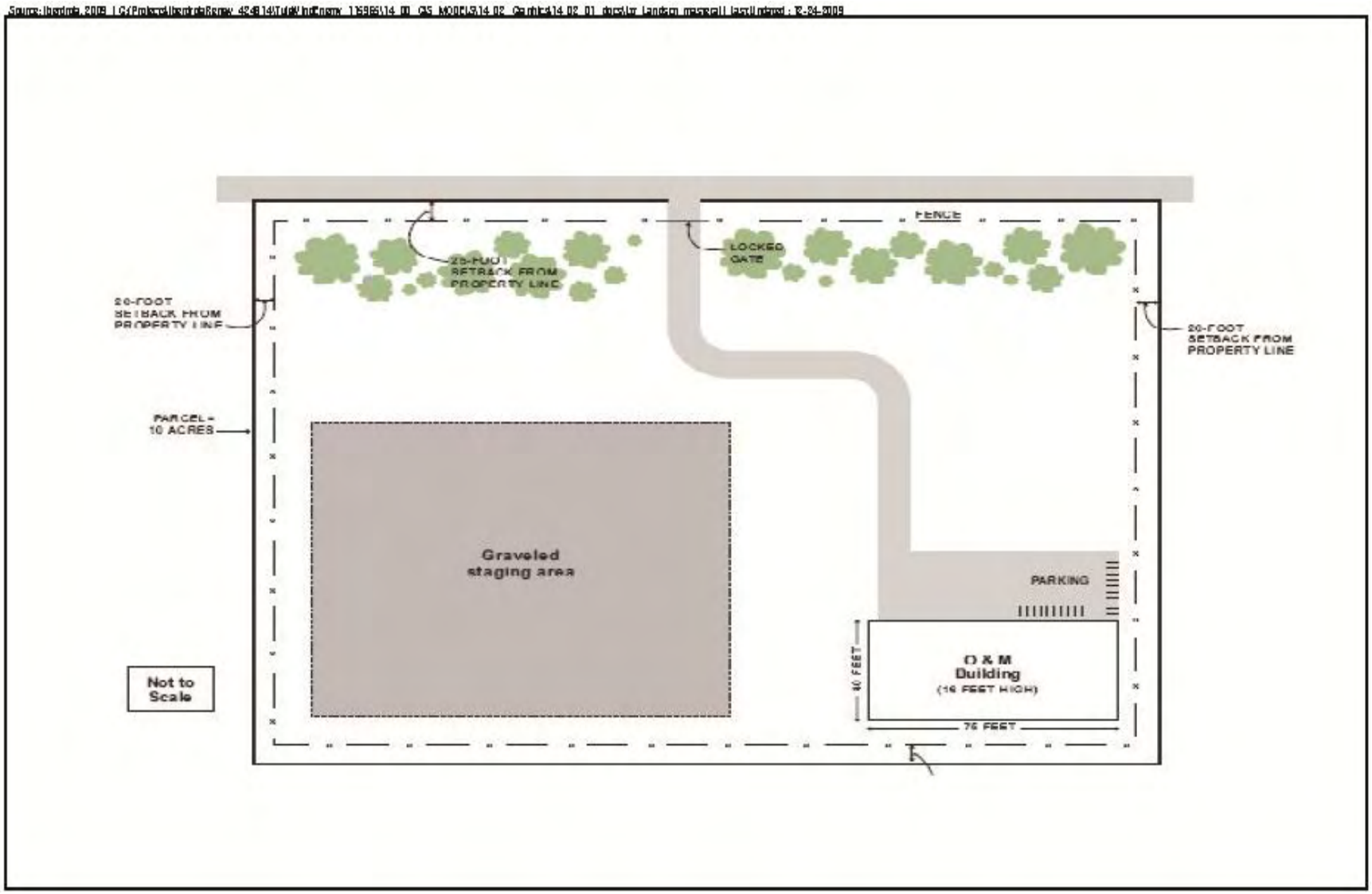
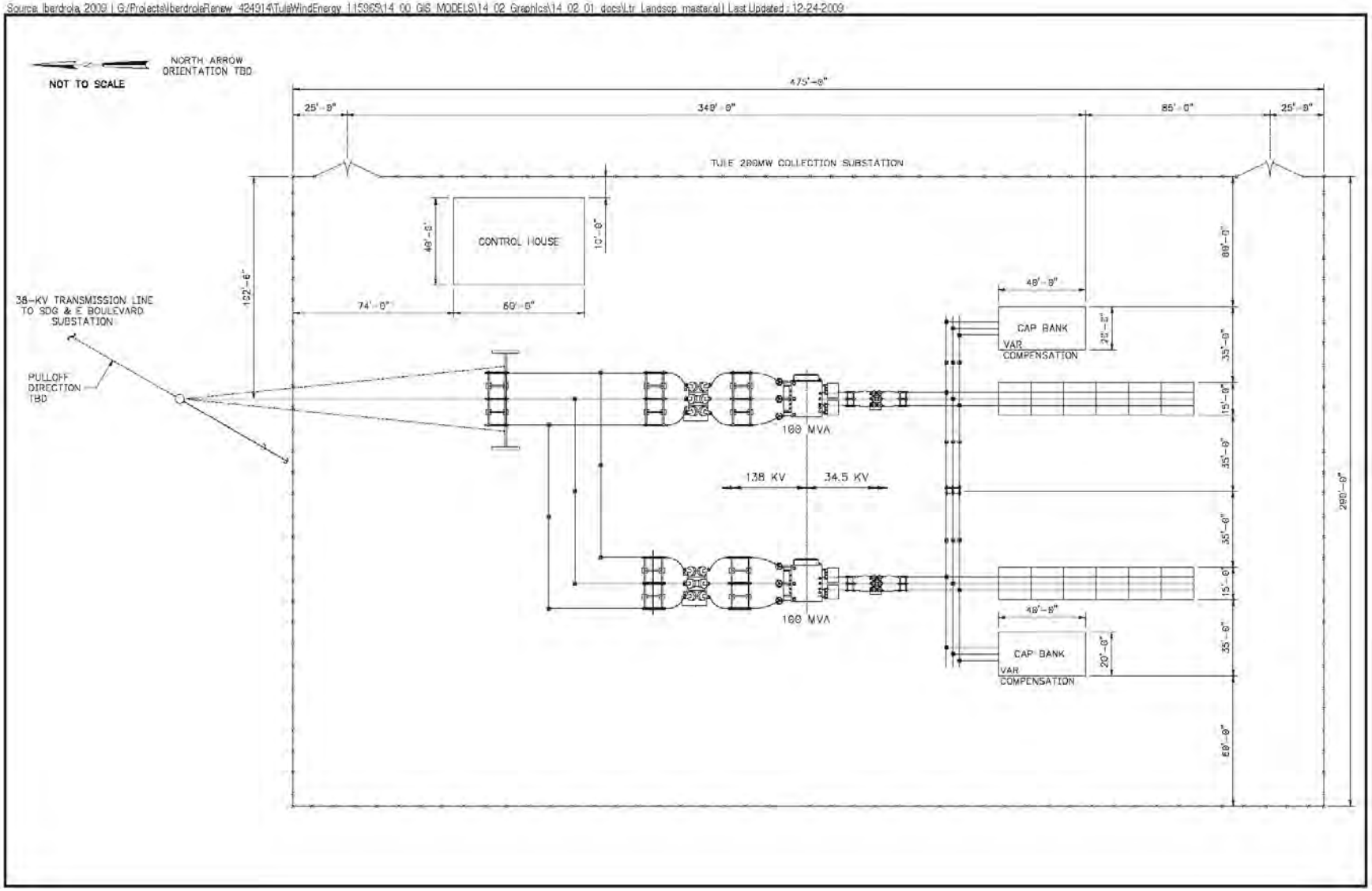


Figure 3
Fire Facilities and Fire District Areas

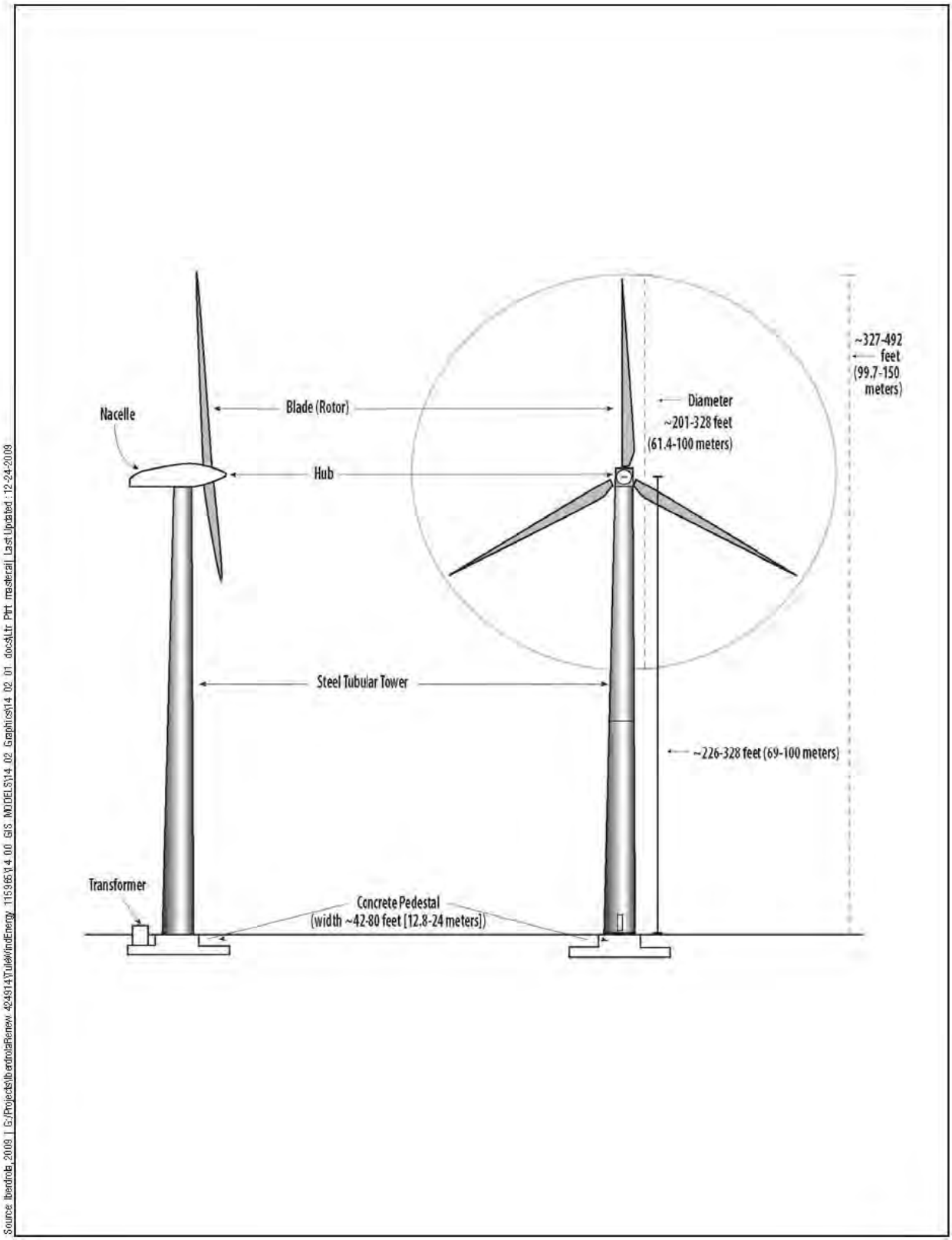


Typical Operations and Maintenance Facility Site **Figure 4**

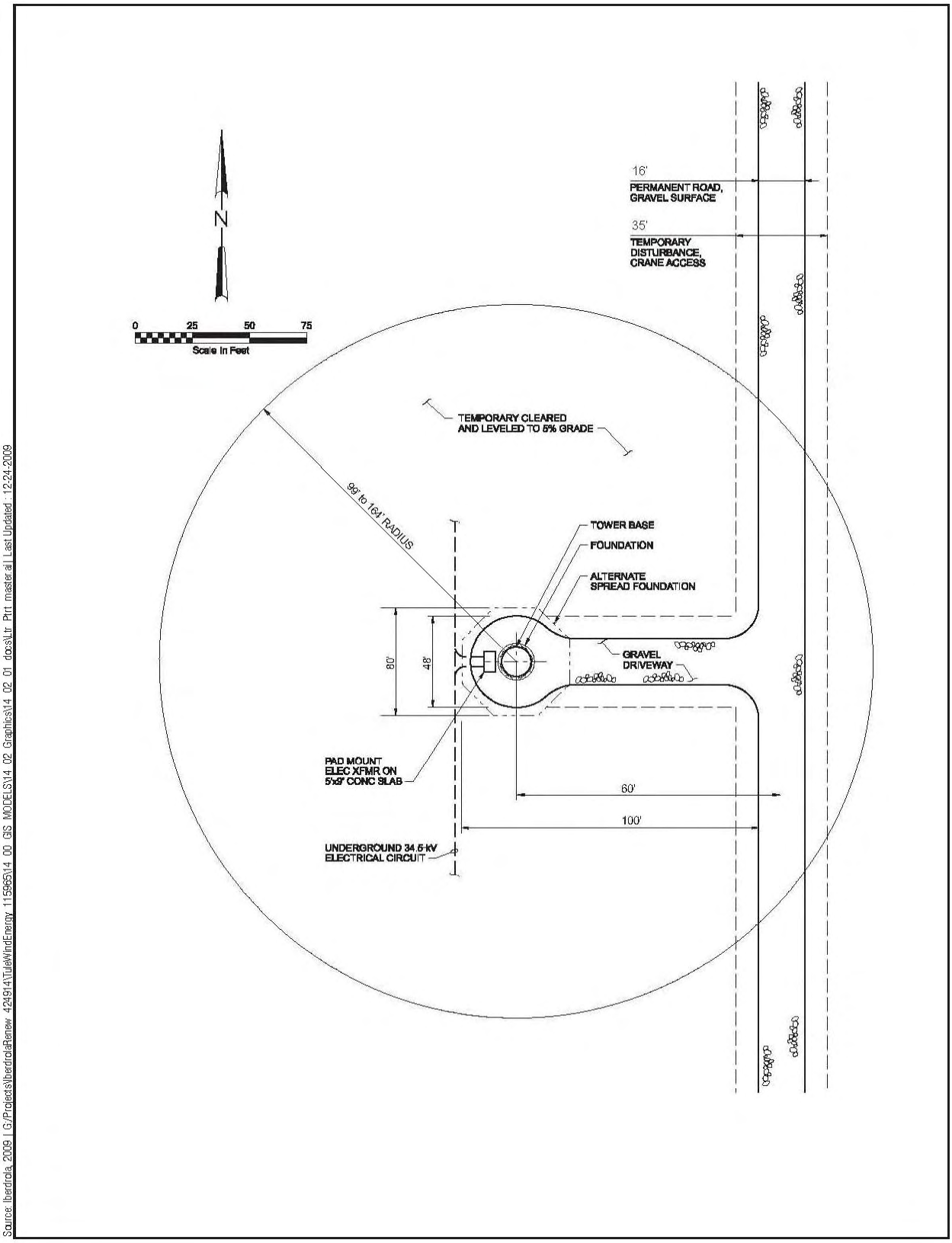
Source: Iberdrola 2009 | G:/Projects\IberdrolaRenew 424914\TuleWindEnergy 115365\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Landscp master.dj | Last Updated : 12-24-2009



200 MW Collection Plan Station View **Figure 5**

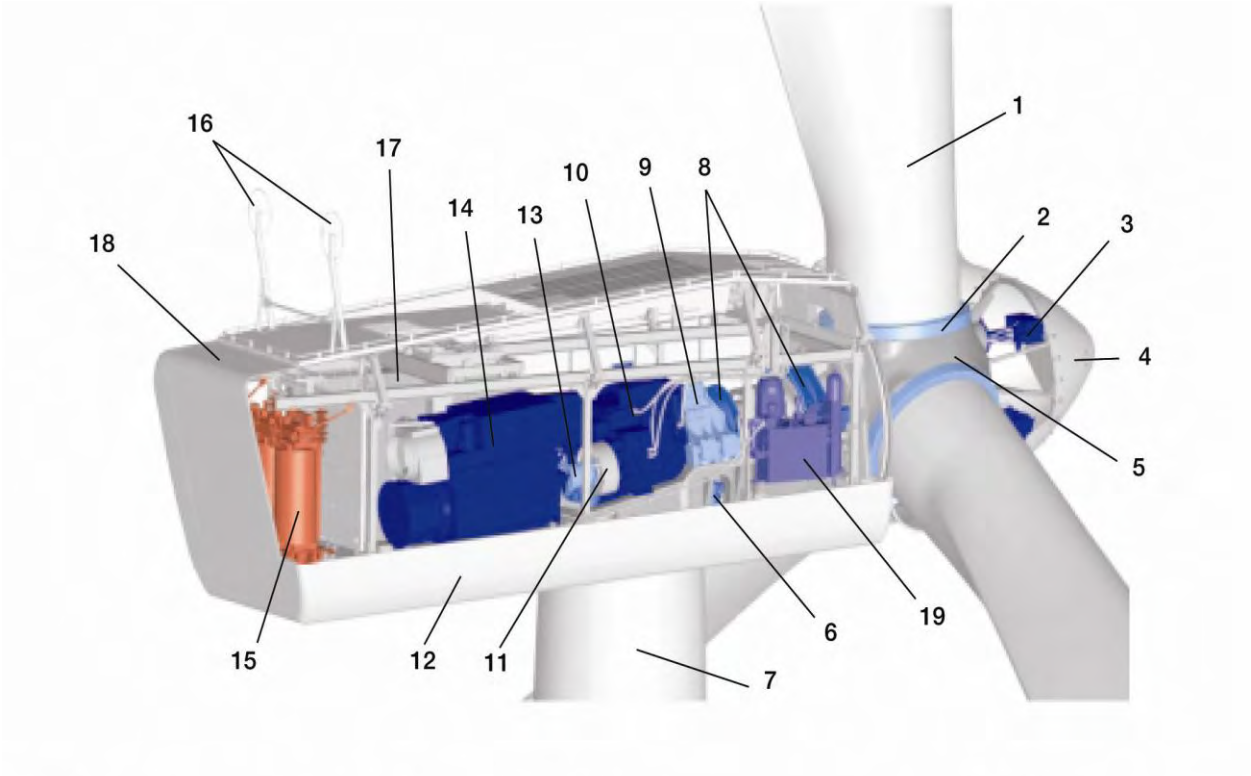


Preliminary Turbine Tower Design **Figure 6**



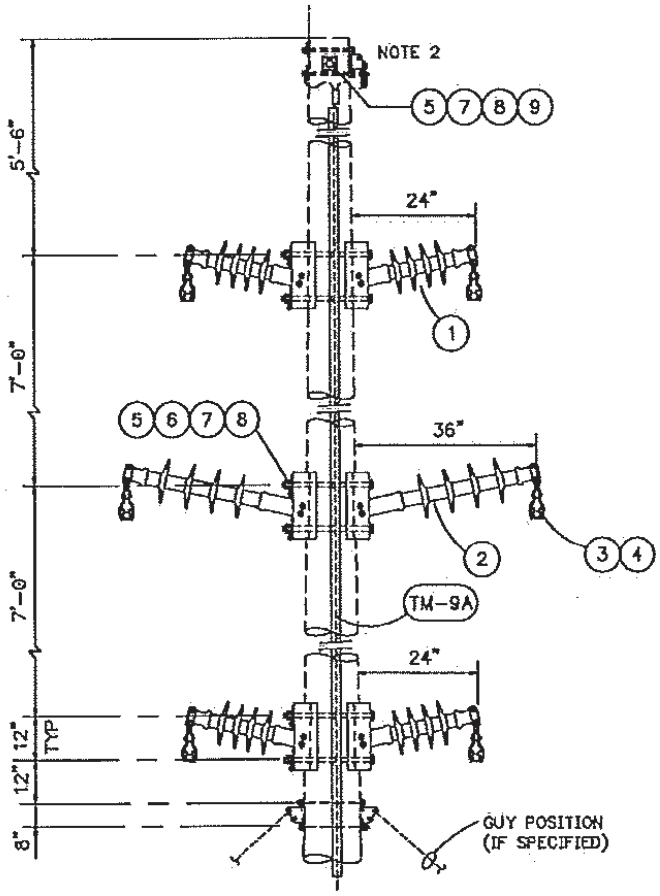
Source: Iberdrola, 2009 | G:/Projects\IberdrolaRenew 4249141\TuleWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prt master.aii | Last Updated : 12-24-2009

Typical Turbine Site **Figure 7**



1. Blade
2. Blade bearing
3. Hydraulic pitch actuator
4. Hub cover
5. Hub
6. Active yaw control
7. Tower
8. Main bearing house
9. Gear tie rod
10. Gearbox
11. Main disc brake
12. Nacelle support frame
13. Cardan or composite shaft
14. Doubly fed generator
15. Transformer
16. Anemometer and wind vane
17. Top controller
18. Nacelle cover
19. Hydraulic unit

Figure 8



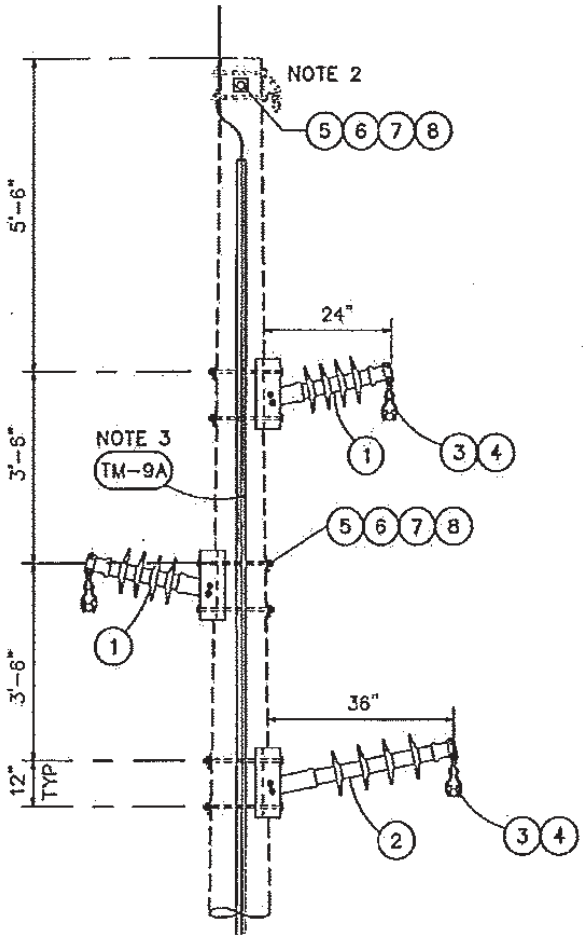
NOTES:

1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHEILD WIRE ASSEMBLIES ARE CALLED OUT ON STAKING SHEETS.

ITEM	QTY	MATERIAL
1	4	Insulator, Polymer, Post, Horizontal, 24", 34.5-kV, MACLEAN H291024VX02
2	2	Insulator, Polymer, Post, Horizontal, 36", 34.5-kV, MACLEAN H391036VX01
3	6	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	6	Clamp, suspension, Armor Grip, 1272 AAC "NARCISSUS", PREFORMED AGS-5138
5	7	Bolt, machine, 7/8", by required length
6	6	Washer, round 2"x 1/4", 15/16" dia. hole
7	7	Locknut, 7/8", MF type
8	7	Washer, spring, 7/8"
9	2	Washer, curved, 4" Sq. x 1/4", 15/16" Dia. Hole
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola,2009 | G:/Projects\Iberdrola\Renew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prtrt master.ai | Last Updated: 12-24-2009

Typical Overhead 34.5 kV Single Circuit Collector Line **Figure 9a**

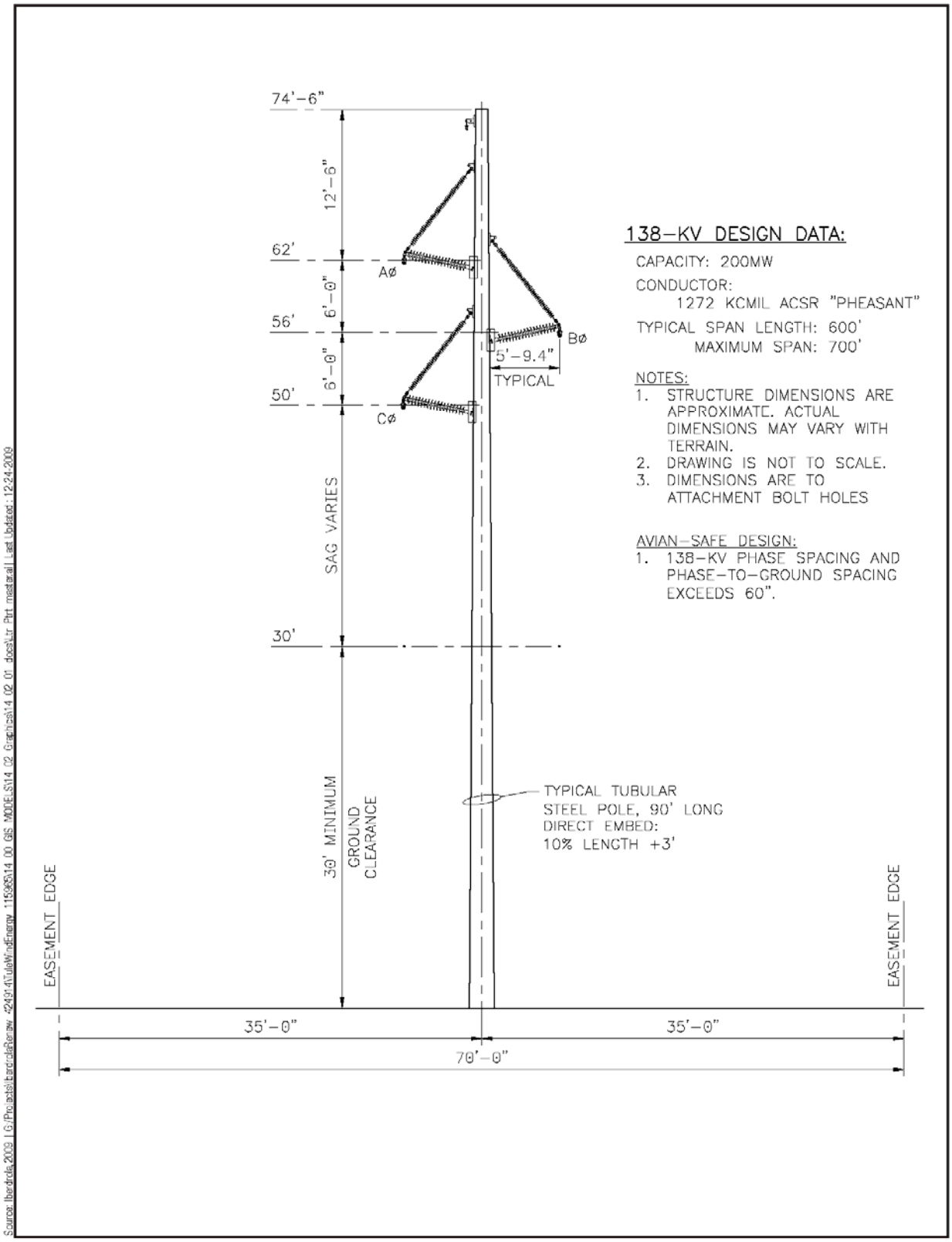


NOTES:
1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHIELD WIRE ASSEMBLIES ARE CALLED OUT SEPARATELY ON STAKING SHEETS.
3. SPECIAL MOLDING REQUIRED FOR RAPTOR-SAFE DESIGN.

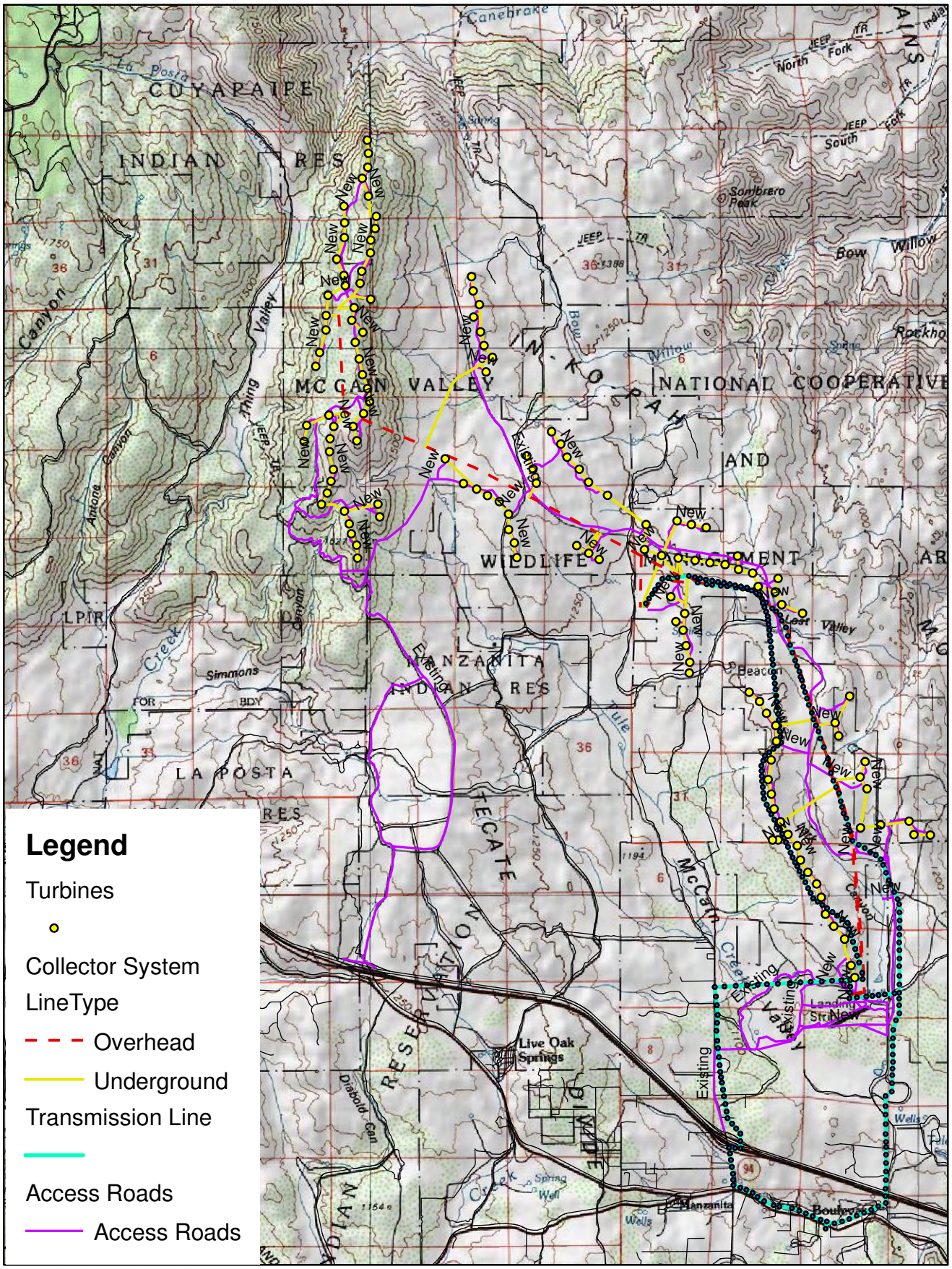
ITEM	QTY	MATERIAL
1	2	Insulator, polymer, post, horizontal, 24", 34.5-kV, 2½" rod, MACLEAN H291024VX02 OR LAPP CL2-024-216-29-A
2	1	Insulator, polymer, post, horizontal, 36", 34.5-kV, 3" rod, MACLEAN H391036VX01
3	3	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	3	Clamp, suspension, Cushion-Grip, 1272 AAC "NARCISSUS", PREFORMED CGS-1115
5	7	Bolt, machine, ⅞", by required length
6	8	Washer, curved, 4" sq.x ¼", 15/16" dia. hole
7	7	Locknut, ⅞", MF type
8	7	Washer, spring, ⅞"
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola 2009 | G:/Projects/IberdrolaRenew 424914/TuleWindEnergy 115965/14 00 GIS MODELS/14 02 Graphics/14 02 01 docs/Ltr Prt master.ai | Last Updated: 12-24-2009

Typical Overhead 34.5 kV Double Circuit Collector Line **Figure 9b**



Typical 138kV Steel Tangent Pole **Figure 10**

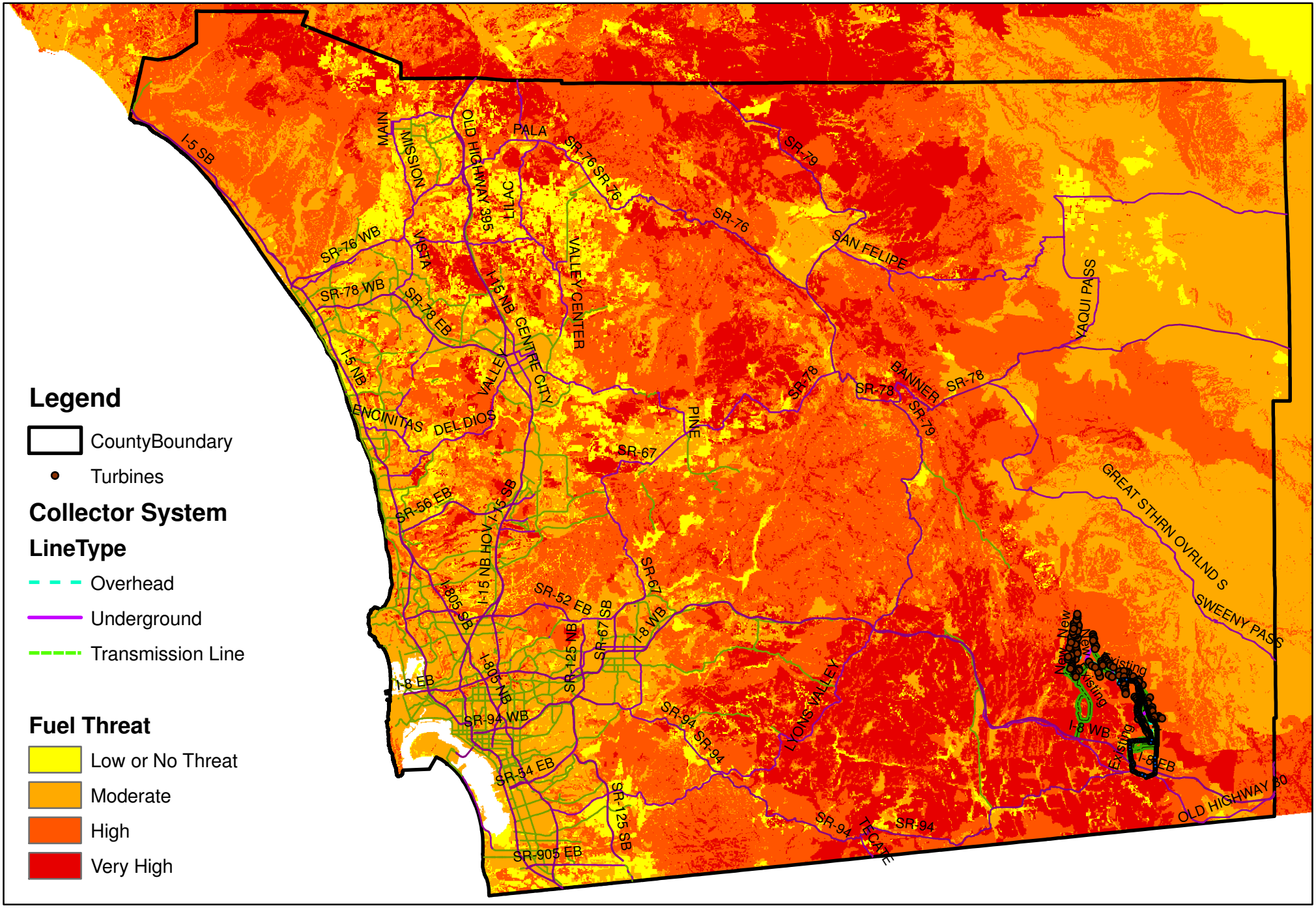


Source: USGS 7.5' Quad: Cameron Corners, Live Oak Springs, Mount Laguna, Sombrero Peak

Figure 11
Topographic Map

N

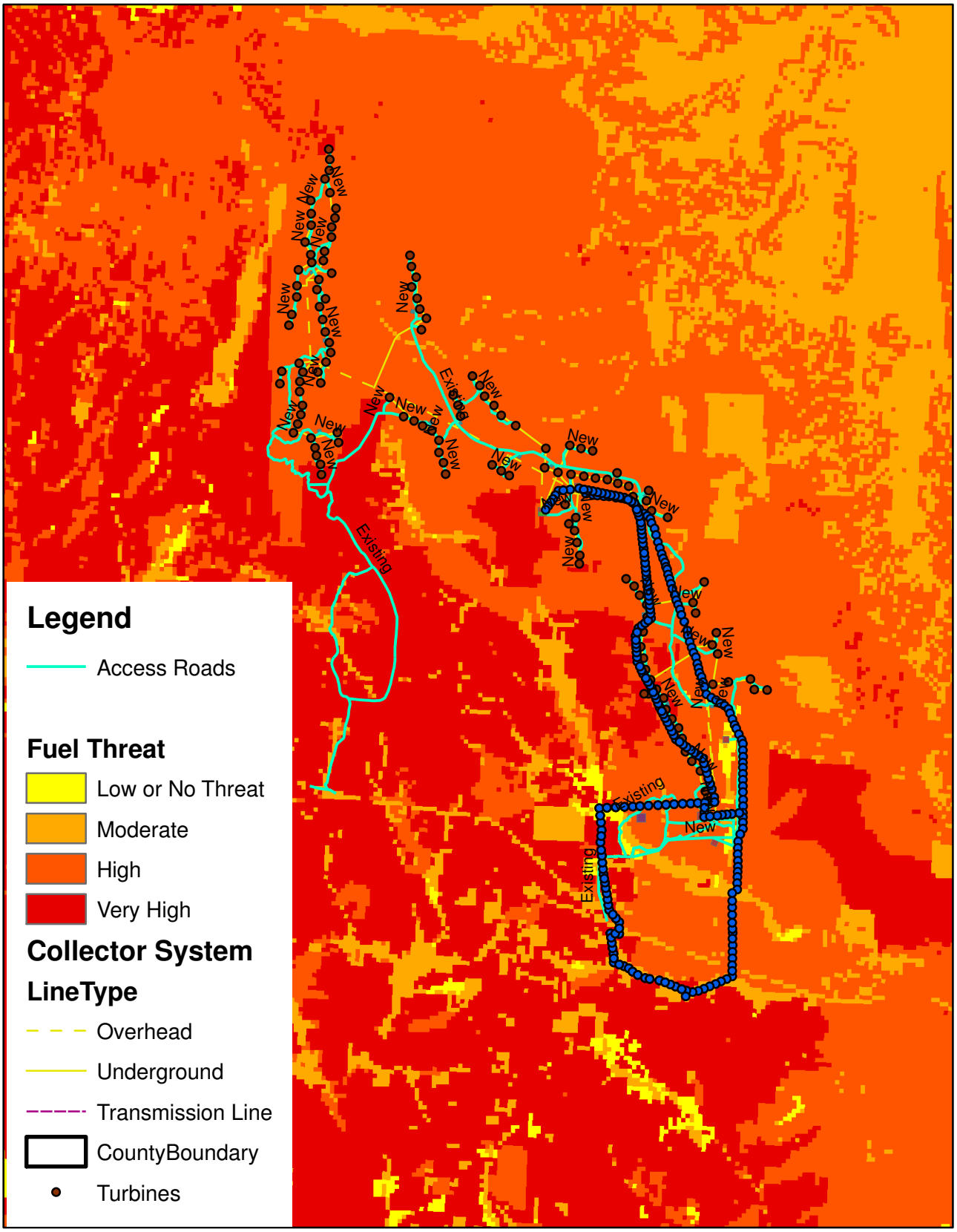
1 0.5 0 1 2
Miles



Source: http://frap.cdf.ca.gov

Figure 12
San Diego County
Fire Hazard Severity Map

N
0 2.5 5 10 15 20 Miles

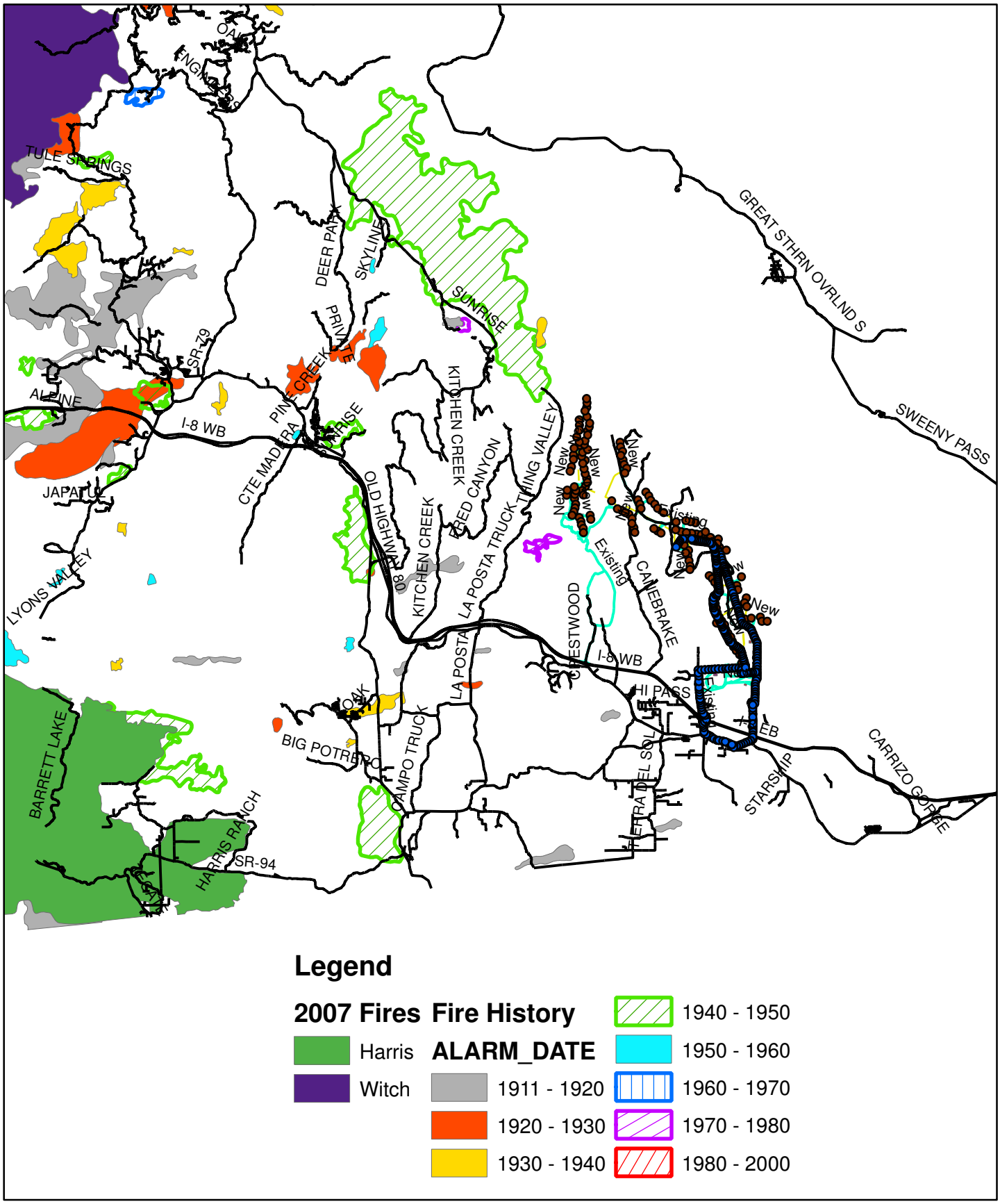


Source: http://frap.cdf.ca.gov

N

0 0.5 1 2 3 Miles

Figure 13
Fire Threat Map



Source: http://frap.cdf.ca.gov

Figure 14
Fire History Map

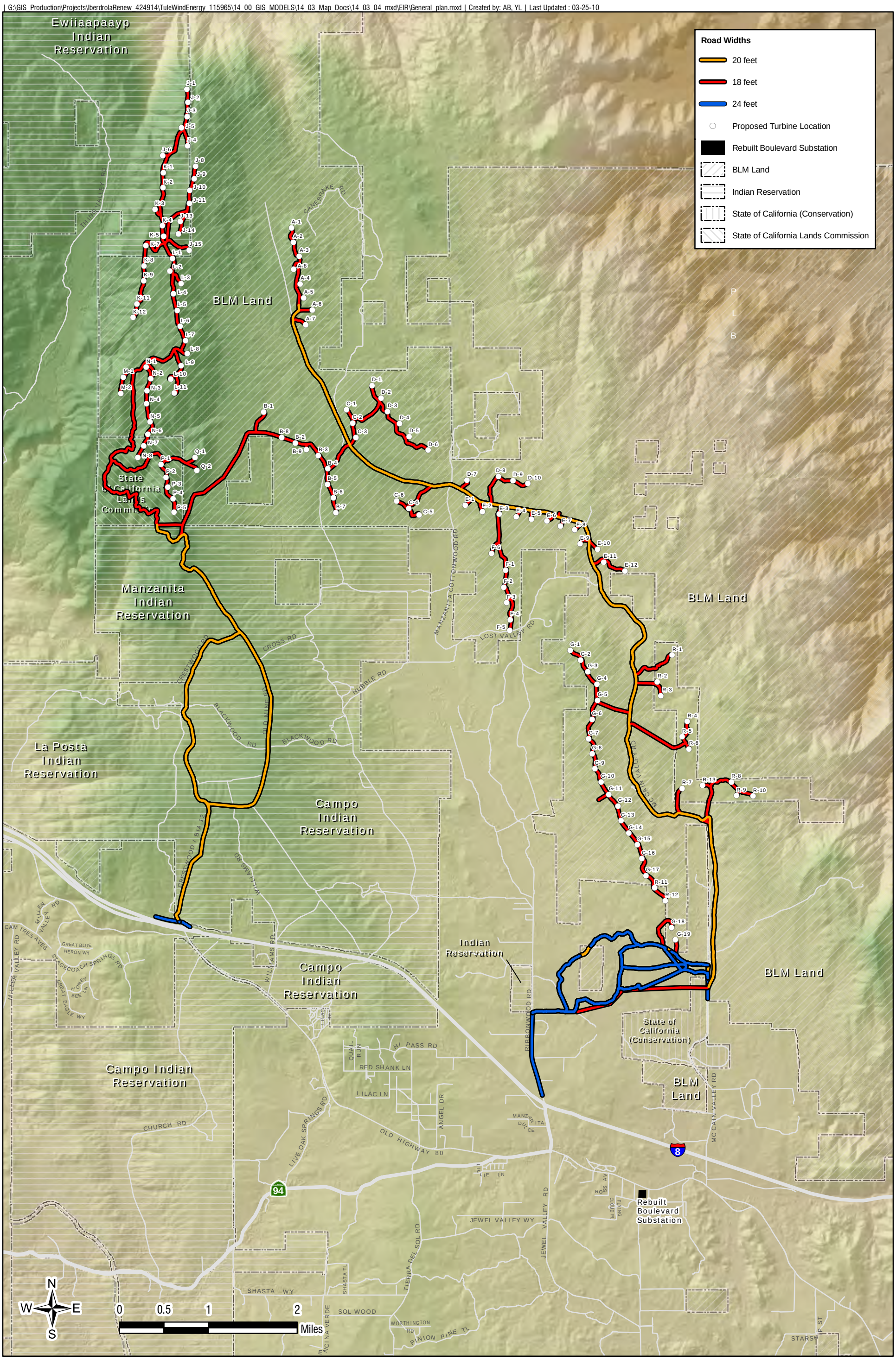
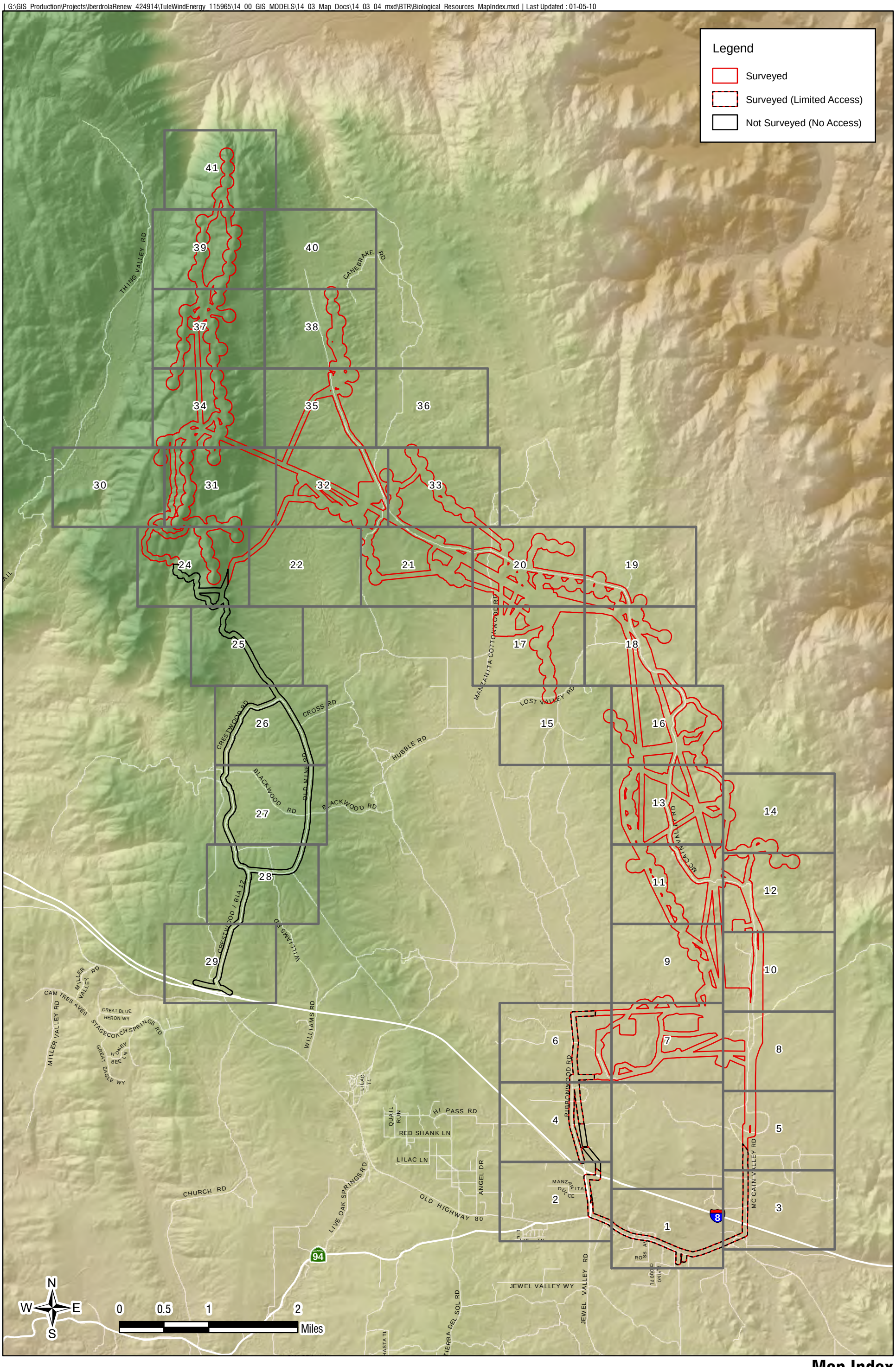


Figure 15
County Roadway Improvements

TECHNICAL APPENDICES

APPENDIX A

Biology Resources Maps



HDR
ONE COMPANY | *Many Solutions*℠

Map Index
FIGURE 1
Iberdrola | Tule Wind Project | EIR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 1)

Figure 2

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
d Disturbed
Fuel Break
b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

I:G:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 2)

Figure 3

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lscd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

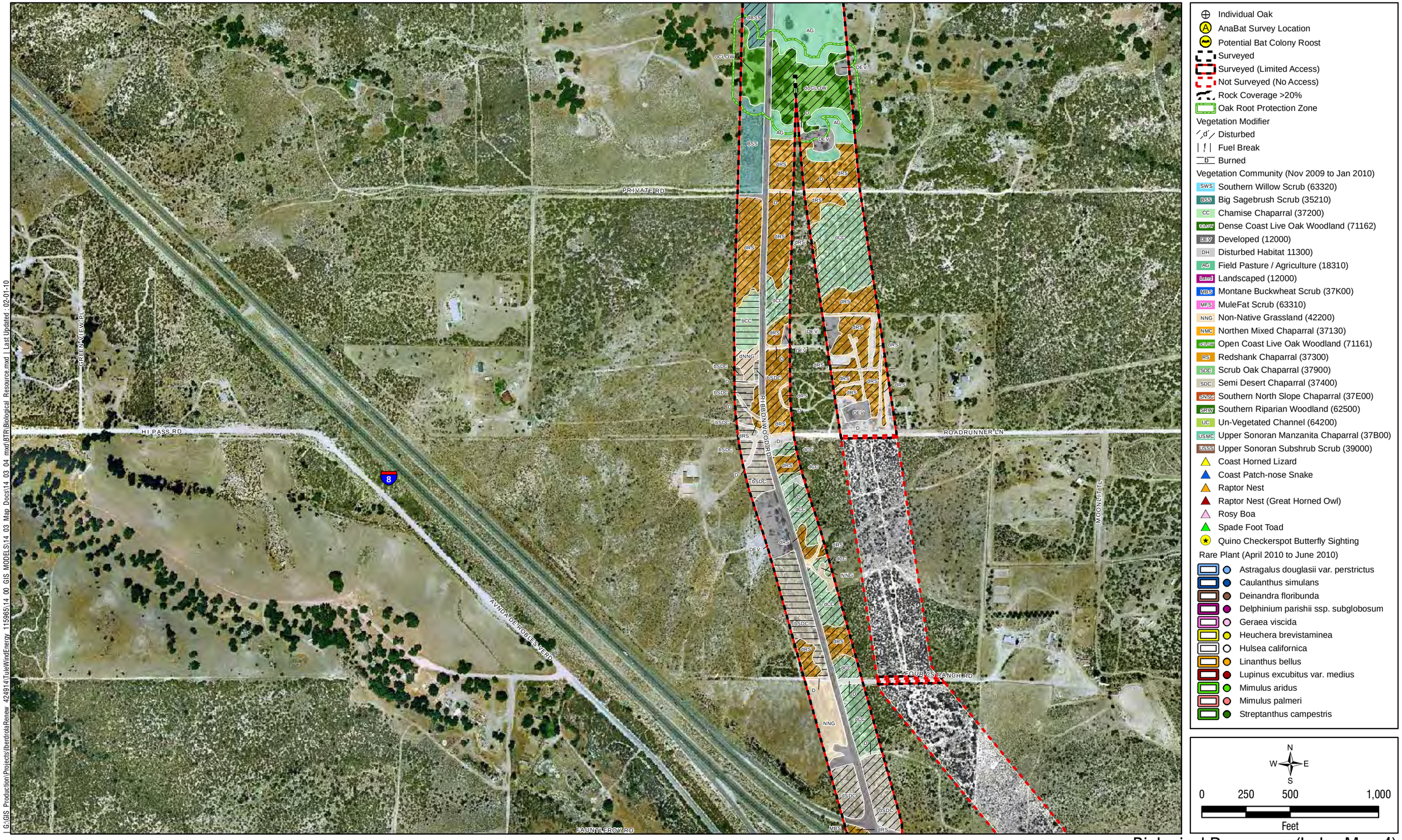
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 3)

Figure 4

Iberdrola | Tule Wind Project | BTR



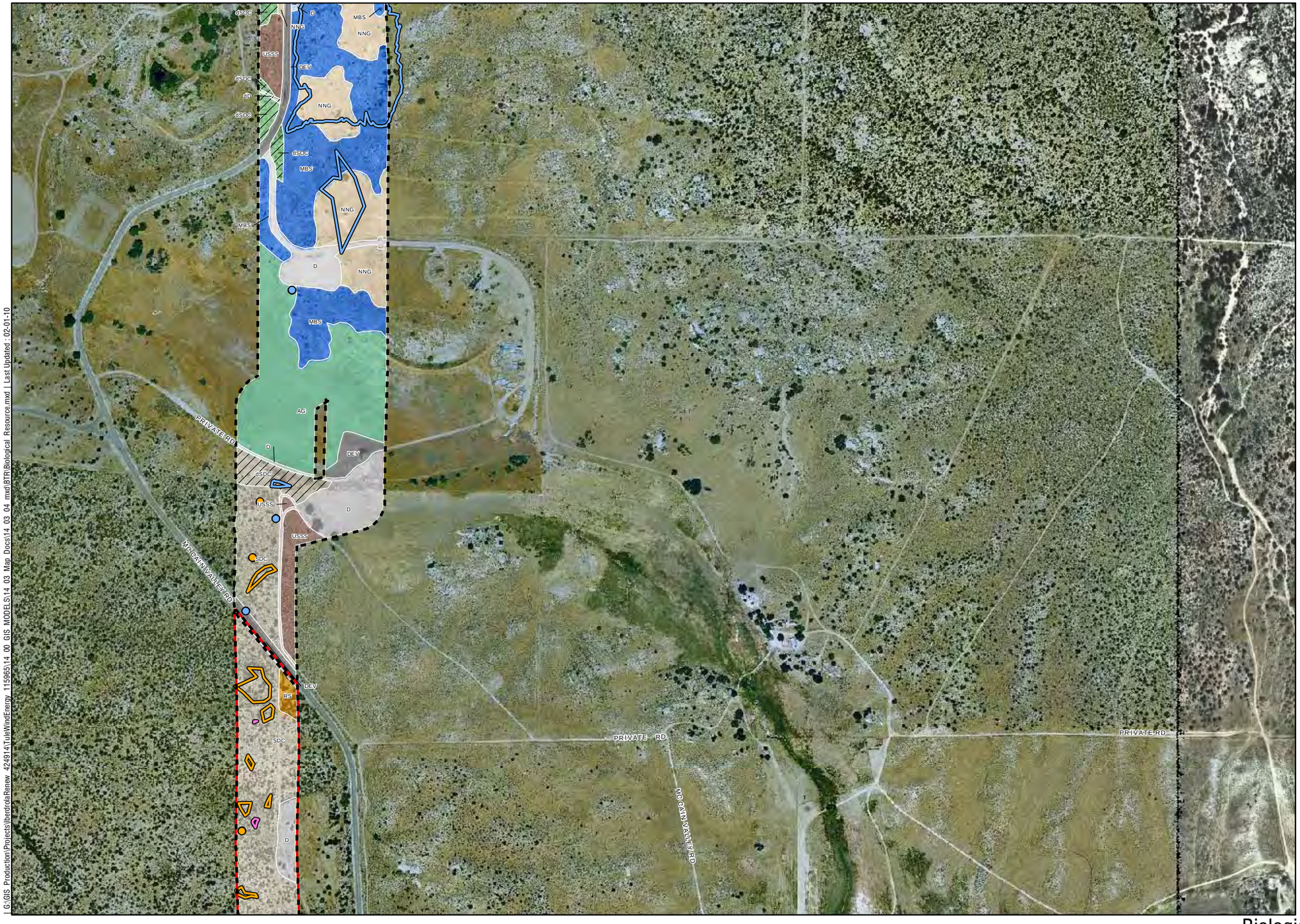
I:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 4)

Figure 5

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lscd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

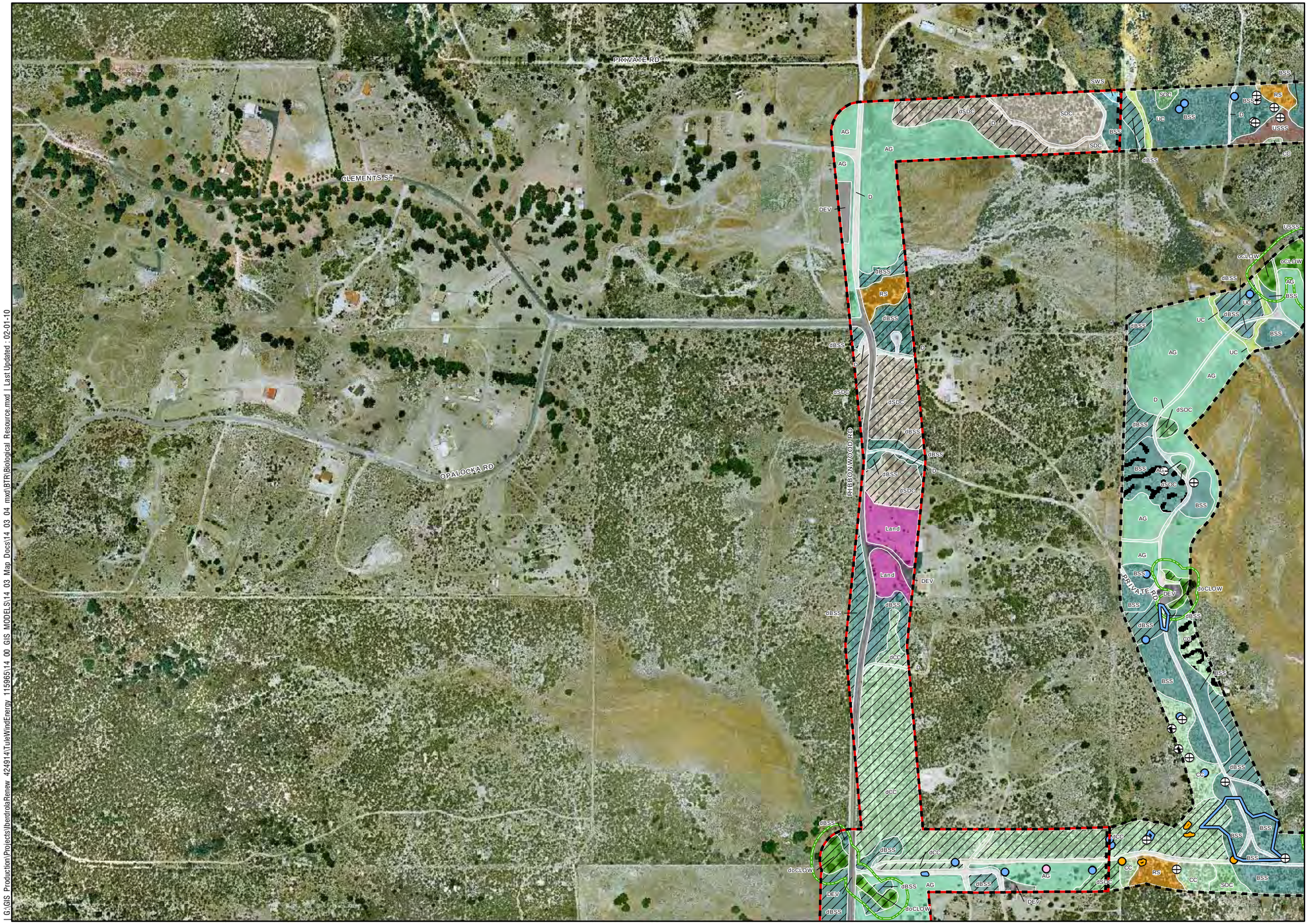
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 5)

Figure 6

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

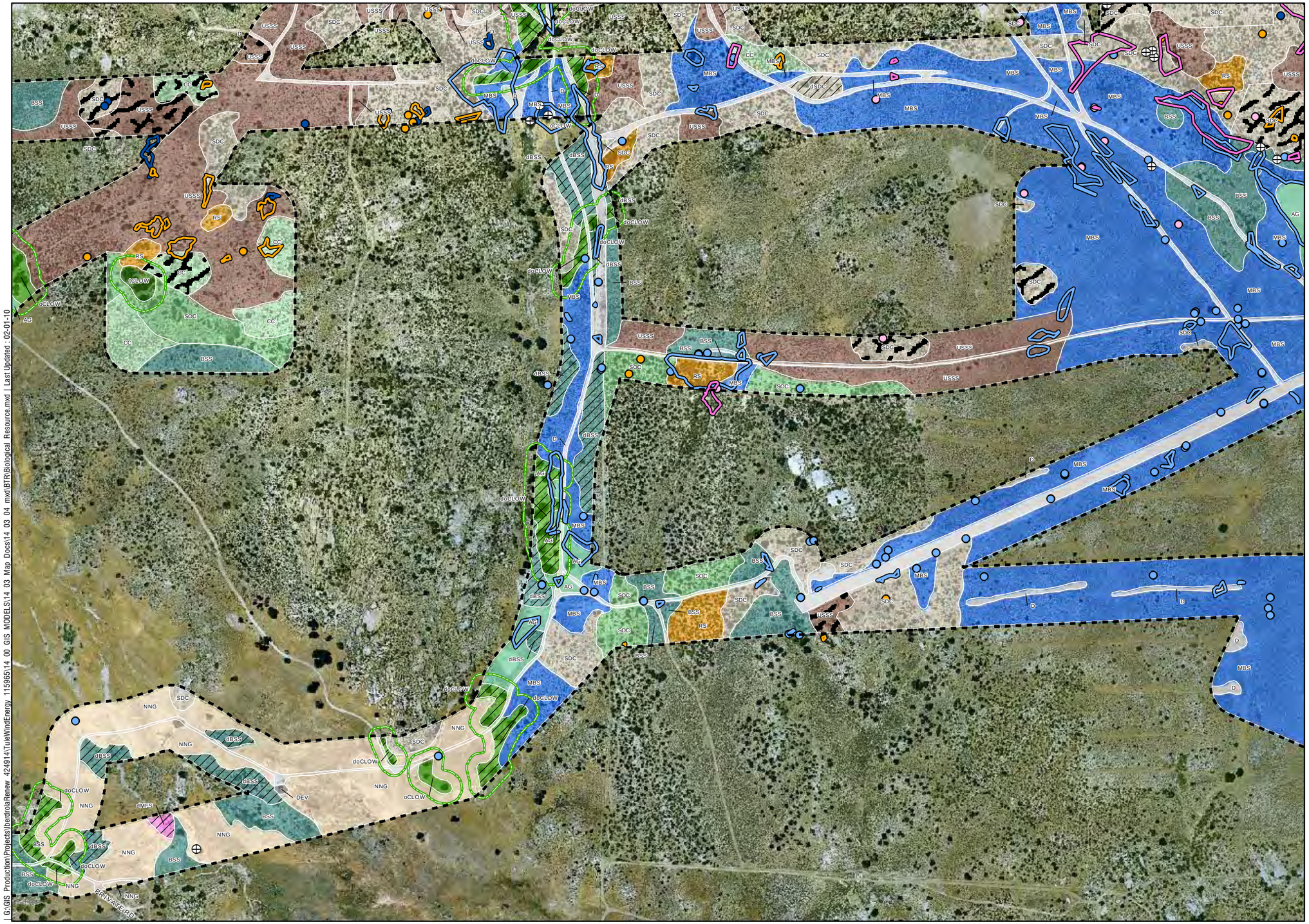
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 6)

Figure 7

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

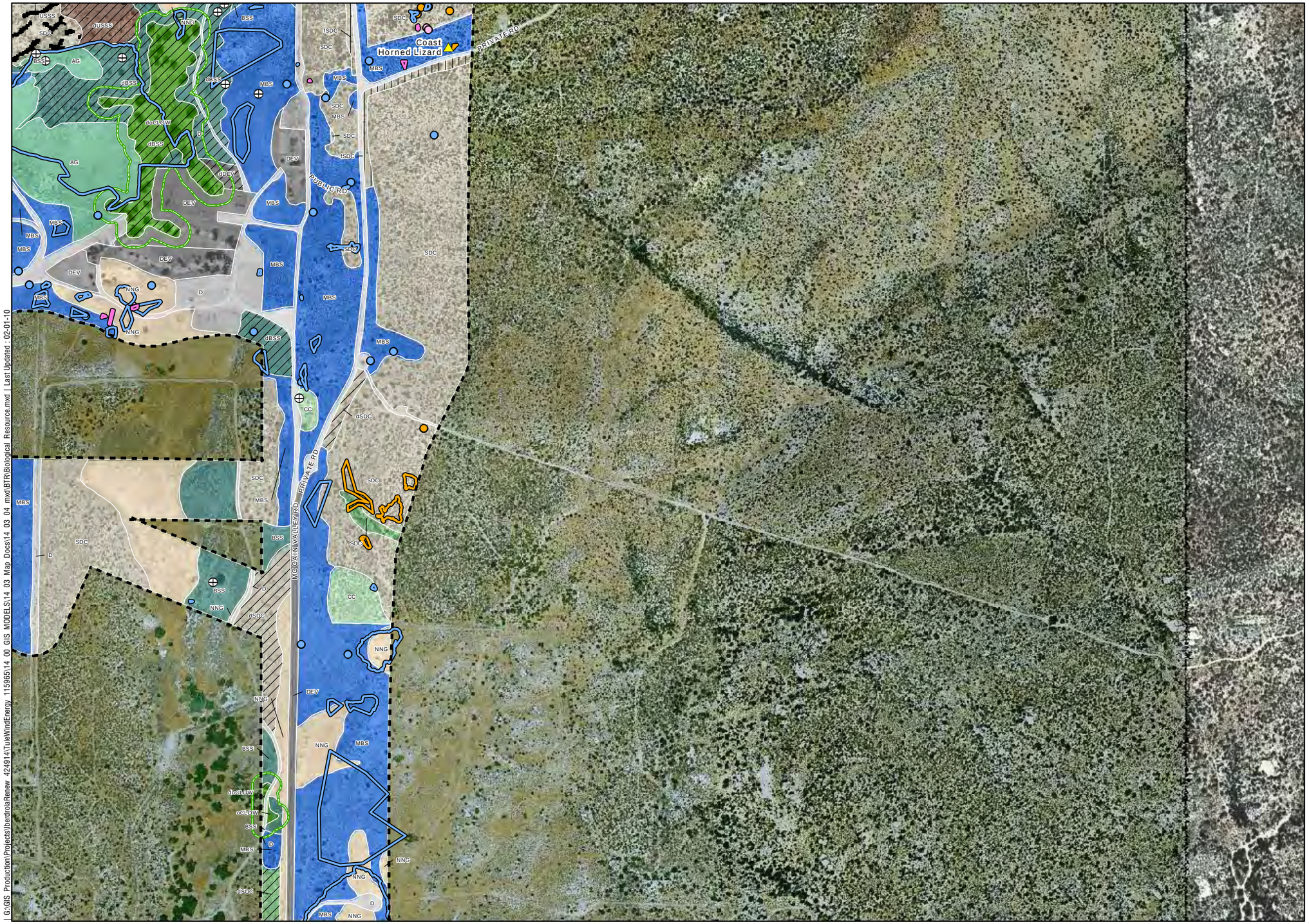
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 7)

Figure 8

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

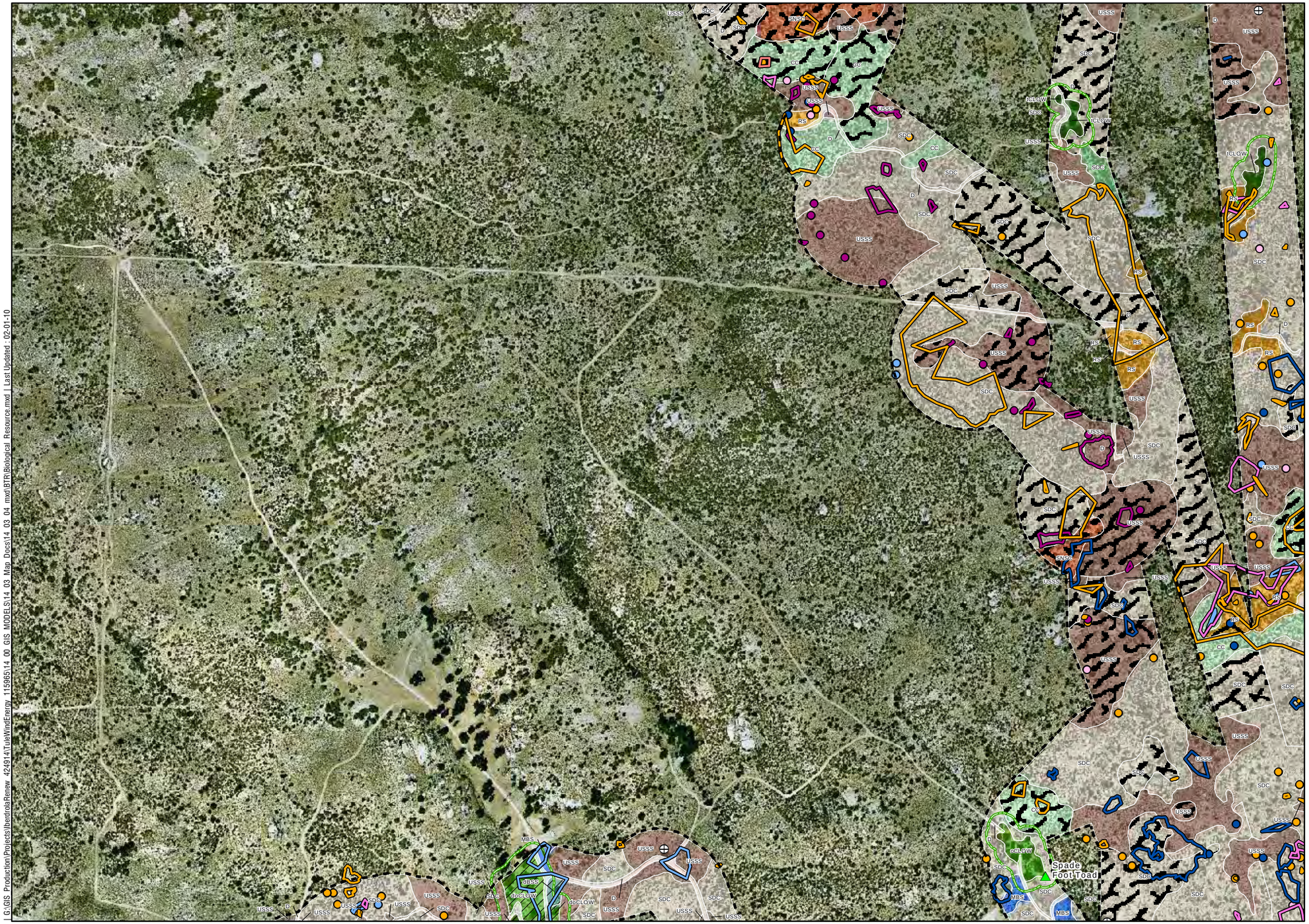
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 8)

Figure 9

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- dcLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- ocLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

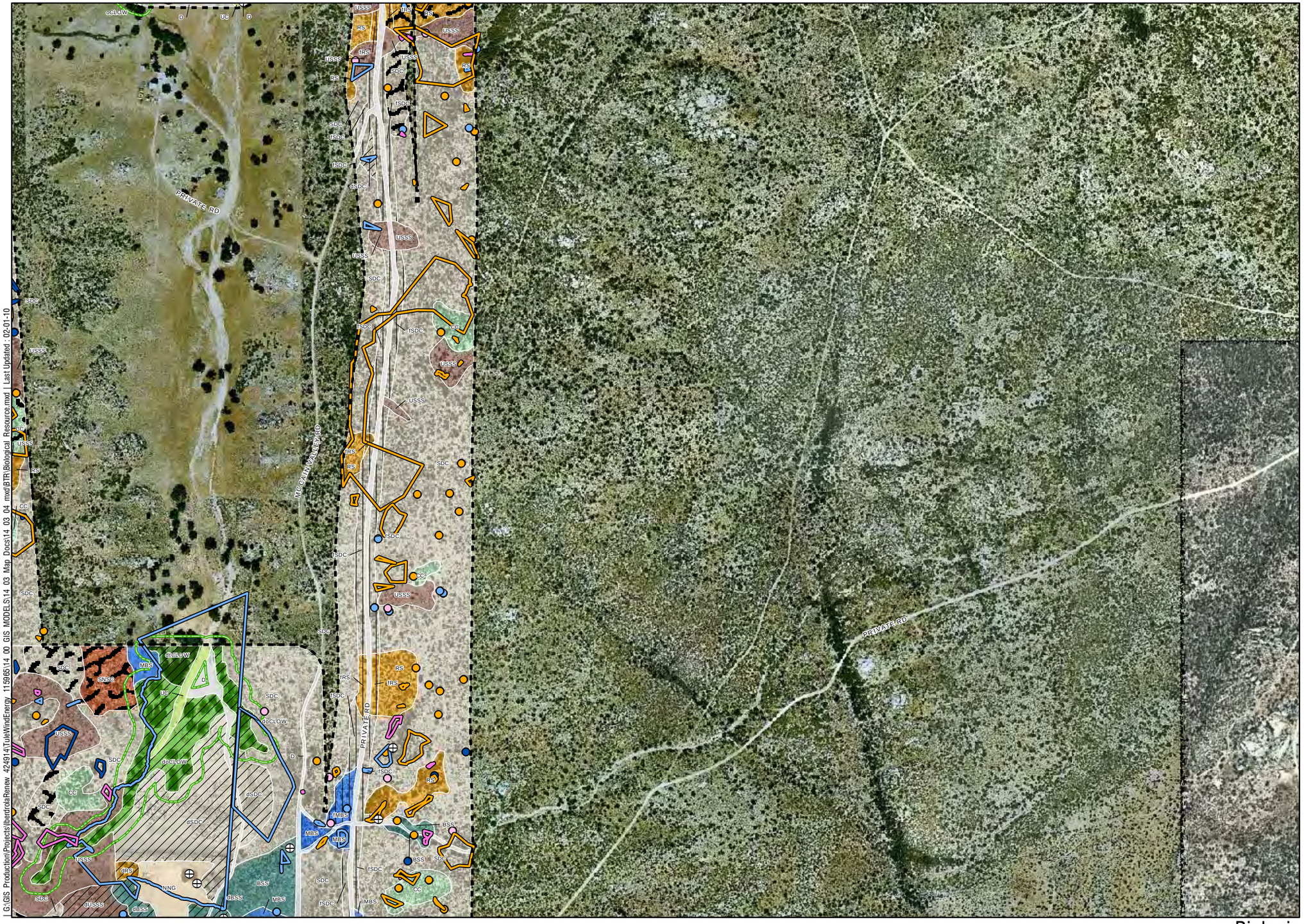
G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 9)

Figure 10

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_1159665\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 10)

Figure 11

Iberdrola | Tule Wind Project | BTR

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

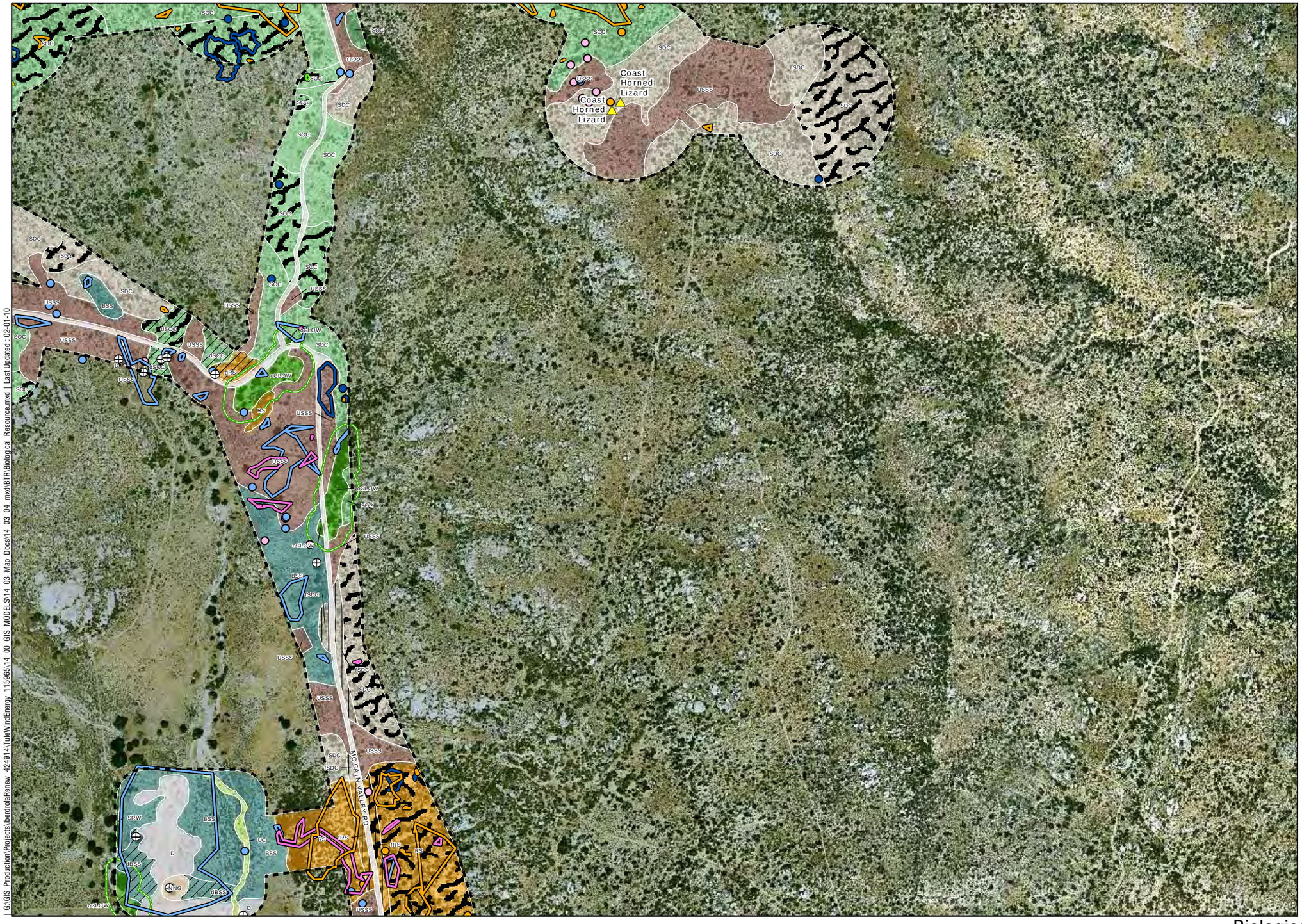
Biological Resources (Index Map 11)

Figure 12

Iberdrola | Tule Wind Project | BTR

HDR

ONE COMPANY | *Many Solutions*



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- ocLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- ocLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

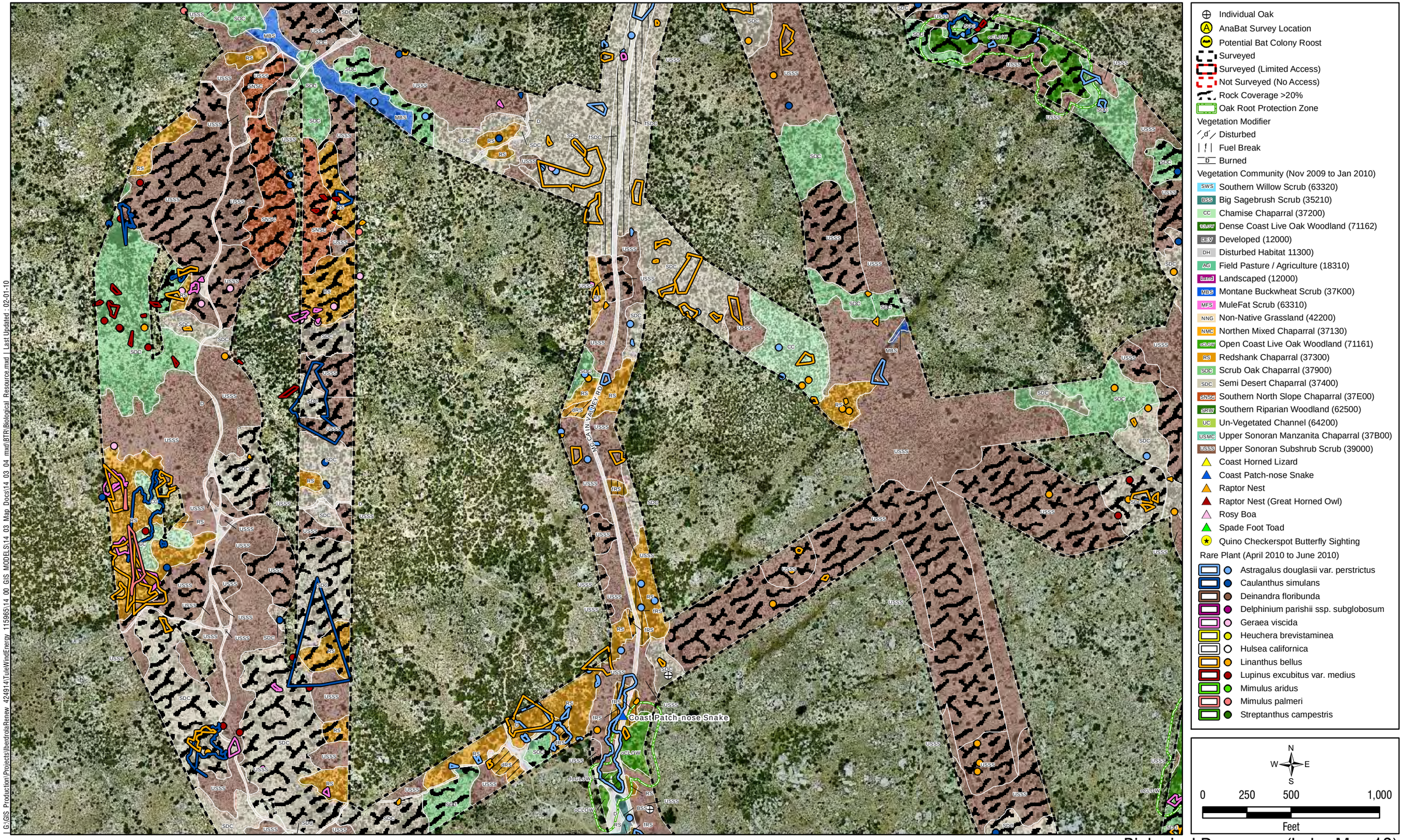
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_1159651\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 12)

Figure 13

Iberdrola | Tule Wind Project | BTR



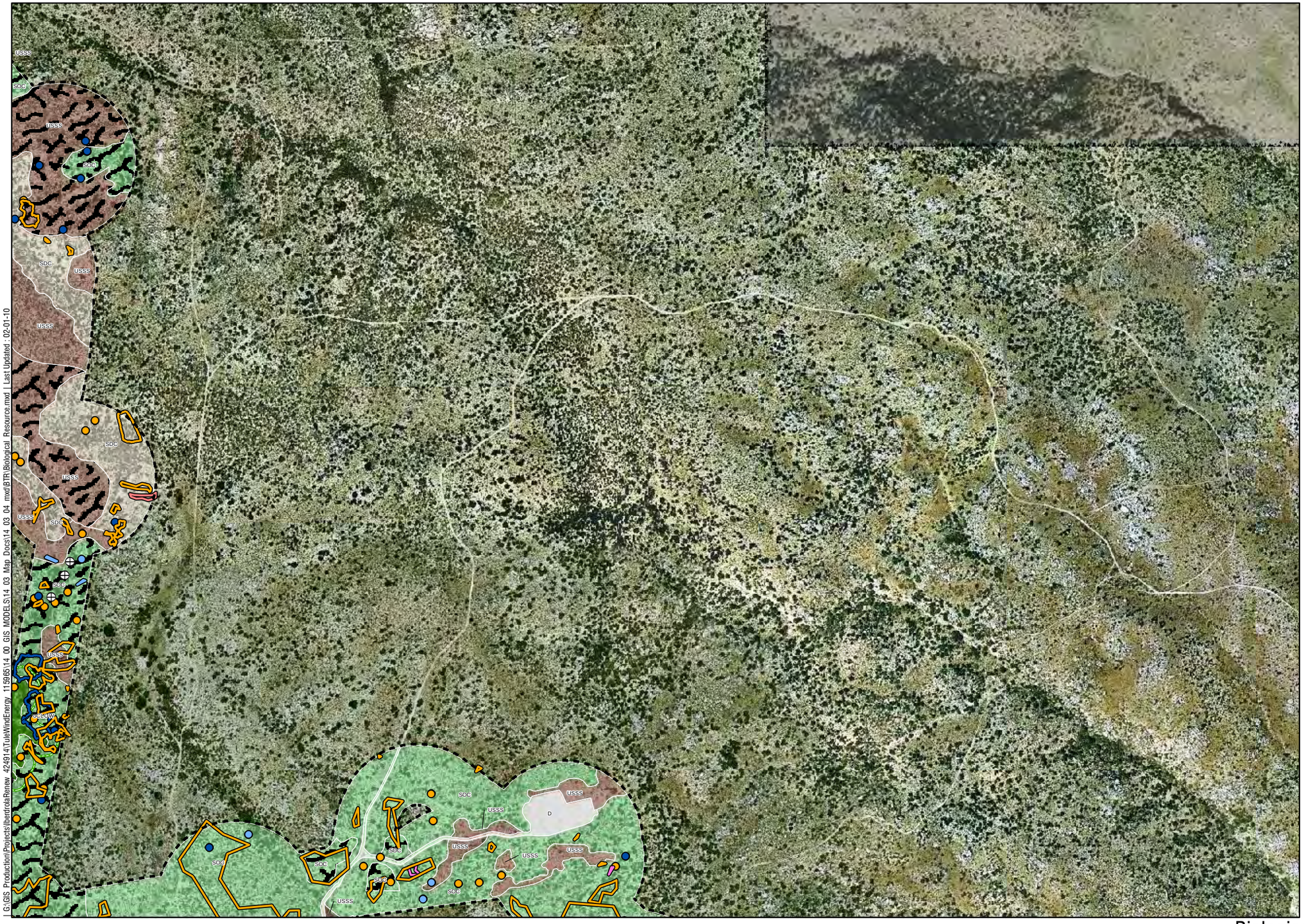
I:\GIS Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 13)

Figure 14

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_1159865\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 14)

Figure 15

Iberdrola | Tule Wind Project | BTR

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

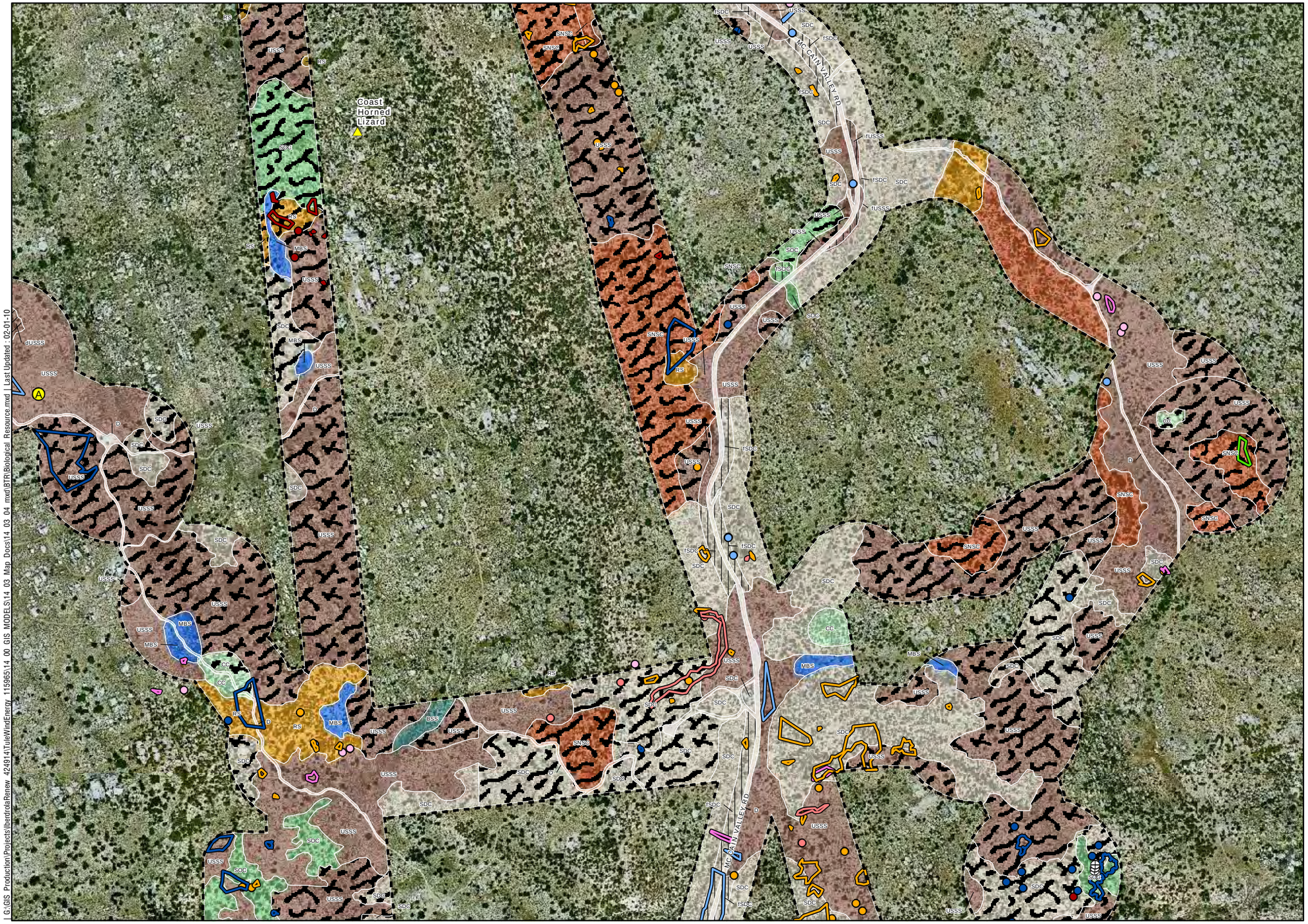
G:\GIS_Production\Projects\IberdrolaRenew_4249141\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 15)

Figure 16

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

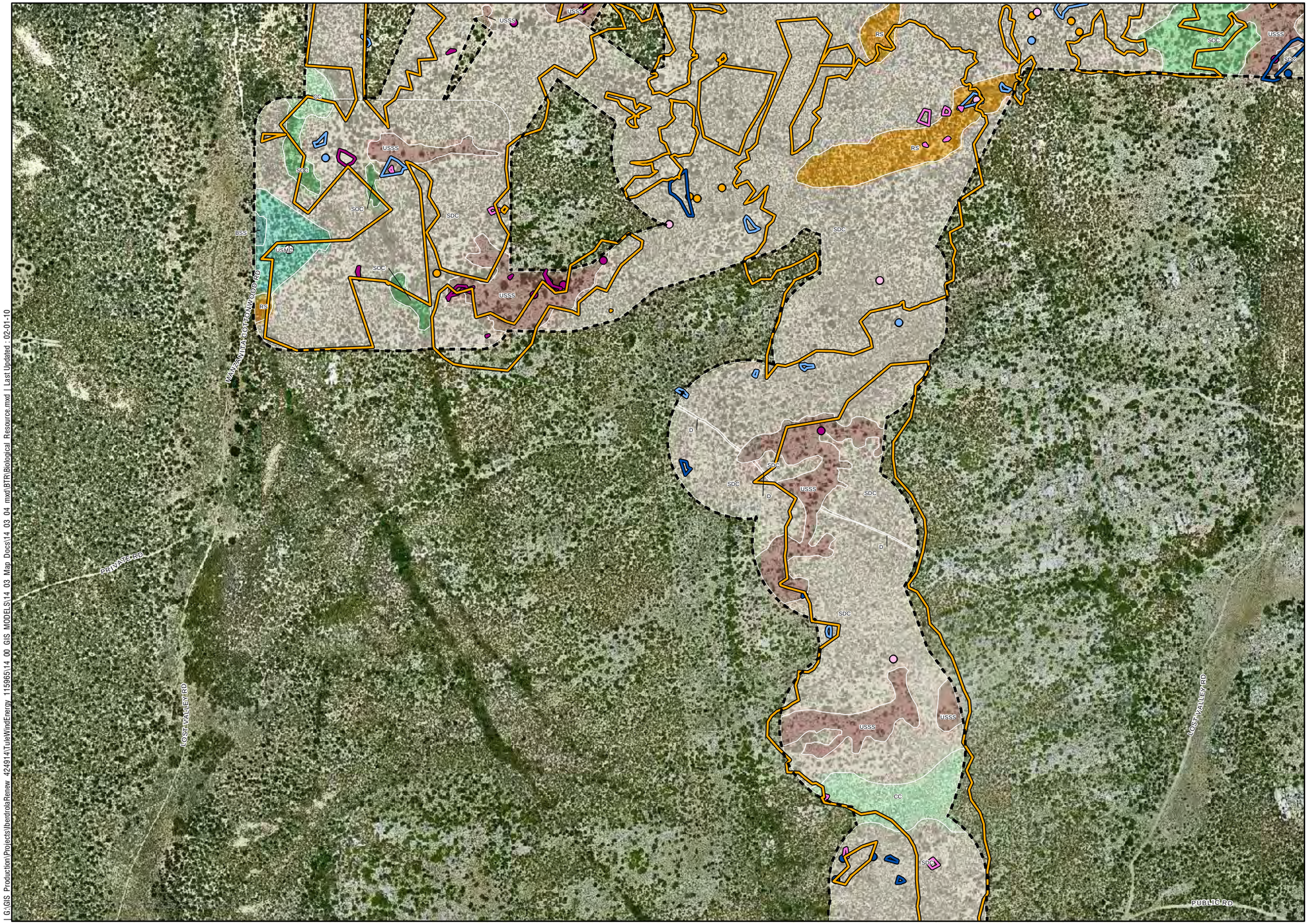
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 16)

Figure 17

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

I:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 17)

Figure 18

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

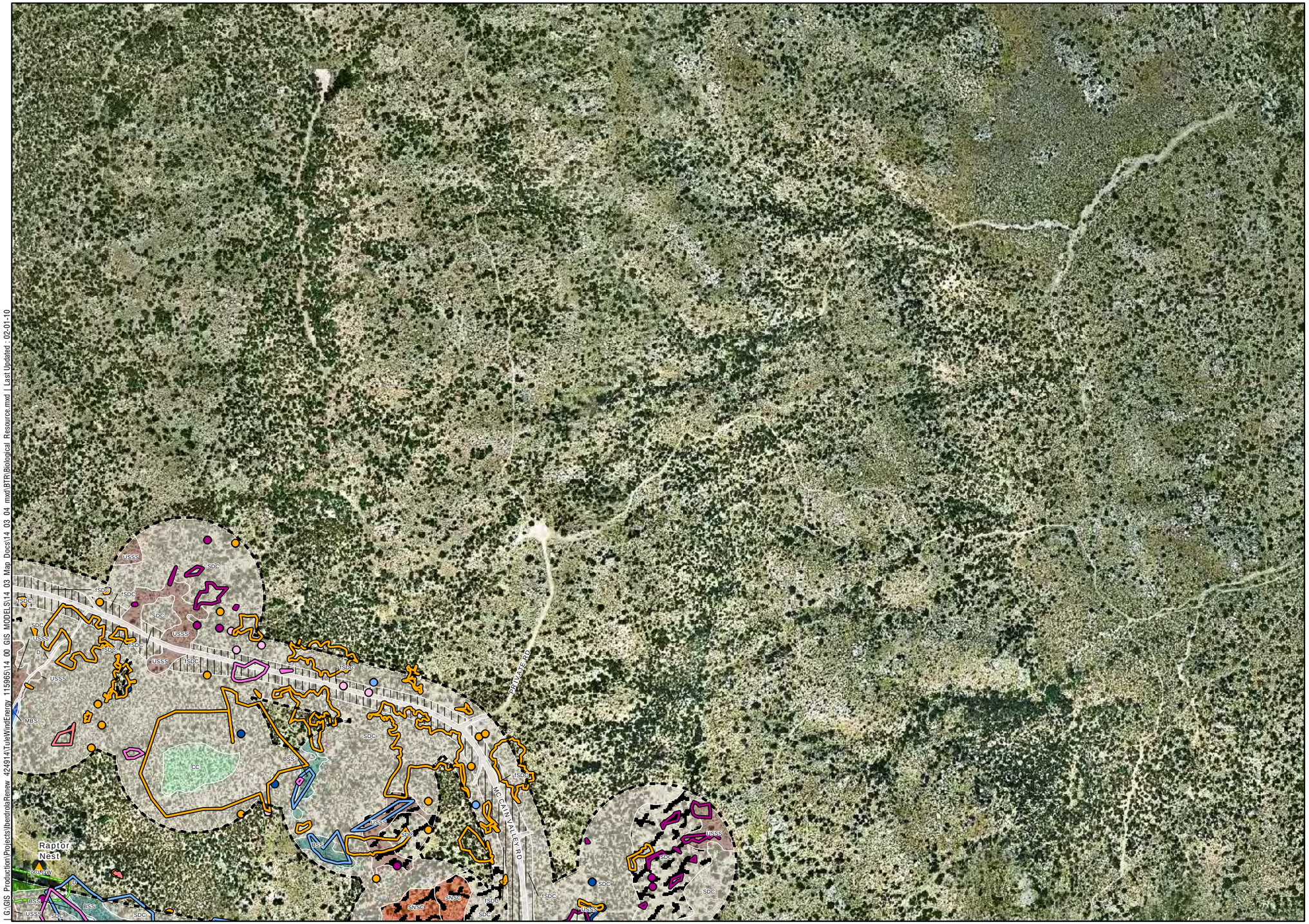
I:\GIS_Production\Projects\Iberdrola\Renew_4\24914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 18)

Figure 19

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

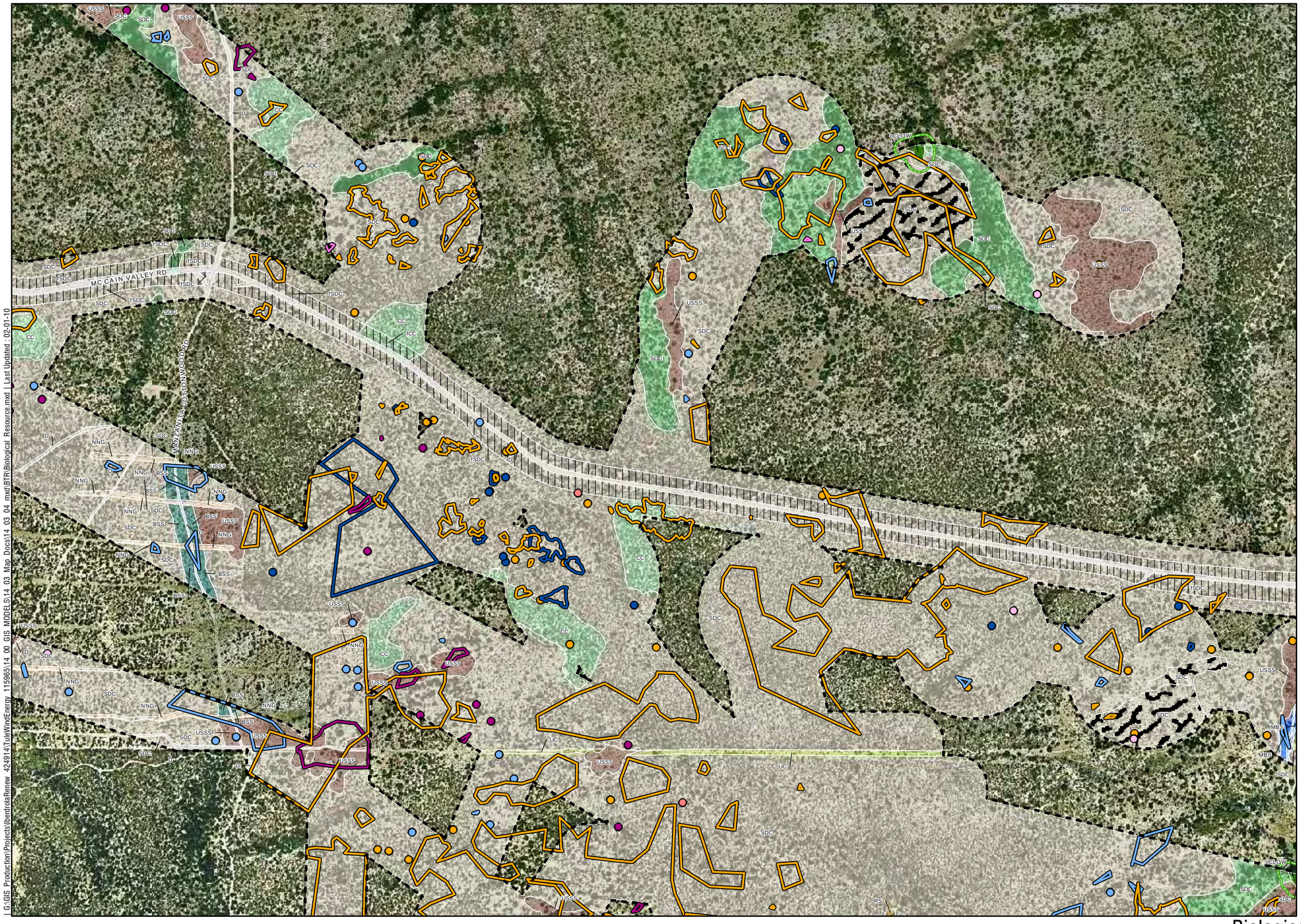
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 19)

Figure 20

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- OLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

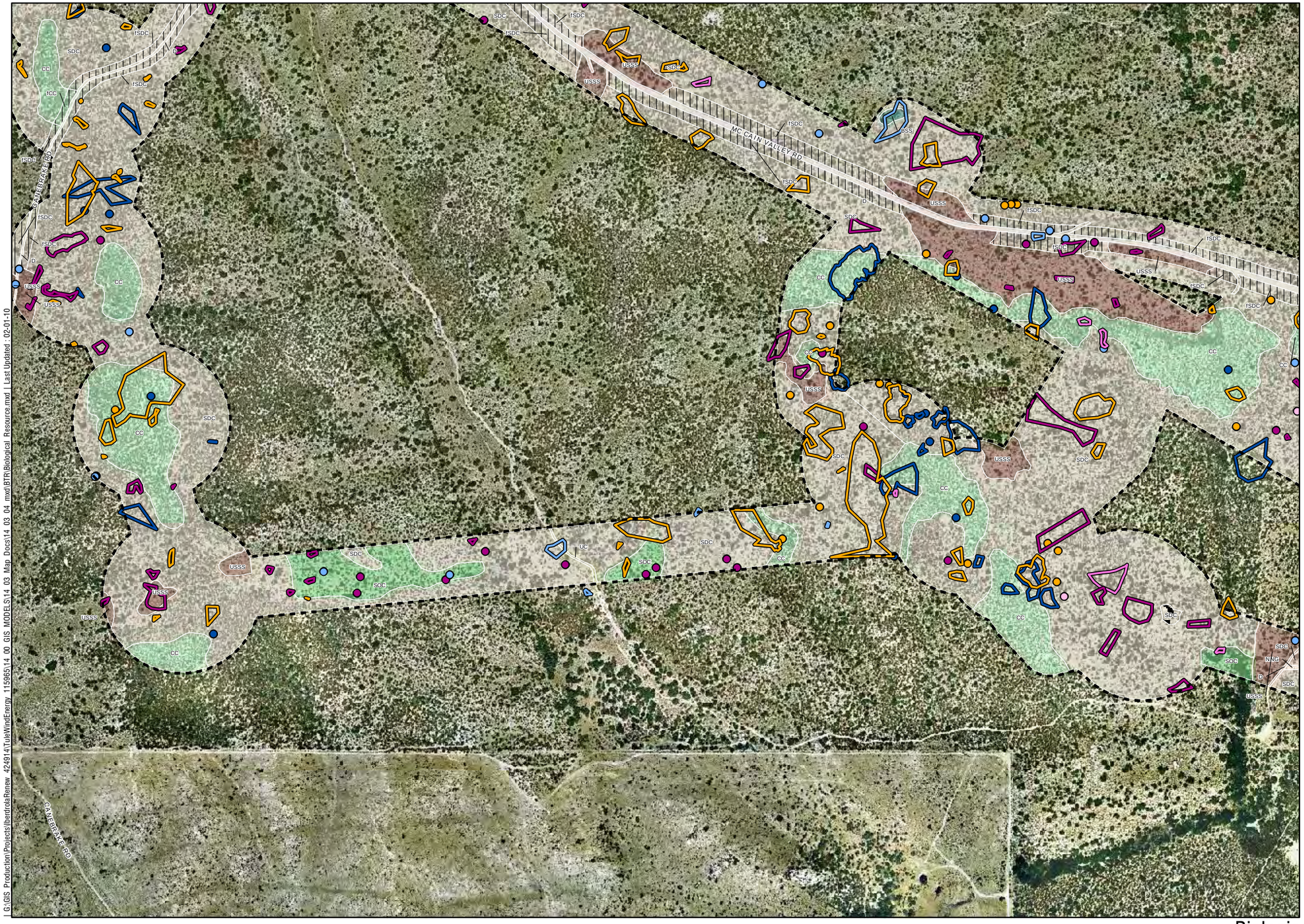
I:\GIS_Production\Projects\Iberdrola\Renew_4249141\TuleWindEnergy_1159651\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 20)

Figure 21

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 21)

Figure 22

Iberdrola | Tule Wind Project | BTR

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

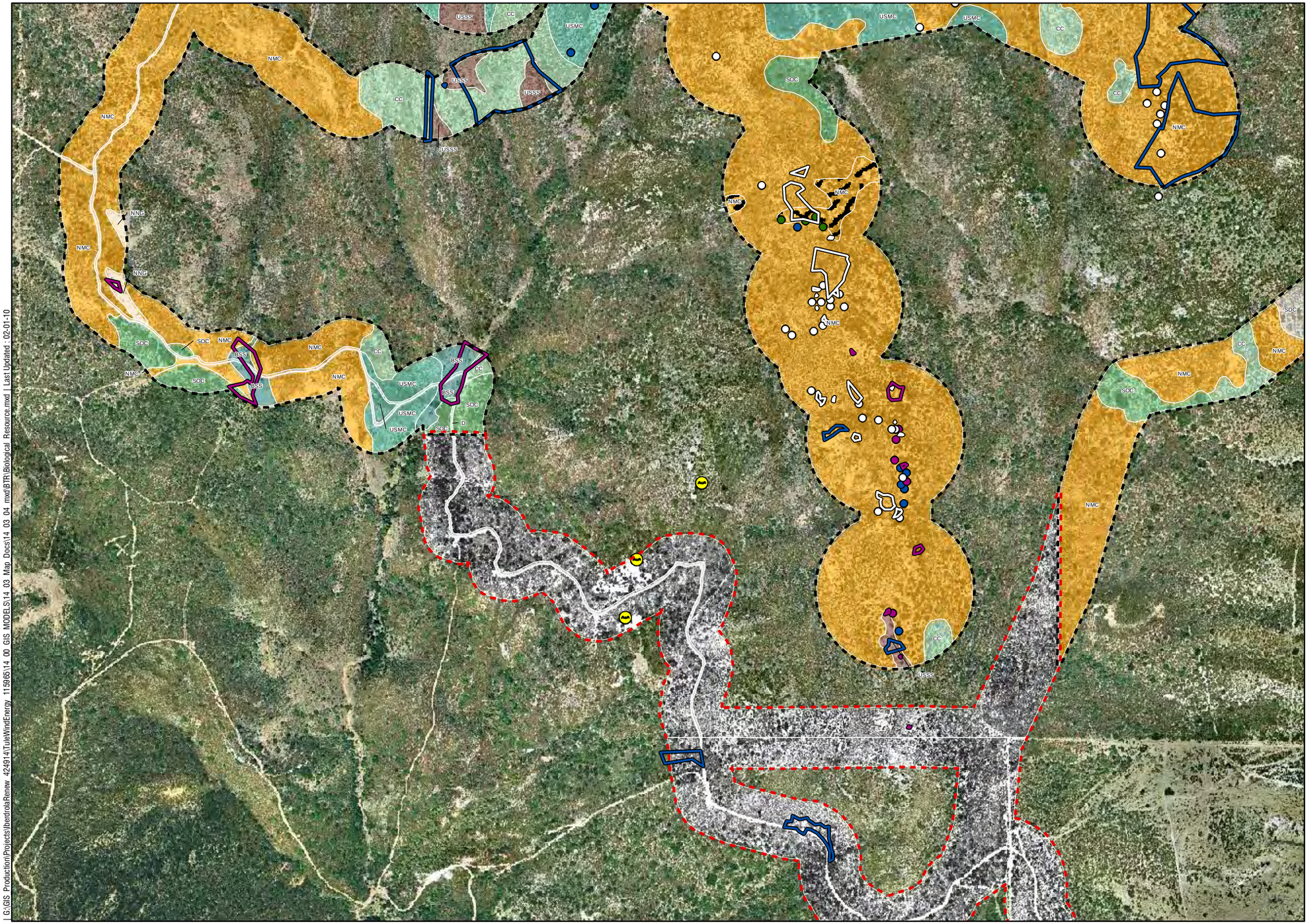
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR ONE COMPANY | *Many Solutions*

Biological Resources (Index Map 22)

Figure 23

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

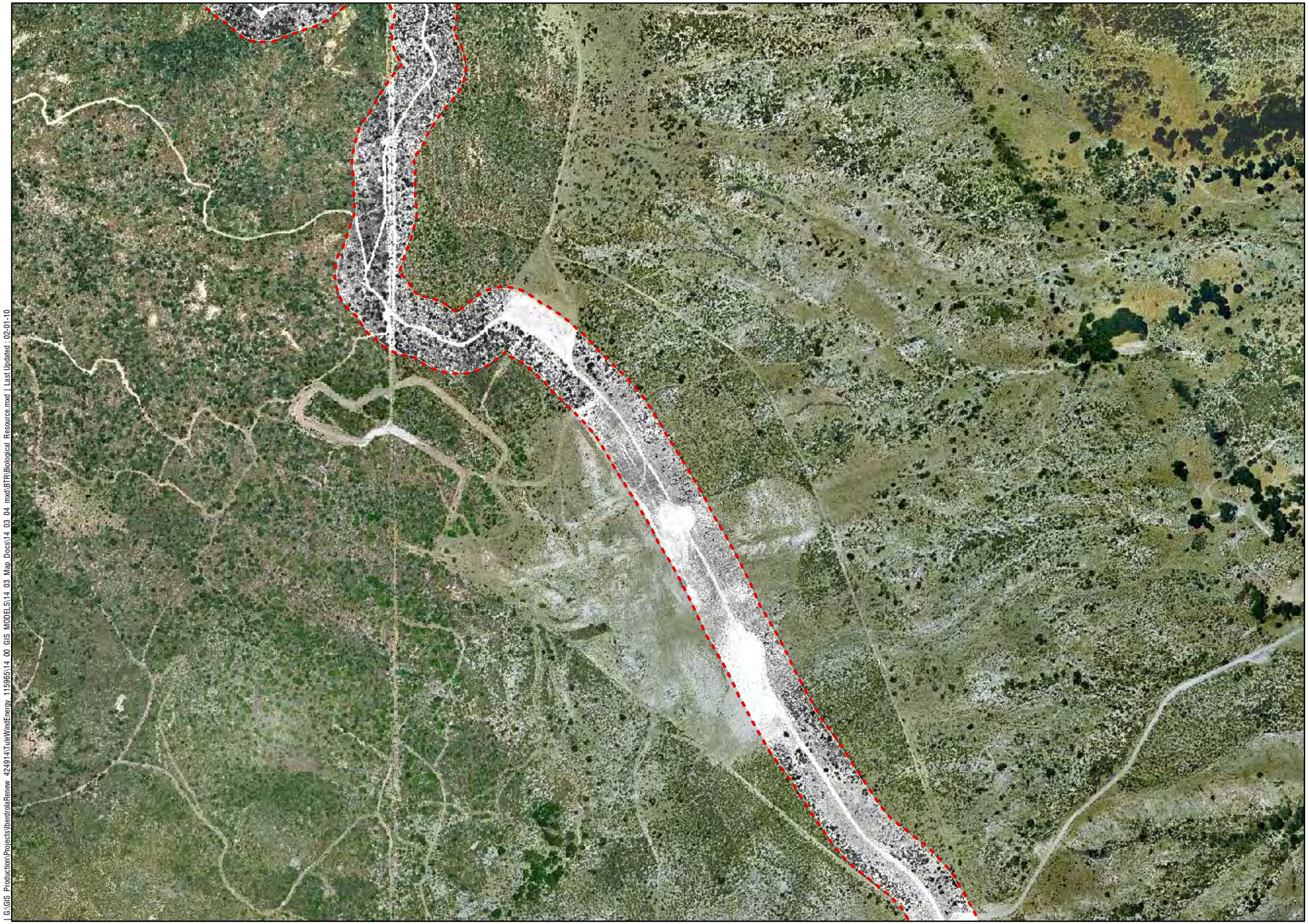
G:\GIS_Production\Projects\IberdrolaRenew_4249144TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 24)

Figure 25

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lscd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 25)

Figure 26

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 26)

Figure 27

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLoW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04.mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 27)

Figure 28

Iberdrola | Tule Wind Project | BTR

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 28)

Figure 29

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
d Disturbed
f Fuel Break
b Burned

Vegetation Community (Nov 2009 to Jan 2010)
SWS Southern Willow Scrub (63320)
BSS Big Sagebrush Scrub (35210)
CC Chamise Chaparral (37200)
DCLOW Dense Coast Live Oak Woodland (71162)
DEV Developed (12000)
DH Disturbed Habitat 11300)
AG Field Pasture / Agriculture (18310)
Land Landscaped (12000)
MBS Montane Buckwheat Scrub (37K00)
MFS MuleFat Scrub (63310)
NNG Non-Native Grassland (42200)
NMC Northen Mixed Chaparral (37130)
OCLOW Open Coast Live Oak Woodland (71161)
RS Redshank Chaparral (37300)
SOC Scrub Oak Chaparral (37900)
SDC Semi Desert Chaparral (37400)
SNSC Southern North Slope Chaparral (37E00)
SRW Southern Riparian Woodland (62500)
UC Un-Vegetated Channel (64200)
USMC Upper Sonoran Manzanita Chaparral (37B00)
USSS Upper Sonoran Subshrub Scrub (39000)
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
Astragalus douglasii var. perstrictus
Caulanthus simulans
Deinandra floribunda
Delphinium parishii ssp. subglobosum
Geraea viscida
Heuchera brevistaminea
Hulsea californica
Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

N
W E
S
0 250 500 1,000
Feet

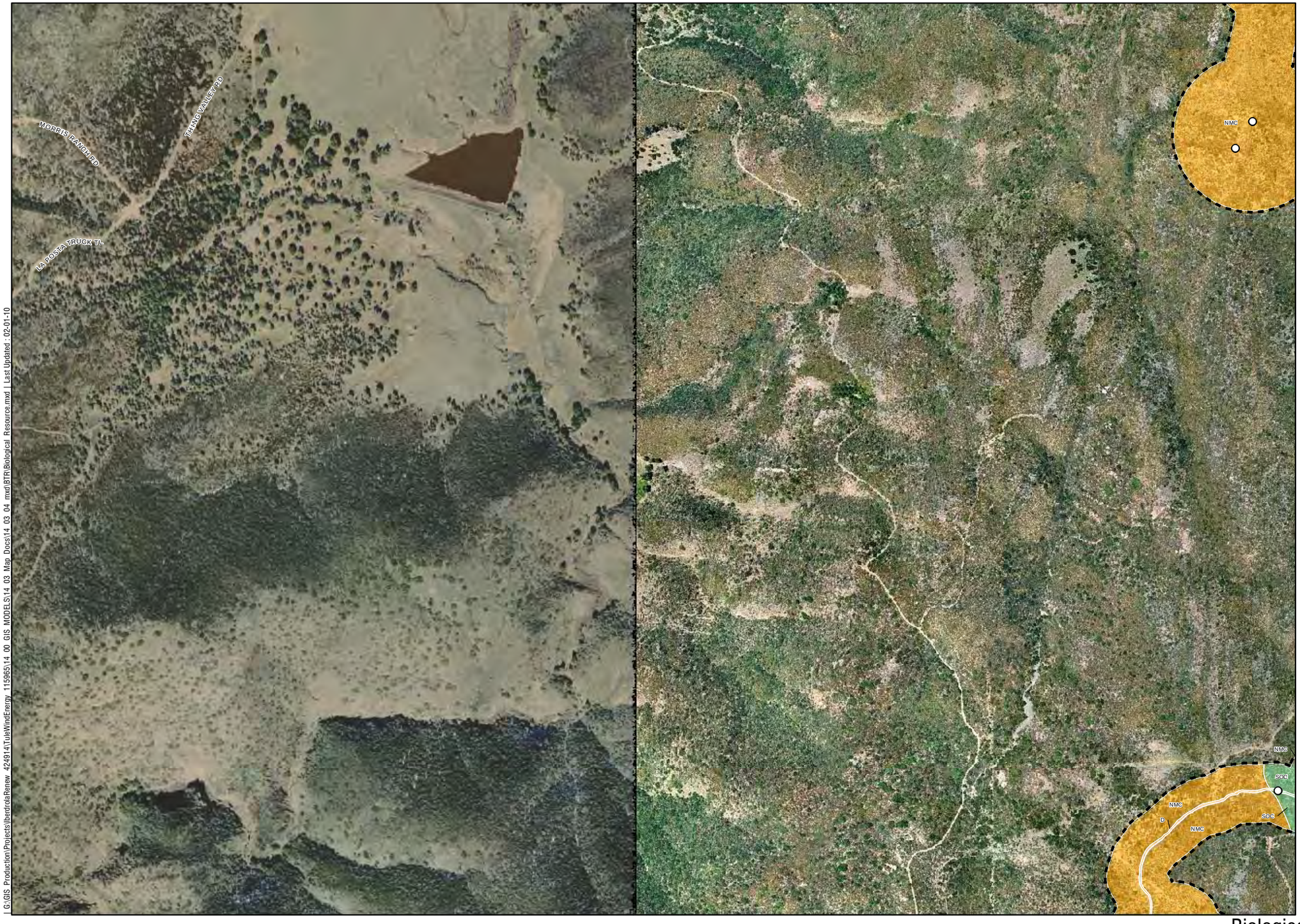
I:\G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 29)

Figure 30

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OcLoW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

Biological Resources (Index Map 30)

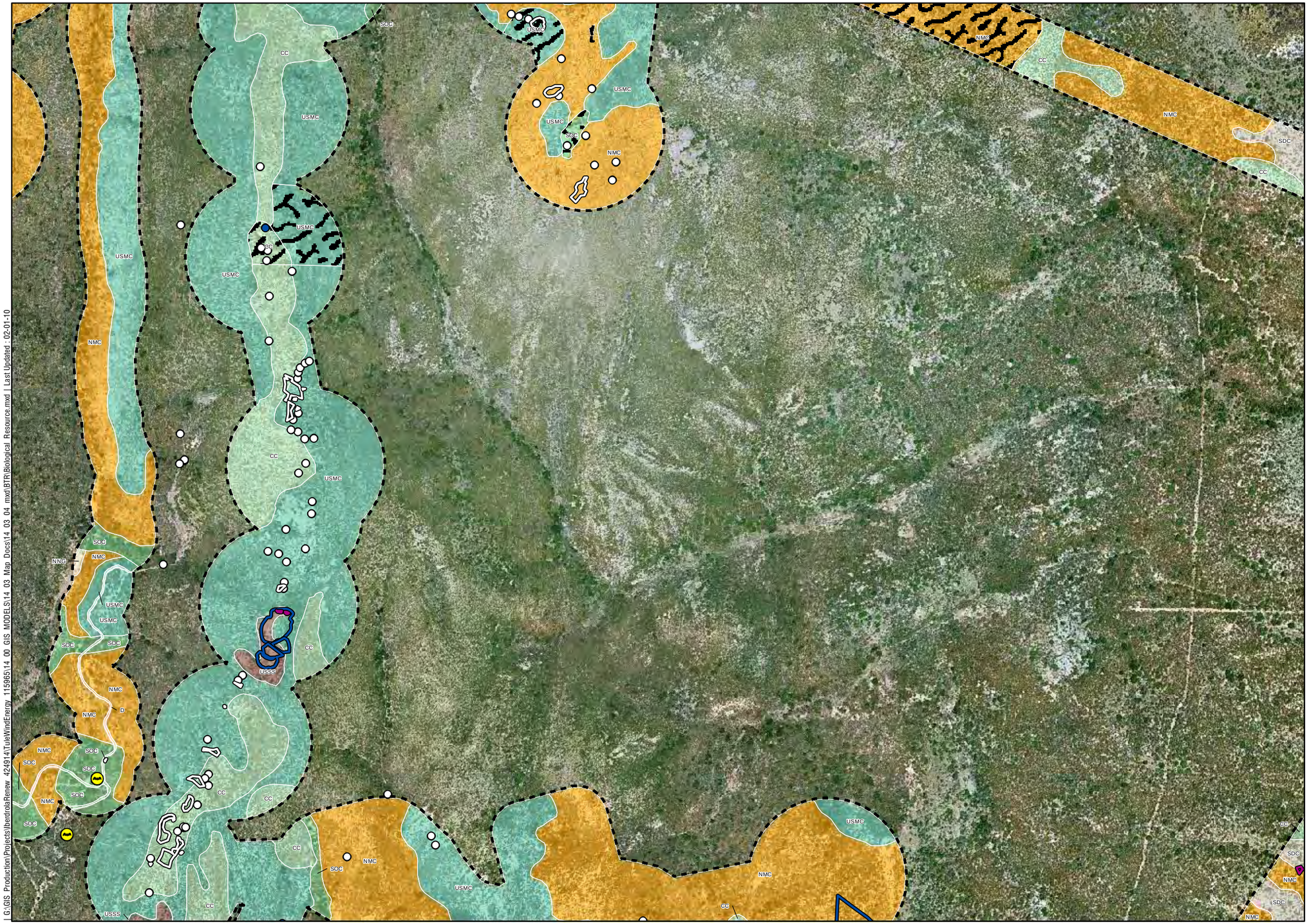
Figure 31

Iberdrola | Tule Wind Project | BTR

HDR

ONE COMPANY | *Many Solutions*℠

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

J:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Biological Resources (Index Map 31)

Figure 32

Iberdrola | Tule Wind Project | BTR

HDR
ONE COMPANY | *Many Solutions*℠

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

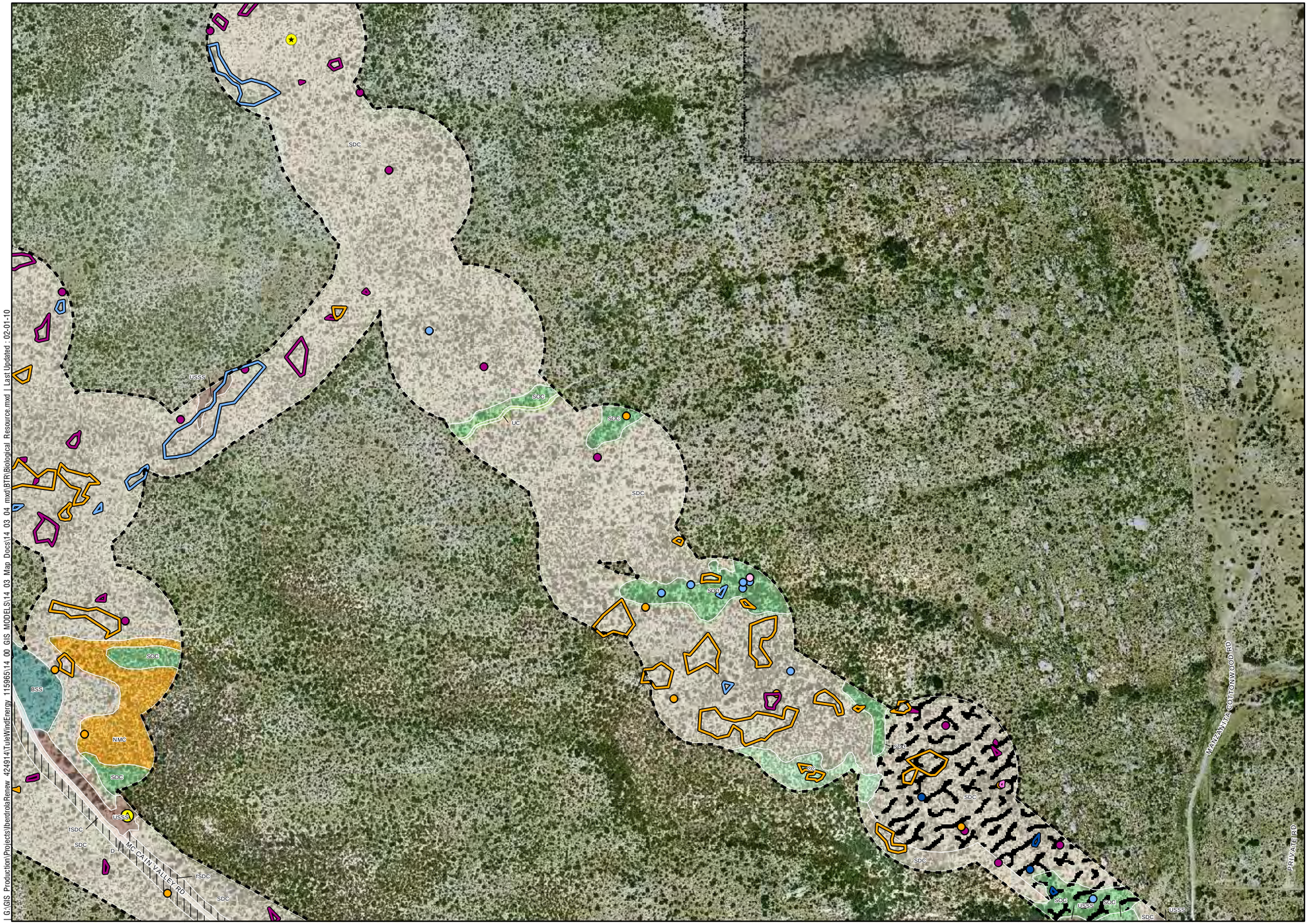
G:\GIS_Production\Projects\Iberdrola\Renew_4249\14\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 32)

Figure 33

Iberdrola | Tule Wind Project | BTR



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 33)

Figure 34

Iberdrola | Tule Wind Project | BTR

I:\GIS_Production\Projects\Iberdrola\Renew_4\24914\TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
d Disturbed
f Fuel Break
b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- oCLoW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 34)

Figure 35

Iberdrola | Tule Wind Project | BTR

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLcW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 35)

Figure 36

Iberdrola | Tule Wind Project | BTR

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLoW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

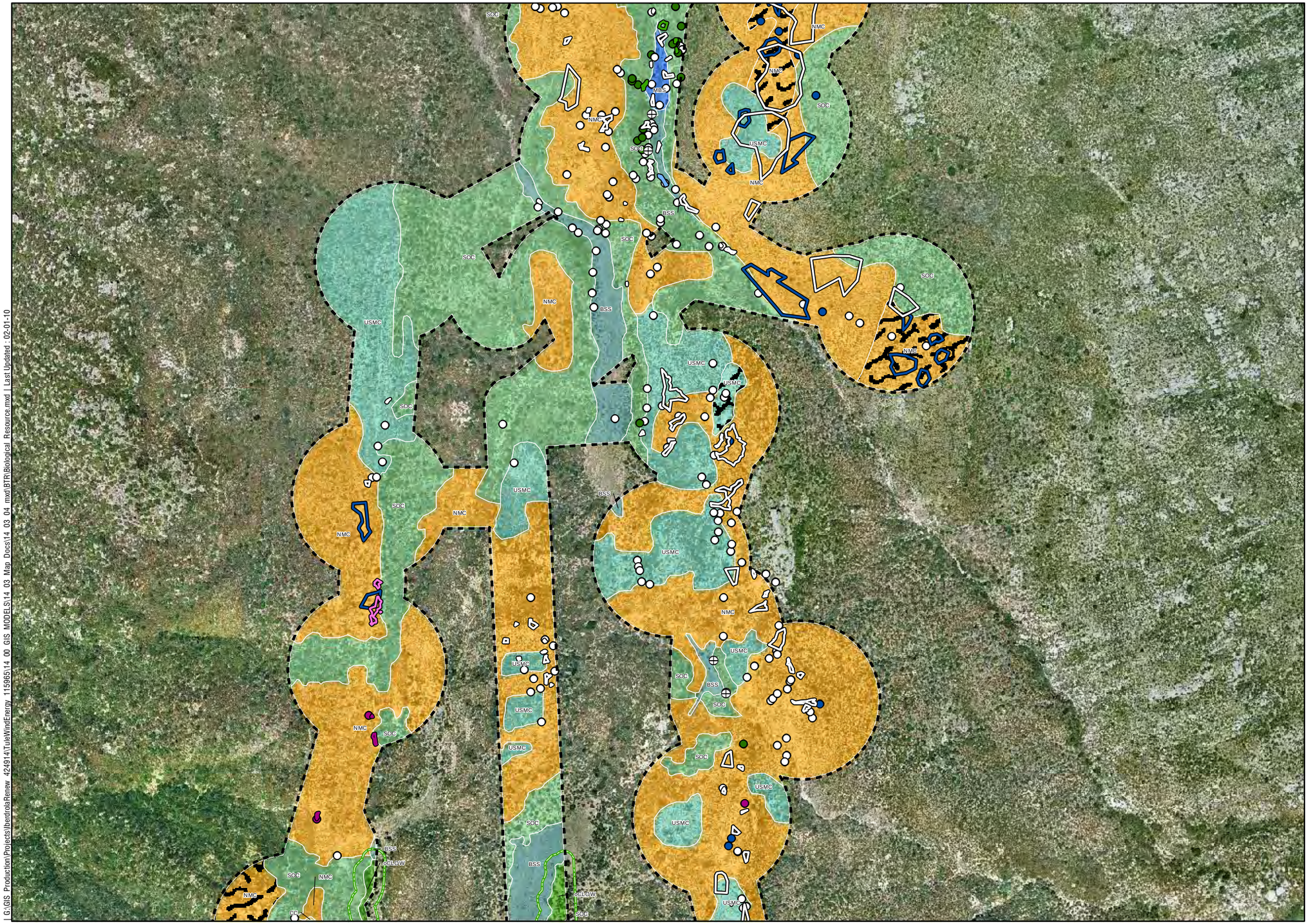
I:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 36)

Figure 37

Iberdrola | Tule Wind Project | BTR



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

Biological Resources (Index Map 37)

Figure 38

Iberdrola | Tule Wind Project | BTR

HDR ONE COMPANY | *Many Solutions*℠

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

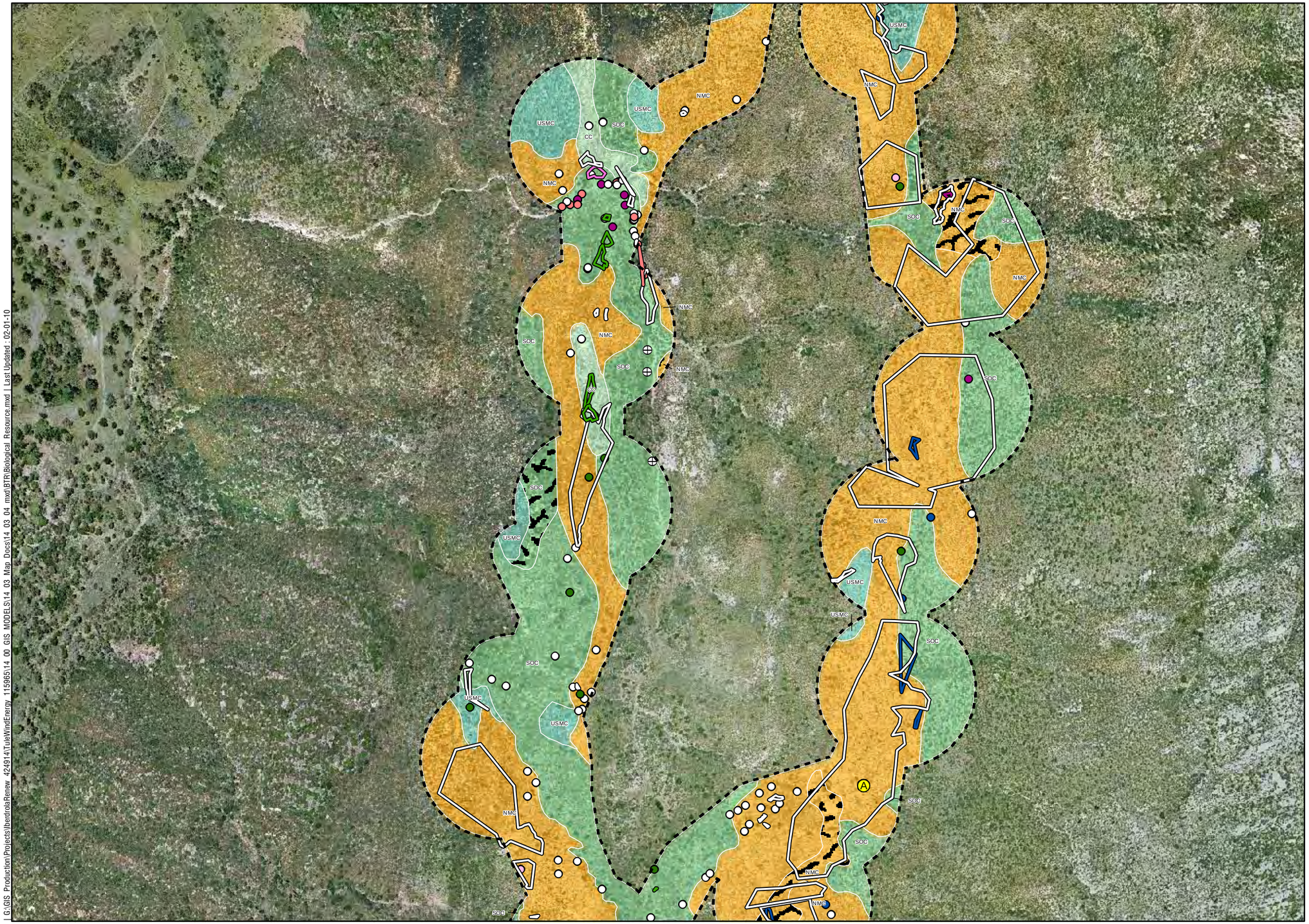
Biological Resources (Index Map 38)

Figure 39

Iberdrola | Tule Wind Project | BTR

HDR
ONE COMPANY | *Many Solutions*℠

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Surveyed
- Surveyed (Limited Access)
- Not Surveyed (No Access)
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

Biological Resources (Index Map 39)

Figure 40

Iberdrola | Tule Wind Project | BTR

HDR ONE COMPANY | *Many Solutions*℠

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Lsmd Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Biological Resources (Index Map 40)

Figure 41

Iberdrola | Tule Wind Project | BTR

HDR
ONE COMPANY | *Many Solutions*

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Surveyed
Surveyed (Limited Access)
Not Surveyed (No Access)
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Jan 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- Land Landscaped (12000)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Biological Resources (Index Map 41)

Figure 42

Iberdrola | Tule Wind Project | BTR

APPENDIX B

***Estimate of Water Availability* Memorandum,**
Geo-Logic Associates
September 7, 2010

Geo-Logic
ASSOCIATES
Geologists, Hydrogeologists and Engineers

MEMORANDUM

TO: Patrick O'Neill, HDR

FROM: Sarah J. Battelle, Geo-Logic Associates

DATE: September 7, 2010

SUBJECT: **ESTIMATE OF AVAILABLE GROUNDWATER TULE WIND PROJECT EAST SAN DIEGO COUNTY, CALIFORNIA**

At your request, this memorandum presents a summary of the water needs identified for the Tule Wind Project construction and the availability of local water, both on site and from adjacent water providers. The data presented herein is based on a site reconnaissance and inquiries made of water suppliers. Construction water supply requirements are provided from discussions with Iberdrola Renewables (IBR), the project proponent.

The project will include the construction of up to 134 wind turbines and associated roads, transmission lines and support facilities. Based on information provided by IBR, the following water requirements have been estimated for the project construction (all work is anticipated to be performed over five-day work weeks):

1. Road Construction – Up to 120,000 gallons per work day will be required over a 72-day construction period. With continuous water storage, 24-hours per day, seven days per week, it is estimated that well production of 59.5 gallons per minute (gpm) will be required to support this work.
2. Turbine Foundation Concrete Mixing – Depending on the turbine, each foundation will require 7,500 to 15,000 gallons of water per foundation. Assuming that two foundations are constructed each day in accordance with the 72-day work schedule; up to 30,000 gallons of water per day would be required. The maximum continuous pumping rate (24-hours per day, seven days per week), required to support concrete mixing for three turbine foundations per day is equivalent to 14.8 gpm.
3. Dust Control – During construction, 50,000 to 100,000 gallons per working day will be required for dust control on project roads. The maximum continuous pumping rate required for dust control would be 49.6 gpm for an estimated nine-month construction period.

As indicated above, it is anticipated that the water supply source will be available 24 hours per day, seven days per week. The contractors on the project will provide temporary water storage to ensure that there is adequate water supply available for required project water needs.

IBR has indicated that there will be some overlap of water uses as the project progresses. The initial road construction alone will be conducted until there is sufficient access to begin turbine foundation construction. At that time, with the combination of road construction, turbine foundation concrete mixing and dust control, the estimated peak water use will be approximately 250,000 gallons per day, requiring continuous pumping of 124 gpm (24-hours per day, seven days per week). This peak water demand will drop quickly after the initial road building activity is completed. Once road construction is complete, the peak water demand level is estimated to be about 130,000 gallons of water per day (equivalent to a 65 gpm pumping rate with pumping 24-hours per day, seven days per week). Once the subsequent 72-day turbine foundation work is complete, water demand will be reduced further to a maximum of 100,000 gallons of water per day (50 gpm of continuous pumping 24-hours per day, seven days per week) for the remainder of the nine month construction period requiring water. Subsequent site work is not expected to require additional groundwater supply. Further, when the Tule Wind Project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

Based on the conservative peak water use requirements of 250,000 gallons per day (associated with road construction, concrete mixing and dust control activities), an estimated continuous supply of water (24-hours per day, seven days per week) will be required from wells pumping at a cumulative continuous rate of 124 gpm. Although there are several wells on the project site, two wells on the project site have been identified as readily available for project use:

1. One well is located on Rough Acres Ranch approximately one to two miles north of Interstate 8 between Ribbonwood Road and McCain Valley Road. Drilled in 2009, data provided on the well log for this well indicates that the estimated well yield is 60 gpm. A 72-hour constant rate aquifer pumping test was performed at this well at 50 gpm utilizing the existing pump. Based on the current preliminary test data, there was very little response from pumping in the adjacent observation well, about 30 feet from the pumping well, and therefore it is reasonable to assume that sustained pumping at 50 gpm, at a minimum can be achieved from this well. Further, with a higher volume pump it may be possible to pump at greater volumes without significant impacts to other adjacent groundwater users;
2. One well is located on the Ewiiaapaayp Reservation, about 7 miles north of Interstate 8 on La Posta Road. A 72-hour constant rate aquifer pumping test was conducted at this well at 80 gpm. Based on the preliminary test results it is reasonable to assume that sustained pumping at 80 gpm is feasible at this well location.

Therefore, based on the preliminary data from two recent pumping tests with a combined total pumping rate of 130 gpm, it is likely that the necessary water supply requirements for the project (124 gpm of continuous pumping, seven days a week) can be met from these two wells.

There are four potential additional water supply sources available for the project. The State Correctional Facility is located about one half mile north of Interstate 8 off of McCain Road. This correctional facility maintains two wells with estimated production of 45 and 65 gpm. The Live Oak Springs Resort located south of Interstate 8 on Old Highway 80 about ¾-mile northwest of the intersection with Highway 94 may provide a source of water supply. This resort (and water company) operates a well that pumps about 40,000 gallons per day (25 to 30 gpm) and maintains a 100,000 gallon pond, and two large tanks with an additional 50,000 gallons of storage capacity. They have committed to providing 40,000 for immediate use and up to 80,000 gallons per day with additional storage tanks (pers. comm., September 8, 2010); equivalent to 28 to 55 gpm. The Jacumba Community Service District (CSD) also has indicated that their well produces 200 gpm and they will commit up to 40,000 gallons per day to the project (pers. comm., September 8, 2010); equivalent to about 28 gpm. Will serve letters from the Live Oak Springs Resort and Jacumba CSD are attached. Finally, the City of El Centro has indicated that they are willing to sell wastewater plant effluent to the project for use during the construction phase.

In summary, as outlined above, the available on-site groundwater can provide the required project water requirements through continuous pumping at a rate of 124 gpm. Current pumping test results indicate at least 130 gpm can be achieved from the two tested wells, and potential greater volumes with a higher volume pump at the Rough Acres Ranch test well. However, with off-site water from the State Correctional Facility, Live Oak Springs Resort, and Jacumba CSD for purchase, an additional 80,000 to 120,000 gallons of water per day, or approximately 55 to 83 gpm of water could be available to support the project water supply needs; ample water for the nine-month construction period. With these additional off-site sources, the combined on-site and off-site water could be equivalent to an estimated 213 gpm could be made available in support of the project. In addition, wastewater plant effluent may be available from the City of El Centro for purchase. It is concluded that there is ample water available from on- and off-site sources to support the project water supply needs.

If you have any questions, please call me at (858) 451-1136.

RAYMOND A. FERNANDEZ
DEPUTY CHIEF ADMINISTRATIVE OFFICER
(619) 531-4535
FAX (619) 232-2436

County of San Diego

PUBLIC SAFETY GROUP
734 W. BEECH STREET, SUITE 301, SAN DIEGO, CALIFORNIA 92101

February 28, 2011

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, CA 92123

Attn: Patrick Brown, Project Planner

RE: Tule Wind Project/EC Substation/ESJ US GEN-TIE Draft EIR and Tule Wind Project Fire Protection Plan
Bureau of Land Management / CAL FIRE / San Diego Rural Fire Protection District / San Diego County Fire Authority
Draft EIR Comments
Tule Wind Project Fire Protection Plan—Accepted

Please review the following comments regarding fire protection for the above project:

We have reviewed the section 15 of the Draft EIR (DEIR) prepared by DUDEK, dated December 2010. The DEIR was prepared for the Tule Wind, ECO Substation, and ESJ US Gen-Tie projects. In conjunction, we have reviewed the revised fire protection plan, dated February, 2011(received February 25, 2011), and prepared by RC Biological, Inc. for the Tule Wind Project.

PROJECT SUMMARY

The Tule Wind Project proposes to install up to 134 wind turbines, ranging in size between 328 and 492 feet in height, a collector substation and operation and maintenance building, a 34.5 kV overhead and underground collector cable system, and a 138 kV overhead transmission line to the proposed rebuild of the Boulevard Substation. The majority of the project will be located on lands managed by the Bureau of Land Management, whereas some portions of the project will be on Tribal, State and privately-owned lands. The portions of the project that are within privately-owned lands fall within the jurisdiction of the San Diego County Fire Authority (SDCFA) and the San

Diego Rural Fire Protection District (SDRFPD).

The ECO Substation Project proposes to construct a 500/230/138-kilovolt (kV) substation approximately 3 miles east of Jacumba, a short loop-in to the existing SWPL transmission line, construction of an approximately 13.3 mile-long 138 kV aboveground transmission line from the proposed ECO Substation to the rebuilt Boulevard Substation, and the rebuild of the Boulevard Substation. The majority of the project will be located on privately-owned lands within the jurisdictions of the SDCFA and the SDRFPD, with approximately 1.75 miles of transmission lines traversing over BLM-managed lands.

The ESJ Gen-Tie Project proposes to construct a 2 mile long single-circuit 500 kV line or a double-circuit 230 kV line from the proposed ECO Substation into Mexico. Approximately 2/3 of a mile of the proposed transmission line would be within the U.S., all of which would be within the jurisdiction of the SDRFPD.

SIGNIFICANCE CONCLUSIONS OF IMPACT FF-2 DISCUSION

The Draft EIR denotes on page D.15-56 that despite the implementation of the proposed mitigation measures FF-1 through FF-5, Impact FF-2 "remains adverse due to the impact created by the presence of the wind turbine facility and the corresponding increase in the probability of a wildfire. Under CEQA, impacts would be significant and cannot be mitigated to a level that is considered less than significant (Class I)."
Many meetings and discussions have been held between Iberdrola Renewables, SDCFA, CAL FIRE and SDRFPD with the goal of reducing the risk of a wildfire being caused by the projects, and mitigating the impacts if a wildfire were to occur. These meetings and discussions resulted in the development of an extensive array of Project Design Features (PDFs) and mitigation measures which we believe reduce the impact of the projects to a level below significance (Class II).

Some of the proposed PDFs that would reduce the risk of a wildfire include the following:

- The nacelle housing and turbine blades would be constructed of non-combustible or difficult to ignite materials.
- The turbines would be monitored at all times with the ability to power down the turbines at the first sign of trouble.
- The lubricant oils for the turbines would be non-combustible or have a high flash point.
- The turbine in the nacelle and the associated electrical equipment would be equipped with an automatic fire extinguishing system.
- Electrical equipment associated with the turbines would be protected with arc flash mitigation relays, which greatly reduce severity of a flash should an electrical malfunction occur.
- Ongoing hazard/fire safety training for all staff.

- Provision of two Type-6 inserts in pick-up trucks to be used as an industrial fire brigade for the project site. Staff would be trained in basic wildland fire techniques.
- Combustible vegetation would be modified per County Fire Code standards in an area of 100 feet around all turbines and structures and 30 feet along all roadways.
- The majority of 34.kV collector lines would be installed underground.
- On-site personnel and personnel at IBR's command center would have contact names and phone numbers of emergency personnel in the event of an emergency.
- Five water storage tanks for fire suppression would be provided at locations throughout the project.

In addition to addressing onsite project design features, there was much discussion on how to mitigate offsite impacts if a wildfire were to occur as a result of the project. If a wildfire were to start as a result of a fire in the nacelle of a turbine or from downed high voltage power lines, the fire could run for 40+ miles to the west through vegetation—some of which has no burn history, and much of which has not burned in 40 years since the Laguna Fire of 1970—threatening the communities and cities in the East and Southeast County. The vast majority of land between the proposed project and developed communities is classified as a Very High Fire Severity Zone—as determined by CAL FIRE FRAP mapping—and is steep in topography with very limited fire department access. The Laguna Fire of 1970 originated 5 miles west of the northwestern edge of the proposed Tule Wind Farm project and burned to the eastern edges of El Cajon and Spring Valley, consuming 190,000 acres, destroying 382 structures and causing the deaths of 5 people.

Today, there are approximately 16,860 homes located within the adjacent continuous fuel bed, and if a wildfire were to occur, the results could be catastrophic. However, this baseline risk exists today without the proposed project. The project is proposing additional mitigation to address this current baseline risk. One of the many lessons learned from the 2003 and 2007 wildfires in San Diego is that structures with adequate defensible space have a much greater chance of surviving a wildfire. Furthermore, in SDCFA's experience, when fire code inspections result in the issuance of a notice of violation for failure to maintain proper defensible space, property owners correct the violation approximately 80% of the time. After a second notice, but before abatement proceedings are begun, 98% to 99% of property owners correct the violation. Consequently, code inspections are an effective tool for reducing the risk of loss from wildfires.

One of the mitigation measures being proposed would significantly increase the SDCFA's ability to conduct defensible space inspections, and if necessary, abatement of the hazard. The project would provide proportional funding for a permanent, full-time Fire Code Specialist II position at the SDCFA. The person filling this position would do inspections of the homes for compliance with defensible space requirements.

Additionally, the project would provide proportional funding for four part-time reserve and/or volunteers to perform defensible space inspections for up to 90 days a year. The funding for the additional staffing would allow the SDCFA to perform approximately 6,000 additional defensible space inspections every year. These mitigation measures would significantly reduce the baseline fire risk and would offset any additional risk of wildfire posed by the proposed project. These mitigation measures would also provide a mechanism for addressing cumulative risk of future wind projects in the vicinity, such as the Padoma, Manzanita and Campo wind projects studied at the programmatic level in the Draft EIR.

The cost for the Fire Code Specialist II position is about $120,000 per year in 2011. The cost for the four part-time positions for 90 days is about $18,000 per year in 2011. The funding should be provided by each applicant to the SDCFA through their respective Development Agreements which must be executed prior to construction of any part of the project.

MM FF-4 TULE WIND PROJECT FIRE PROTECTION PLAN

We reviewed the revised fire protection plan, dated February, 2011, prepared by RC Biological Consulting, Inc. for the Tule Wind Project. The FPP has offered additional onsite and offsite mitigation in addition to the considerable number of project design features previously proposed. We agree with the FPP conclusion that the project's impacts have been reduced to a level below significance and, therefore, we accepted the fire protection plan for the Tule Wind Project.

Additional clarification on the following items is requested:

There are many inconsistencies between the Applicant Proposed Measures (APMs) in the DEIR and the Mitigation Measures (MMs) in the Fire Protection Plan accepted by the SDCFA. These discrepancies should be resolved.

MM FF-1 is a deferred submittal, but is offered as mitigation. By deferring preparation of the plan, we cannot evaluate the effectiveness of the proposed mitigation. This plan should be submitted concurrently with the DEIR either as an attachment or separate submittal.

MM FF-3 is to provide development agreements for the projects with the SDRFPD and the SDCFA. To date, only the Tule Wind Farm project has entered into a development agreement with the SDRFPD, and Tule Wind Farm is in the process of creating an agreement with the SDCFA. The ECO Substation Project and the ESJ Gen-Tie Project have not made progress in creating development agreements.

MM FF-4 is to create a customized fire protection plan for the project. To this date, no fire protection plan has been submitted for the ECO Substation Project.

Pages D.14-22 & 23 stipulates that all three projects comply with the travel time requirements of the County General Plan. Unmanned electrical generation facilities and

transmission lines usually are not evaluated for compliance with this General Plan requirement. Both the ECO Substation and the Boulevard Substation are on County lands, and their locations comply with the travel time requirements of the General Plan. The project is located in a Rural Land Use Category and the General Plan allows a maximum travel time of 20 minutes from the nearest responding fire station to the development. The Operations & Maintenance Building for the Tule project would be approximately 26 minutes travel time from the nearest responding agency. However, given that the Operations & Maintenance Building being proposed would be on BLM land, it is not subject to the General Plan. If the building were to be relocated on private property, it would need to be located in an area within 20 minutes travel time. The proposed General Plan Update recommends the area adjacent the proposed location of the Operations & Maintenance Building to be categorized to a land use that would allow a travel time of greater than 20 minutes. Thus the location of the Operations & Maintenance Building as proposed would comply with the General Plan Update.

Page D.15-48, second paragraph states "Wind turbines in California annually result in 35 turbine generator related fires (IAEI 2010)". Research conducted by Iberdrola Renewables has found the source of the information cited in the article to be unsubstantiated. We agree with Iberdrola Renewables and this sentence should be removed.

Page D.15-54 notes the Tule Wind Project "would result in potential ignition sources adjacent to wildland fuels in an area with a history of wildfires and over 2,000 inhabited structures in the vicinity". This sentence dramatically understates the baseline risk. The project would be located within a very large continuous bed of old combustible vegetation where there are now approximately 16,860 homes and steep topography with very limited fire department access.

Best regards,

James Pine, Fire Marshal
San Diego County Fire Authority
Public Safety Group

cc: via email:
CAL FIRE Howard Windsor
Kathleen Edwards
San Diego Rural Fire Protection District, Dave Nissen
Mark Mead
William Johnson
Ralph Steinhoff
HDR Engineering
Robin Church

FIRE PROTECTION PLAN

for the

Tule Wind Project

Prepared for the County of San Diego

May 2010, Revised September 2010
(Approved by San Diego Rural Fire Protection District, November 3, 2010)
Revised February 2011
(Accepted by San Diego County Fire Authority, February 28, 2011)
Major Use Permit Application Number: MUP 3300-09-019
Environmental Review Number: 3910-1000001

Prepared for: HDR Engineering, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123

and

Tule Wind, LLC
1125 NW Couch Street, Suite 700
Portland, OR 97209

Prepared by: RC Biological Consulting, Inc.
P.O. Box 1568
Lemon Grove, CA 91946-1568
(619) 463-1072

Robin Church

Robin Church
County Approved Fire Consultant

Technical review and contributions by:

Hunt Research Corporation
Jim Hunt, President
P.O. Box 291
Solvang CA 93464
805-688-4625

TABLE OF CONTENTS

ACRONYMS vii

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 2
- **1.1 Project Location, Description, and Environmental Setting** 3
  - **1.1.1 Project Location** 3
  - **1.1.2 Project Description** 4
  - **1.1.3 Environmental Setting** 6
- **1.2 Fire Agency Jurisdiction** 7
  - **1.3.1 Federal Regulations and Nationally Recognized Standards** 9
  - **1.3.2 State Regulations and Standards** 12
  - **1.3.3 Regional and Local Regulations and Standards** 15

2.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE 16

3.0 ANTICIPATED FIRE BEHAVIOR IN THE VICINITY 17

4.0 ANALYSIS OF PROJECT EFFECTS 18
- **4.1 Adequate Emergency Services** 18
- **4.2 Fire Access** 22
- **4.3 Water** 23
- **4.4 Ignition-Resistant Construction and Fire Protection Systems** 24
  - **4.4.1 Wind Turbines** 24
  - **4.4.2 Operations and Maintenance Building** 25
  - **4.4.3 Substation Transformers** 26
  - **4.4.4 Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels** 27
- **4.5 Fire Fuel Assessment** 27
- **4.6 Fire Behavior Modeling** 28
- **4.7 Defensible Space and Vegetation Management** 30
- **4.8 Cumulative Impact Analysis** 31

5.0 DESIGN CONSIDERATIONS OR PROJECT DESIGN FEATURES AND MITIGATION MEASURES 33
- **5.1 Project Considerations and Associated Fire Risks** 33
  - **5.1.1 Construction** 34
  - **5.1.2 Electrical 34.5 kV Collection and 138 kV Transmission System** 35
  - **5.1.3 Wind Turbines** 37
  - **5.1.4 Operations and Maintenance** 41
- **5.2 Project Design Features** 44
  - **5.2.1 Construction** 44
  - **5.2.2 Electrical Collection and Transmission System** 48
  - **5.2.3 Wind Turbines** 51
  - **5.2.4 Operations and Maintenance** 53

6.0 CONCLUSION 76
6.1 Analysis of Additional County Guidelines for Determining Significance 76
6.1.1 Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands? 76
6.1.2 Would the project result in inadequate emergency access? 77
6.1.3 Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection? 77
6.1.4 Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed? 78
6.2 County of San Diego Wildland Fire and Fire Protection Significance Criteria Guidelines 78
6.2.1 Can the Project Demonstrate Compliance With Fire Regulations? 78
6.2.2 Has a Fire Protection Plan Been Required and Will the Project Be Consistent With Its Recommendations, Including Fuel Modification? 78
6.2.3 Can the Project Meet the Emergency Response Objectives Identified in the Public Facilities Element of the County General Plan, or Offer Same Practical Effect? 79
6.3 Additional Questions Considered By the California Public Utility Commission and Bureau of Land Management 79
6.3.1 Would the Presence of Project Facilities (Overhead Transmission Lines, Overhead Collector Lines, and/or Wind Turbines) Significantly Increase the Probability of a Wildfire? 79
6.3.2 Would Project Construction and/or Operation and Maintenance and Decommissioning Activities Significantly Increase the Probability of a Wildfire? 80
6.3.3 Would the Presence of the Overhead 138 kV Transmission Lines, Overhead 34.5 kV Collector Lines, and/or Wind Turbines Reduce the Effectiveness of Firefighting? 82
6.3.4 Would Project Activities Contribute to an Increased Ignition Potential and Rate of Fire Spread Through the Introduction of Non-Native Plants? 84

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED85

8.0 PERSONS AND ORGANIZATIONS CONTACTED 86

9.0 REFERENCES.....87

10.0 PREPARERS' LIABILITY STATEMENT.....90

TECHNICAL APPENDICES.....123

FIGURES, TABLES AND APPENDICES

LIST OF FIGURES

Figure 1 Region and Vicinity.....91
Figure 2 Proposed Project.....93
Figure 3 Fire Facilities and Fire District Areas.....95
Figure 4 Typical Operations and Maintenance Facility Site.....97
Figure 5 200MW Collection Plan Station View.....99
Figure 6 Preliminary Turbine Tower Design.....101
Figure 7 Typical Turbine Site.....103
Figure 8 Typical Turbine Nacelle.....105
Figure 9a Typical Overhead 34.5 kV Single Circuit Collector Line.....107
Figure 9b Typical Overhead 34.5 kV Double Circuit Collector Line.....109
Figure 10 Typical 138kV Steel Tangent Pole.....111
Figure 11 Topographic Map.....113
Figure 12 County of San Diego Fire Hazard Severity Map.....115
Figure 13 Fire Threat Map.....117
Figure 14 Fire History Map.....119
Figure 15 County Roadway Improvements.....121

LIST OF TABLES

Table 1. Fire and Emergency Services Agencies, Equipment, and Staff.....18
Table 2. Emergency Response Travel Times.....19
Table 3. Estimated Travel Time from Nearest Fire Departments.....20
Table 4. Construction Fire Risk, Project Design Features and Code Requirements.....34
Table 5. Electrical Collector and Transmission System Fire Risk, Project Design Features and Code Requirements.....36
Table 6. Wind Turbine Fire Risk, Project Design Features, and Code Requirements.....40
Table 7. Operations and Maintenance Fire Risk, Project Design Features and Code Requirements.....42
Table 8. Impacts, Project Design Features, Mitigation Measures, and Significance Criteria.....57

LIST OF APPENDICES

Appendix A	Biology Resource Maps
Appendix B	Groundwater Investigation Report, Geo-Logic Associates, December 2010
Appendix C	East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Cumulative Project List
Appendix D	List of Fires Identified in Figure 14 Fire History Map

ACRONYMS

AFFF	Aqueous Film Forming Foam
ANSI	American National Standards Institute
BLM	Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
CBC	County Building Code
CCR	California Fire Code
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CSA	County Service Areas
CSD	Community Service District
CSLC	California State Lands Commission
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FMZ	Fire Management Zone
FMP	Fire Management Plan
FPP	Fire Protection Plan
GACC	Geographic Area Coordination Center
GO	General Order
gpm	Gallons per minute
HVAC	Heating, ventilation, and air conditioning
I-8	Interstate 8
IBR	Iberdrola Renewables, Inc.
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Fire Code
kV	Kilovolt
MW	Megawatt
NCC	National Control Center
NEPA	National Environmental Protection Act
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
O&M	Operations and maintenance
PDF	Project Design Feature
ROW	Right-of-Way
SanGIS	San Diego Geographic Information Source
SCADA	Supervisory Control and Data Acquisition System
SDFCA	San Diego County Fire Authority
SDRFPD	San Diego Rural Fire Protection District
SODAR	Sonic detection and ranging
SRA	State Responsibility Areas
TVMP	Transmission Vegetation Management Program

This page intentionally left blank.

EXECUTIVE SUMMARY

Tule Wind, LLC, a wholly owned subsidiary of Iberdrola Renewables, Inc. (TULE WIND, LLC) is proposing to construct and operate the Tule Wind Project (proposed project) near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an operations and maintenance (O&M) building, transportation haul routes and access roads, a temporary concrete batch plant, a temporary parking area, temporary laydown staging areas, and meteorological towers. The project is proposed on lands administered by the Bureau of Land Management (BLM), California State Lands Commission (CSLC), Tribal lands, and privately-owned lands under the jurisdiction of the County of San Diego.

The project is located in an area with varied topography with gentle to moderate slopes, and a range in elevation between 3,600 to 5,600 feet above mean sea level. Vegetation includes a variety of types of scrub, chaparrals, and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area. The project area has been identified by California Department of Forestry and Fire Protection (CAL FIRE) as being located in a high to very high fire hazard severity area. However, there have been no fires mapped in the project area in recent history.

Fire Agency Jurisdiction: The responsibility for fire suppression within the project area is shared by the San Diego County Fire Authority (SDFCA), San Diego Rural Fire Protection District (SDRFPD), CAL FIRE, BLM and Tribal governments. The portions of the project area located on privately owned lands fall within the jurisdiction of the SDCFA County Service Areas (CSA) 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within State Responsibility Areas (SRA).

Emergency Response to the project area is provided by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement, the area is located in an SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands.

Fire Protection Plan (FPP): The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

The FPP evaluates the potential for adverse effects of construction, and operations and maintenance of a proposed project that may result in a wildland fire occurring on or adjacent to the project. The FPP also evaluates the positive environmental effects that may occur due to the development of this project.

The Project Design Features (PDFs) and proposed plans are presented in the FPP to exhibit how the potential fire impacts to the surrounding area and the community will be mitigated. The project addresses the applicable federal, state, and local fire regulations, including the California

Fire Code and the County Consolidated Fire Code. The project is consistent with the County of San Diego Department of Planning and Land Use recommendations including fuel modification.

As a mitigation measure to reduce the potential for fire ignition within the wind turbine nacelle to a level less than significant, a fire suppression system shall be provided in each wind turbine nacelle and in the operation and maintenance facility. Fire Suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

The project components effects' have been analyzed using California Environmental Quality Act (CEQA), County of San Diego's Wildland Fire and Fire Protection Guidelines, and California Public Utilities Commission (CPUC) Guidelines to determine the potential for fire ignition. Based on application of the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance, it has been determined that construction and operation and maintenance of the proposed project would result in a less than significant impact with the implementation of PDFs and required Mitigation Measures. In addition, the project's contribution to cumulative impacts with the implementation of PDF and identified mitigation measures are less than cumulatively considerable.

1.0 INTRODUCTION

This FPP has been prepared for the proposed project. TULE WIND, LLC is proposing to construct and operate the proposed project near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and 138 kV transmission line, a project collector substation, an operations and maintenance building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, temporary laydown (staging) areas, and meteorological towers. The majority of the project would be built on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the California State Land Commission (CSLC), and privately-owned lands under the jurisdiction of the County of San Diego. The BLM is the Lead Agency under National Environmental Protection Act (NEPA), the CPUC is the Lead Agency under CEQA, and the County of San Diego is the permitting agency for the Major Use Permit and Building Permits.

The largest owner/operator of wind generation in the world, TULE WIND, LLC, which is a subsidiary of Iberdrola Renewables, Inc. owns and operates over 2,600 wind turbines at 43 wind farms totaling 4.8GW of wind generating capacity across the United States. TULE WIND, LLC has over 49 million operating hours on its U.S. fleet.

Since fire danger in the project area is a significant concern, the project is being designed to eliminate or minimize potential ignition sources. TULE WIND, LLC has participated in numerous meetings with fire agency personnel from various agencies, including CAL FIRE, SDCFA, SDRFPD, and BLM Fire, to discuss the overall approach to providing appropriate fire

prevention, protection, and suppression as part of the project. A site meeting was conducted at TULE WIND, LLC's Dillon Wind Farm in Palm Springs, California on August 12, 2010 and included staff from the SDCFA, SDRFPD, and CAL FIRE, as well as Mr. Jim Hunt of Hunt Research. The meeting included a briefing by the site manager of the Dillon Wind Farm. The site manager provided a briefing on the Supervisory Control and Data Acquisition System (SCADA) system and how it is linked to the on-site monitoring system and to TULE WIND, LLC's National Control Center (NCC) in Portland, Oregon, which is staffed 24-hours per day. The operational system implemented at the Dillon Wind Farm would be very similar to the system implemented for the proposed project. To address potential sources of ignition risk, the project is being designed with features and components to reduce the risk of wildland fire below a level of significance.

The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. As part of the assessment, the property location, topography, geology, combustible vegetation (fuel types), climatic conditions, and fire history were all taken into consideration in developing the FPP. The FPP addresses water supply, access (including secondary/emergency access where applicable), structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The FPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect one or more-at-risk communities and essential infrastructures.

1.1 Project Location, Description, and Environmental Setting

1.1.1 Project Location

The general project location is shown in **Figure 1**. The project area lies in the McCain Valley in the In-Ko-Pah Mountains, just north of U.S. Interstate-8 (I-8) and Live Oak Springs. The area is accessible via the Crestwood Road, Ribbonwood Road, and McCain Valley Road exits off of I-8. The primary access routes to the project area will be from Ribbonwood and McCain Valley Roads. The majority of the project is proposed on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the CSLC, and privately-owned lands under the jurisdiction of the County of San Diego.

The proposed wind turbines will be located on a series of north-to-south and northwest-to-southeast ridges. The project site layout is shown in **Figure 2**. The majority of the area is composed of undeveloped land. The project area encompasses approximately 24,500 acres; however, the construction footprint of the project would impact approximately 725acres, and does not include the entire parcels.

The fire agencies' jurisdictional responsibilities are shown in **Figure 3** and outlined in more detail in Section 1.2.

1.1.2 Project Description

TULE WIND, LLC is proposing to construct and operate the Tule Wind Project located near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an O&M building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, a temporary laydown (staging) areas, and meteorological towers.

The Tule Wind Project will consist of the following components:

- Up to 128 wind turbines, ranging in size between 328 and 492 feet in height and generating capacity between 1.5 megawatts (MW) and 3.0 MW, to produce 201 MW of electricity;
- A 34.5 kilovolt (kV) transmission collector cable system linking each turbine to the next and to the project collector substation, which will run principally underground except in select areas where cultural, environmental, or logistical conditions require an overhead line;
- A 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation;
- A 5-acre collector substation site and 5-acre O&M building site;
- Access roads between turbines, as well as improvements to existing roadways and new roadways to accommodate construction and delivery of equipment;
- A temporary batch plant for construction located on a 5-acre area;
- A temporary 10-acre parking area;
- Nineteen 2-acre temporary lay down areas; and
- Three permanent meteorological towers and one sonic detection and ranging (SODAR) unit or light detecting and ranging (LIDAR) unit.
- Up to three temporary use water wells for construction (on private land only, not be placed on public lands).
- One permanent water well and septic tank for the O&M building.

The maximum build-out of the project allows for up to 201 MW of installed wind turbine capacity. This 201 MW could consist of as many as 128 1.5 MW turbines, as little as 67 3.0 MW turbines, or some intermediate mix of turbines ranging in output from 1.5 MW to 3.0 MW. Turbines with a smaller output can be spaced closer together, whereas turbines with a larger output require larger spacing. At this time, the 128-turbine layout proposes 96 wind turbines on BLM land, 18 turbines on Tribal lands, 7 turbines on State lands, and 7 turbines on privately owned land, commonly known as Rough Acres Ranch.

The project will include an approximate 5,000 square foot, pre-engineered metal O&M building, located next to the collector substation to house operations personnel and critical spare parts. A

typical O&M Building is illustrated in **Figure 4**.[1] The O&M building will include a foundation, with electrical and heating, ventilation, and air conditioning (HVAC) systems. The O&M building will also include a septic system and well to provide up to 5 gallons per minute of potable water throughout operations. Once the project is operational, the O&M facility will use approximately 2,500 gallons per day of water.

The only staffed structure as part of the project is the proposed O&M building. The project is expected to be supported by up to 12 full time employees on the O&M staff. Typically, O&M staff will be present on-site during normal business hours.

The proposed location for the project collector substation is shown on **Figure 2**. Construction will generally consist of the installation of concrete pads and electric transformers. Areas not covered by concrete pads will be surfaced with gravel to minimize erosion and surface runoff, and to provide fire protection through prevention of weedy growth. The collector substation will be fenced with security fencing to minimize the potential for entry by non-authorized personnel. A typical substation site is included as **Figure 5**.[2]

Proposed turbine locations are shown on **Figure 2**. The wind tower foundations will be approximately 60 feet in diameter, and 7 to10 feet deep. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the 200-foot radius area would be performed, annually prior to May 1 and more often as needed. A typical turbine tower design is illustrated in **Figure 6**. A typical turbine site is illustrated in **Figure 7**. A typical turbine nacelle with labeled internal equipment is illustrated in **Figure 8**.

Three permanent meteorological towers will also be installed; their locations are noted on **Figure 2**. The towers will be free standing (no guy wires) and approximately 196 feet high with a concrete foundation. Installation will follow all safety measures contained in TULE WIND, LLC's Health and Safety Manual. A permanent sonic detection and ranging SODAR unit will also be placed on-site and fenced.

Electricity generated by the wind turbines will be collected through 34.5kV collector lines and delivered to the project collector substation. The 34.5kV collector lines will principally be placed underground, except in locations where site-specific conditions require that they run aboveground. Typical overhead 34.5 kV single circuit collector line is shown in **Figure 9a** and a typical overhead 34.5 kV double circuit collector line is shown in **Figure 9b**.

---

[1] Note: Figure 4 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot radius fuel modification zone will be provided.

[2] Note: Figure 5 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot fuel modification zone will be provided.

After the electricity is stepped up to 138 kV at the project collector substation, an approximate 9.2-mile long 138 kV transmission line will interconnect the project collector substation with SDG&E's proposed Rebuilt Boulevard Substation, which is part of the SDG&E ECO Substation Project. A typical 138kV steel tangent pole is shown in **Figure 10**.

1.1.3 Environmental Setting

The project area site visit was conducted by consultant Robin Church on January 28, 2010. The project area is located on BLM, State, County, and Tribal lands in the area north of the community of Boulevard, CA. The project area is located south of the Cleveland National Forest and west of Anza-Borrego Desert State Park.

1.1.3.1 Topography

The topography of the area is gently-to-moderately sloping with an elevation ranging between about 3,600 and 5,600 feet above mean sea level. Given the site location and size, slopes are widely variable with aspects in every direction. Tule Creek is the primary drainage feature in the project vicinity and drains the central portion of McCain Valley, towards the southeast as shown in **Figure 11**.

1.1.3.2 Vegetation and Fuels

The native vegetation type within the project area is predominantly chaparral and related shrublands. The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A,** Biological Resources Maps). Vegetation included a variety of types of scrub, chaparrals and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. Overall the chaparrals dominate the project area. Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in Southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

1.1.3.3 Climate and Fire History

San Diego County is an extremely fire-prone landscape. San Diego County is dominated by a Mediterranean-type climate with mild, wet winters and hot, dry summers. The County is divided into five climate zones from the coast to the desert (Climates of San Diego County, Agricultural Relationships, University of California, Agricultural Extension Service, and U.S. Weather Bureau). These climate zones are determined by several factors: proximity to the ocean, terrain, elevation, and latitude. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area.

The climate in central San Diego County supports dense, drought-adapted shrublands that are highly flammable, especially in the fall as fuel moistures reach very low levels. The combination of the climate and drought adapted shrubs results in a fire season that is year around. Most

critically, winds originating from the Great Basin, locally known as Santa Anas, which create extreme fire weather conditions characterized by low humidity, sustained high-speed winds, and extremely strong gusts. Santa Ana winds typically blow from the northeast over the Peninsular Range. As the air is forced through coastal mountain passes, wind speeds of 40 miles per hour (mph) at measured at ground level can be maintained for hours with gusts from 70 to 115 mph possible (Schroeder et al., 1964). Santa Ana winds create extremely dangerous fire conditions and have been the primary driver of most of Southern California's catastrophic wildfires.

Santa Ana winds are at their peak during fall and early winter months, which marks the height of fire season. Because of the presence of dense, dry fuels and periodic Santa Ana winds, southern California has been characterized as having one of the most fire-prone landscapes in the world. **Figure 12** presents a map of San Diego County overlain with Fire Hazard Severity Zones, defined as a measure of the likelihood that an area will burn combined with the severity of burn behavior characteristics (such as intensity, speed, and embers produced).

1.2 Fire Agency Jurisdiction

The responsibility for fire suppression within the project area is shared by the SDCFA, SDRFPD, CAL FIRE, BLM and Tribal governments. The portions of the project located on privately-owned lands fall within the jurisdiction of the SDCFA CSA 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within SRAs. Fire Responsibility Areas and fire stations are shown in **Figure 3**.

San Diego County Fire Authority (SDCFA)

The San Diego County Fire Authority was created by the County Board of Supervisors in July 2008 to improve fire protection and emergency medical services in the region. The goal of the SDCFA is to unify the administrative support, communications and training of 15 rural fire agencies and extend around the clock protection to 1.5 million acres of the unincorporated County lands that previously had either limited, or part-time on-call protection, by 2012.

San Diego Rural Fire Protection District (SDRFPD)

The San Diego Rural Fire Protection District was formed on May 18, 1983 through the consolidation of 13 East County volunteer fire departments. SDFPD, under a cooperative fire protection agreement with CAL FIRE, protects an area of approximately 720 square miles and provides emergency medical services, structural fire protection and rescue services. SDRFPD also responds to wildland fires; although wildland fire protection within this area is primarily the responsibility of CAL FIRE and the United States Forest Service (USFS).

California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE is the state's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CAL FIRE has joined with federal and local agencies to form a statewide mutual aid system. This system insures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction.

County Service Areas (CSA)

CSAs are organized under the authority of the Board of Supervisors to provide a level of emergency response within a defined jurisdictional boundary by using volunteers. CSAs have defined boundaries and most participate in the Fire Mitigation Fee program, which funds facilities and equipment, but the CSAs lack the authority to adopt a fire code or provide official response to planning and building projects. A portion of the project is located within CSAs 135 and CSA 111.

Bureau of Land Management (BLM)

BLM has land use jurisdiction throughout the majority of the project area. However, BLM has no local emergency response resources.

The BLM maintains several programs in the disciplines of fire suppression, preparedness, fuels management, prevention and education, community assistance, and protection and safety, all of which are intended to safely protect the public, natural landscape, and wildlife habitat from fire-related damage. The various programs of the BLM are discussed briefly below.

- The Fire and Aviation Directorate Program is tasked with providing aerial firefighting support for fires occurring on BLM lands. Aircraft used by the BLM are BLM-owned and contracted.
- The Community Assistance and Protection Program includes mitigation and prevention, education, and community outreach. Experts within this program are typically deployed to fire-prone areas before a fire starts to educate the community regarding fire management and suppression activities.
- The Fuels Management Program focuses on protecting communities and natural resources while providing for local economic opportunities. Through this program, fuels are effectively managed through collaboration with local communities and agencies in the form of community wildfire protection programs, fuels treatment, biomass utilization, and local fuels management contracts.

It should be noted that in addition to maintaining these programs, the BLM provides funding for firefighting efforts (through Community Assistance Grants) in the rural areas of San Diego County. In the past, funding has been used for wildfire training to local volunteers responsible for responding to fires on BLM lands. In San Diego County, BLM lands are under a Direct Protection Agreement with CAL FIRE, which specifies that CAL FIRE provides fire response resources and is responsible for conducting investigations regarding the recovery of fire suppression costs (CPUC and BLM 2008a).

The project is located within the California Desert District Planning Area and in the El Centro Fire Management Zone (FMZ) of the BLM. The current Fire Management Plan (FMP) for the California Desert District was developed in 1998 and was designed around a “fire management zone” concept based on distinct vegetation communities and the strategies for fire suppression within each of those communities. The intent was for objectives and constraints identified for fire-suppression activities to be developed by Land Use Plan decisions associated with resources.

The FMP categorized the Planning Area as FMZ 6, which is a CAL FIRE Direct Protection Area. CAL FIRE is the primary fire protection agency for BLM-administered lands in the area (CPUC and BLM 2008a).

The primary objective of CAL FIRE is to suppress all vegetation fires of 10 acres or less upon initial attack, based on "assets at risk analysis," which favors protection of structures in the urban interface. CAL FIRE and BLM operate under a Cooperative Fire Protection Plan that implores CAL FIRE to consider BLM's resource protection standards in order to develop the least-cost/least-damaging suppression strategy possible. BLM is required to send a resource advisor to work directly with the CAL FIRE incident commander to ensure resource values are fully protected or at least mitigated. This requirement is applicable to all vegetation fires occurring in the Planning Area.

Tribal Lands

Emergency response to fires on tribal lands is provided by the Campo Indian Reservation Fire Department by agreement with the other tribes. The Fire Department has one Type III brush fire engine, and staffing is variable from day to day. They are dispatched as part of the first alarm fire assignment to the project area, as described in Adequate Emergency Services, Section 4.1.

1.3 Applicable Regulations, Plans, and Standards

This section summarizes federal, state and local regulations, plans and standards relevant to fire suppression and fire prevention.

1.3.1 Federal Regulations and Nationally Recognized Standards

This section provides a description of the regulations and guidance pertinent to the project. As described in the following sections, a wide range of standards are used throughout the industry.
The BLM is the federal lead agency under the National Environmental Policy Act (NEPA). This FPP will serve as part of the analysis in the Environmental Impact Statement (EIS). The NEPA analysis will be based upon the Council on Environmental Quality (CEQ) regulation for implementing NEPA (40 Code of Federal Regulations [CFR] 1500 et seq.), and the BLM NEPA Handbook (H-1790-1).

According to a 2004 Federal Energy Regulatory Commission (FERC) report, the vast majority of transmission owners follow the National Electrical Safety Code (NESC) rules or American National Standards Institute (ANSI) guidelines, or both when managing vegetation around transmission system equipment. The NESC manages electric safety rules, including transmission wire clearance standards, whereas the applicable ANSI code manages the practice of pruning and removal of vegetation. However, in California, the CPUC has adopted General Order (GO) 95 rather than NESC as the key electric safety standard for the state. The following standards, guidelines, rules and regulations identify requirements and suggested practices for vegetation management in transmission line corridors.

In addition the National Fire Protection Association (NFPA) has prepared a Standard (guidance document) on Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations (NFPA 850) that contains relevant information.

National Electric Safety Code 1977, 2006

The NESC is a national code covering a variety of basic provisions regarding electric supply stations, overhead electric supply and communication lines, and underground electric supply and communication lines. It contains work rules for construction, maintenance, and operation of electric supply and communication lines and equipment. The NESC must be adopted by states, and the State of California has adopted its own standard (GO 95; discussed in Section 1.3.2) governing overhead transmission lines in the State. Therefore, the NESC is not discussed further.

North American Electric Reliability Council (NERC)

NERC is a nonprofit corporation whose members are ten regional reliability councils. NERC's function is to maintain and improve the reliability of the North American integrated electric transmission system, including preventing outages from vegetation located on transmission right-of-ways (ROWs), minimizing outages from vegetation located adjacent to ROWs and maintaining clearances between transmission lines and vegetation along transmission ROWs. As a result of the recommendations following the August 14, 2003 blackouts on the East Coast, NERC was charged with developing a vegetation management standard that would be applicable to all utilities and that would provide greater specificity than the NESC and ANSI standards.

Standard FAC-003-1, Transmission Vegetation Management Program (TVMP), became effective April 7, 2006, and mandatory for all utilities, pursuant to Section 1211 of the Energy Policy Act of 2005. This standard applies to all transmission lines operated at 200 kV and above and to any lower voltage lines considered critical to the reliability of the electric system in the region. The transmission line owner must prepare, and keep current, a formal TVMP. The TVMP must identify and document clearances between vegetation and overhead, ungrounded supply conductors, taking into consideration transmission line voltage, the effects of ambient temperatures on conductor sag under maximum design loading, and the effects of wind velocities on conductor sway. Minimum clearance distances must be no less than those set forth by the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003.

Institute of Electrical and Electronics Engineers Standard 516-2003

The IEEE is a leading authority in setting standards for the electric power industry. Standard 516-2003, Guide for Maintenance Methods on Energized Power Lines, provides minimum vegetation-to-conductor clearances to maintain electrical integrity.

National Fire Protection Association (NFPA) Codes, Standards, Practices and Guides

NFPA® codes, standards, recommended practices, and guides ("NFPA Documents"), are developed through a consensus standards development process approved by ANSI. This process brings together professionals representing varied viewpoints and interests to achieve consensus

on fire and other safety issues. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection but are not law or "codes" unless adopted as such or referenced as such by the California Fire Code or the Local Fire Agency.

- NFPA 850, Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010: NFPA 850 was prepared for the guidance of those charged with the design, construction, operation, and protection of electric generating plants and high voltage direct current converter stations that are covered by the scope of this document. This document provides fire hazard control recommendations for the safety of construction and operating personnel, the physical integrity of plant components, fire protection systems and equipment, and the continuity of plant operations.
- NFPA 10, Fire Extinguishers: A long-standing standard, which specifies the types, sizes, rating and locations for portable fire extinguishers. It also provides information on how to calculate the number and size of portable fire extinguishers needed.
- NFPA 11, Fire fighting foam (Low, Medium, and High Expansion Foam): NFPA 11 is a longstanding standard, which provides recommendations for design and installation of firefighting foam systems and portable equipment. It also provides recommendations regarding calculating the amount of foam concentrate and solution needed on a flammable or combustible liquid fire.
- NFPA 13, Standard for Installation of Sprinkler systems: NFPA 13 is the standard for design and installation of fire sprinkler systems in a building. It provides the requirements for the type of system needed in a particular occupancy, water supply, sprinkler head flow and pressures, the locations of sprinkler heads, and installation of the system. This standard is referenced by the California Fire Code.
- NFPA 22, Standard for water tanks for private fire protection: Provides recommendations for the design, construction and installation of water storage tanks for private fire protection systems.
- NFPA 30, Flammable and Combustible Liquids Code: This standard provides recommendations for storage, use and handling of flammable and combustible liquids. It provides detailed information regarding tank storage, spacing, dispensing of liquids, portable containers and other related operations. NFPA 30 is referenced by the California Fire Code.
- NFPA 70, National Electrical Code: NFPA 70 is the standard for the design and installation of electrical systems. It includes recommendations for various types of occupancies and also provides recommendations and criteria for the location and installation of "explosion proof" electrical systems.
- NFPA 72, National Fire Alarm and Signaling Code: NFPA 72 is the standard for the design, installation and operation of fire alarm systems in various occupancies. This standard is used by fire alarm system designers when designing and installing a system. It is utilized also by Fire Agencies when reviewing plans for new systems.

- NFPA 497, Classification of Flammable liquids, Gases and Vapors, and for Electrical Area Installations in Chemical process areas: NFPA 497 is the standard, which is utilized along with NFPA 70 to determine flammable gas, flammable liquid and combustible liquid hazards and recommend the areas which require explosion proof electrical systems. It also sets forth the extent of the classified areas. Although the title says chemical process areas, it is used as a standard for explosion proof electrical as it defines various risks and contains numerous diagrams to help the electrical system designer.

International Fire Code (IFC)

The IFC is published by the International Code Council, is a code which may be adopted by a jurisdiction. It forms the basis of the current California Fire Code (CCR Title 24, part 9). The IFC is the underlying nationally recognized code that sets standards and requirements to safe guard against the threat fires may pose to public health, safety, and the environment. The IFC, when adopted by a jurisdiction, regulates the planning, construction, and maintenance of development in all areas.

International Wildland-Urban Interface Code

The International Wildland-Urban Interface Code is published by the IFC, and is a model code addressing wildfire issues.

1.3.2 State Regulations and Standards

This section provides a description of the regulations and guidance pertinent to the to management of vegetation as they relate to the reliability of electric transmission systems as regulated by the CPUC, GO 95, CAL FIRE objectives to reduce wildfire and hazard clearance standards, the California Code of Regulations (CCRs), and CAL FIRE recovery costs project.

California Public Utilities Commission

GO 95: Rules for Overhead Electric Line Construction

GO 95 is the key standard governing the design, construction, operation, and maintenance of overhead electric lines in the State. It was adopted in 1941 and updated most recently in 2006. GO 95 includes safety standards for overhead electric lines, including minimum distances for conductor spacing, minimum conductor ground clearance, standards for calculating maximum sag, and vegetation clearance requirements. The latter, governed by Rule 35, is summarized here.

GO 95: Rule 35, Tree Trimming, defines minimum vegetation clearances around power lines. Rule 35 guidelines specify, at the time of trimming require:

- 4 feet radial clearances are required for any conductor of a line operating at 2,400 volts or more, but less than 72,000 volts;
- 6 feet radial clearances are required for any conductor of a line operating at 72,000 volts or more, but less than 110,000 volts;

- 10 feet radial clearances are required for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts (this would apply to the project);
- 15 feet radial clearances are required for any conductor of a line operating at 300,000 volts or more.

GO 95 has been periodically updated over the last six decades. Under Public Utilities Code Section 1708.5, any person may petition the Commission to amend the regulation.

CAL FIRE

CAL FIRE has a primary objective of reducing wildfire occurrence and enforcing fire hazard clearance standards around structures and utilities in order to protect the public from loss of life property and resources. Within CAL FIRE jurisdiction areas, the LE-38 Fire Safety Inspection Program is implemented for community outreach enforcement of fire safe codes. These laws include the California Public Resources Codes (PRC) 4291, 4292, and 4293 that define defensible space clearance requirements around private structures and aboveground power lines.

CCR, Title 14 Section 1254 (described below) applies to minimum clearances around utility poles. CAL FIRE inspections of utility facilities entail making notes on violations and defects in the infrastructure. Joint inspections of electrical facilities by CAL FIRE and the utility company are encouraged for the mutual benefit of fire prevention on the part of each entity. Violations identified during inspections must be brought into compliance before the utility follow-up inspections otherwise the responsible party could face misdemeanor charges for violating fire safety laws. In the event that a fire safety violation results in a fire, the inspection records can be used later in fire-cause investigations to determine the liable party. The responsible party could pay for the resulting damage of the wildfire through the CAL FIRE Civil Cost Recovery Program, described below.

In the section of Southern California where the project is proposed, the power line hazard reduction standards are applicable year round due to the scope of the fire season. More detailed descriptions of the applicable codes and regulations and images of exempt and non-exempt power line structures may be found in CAL FIRE Power Line Fire Prevention Field Guide (CAL FIRE 2008).

- PRC § 4291, Reduction of Fire Hazards Around Buildings, requires 100 feet of vegetation management around all buildings, and is the primary mechanism for conducting fire prevention activities on private property within CAL FIRE jurisdiction.
- PRC § 4292, Powerline Hazard Reduction, requires clearing vegetation inside a 10-foot circumference of such pole or tower which supports a switch, fuse, transformer, lightning arrestor, line junction, or which is a dead end or corner pole.
- PRC § 4293, Powerline Clearance Required presents guidelines for line clearance.
- CCR, Title 14 Section 1254 presents guidelines for minimum clearance requirements around utility poles.

CCR, Title 14 Section 1254

The firebreak clearances required by PRC § 4292 are applicable within an imaginary cylindrical space surrounding each pole or tower on which a switch, fuse, transformer or lightning arrester is attached and surrounding each dead-end or corner pole, unless such pole or tower is exempt from minimum clearance requirements by provisions of CCR, Title 14 Section 1255 or PRC § 4296.

The radius of the cylindroids is 10 feet measured horizontally from the outer circumference of the specified pole or tower with height equal to the distance from the intersection of the imaginary vertical exterior surface of the cylindroid with the ground to an intersection with a horizontal plane passing through the highest point at which a conductor is attached to such pole or tower. Flammable vegetation and materials located wholly or partially within the firebreak space shall be treated as follows:

- At ground level – remove flammable materials, including but not limited to, ground litter, duff and dead or desiccated vegetation that will propagate fire;
- From 0 to 8 feet above ground level – remove flammable trash, debris or other materials, grass, herbaceous and brush vegetation. All limbs and foliage of living trees shall be removed up to a height of 8 feet;
- From 8 feet to horizontal plane of highest point of conductor attachment – remove dead, diseased or dying limbs and foliage from living sound trees and any dead, diseased or dying trees in their entirety.

CCR, Title 14, Forest Practice Rules Article 8, Rule #918 Fire Protection

The requirements of Title 14, Section 918 applies to all vegetation operations in SRAs. This includes patrols for two hours subsequent to vegetation removal activities to ensure that the activity has not sparked a fire.

CAL FIRE Civil Cost Recovery Program

The CAL FIRE Civil Cost Recovery Program was established to recover the cost of fighting fires caused by people (or entities) that violate the law or were negligent in their actions. For overhead electric lines, these violations are generally related to non-compliance with vegetation clearance requirements.

California Code of Regulations - California Building and Fire Codes

California Code of Regulations, Title 24 parts 2 & 9, (http://osfm.fire.ca.gov/). Title 24 contains several International Codes that address fire safety including the International Fire Code, International Building Code. Additional safety regulations adopted by the California Building Standards Commission include the Uniform Mechanical Code, and Uniform Plumbing Code, which are also part of the California Code of Regulations.

California Environmental Quality Act

The CPUC is the state lead agency under CEQA. This FPP will serve as part of the basis for analysis in the Environmental Impact Report (EIR). Appendix G of CEQA Guidelines does not specify evaluation criteria for identifying potentially significant impacts regarding for fire fuel management. Section 15382 of the *CEQA Guidelines* states that a significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air and water. The CEQA analysis will be conducted pursuant to Section 15060-15065 of the *CEQA Guidelines.*

1.3.3 Regional and Local Regulations and Standards

CAL FIRE San Diego Unit "Pre-Fire Management Plan 2009"

As directed by the California State Fire Plan, the CAL FIRE San Diego Unit has prepared a "Pre-fire Management Plan" that encompasses 1,237,201 acres of SRA within San Diego County and Western portions of Imperial County. This document was last updated in 2005. Of particular concern to the unit is the continuation of drought induced tree and vegetation mortalities caused by bark beetle infestations. By proclamation of the Governor, CAL FIRE has taken steps to reduce the fire hazard by allowing the immediate removal of dead and dying trees from landowners' properties. This proclamation also directs CAL FIRE to protect public safety by clearing effective evacuation and emergency response routes and by establishing fire safe evacuation centers. In order to facilitate these projects, CAL FIRE San Diego is to coordinate and cooperate with all agencies involved. Areas of high priority that will be focused on for future fire prevention activities will be determined based on ignition trends and fire history. The overall goal of the San Diego Pre-Fire Management Plan is to protect public safety and assets by reducing wildfire ignitions and increasing initial attack successes.

County of San Diego

The County of San Diego Department of Planning and Land Use (DPLU) is the permitting authority for the Major Use Permit (MUP) and Building Permits. The main entities that are responsible for ensuring the health and public safety in unincorporated areas of the County are provided by San Diego County and fire protection districts (FPDs). The enforcement responsibilities within CAL FIRE and the FPDs are by any person designated by the FPD's Chief to exercise the powers and perform the duties of the fire code official as set forth in their respective fire code as ratified by the Board of Supervisors. In the unincorporated areas of the County outside of a FPD, the enforcement responsibility lay with the person designated by the Chief Administrative Officer of San Diego County or his/her authorized representative.

County of San Diego Building and Fire Codes (Divisions 1, 2 and 6, San Diego County Code of Regulatory Ordinances)

Following the October 2003 and fall 2007 wildfires, assessments were made of damaged and destroyed homes in an effort to identify areas where codes could be strengthened in order to enhance the chances of a structure surviving a wildfire. As a result, in February 2008, the County further amended the Fire Code and Building Code to include strengthened ignition-resistive

construction requirements, modifying the previous two-tiered system and requiring "enhanced" standards for all new construction.

The County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are described in detail in the next section of this FPP.

2.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The FPP must evaluate the adverse environmental effects that a proposed project may have from wildland fire and properly mitigate those impacts to ensure that development projects do not unnecessarily expose people or structures to a significant risk of loss, injury or death involving wildland fires. Detailed guidelines for the determination of significance are identified in the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance (see http://www.co.san-diego.ca.us/dplu/docs/Fire-Guidelines.pdf), as are guidelines for preparing Fire Protection Plans (*see* http://www.co.san-diego.ca.us/dplu/docs/Fire-Report-Format.pdf).

This section of the FPP must include the following Guidelines for the Determination of Significance:

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

2. Would the project result in inadequate emergency access?

3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

These County significance guidelines are analyzed in Section 6.1, and consider emergency services, fire access, water, ignition resistant construction and fire protection, fire fuel assessment, defensible space and vegetation management.

Second, the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance explain that an affirmative response to or confirmation of any one of the following Guidelines will generally be considered a significant impact related to wildland fire and fire protection as a result of project implementation, in the absence of scientific evidence to the contrary. These additional Guidelines would become significant where:

1. The project cannot demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code.

2. A comprehensive FPP has been required and the project is inconsistent with its recommendations including fuel modification.

3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect.

These significance guidelines are analyzed in Section 6.2.

Third, the CPUC and BLM are considering potential project effects according to the following four guidelines, which overlap with the previously described County guidelines. The CPUC Guidelines are as follows:

1. Would the presence of project facilities (overhead transmission lines, overhead collector lines, and/or wind turbines) significantly increase the probability of a wildfire?

2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?

3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?

4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants?

The CPUC/BLM significance guidelines are considered in Section 6.2.

3.0 ANTICIPATED FIRE BEHAVIOR IN THE VICINITY

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on **Figure 13**. The fire history of the area was reviewed and is depicted on **Figure 14**. Fire history information was derived from CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size, however not all historic fires may be documented. Approximately half of the project area is identified as unburned over the past one hundred years. A large majority of the project area was burned in the 1944 fire, with smaller portions burned during the Carrizo (1983), Ribbonwood (2005), and the 1919 fire. Additional fires located near the project area include the Cottonwood (1999), Manzanita (1992), and McCain (1995). A complete list of identified fires presented in **Figure 14** is listed in **Appendix D** of this document.

A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, Laguna, Horse, and Poomacha

fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events.

Recent reports by CAL FIRE and the CPUC have highlighted the fire risks associated with powerlines. CAL FIRE documented their analysis of the causes associated with the Witch, Guejito, and Rice fires of 2007 (http://www.fire.ca.gov/fire_protection/fire_protection_firereports.php) in a series of published reports. Key findings indicate that winds in the vicinity of the fire area peaked at velocities approaching 50 mph. In each case the fires started when the lines came in contact with each other, vegetation, or other wires, causing sparks that ignited dry vegetation. The Witch Fire was associated with a 69 kV line, and the Guejito and Rice fires were associated with 12 kV lines. The CPUC report (http://docs.cpuc.ca.gov/published/Graphics/87470.PDF) also documents peak winds in the 50 to 60 mph range. The CPUC reports conclude that winds in that velocity range are not unusual for the area.

4.0 ANALYSIS OF PROJECT EFFECTS

4.1 Adequate Emergency Services

Emergency dispatch is handled by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement the area is located in a SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands. The following describes the identified fire entities providing service for the project area including: response times, travel distance, travel time, and compliance/non-compliance with the Public Facilities Element of the San Diego County General Plan.

Table 1 describes the agencies, equipment and staffing for the areas in the vicinity of the Project.

Table 1. Fire and Emergency Services Agencies, Equipment, and Staff

Station/Agency	Equipment	Staff
CAL FIRE – Whitestar (Campo)	• Five engines • One bulldozer • Two air tankers • Two helicopters	• Four firefighters • One Battalion Chief • Two hand crews
Boulevard Fire Department Station # 87 (San Diego County Fire Authority)	• One Type I engine • Two Type II engines, • One Type III engine, • One water tender (1,000 gallons)	• Two stipend firefighters
Campo Fire Department	• One water tender; or • One engine company	• Two firefighters
Campo Indian Reservation	• One Type III engine	• Day-to-day staffing varies

Station/Agency	Equipment	Staff
Jacumba Fire Station Station # 43 (San Diego Rural Fire Protection District)	• Engine • 1,500-gallon tender	• Two stipend firefighters
Lake Morena Fire Station Station #42 (San Diego Rural Fire Protection District)	• One engine; or • Water tender	• Two firefighters
Bureau of Land Management	• None	• None
U.S. Forest Service – Cameron, Cottonwood, or Glencliff	• Two engine companies	• Four firefighters per company

For a building fire, the dispatch would be:

- Two or three CAL FIRE engine companies;
- Boulevard Fire Department;
- Campo Volunteer Fire Department;
- San Diego Rural Fire Protection District;
- Campo Indian reservation.

Travel times will vary depending on the responding entity, response route and location of the fire. Travel times have been determined for the following responding entities: Boulevard Fire District, CAL FIRE Whitestar station and Cal FIRE Campo station (see **Figure 3** for station locations).

Emergency response time standards for land use categories in **Table 1** the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are provided in three categories shown in the **Table 2**.

Table 2. Emergency Response Travel Times

Land Use Category	Maximum Travel Time	Land Use Category Defined
Town	5 minutes	Single-family residential lots of less than two acres, or more intensive uses such as multi-family residential includes all industrial development and all commercial development except neighborhood commercial.
Estate	10 minutes	Single-family residential lots from two to four acres in size, Includes neighborhood commercial development.
Rural	20 minutes	Large lot single-family residential and agricultural development. Lot sizes of grater than four acres.

The Project areas within the County of San Diego are designated in the County General Plan as General Agriculture 1 du/10, 40 acres (one dwelling unit allowed per 10 or 40 acres), and is zoned as A72 – Agricultural, or S80 Open Space. Because neither the "Town" (1 du per 2 ac.) nor "Estate" (1 du per 2-4 ac.) land use categories defined above would apply to the Project area, the closest applicable land use category is "Rural" with a maximum travel time of 20 minutes.

All land uses within the County are classified into a limited number of "use types," based on common functional, product, or compatibility characteristics. The project is considered to be a Civic Use Type– Major Impact Services and Utility per Section 1350 of the County of San Diego Zoning Ordinance. Emergency response travel times, as found in the County General Plan, were intended to apply to habitable development such as residential and commercial. The only portion of the project which will be occupied on a regular basis is the O&M Building. The 20 minute maximum travel time standard applies to the County portions of the Project alone, but not to those portions of the Project that lie on BLM, SLC, or Ewiiaapaayp tribal land.

Travel times for the Project have been calculated from the nearest station to the following points in the Project: (1) the entrance of the Project site (defined as the intersection of McCain Valley Road and Rocky Knoll Road); (2) the northern County boundary of the Project; (3) the O&M Building on BLM land; and (4) turbine J1, which is the furthest turbine at the terminus of the northern-most string of turbines on Ewiiaapaayp tribal land. Travel times were calculated using NFPA 1142 Table C.11 (b), or based on personal conversations between Jim Hunt and the applicable agency personnel.

The nearest fire station to the entrance of the project area is the Boulevard FD. The next nearest fire stations are the Whitestar CAL FIRE station in Boulevard, on Del Sol road, and the SDRFPD fire station in Jacumba. There is also a CAL FIRE station in Campo on Highway 94 and Buckman Springs Road. **Table 3** identifies the travel times for the stations that would be the first to respond.

Table 3. Estimated Travel Time from Nearest Fire Departments

Station	Location	Route	Distance (miles)	Rate of Speed (MPH)	Travel Time* (minutes)
Boulevard FD Station 87	Entrance	Old Hwy 80 / McCain Valley	**2.9**	35	**5.75**
	Northern County Boundary	Old Hwy 80 / McCain Valley/Turbine Road	5.65 3.7 **Total 9.35**	35 25	10.25 9.53 **Total 19.78**
	O&M Building	Via Ribbonwood / McCain Valley	3.6 7.7 **Total 11.3**	35 25	6.77 19.13 **Total 25.9**
	Turbine (Turbine J1)	Interstate 8 / Crestwood / Turbine Roads	5.87 9.47 **Total 15.34**	35 25	10.6 23.4 **Total 34**

Station	Location	Route	Distance (miles)	Rate of Speed (MPH)	Travel Time* (minutes)
CAL FIRE White Star	Entrance	Tierra Del Sol / Hwy 94 / McCain Valley	**6.2**	35	**11.2**
	Northern County Boundary	Tierra Del Sol / Hwy 94 / McCain Valley/Turbine Road	8.95 3.7 **Total 12.65**	35 25	15.9 9.53 **Total 25.43**
	O&M Building	Tierra Del Sol / Ribbonwood / McCain Valley	6.2 7.7 **Total 13.9**	35 35	11.2 19.13 **Total 30.3**
	Turbine (Turbine J1)	Tierra Del Sol / Interstate 8 / Crestwood / Turbine Roads	6.39 9.47 **Total 15.86**	35 25	11.5 23.4 **Total 34.9**
Jacumba Fire Station # 43	Entrance	Old Hwy 80/McCain Valley	**6.9**	35	**12.4**
	Northern County Boundary	Old Hwy 80/McCain Valley/Turbine Road	9.7 3.7 **Total 13.4**	35 25	17.1 9.53 **Total 26.6**
	O&M Building	Old Hwy 80/McCain Valley	9.7 7.3 **Total 17**	35 25	17.1 18.2 **Total 35.3**
	Turbine (Turbine J1)	Old Hwy 80/Interstate 8 / Crestwood / Turbine Roads	14 9.47 **Total 23.47**	35 25	24.5 23.4 **Total 47.9**

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems (see PDF-24). Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDF and mitigation measures to reduce the risk of fire, as summarized in Section 5.0. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

As discussed previously, a Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by SDCFA, SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access) for additional information.

4.2 Fire Access

The project area is accessible via the Crestwood, Ribbonwood, and McCain Valley Road exits off of I-8. The primary access routes will be Ribbonwood and McCain Valley Roads. Additional access is provided by Crestwood Road and Old Mine Road and will primarily serve the western portion of the project area including the western ridgeline. Access road locations are shown on **Figure 2**.

To facilitate construction activity, existing and new access road improvements will include widening from approximately 16 to 20-foot widths to 36-foot widths to accommodate large cranes and equipment delivery. The access roads will be restored from the 36-foot temporary width (accommodates large equipment and deliveries) to the widths identified below, after the turbines have been installed.

Upon completion of construction activities, existing and proposed access roads located on land under the jurisdiction of the County of San Diego will be improved to comply with the Department of Public Works Private Road Standard of 24 feet (28 foot graded extent). The main project roads (Ribbonwood Road and McCain Valley Road) throughout the project site will be improved to a maximum of 20 feet to comply with the California Fire Code Standards on lands outside of the County's jurisdiction. Spur roads to the turbines (on land under any jurisdiction) will be improved to a maximum of 18 feet wide to comply with SRA Fire Safe Regulations. These requirements were provided by the SDCFA (personal communication, James Pine, Fire Marshal). A detailed map of County roadways to be upgraded is shown in **Figure 15**.

Thirty feet of fuel management shall occur adjacent to the access roads for the proposed facilities including the turbine roads. This shall be the reduction or where reclaimed of high fuel vegetation to less than 50% cover.

Appropriate site mapping, showing roads, turbines, structures, substation, power line route, and water tank locations will be provided to SDRFPD and other local response agencies for use during emergencies. Maps will also be kept in a KNOX data box at the main entrance to facility. The maps shall be submitted to the SDRFPD for approval. The KNOX box will also contain a copy of the Emergency Response Plan and Emergency action checklists, and TULE WIND, LLC 24/7 contact information.

4.3 Water

4.3.1 Projects outside a Public or Private Water District.

TULE WIND, LLC will need to construct a well and septic system on-site to obtain water for potable and sewer use at the O&M building. The proposed O&M building will be approximately 5,000 square feet in size, and will include a well to provide up to 5 gallons per minute of potable water and a septic system. It is anticipated that the O&M facility will use approximately 2,500 gallons of water per day. In addition to the water required for use by the facility water must be available in conformance with Sec. 508.2.2 of the County of San Diego Consolidated Fire Code - Water tanks.

The water will be stored in aboveground metal tanks complying with the requirements of the SDRFPD. The tank installation, including all notes on the SDRFPD standard drawing, will be complied with. In addition the tank shall comply with NFPA 22, Private Fire Protection Water Tanks. The water capacity of each tank shall be 10,000 gallons which is the maximum required by the SDRFPD tank standard. In order to allow firefighting aircraft to dip into the tank and obtain water, the top of the tank will be left open.

The capacity of the water tank at the substation will be based upon the demand for the fire sprinkler system plus hand lines for the O&M building (estimated to be 33,000 gallons for a one hour supply to an ordinary Group 2 system per NFPA 13, 2002 ed., Chapter 11), plus hand lines, plus a reasonable allocation for water supply for Fire Engine to generate firefighting foam for 15 minutes at an application density of 0.16 gpm/sq ft from a hose line using a 3% AFFF concentrate, for use on an oil fire in transformer containment. A conceptual estimate at this point, prior to detailed design, is 250 gpm for 15 minutes (3,750 gallons of water) plus 112.5 gallons of foam concentrate for oil firefighting. The actual amount of stored water is to be determined upon detailed design of the substation, transformer secondary containment, and O&M building, and distance of the O&M building from transformers. The actual size of the water tank will be determined by the fire sprinkler contractor and the appropriate agencies, at time of detailed system design. This tank will need to be on an elevated plane or have an approved pump for fire sprinkler supply. A procedure for ongoing inspection, maintenance and filling of tanks will be in place.

TULE WIND, LLC will provide four (4) additional 10,000 gallon water tanks to the SDRFPD for SDRFPD to place at strategic locations based on its expert knowledge throughout the project area. The tanks will be installed and maintained by the TULE WIND, LLC with SDRFPD maintaining adequate water supply for fire protection services. The supplemental water can be utilized as additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The tank and fire engine connection for water tanks shall be located on the side of the road. The width of the road at that point should be at least 18 feet (travel width) plus an additional 10 foot width, for a distance of 50 feet, to allow for fire engine to park and connect to the tank, while leaving travel lanes open. Tanks shall be labeled “Fire Water: 10,000 gallons. Open top” in reflective paint.

The purpose of the tank is to allow a fire engine or water tender to refill its onboard water tank and to allow firefighting helicopters to dip into the tank.

Conceptually, the following tank locations could be employed by SDRFPD:

- Near main entrance to site on side of main trunk road; and/or
- At main intersections of access roads; and/or
- On roads to turbine pads, located subject to approval of the SDRFPD and SDCFA Fire Marshal, upon submittal of a detailed drawing; and/or
- At the substation for water supply for fire sprinklers in the O&M building and for water supply for foam making.

Actual tank locations shall be approved by the SDRFPD, and SDCFA Fire Marshal, based on a tank location drawing to be submitted by TULE WIND, LLC Engineers. Drawings shall show tank location, road, and shall include the SDRFPD tank standard drawing and notes.

4.4 Ignition-Resistant Construction and Fire Protection Systems

The section provides a discussion of the ignition resistant construction materials and fire protection systems associated with components of the proposed project. These specific components include the potential ignition sources associated with the project. These include: (1) wind turbines; (2) O&M building; (3) substation transformer; and (4) storage, use and handling of oils, flammable liquid, hazardous materials, and vehicle fluids.

4.4.1 Wind Turbines

The turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC's National Control Center in Portland, Oregon. The monitoring system for the SCADA will have an emergency power backup. A fire suppression system shall be provided in each wind turbine nacelle. Fire suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle.

There are two basic wind turbine designs:

1. Electrical equipment in the nacelle (Up-Tower).
2. Electrical equipment mounted at ground level (Down-Tower).

On the site tour of TULE WIND, LLC's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

1. Up-Tower Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, in one turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

    - Smoke detectors;
    - Arc-flash sensors; and
    - Over-current sensing transducers.

    Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system, and send an alarm to the on-site O&M facility and the NCC. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

2. Down-Tower turbines being considered for this project have the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site.

Turbine blades are manufactured from composites, fiberglass, carbon fiber, or a combination of each. Given the components of the turbine blades, they are not considered a flammable source.

A fire suppression system shall be provided in each wind turbine nacelle. Fire suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

4.4.2 Operations and Maintenance Building

To provide separation of the building and installed equipment from combustible vegetation, gravel will be placed in and around O&M building. The O&M building and the substation will have a minimum of 100 feet of fuel management.

The O&M building is the only new structure proposed that will include TULE WIND, LLC staff during business hours. The O&M building will include the following ignition resistant construction features and fire protection systems:

Ignition Resistant Construction

- The building construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.
- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.

Fire Protection Systems

- Fire Sprinkler system will be located within the O&M facility. Monitoring of the system will be supervised by TULE WIND, LLC's NCC and to the offsite 24/7 alarm monitoring company. Determination will be made by TULE WIND, LLC as to supervision by the alarm monitoring company. If there are twenty heads or more, remote supervision of all valves is required by a Fire District approved 24/7 monitoring company. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The SCADA monitoring system will have emergency power backup.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety, will have exterior exits, and will also have a fire sprinkler system.
- The building will have smoke detectors, which will activate an alarm on exterior of building, and are supervised to the Portland NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on the exterior by the main door for use by firefighters.

4.4.3 Substation Transformers

Ignition Resistant Construction

Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6., provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located a minimum of 50 feet from the O&M building and any other buildings, and will have a minimum of 100 feet of fuel modification.

Fire Protection Systems

The transformers will utilize fire walls for exposure protection and secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% AFFF concentrate is used, and the application rate is 0.16 gpm/sq ft for 15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain PCB or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by TULE WIND, LLC and plans submitted to SDRFPD and SDCFA for approval.

4.4.4 Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels

Ignition Resistant Construction

The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and shall have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Fire Protection Systems

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems, shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and “No Smoking” signs shall be posted.

4.5 Fire Fuel Assessment

The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A** – Biological Resources Maps). Approximately 96 percent of project area include the following vegetation communities include: upper Sonoran sub-shrub scrub; montane buckwheat scrub; big sagebrush scrub; northern mixed chaparral; semi-desert chaparral; chamise chaparral; redshank chaparral; scrub oak chaparral; upper Sonoran manzanita chaparral; southern north slope chaparral; coast live oak woodland; mule fat scrub; southern willow scrub; southern riparian woodland; and non-native grassland. The remaining four percent of the project area supports land use in the form of rural residential development, agriculture, heavily disturbed land, roads, and non-vegetated channels.

Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, shown on **Figure 12**. The fire history of the area was reviewed and is depicted on **Figure 14**. The source of the fire history information is CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size; however, not all historic fires may be documented. The area has experienced two fires within the project area; the largest was the 1944 fire that affected the western ridge and the McCain Valley area, and the 1983 Carrizo fire which affected a small portion located in the McCain Valley area. Other smaller fires; Ribbonwood 1972 and 1974, and McCain 1995 affected areas of the project that are proposed for transmission line construction.

4.6 Fire Behavior Modeling

As discussed in Section 4.5 the project is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE. A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, and Poomacha fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events. As a result of the fact that the site is known to occur within a high fire hazard severity zone, recent fires illustrating the results of fires occurring within these zones, and the project being a linear non-residential, primarily non-human occupied project fire modeling utilizing the Behave software was not performed. Instead, the fireshed approach that was performed for the Sunrise Powerlink, a similar type project is being utilized.

According to **Figure 12**, the proposed project would be located primarily within a very high fire hazard severity zone (CAL FIRE 2010). CAL FIRE uses Fire Hazard Severity Zones to classify the anticipated fire-related hazard for SRAs. Fire hazard measurements take into account the following elements: vegetation, topography, weather, crown fire production, and ember production and movement. The very high fire hazard severity designation can be attributed to a variety of factors including highly flammable, dense, drought-adapted desert chaparral vegetation, seasonal, strong winds, and a Mediterranean climate that results in vegetation drying during the months most likely to experience Santa Ana winds.

4.6.1 Firesheds

“Firesheds” are defined as regional landscapes that are delineated based on a number of fire-related features including fire history, fire regime, vegetation, topography, and potential wildfire behavior (CPUC and BLM 2008a). The fireshed concept is one way to evaluate fire risk across a given landscape and in relation to proposed projects. As defined in the Sunrise Powerlink

EIR/EIS, the Tule Wind Project is primarily in the La Posta Fireshed with southern portions in the Boulevard Fireshed. The following sections describe the firesheds.

4.6.1.1 Boulevard Fireshed Description

The Boulevard Fireshed is located in the extreme southeastern corner of San Diego County. Nearby communities include Boulevard, Manzanita, and Jacumba, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). Terrain varies throughout the fireshed with elevations ranging from below 1,700 feet amsl to nearly 4,700 feet amsl. Vegetation throughout the fireshed varies, but large portions are dominated by sparse, semi-arid vegetation including desert scrub, chaparral, juniper woodland, and oak woodland. Land ownership within the fireshed includes BLM lands, State lands, tribal lands, and private holdings. Population density is a sparse 34 people per square mile.

Fire History

Fire history within the Boulevard Fireshed indicates that over the last roughly 50 years, 29 wildfires have been recorded. Most fires have been small, either due to lack of fuel or quick response and control. Only three fires have grown to 500 to 1,000 acres and another three fires are considered "major" fires of over 1,000 acres. Large portions of the fireshed have not burned in the last 50 years. The xeric environment within the fireshed supports sparse vegetation, which is likely the primary limiting factor for wildfire ignition and spread. However, invasive annual grasses are establishing throughout the fireshed and may, over time, cause a shift to more frequent and larger fires (CPUC and BLM. 2008a). Recorded ignitions within the fireshed include a variety of sources, including equipment use, vehicles, campfires (including fires from illegal immigrants), debris burning, lightning, smoking, and powerline-related ignitions.

Fire Suppression

The Boulevard Fireshed is divided between the SDRFPD, CAL FIRE, and the SDCFA, Boulevard and Campo Fire Stations. The Boulevard Fireshed is covered by the CAL FIRE Whitestar Station, Boulevard Fire Station, Campo Fire Department, and Jacumba Fire Station. Between these agencies, there are significant firefighting resources to serve the area's wildfire potential, especially with CAL FIRE's air attack capabilities that can reach the area within 20 minutes.

Wildfire Modeling Results

The Boulevard Fireshed was modeled (CPUC and BLM. 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE's Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). The proposed project occurs in varying classification areas, but generally occurs within areas ranked high, very high, or extreme (CAL FIRE 2010).

4.6.1.2 La Posta Fireshed Description

The La Posta Fireshed is located directly to the west of the Boulevard Fireshed in southeastern San Diego County and includes the northern portion of the Tule Wind Project. Nearby communities include Boulder Grove, Live Oak Springs, Cuyapaipe, and La Posta, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). The La Posta Fireshed is generally at higher elevations than the Boulevard Fireshed, with elevations ranging from nearly 4,000 feet amsl to nearly 6,000 feet amsl. Vegetation throughout the fireshed varies, with coniferous forests at the higher elevations and sparse chaparral and sagebrush communities in the eastern portions of the fireshed. Land ownership within the fireshed includes USFS lands, BLM lands, State lands, City of San Diego lands, SDG&E lands, County of San Diego lands, and private holdings. Population density is higher than the Boulevard Fireshed at 56 people per square mile.

Fire History

Fire history within the La Posta Fireshed indicates that over the last 50 years, 36 wildfires have been recorded. Most fires have been small, either due to lack of continuous fuels or quick response and control. A total of five fires have grown to 500 to 1,000 acres and another four fires are considered "major" fires of over 1,000 acres. Of note, the 1970 Laguna Fire in this fireshed was ignited by a downed electrical distribution line. Over the 13-year period between 1995 and 2008, there have been 419 reported ignitions. Lightning, campfire, equipment use, vehicle fires, and arson are among the primary causes.

Fire Suppression

Fire suppression responsibilities are tasked to SDRFPD, CAL FIRE, SDCFA and USFS within the La Posta Fireshed. These agencies include significant firefighting resources to serve the area's wildfire potential, especially with the combined CAL FIRE and USFS air attack capabilities that can reach the area within 20 minutes or less.

Wildfire Modeling Results

The La Posta Fireshed was modeled (CPUC and BLM 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE's Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). Fire Threat classifications vary over the project extent and include rankings of high, very high, or extreme (CAL FIRE 2007a).

4.7 <u>Defensible Space and Vegetation Management</u>

The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre

graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

In conformance with the Section 4702.2 of the County of San Diego Consolidated Fire Code TULE WIND, LLC will provide a minimum of 100 feet of Fuel Management adjacent to buildings (primarily proposed for human habitation) associated with the O&M building and project collector substation.

The area within 50 feet of a building or structure shall be cleared of vegetation that is not fire resistant and re-planted with fire-resistant plants. In the area between 50 to 100 feet from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50% of the square footage of this area. Trees may remain in both areas provided that the horizontal distance between crowns of adjacent trees and crowns of trees and structures is not less than 10 feet.

4.8 Cumulative Impact Analysis

CEQA and NEPA require an analysis of cumulative impacts. Cumulative impacts to fire and fuels management would impact area fire service providers. The SDCFA, SDRFPD, CAL FIRE, BLM and Tribal governments service the surrounding area. The project is located in an area that has the potential for wildfires. The project area has been identified in the County of San Diego Draft General Plan Update (April 2010) as having moderate to very high in the majority of the project area and extreme potential for wildland fires in the western portion of the project area.

The proposed project is considered a connected action with the SDG&E ECO Substation project which is proposing upgrades to the existing substation and a double-circuit 230 kV or a single-circuit 500 kV transmission line and the Energia Sierra Jaurez United States Transmission Generation Tie Line project (ESJ) which proposes either a double circuit 230 kV or a single circuit 500 kV transmission line. The project area is also identified as a proposed transmission route for the Sunrise Power Link project. This would add an additional 230 kV double-circuit or single circuit along McCain Valley Road. In addition to the energy projects, the Campo Indian Reservation is in the process of adding an additional 80 turbines to the existing 25 turbines.

There currently are several energy projects within the general vicinity, presented in **Appendix C**. There are three energy projects, eight transmission and other renewable projects, nine federal development projects, and 39 County Development projects located in the general vicinity of the Tule Wind Project area. Other projects in the area are composed of residential developments,

mining operations, cell towers, and commercial development. These additional energy projects could have a cumulative effect on the surrounding area due to wildfire and wildfire management.

The components of the area energy projects may have an affect on fire fighting capability due to the transmission lines and turbines absent implementation of PDFs and Mitigation Measures. Cumulative impact research was conducted for the Tule Wind Project, and three private projects were identified as having impacts due to wildland fire hazards.

The following cumulative impacts have the potential to occur:

- Introduction of non-native plants which can contribute to fire spread rate.

  TULE WIND, LLC will implement a Noxious Weed and Invasive Species Control Plan to reduce the introduction of non-native plants into the project area. Given natural state of the project area consideration of the combined energy projects that are scheduled for development, it is anticipated that collectively non-native plants will be introduced into the area. However, the implementation of the Invasive Species Plan that will be in place for the project will render the project's contribution to this impact less than cumulatively considerable by preventing non-native species from being introduced.

- Alter the natural fire system.

  The project area is considered to be in a high to very high fire danger area and historically has not experienced a catastrophic fire in recent history. The vegetation in the area will be altered due to the construction of the turbines, the roadways, and structures. The mitigation measures that will be in place for the project, including a Disturbed Area Revegetation Plan, will render the project's contribution to this impact less than cumulatively considerable by minimizing the potential for ignition which would result in an alteration to the natural fire system.

- Impact natural resources.

  The project and cumulative projects will impact vegetation communities due to the construction of transmission lines, turbines, and structures. TULE WIND, LLC will implement several Mitigation Measures, including a Disturbed Area Revegetation Plan, which will render the project's contribution to this impact less than cumulatively considerable because temporary impacts to vegetation communities will be revegetated to pre-construction conditions and permanent impacts will be mitigated. A comprehensive analysis is provided in the Biological Technical Report for the project (HDR 2010).

- Impact firefighting effectiveness due to the project components (turbines, transmission lines).

The project and cumulative projects will include wind turbines, transmission lines, and non-residential structures that absent mitigation could hamper firefighting effectiveness. Helicopter use likely will not be limited in the area during a wildland fire because the wind turbines can be shut-down from the on-site O&M building and/or TULE WIND, LLC's NCC in Portland, Oregon, which is staffed continuously. Turbines and transmission structures will include any required FAA lighting and markings, which will make them visible reducing the potential for contact from aerial fire fighting. The transmission lines are spaced far enough apart to not restrict aircraft maneuverability and significantly increase the risk of contact by aircraft or water

buckets. Water drops are performed at 150 feet above the ground otherwise known as the "150-foot drop zone". The transmission towers are proposed to be 75 feet in height, less than half the height of the drop.

Ground based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. In order to prevent this, TULE WIND, LLC shall immediately de-energize the electrical collector and transmission systems during fire emergencies in which SDG&E de-energizes its local 138 kV system (FPP-11). Appropriate fire agencies shall be immediately notified of the line de-energizing. Additionally, TULE WIND, LLC shall provide all appropriate local, state, and federal fire dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. The transmission line shall be de-energized prior to and during fire suppression activities within 1 mile of the transmission corridor to maintain firefighter safety, and re-energizing shall require notification and approval of all the responsible fire agencies (FPP 11). The project is also improving existing access roads and constructing new roads which will improve access for firefighting.

In addition, A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDCFA, SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project. This will prevent the project from contributing to a decrease in service through the additional demand of services from the project.

The PDFs discussed in Section 5.0 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable. Therefore, the project's contribution is considered less than significant for cumulative impacts.

5.0 DESIGN CONSIDERATIONS OR PROJECT DESIGN FEATURES AND MITIGATION MEASURES

This section describes potential sources of fire risk associated with the proposed project and identifies Project Design Features (PDFs) that minimize fire risk and provide fire protection and prevention as it relates to the potential sources of fire risk associated with the project. Mitigation measures are discussed at the end of this section.

5.1 Project Considerations and Associated Fire Risks

The potential sources of fire risk associated with the proposed project include the following and are discussed in detail below.

- Construction activities;
- Electrical 34.5 kV collection and 138 kV transmission system;

- Wind turbines; and
- Operations and maintenance activities.

5.1.1 Construction

For purposes of identifying potential sources of fire risk from the proposed project, the following issues have been identified as having the potential to elevate the risk of fire ignition. **Table 4** below identifies the sources of fire risk associated with particular construction activities. Additionally, **Table 4** identifies and briefly describes PDF that avoid and/or minimize the potential for fire risk associated with the particular construction activities. Detailed discussion of the PDF is provided below in Section 5.2.1.

Table 4. Construction Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.1) and Code Requirements
Hot Work occurring during a Red Flag Alert.	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Pioneering Work (initial brush clearing by bulldozer, which can result in ignition to vegetation from engine sparks or bulldozer blade strikes against rocks)	**PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan
Some areas may require blasting to obtain the required roadway profiles and to install power poles, underground collector cables, and install turbine foundations.	**PDF-3:** Blasting Plan **PDF-4:** County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability.
Construction waste, consisting of wood waste from wood forms used for concrete foundation construction, additional wastes, consisting of erosion control materials such as straw bales and silt fencing, and packaging materials for associated turbine parts and other electrical equipment could create a fuel hazard.	**PDF-5:** Construction Waste Disposal. As a standard practice, TULE WIND, LLC does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.
Chemicals such as lubricating oils and cleaners for the turbines create a fuel hazard.	**PDF-6:** *Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels.* The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC).
Adequate water supply onsite to meet firefighter flow requirements in case of wildfire.	**PDF-7:** See Section 4.3. Based on the well pump tests performed at wells on Rough Acres Ranch and the Ewiiaapaayp Native American Reservation and other off-site water source options, an ample water supply exists for the project construction period. If a fire were to occur in the project area, during construction activities, construction activities would cease and the groundwater available from these

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.1) and Code Requirements
	sources could be used to for fire fighting, in addition to the water tanks identified above. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources could be utilized for firefighting purposes (HDR communication with County Fire Authority).
Inadequate fire or emergency services capacity.	**PDF -8:** Fire and Emergency Service Agreement. A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate.

5.1.2 Electrical 34.5 kV Collection and 138 kV Transmission System

The project's electrical system will consist of three key elements: (1) an underground and overhead collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line that will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

The electrical collection and distribution system will be designed to be in compliance with Rule 250 of the NESC, which covers all wind and ice loading requirements for overhead lines. Pole design will comply with the Avian Powerline Interaction Committee (APLIC) "Suggested Practices for Avian Protection on Power Lines" and anti-perching devices will be utilized where poles are within 0.5 miles of turbines.

34.5 kV Overhead Collector System

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.2 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

138 kV Transmission Line

The overhead 138 kV transmission line will begin at the project collector substation and run south on either side of McCain Valley Road, and across I-8 to the SDG&E proposed Rebuilt Boulevard Substation located on Old Highway 80. The transmission line will be constructed as a single circuit without any under build attachments and would be a maximum of 9.7 miles.

A maximum of 116 steel galvanized or weathered steel finish transmission poles will be necessary to support the 138 kV transmission line. The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. The table below identifies the sources of fire risk associated with power lines. Additionally, **Table 5** identifies PDFs that minimize the potential for fire risk associated with power lines. Detailed discussion of each PDF is provided below in Section 5.2.2.

Table 5. Electrical Collector and Transmission System Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.2) and Code Requirements
Vegetation contact with conductors resulting in arcing.	**PDF-9:** The 34.5 kV overhead collector lines as well as the 138 kV transmission lines will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact. For example, the 138kV transmission line will have a minimum clearance from the conductor to the ground of 30 feet and the 34.5 kV overhead collector lines will have a minimum of 18.5 feet. Although, TULE WIND, LLC's standard practice is to place the lines at a greater distance apart (e.g., 25 feet). Based on regular visual inspections, vegetation removal and management will be conducted below the lines to ensure this clearance is maintained.
Malfunctioning hardware such as transformers and capacitors or arcing from pole mounted hardware.	**PDF-10:** The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base. No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation, including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.
Avian contact with power lines.	**PDF-11:** The design of the power lines will comply with APLIC "Suggested Practices for Avian Protection on Power Lines" which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart,

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.2) and Code Requirements
	and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet Vertical feet and 5 feet horizontal feet apart.
Conductor-to-conductor contact or floating/wind-blown debris contact with conductors or insulators.	**PDF-12:** The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.
Wood support poles being blown down in high winds.	**PDF-13:** Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.
Dust or dirt on insulators.	**PDF-14:** Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.
Airplane and/or helicopter contact with conductors or support structures.	**PDF-15:** Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

5.1.3 Wind Turbines

Wind turbines have a number of safety features that minimize the potential for fire ignition. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The installation of the turbine and associated electrical equipment is to be certified by a nationally-recognized third party testing agency. The project will be monitored TULE WIND, LLC's proprietary wind turbine monitoring Supervisory, Control and Data Acquisition system (SCADA). This system will be located in the Operations and Maintenance building (O&M) and will collect operation, performance data, and allow for remote operation of the wind turbines. In addition, this system informs personnel at TULE WIND, LLC's NCC in Portland, Oregon. The monitoring system for the SCADA will have a backup emergency power source.

For purposes of identifying potential sources of fire risk, as it relates to the wind turbines, the following issues have the potential to elevate the risk of fire ignition:

- Nacelle Fire resulting from:
  - Electrical components and wiring;
  - Flammable gear and bearing lubricants;
  - Overheating due to blade over speed, wind or vibration; and
  - Lightning.
- Electrical Components elsewhere in the turbine.

Nacelle Fire

The turbine system is equipped with an arc flash detection sensors optical technology to detect the presence of the initial arc flash, over-current sensing transducers and smoke detectors. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-or-range condition, the turbine will shutdown and will disengage from the electrical collection system. In addition, the SCADA system will alarm. The following two types of turbine electrical components are proposed for the project:

1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components that are included and mounted on key power cables within the nacelle. The fire detection and safety features include:

- Smoke detectors;
- Arc-flash sensors – Provide a clear arc flash measurement. Since the light emitted during an arc flash event is significantly brighter than normal background light, optical technology can easily detect the light present at the initiation of the flash. If an arch-flash is detected, the turbine will immediately command a shutdown; and,
- Over-current sensing transducers – All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. If any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

A fire suppression system shall be provided in each wind turbine nacelle selected by TULE WIND, LLC for construction. In addition, turbines including all components will be certified by a nationally-recognized third party testing agency.

2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower; however the same potential for a fire within the electrical components and transformer exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site. Portions of the turbine could ignite and could fall to the ground. However, the project is proposing up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the cleared area would be revegetated using low fuel vegetation in a spacing and

height configuration approved by the Fire District for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The environmental analysis conducted for the project assumed a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed annually prior to May 1 and more often as needed.

Based on TULE WIND, LLC's experience, burning debris from a nacelle fire could fall up to 100-feet from the turbine; however, this is speculative as the distance that debris would fall is dependant upon the wind conditions of that particular day. Burning material could travel in a windy condition and start a vegetation fire. Burning embers in wind driven vegetation fires can also travel distances from the main fire and start spot fires.

As a supplement to the fire detection and protection features (smoke detectors, arc-flash sensors, over-current sensing transducers, SCADA system, fuel modification, fire extinguishers) provided as part of the turbine design, TULE WIND, LLC will provide one tank at the O&M building and four (4) water tanks with locations to be confirmed with the SDRFPD. Water tanks would be located within portions of the project area that the agencies feel are strategic from a firefighting perspective. Water tanks will be installed and maintained by TULE WIND, LLC, with the SDRFPD maintaining adequate water levels to support fire protection services.

It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

It is unlikely that fire ignition in the nacelle due to blade over speed would occur due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibration sensors that automatically shut the turbines down if vibration exceeds the normal operating conditions.

Lightning

Wind turbines are vulnerable to lightning strikes due to their height and location on elevated features such as ridges. Turbine blades are manufactured from fire resistant components, composites, fiberglass, carbon fiber, or a combination of all. However, to address this issue, the wind turbines being considered for this project include "grounding" features within the wind turbine blades to reduce the potential for fire due to lighting.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 6** below identifies the sources of fire risk associated with wind turbines. Additionally, the table identifies PDF that minimize the potential for fire risk associated with wind turbines. Detailed discussion of the PDF regarding turbine components and the tower itself is provided below in Section 5.2.3.

Table 6. Wind Turbine Fire Risk, Project Design Features, and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.3) and Code Requirements
Nacelle Fire – Electrical • Electrical components and wiring • Flammable gear and bearing lubricants Nacelle Fire – Braking • Overheating due to turbine blade over speed, wind, and vibration	**PDF-16:** **1) Up-Tower -** Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components mounted on key power cables within the nacelle. The fire detection features include: • Smoke detectors, • Arc-flash sensors, • Over-current sensing transducers; and • Portable fire extinguishers. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine, disengage it from the electrical collection system, and send a notice through the SCADA system to the NCC in Portland, Oregon. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower. The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. A fire suppression system shall be provided in each wind turbine nacelle selected by TULE WIND, LLC for construction. In addition, turbines including all components will be certified by a nationally-recognized third party testing agency. **(2) Down-Tower -** This type of turbine being considered for the project has the medium voltage electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However this turbine style still has the same risk of a fire associated with electrical components as the Up-

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.3) and Code Requirements
	Tower style does. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site. The potential for fire ignition in the nacelle due to blade over speed, wind or vibration is limited due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine in high wind conditions. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibration sensors that automatically shut the turbines down if vibration exceeds the normal operating conditions. Turbine and associated electrical equipment will be certified by a nationally-recognized third party testing agency.
Lightning	**PDF-17:** All wind turbine models for this project will incorporate blade lightning protection systems in accordance with the International Electrotechnical Commission (IEC) TR 61400-24. In addition, the lightning protection will be certified by an independent engineering company (e.g., Germanischer Lloyd, DNV or other appropriate independent engineer). A copy of that certificate will be available with the turbine order. In general, these systems consist of: air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth.

5.1.4 Operations and Maintenance

Maintenance activities will be limited to areas accessible by the permanent access roads. Typical turbine maintenance activities involve deploying personnel to the turbine to service parts within the turbine, but may also include temporarily deploying a crane within the previously disturbed construction area around the turbine, removing the turbine rotor, replacing generators, and bearings. See discussion below in Section 5.2.1 regarding TULE WIND, LLC's Hot Work Procedure that would be implemented during any operations and/or maintenance activities that occur during Red Flag Alerts.

As described previously, the project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite

backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 7** identifies the sources of fire risk associated with operations and maintenance activities. Additionally, the table identifies PDF that minimize the potential for fire risk associated with operations and maintenance activities. Detailed discussion of the PDF is provided below in Section 5.2.4.

Table 7. Operations and Maintenance Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.4) and Code Requirements
Off-road vehicle use • Pioneering Work • Sparks from road grading equipment	**PDF-18:** • No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009). • Hot Work Procedure (PDF-1). • Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2). • Road maintenance activities requiring the use of grading equipment will be suspended during red flag events. • Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.
On highway activities located in particularly hazardous fuel conditions • Idling or parked vehicles and equipment in areas of brush, grass, vegetation.	**PDF-19:** No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.
Chain saw use of any kind	**PDF-1:**Hot Work Procedure (Section 5.2.1)
Operation of generators, pumps, augers, two-cycle motors, or other equipment capable of producing sparks or ample exhaust heat to cause ignition	**PDF-20:** Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 100-foot radius surrounding the turbine in which vegetative fuel reduction will take place. **PDF-1:** Hot Work Procedure (Section 5.2.1)

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.4) and Code Requirements
Tree removal equipment including but not limited to grinders, chippers, skidders, excavators, etc.	**PDF-1:** Hot Work Procedure (Section 5.2.1) **PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2).
Grinding and welding	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Working on energized electrical equipment or facilities	**PDF-21:** Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.
Smoking	**PDF-22:** Limited to cleared areas around the O&M building
Red Flag Warnings	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Turbine Fire – Human Activity (Hotwork)	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Inadequate Site Access	**PDF-23:** Existing access roads will be improved and new access roads will be constructed.
O&M Building Fire Risk	**PDF-24:** O&M building construction will include fire prevention and protection. • Construction to comply with County Building Code (CBC). • O&M building to be surrounded by 4-acre cleared area, with a minimum of 100 feet of fuel management. Structure will comply with County Consolidated Fire Code for defensible space. • Batteries will have secondary containment and required ventilation. • Sprinkler systems will be installed. • SCADA monitoring system will have emergency power source. • CFC and CBC compliance for fire separation. • Control room will have 1-hour fire rated walls. • Building will be equipped with smoke detectors. • Building will be equipped with a Knox box on the exterior by the main door.
Substation, Transformers, or Electrical Fire Risk	**PDF-25:** Transformers walls will have secondary containment adequate to contain the total amount of oil plus firefighting water for 15 minutes. To be approved by SDRFPD and SDCFA.
Inadequate Fire or Emergency Services Capacity	**PDF-8:** Fire and Emergency Service Agreement.
Combustible Storage	**PDF-26:** • Minimize the accumulation of combustible material. Storage of flammable materials in fire rated cabinets. • Perform periodic housekeeping inspections and unsure employees are trained in the use of fire extinguishers. • Combustible storage and trash will be removed from site as soon as possible.

5.2 Project Design Features

Included below is a detailed discussion of the PDF's identified above.

5.2.1 Construction

PDF-1 Hot Work: TULE WIND, LLC will comply with the applicable sections in NFPA 51-B "Fire prevention during welding, cutting and other hot work" and CFC Chapter 26 "Welding and other Hot Work". During Red Flag Alerts, operations involving cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, use of torches, or other similar activity during construction or maintenance activities will be conducted according to NFPA 51-B. Red Flag Warnings are issued by the U.S. National Weather Service. Fire Weather Watches and Red Flag Warnings are normally issued only after: (1) An accurate assessment of fuel conditions has been determined (see "Qualifying Fuels Information" section); and (2) Conferring with the affected agencies or a representative subset of affected agencies, to include the Geographic Area Coordination Center (GACC) Predictive Services Units. This is normally accomplished via morning conference calls hosted by the GACCs. It is to be understood that there may be times when full coordination cannot be accomplished due to schedule and workload issues, and that the ultimate responsibility for the issuance of a watch/warning rests with the NWS forecaster. The project area is located in the National Weather Service San Diego Mountain (CA 258) zone.

TULE WIND, LLC will implement a Hot Work Procedure on-site to minimize the potential for fire ignition. Components of the Hot Work Procedure will include:

- Prior to hot work activity commencing, the on-site TULE WIND, LLC fire safety coordinator will monitor daily the National Weather Service Red Flag Alert system.
- In the event of a Red Flag Alert, prior to hot work activity commencing, the on-site TULE WIND, LLC fire safety coordinator will contact the local fire agency to determine the level of alert specific to the project area.
- The on-site TULE WIND, LLC fire safety coordinator will require all hot work to be conducted according to NFPA 51-B.
- TULE WIND, LLC will require all employees and/or sub-contractors who perform hot work during Red Flag Alerts to be trained under the applicable sections of NFPA 51-B.
- The on-site TULE WIND, LLC fire safety coordinator will have the authority to modify hot work activities associated with construction and/or maintenance activities to the degree necessary to prevent fire ignition.

PDF-2: Construction Activities **-** Develop and implement a Construction and Maintenance Fire Prevention/Protection Plan. TULE WIND, LLC shall develop a multi-agency Construction and Maintenance Fire Prevention Plan. Plan reviewers shall include: CPUC, CAL FIRE, BLM, CSLC, and the County of San Diego. TULE WIND, LLC shall provide a draft copy of this Plan to each listed agency at least 90 days before the start of construction activities. Comments on the Plan shall be provided by TULE WIND, LLC to all other participants, and TULE WIND, LLC

shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, SDRFPD and the SDCFA. The final Plan shall be submitted to CAL FIRE, SDRFPD and SDCFA at least 30 days prior to the initiation of construction activities. TULE WIND, LLC shall fully implement the Plan during all construction and maintenance activities. All construction work on the project shall follow the Construction Plan guidelines and commitments, and Plan contents are to be incorporated into the standard construction contracting agreements for the construction of the project. Primary Plan enforcement and implementation responsibility will remain with TULE WIND, LLC.

At a minimum, Plan contents will include the requirements of Title 14 of the California Code of Regulations, Article 8 #918 "Fire Protection" and the elements listed below:

1. During the construction phase of the project, TULE WIND, LLC shall implement ongoing fire patrols. TULE WIND, LLC shall maintain fire patrols during construction hours and for 1 hour after end of daily construction, and hotwork.
2. Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), TULE WIND, LLC shall update in writing the 24-hour contact information and onsite fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the CAL FIRE, SDRFPD, SDCFA, CPUC, BLM, and to state and federal fire agencies.
3. During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and Federal Responsibility Areas (FRA), all non-essential, non-emergency construction and maintenance activities shall cease. Utility and contractor personnel will be informed of changes to the Red Flag event status as stipulated by CAL FIRE.
4. All construction crews and inspectors shall be provided with radio and cellular telephone access that is operational along the entire length of the approved route to allow for immediate reporting of fires. Communication pathways and equipment shall be tested and confirmed operational each day prior to initiating construction activities at each construction site. The radio shall allow communications with other TULE WIND, LLC vehicles and construction trailer. All fires will be reported immediately upon detection.
5. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards will be updated and redistributed to all crewmembers as needed, and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect.
6. Each member of the construction crew shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats.
7. Water storage tanks and access roads shall be installed and operational at time of start of construction.

PDF-3: Blasting – As part of the project design, a blasting plan will be prepared. The blasting plan will include identification of planned blasting locations, a description of the planned blasting methods, an inventory of receptors potentially affected by the planned blasting, and to determination the area affected by the planned blasting. Blasting methods will take into consideration the high wildland fire hazard conditions in and surrounding the project area.

Precautions to prevent fire will be included in the blasting plan will include requirements to have all blasting charges capped with soil and/or other materials that are not combustible.

Blasting activities are required to be observed by a Blasting Inspector. A Blasting Inspector is a person on the Sheriff's approved list of inspectors authorized to conduct inspections, before and after a blast. To be on the Sheriff's approved list, an inspector shall be certified by or registered with the International Conference of Building Officials, the International Code Counsel/Counsel of American Building Officials, the Building Officials & Code Administrator or the Southern Building Code Congress International.

PDF-4: County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability – The project will comply with the County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability. The Fire Code requires a permit application to be issued prior to the start of blasting activities. Blasting activities shall be limited to Monday through Saturday between the hours of 7:00 a.m. and 6:00 p.m. or one-half hour before sunset, whichever occurs first, unless issuance of grant approval. Surrounding residents within 600 feet will be notified in writing within 600 feet of any major blast location or 300 feet from any minor blast location.

PDF-5: Construction Waste Disposal – As a standard practice, TULE WIND, LLC does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.

PDF-6: Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels – As part of the project construction and operations, chemicals such as oils and cleaners for turbines will be properly storage, used, and handled as regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and will have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and "No Smoking" signs shall be posted.

PDF-7: Water Availability – Groundwater Investigation Report (Geo-Logic, December 2010) (**Appendix B**). Over a nine- month construction period, 72 days of maximum road watering and foundation construction would occur simultaneously, the project would require the use of up to 250,000 gallons of water per day, requiring continuous pumping of 124 gallons per minute (24-hours per day, seven days per week) to support the water needs of the project for dust suppression and concrete mixing.

The project is planning to obtain water from wells within the Thing Valley Water Production Area (WPA) on the Ewiiaapaayp Reservation and the Rough Acres Ranch WPA. Two groundwater production wells are located within the Thing Valley WPA. Two wells (6 and 6a) are located within the Rough Acres Ranch WPA; however, seven wells surrounding the project area were evaluated during the groundwater investigation. Four of the wells are currently equipped with pumps and are actively used for municipal water supply or to provide water to livestock. The remaining three wells are either equipped with pumps and are not currently used or have not been equipped with pumps.

Based on aquifer testing conducted as part of the groundwater investigation and well testing, Well No. 6 and No. 6a are capable of producing groundwater at 50 to 60 gpm each. The well test conducted on well No. 6a indicates a specific yield of 60 gpm. A Major Use Permit for water extraction will be required for groundwater pumping at Well No. 6a or other wells located on land under the jurisdiction of the County of San Diego.

There is no requirement for an MUP for groundwater extraction for use of the well on the Ewiiaapaayp Reservation. Results of the testing indicate that the Reservation well can pump rate of 80 gallons per minute (gpm) is possible, but a reduced pumping rate is recommended. In addition, pumping from other reservation wells is possible to provide a supplemental water supply. The project has also received written confirmation from the Jacumba Community Service District (Lindenmeyer 2010) and Live Oak Springs Water Company (Najor 2010) of water supplies available to provide construction water to the project. However, based on the results of the Groundwater Investigation Report (Geo-Logic Associates, December 2010), water from these sources is not required to meet the 124 gpm pump rate.

Based on the lower pumping rate of 50 gpm at Well No. 6a and an 80 gpm pumping rate at the one well tested on the Reservation, the required pumping rate of 124 gpm is achieved. Based on the results of the aquifer pumping test at Well No. 6a, the significance criteria for well interference and 50 percent depletion of groundwater in storage associated with project construction requirements will not be exceeded. Actually, at the gpm rates identified in the Groundwater Investigation Report, a gpm pumping rate of 130 is achieved, which exceeds the project's maximum daily water requirements during construction. Additionally, if the pumping rate at Well No.6a is doubled to 100 gpm, the project would exceed the required gpm pumping rate by 56 gpm/day. Also, it should be taken into consideration that additional wells on the Ewiiaapaayp Reservation may be available for use.

The potential for depletion of groundwater in storage within the McCain Valley is not anticipated. Results of the groundwater demand during a drought period indicate that eight times the anticipated groundwater pumping proposed by the project would be required to draw groundwater to the 50 percent depletion level.

There are four potential additional water supply sources available for the project. The State Correctional Facility is located about one half mile north of Interstate 8 off of McCain Road. This correctional facility maintains two wells with estimated production of 45 and 65 gpm. The Live Oak Springs Resort located south of Interstate 8 on Old Highway 80 about ¾-mile northwest of the intersection with Highway 94 may provide a source of water supply. This resort

(and water company) operates a well that pumps about 40,000 gallons per day (25 to 30 gpm) and maintains a 100,000 gallon pond, and two large tanks with an additional 50,000 gallons of storage capacity. They have committed to providing 40,000 for immediate use and up to 80,000 gallons per day with additional storage tanks (pers. comm., September 8, 2010); equivalent to 28 to 55 gpm. The Jacumba Community Service District (CSD) also has indicated that their well produces 200 gpm and they will commit up to 40,000 gallons per day to the project (pers. comm., September 8, 2010); equivalent to about 28 gpm. Finally, the City of El Centro has indicated that they are willing to sell wastewater plant effluent to the project for use during the construction phase.

In summary, as outlined above, the available on-site groundwater can provide the required project water requirements through continuous pumping at a rate of 124 gpm. Current pumping test results indicate at least 130 gpm can be achieved from the two tested wells, and potential greater volumes with a higher volume pump at the Rough Acres Ranch test well. However, with off-site water from the State Correctional Facility, Live Oak Springs Resort, and Jacumba CSD for purchase, an additional 80,000 to 120,000 gallons of water per day, or approximately 55 to 83 gpm of water could be available to support the project water supply needs; ample water for the nine-month construction period. With these additional off-site sources, the combined on-site and off-site water could be equivalent to an estimated 213 gpm could be made available in support of the project.

If a fire were to occur in the project area, construction activities utilizing ground water would cease and the groundwater available from these sources could be used for firefighting purposes. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources would be utilized for firefighting purposes (HDR staff, Pers. Comm.).

TULE WIND, LLC will provide four (4) additional 10,000 gallon water tanks to the SDRFPD to place at strategic locations throughout the site. The tanks will be installed and maintained by TULE WIND, LLC, with SDRFPD maintaining adequate water levels for fire protection services. The water tanks will provide a supplemental water source that can be utilized for additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The same wells will provide the source of water during operations. When the project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

5.2.2 Electrical Collection and Transmission System

The project's electrical system will consist of three key elements: (1) an overhead and underground collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line which will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.4 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

The overhead transmission system is proposed to be a 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation. TULE WIND, LLC will utilize steel poles for the transmission lines and TULE WIND, LLC is considering the use of wood and/or steel poles for 34.5 kV distribution lines. The length (in miles) of the proposed 138 kV transmission line totals 9.2 miles with 5.91 miles on BLM lands, 0.26 miles of State of California lands, and 3.05 miles on County of San Diego lands, with no transmission lines located on tribal lands. The following describes the 138 kV transmission line and 34.5 collector line design:

- 138 kV Transmission and 34.5 kV collector line designs will include longer insulators to support the wires. The long insulators assure adequate conductor separation to prevent arcing during high-wind conditions. This design also protects raptors with wide wingspans.
- No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing.
- The transmission line will be designed so under all load conditions, the line will be no closer to the ground than 25 feet. In areas where a distribution circuit is also placed on the pole at a lower elevation, the minimum clearance for the distribution circuit to the ground is 25 feet. The distance between the transmission and distribution circuits is a minimum of 10 feet, assuming worst case conditions maximum sag for the transmission circuit and minimum sag for the distribution circuit.
- Self supporting poles for both 138 kV and 34.5 kV lines will generally be used at locations where the line changes direction rather than guy wires and anchors. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-8: Execute a Fire and Emergency Protection Services Agreement - A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC and the SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

TULE WIND, LLC will educate the construction crew and maintenance employees as to potential dangers that may occur during construction and maintenance of the project. To reduce the possibility of fire ignition during hot work, TULE WIND, LLC will implement the Hot Work Procedure and coordinate with local fire authority regarding the specific conditions in the project area. The PDFs discussed in Section 5.2 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable.

PDF-9: Overhead collector lines (138 kV and 34.5 kV) transmission lines - Will be designed in accordance with CPUC GO 95 "Rules for Overhead Electric Line Construction" and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact.

PDF-10: Cleared Areas **-** The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base.

No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation, including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.

PDF-11**:** ***Powerline Design*** - The design of the power lines will comply with APLIC "Suggested Practices for Avian Protection on Power Lines" which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart, and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet vertical feet and 5 feet horizontal feet apart.

PDF-12: Line Design **-** The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.

PDR-13: Pole Design- Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-14: Transmission Line Maintenance **-** Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.

PDF-15: Lighting **-** Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

5.2.3 Wind Turbines

The turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. The installation of the turbine and associated electrical equipment is to be certified by a nationally-recognized third party testing agency. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC's NCC in Portland, Oregon. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

PDF-16 Nacelle Fire Risk Reduction

There are two basic wind turbine designs:

(1) Up-Tower - Electrical equipment in the nacelle; and
(2) Down-Tower - Electrical equipment mounted at ground level.

On the site tour of TULE WIND, LLC's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

(1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, the turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

- Smoke detectors;
- Arc-flash sensors; and
- Over-current sensing transducers.

Should any of these devices register an out-of-range condition, the device immediately commands a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC.

(2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However the same risk of a fire associated with electrical components exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved access roads.

Regardless of the wind turbine type, installation of the turbines and associated electrical equipment will be certified by a nationally-recognized third party testing agency. In addition, a potential fire risk associated with wind turbines is improperly installed electrical equipment (e.g., technical defects or components in the power electronics, failure of power switches, failure of control electronics, high electrical resistance caused by insufficient contact surface with electrical connections, such as loose connections, insufficient electrical protection concept with respect to the identification of insulation defects and the selectivity of switch-off units, no pole mounted disconnected switches, inadequate surge protection, inadequate grounding due to incorrect design or improper installation).

If fire ignition occurred within the Up-Tower or Down-Tower turbine type due to improperly installed electrical equipment, the fire protection and prevention features identified above would be triggered and the device that registered an out-of-range condition would immediately shutdown and an alarm would be indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC's NCC in Portland, Oregon. In addition, signage will be posted at the NCC to call a 10 digit 24/7 landline phone number to emergency dispatch center in San Diego County in the case of an emergency.

PDF-17: Lightning - Although a final decision on the type of wind turbine has not been made, the majority of turbine manufacturers have imbedded "grounding" systems within the turbine blades to prevent ignition of a fire due to lighting. All wind turbine models being considered for this project will incorporate blade lightning protection systems. In general, these systems consist of air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth. The lightning protection systems will be developed in accordance with the International Electrotechnical Commission (IEC) TR 61400-24. In addition, the lightning protection will be certified by a nationally-recognized third party testing agency. As mentioned earlier, TULE WIND, LLC has nearly 50 million operating hours on its U.S. fleet, and over that time, lightning-induced fire has not occurred.

To provide separation of installed equipment from combustible vegetation, gravel will be placed in and around substation, O&M building, wind turbines, and transformers. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter

(gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

5.2.4 Operations and Maintenance

TULE WIND, LLC's NCC in Portland, Oregon monitors and controls all of TULE WIND, LLC's wind turbines and is staffed continuously. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the plant, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Construction related activities that occur during operations and maintenance activities will be conducted according the same Hot Work Procedure identified above under the PDF. This will minimize the potential for fire ignition.

PDF-18: Off-road Vehicle Use

- No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed;
- Hot Work Procedure (PDF-1);
- Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2).
- Road maintenance activities requiring the use of grading equipment will be suspended during red flag events;
- Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.

***PDF-19: Vehicle Idling* -** No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.

***PDF-20: Portable Equipment* -** Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 200-foot radius surrounding the turbine in which vegetative fuel reduction will take place.

***PDF-21: Energized Equipment* -** Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.

***PDF-22: Smoking* -** Smoking is limited to cleared areas around the O&M building.

***PDF-23: Existing and New Access Roads* -** As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009) where they occur on County lands with the exception of spurs that serve turbines only (See Section 4.2 Fire Access and County Roadway Improvements **Figure 15**). These improvements will have the effect of decreasing fire response times to the project area and general area, in the event of a fire or other emergency.

The proposed access road improvements will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood and McCain Valley Road is proposed as a private road; however, it will not be gated. As a result this road will be available to the community in the event of an emergency. This road will be improved to meet County of San Diego private road standards. Additionally, the turbine roads will improve access allowing fire crews and tanker trucks faster initial response in the project area. Fire and other emergency vehicles will also be able to utilize the access roads to improve response times to remote areas. BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 4.2.

***PDF-24: Operations and Maintenance Facility* -** The O&M facility is the only new structure proposed that will include TULE WIND, LLC staff during business hours. The O&M building will include the PDF that provide fire prevention and protection.

- The facility construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code (CBC) Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.
- The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project will provide a minimum of 100 feet of fuel management.
- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.
- Sprinkler system will be installed in the O&M facility. Fire Sprinkler system will be supervised by TULE WIND, LLC's Portland Control center and to the offsite 24/7 alarm monitoring company. Determination will be made by TULE WIND, LLC as to

supervision by the alarm monitoring company. Supervision to a Fire District approved remote alarm monitoring company required based on number of sprinkler heads. Twenty heads requires electrical supervision of all valves in system, pumps, water tank level, etc. CFC Section 903.4.

- The SCADA monitoring system will have emergency power source at the O&M building, in addition to 24/7 monitoring at the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety and will have exterior exits.
- The building will have smoke detectors, which are supervised in Portland control room, activate an alarm on exterior of building, and are supervised to the NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on exterior by main door for use by firefighters.

Per the requirements of PRC 4291, *Reduction of Fire Hazards Around Buildings*, the project will provide 100 feet of fuel modification around all buildings, and is the primary mechanism for conducting fire prevention activities on property within CAL FIRE jurisdiction. In addition, TULE WIND, LLC will implement a brush management plan at its project O&M facility, turbine pads, and substation. This plan will be consistent with the following County Consolidated Fire Code:

- Under the County Consolidated Fire Code, brush is to be modified within 100 feet (31 meters) of structures in radius, called defensible space (Section 4707.2a). There are two zones to be aware of when creating a defensible space for fire mitigation.
    - Zone 1, From structure out to a minimum of 50 feet: "The area within 50 feet (15 meters) of a building or structure shall be cleared of vegetation that is not fire resistant and/or replanted with fire-resistant plants" (County Fire Code Section 4707.2a).
    - Zone 2, Between 50 to 100 feet from structures: "In the area between 50 to 100 feet (15 to 31 meters) from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50 percent of the square footage of this area" (County Fire Code, Section 4707.2a).

PDF-25: Substation Transformers - Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6, provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located approximately 50 feet from the O&M building and will a minimum of 100 feet of fuel management. The substation is proposed to be located adjacent to the O&M building on a 5-acre parcel and will be surrounded by a 3-acre graveled parcel providing a minimum of 100 feet of fuel management around the substation.

Transformers will utilize fire walls for exposure protection and will have secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes. Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% Aqueous Film Forming Foam (AFFF) concentrate is used, and the application rate is 0.16 gpm/sq. ft. for 15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain polychlorinated biphenyls (PCBs) or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by TULE WIND, LLC and submitted to SDRFPD and SDCFA for approval.

PDF-26: Combustible Storage - Prevention and minimization of fire risk is a primary concern for TULE WIND, LLC. Other typical best management practices related to combustible storage that will be implemented on the project site include:

- Minimizing accumulation of combustible material, only allow storage of flammable materials in fire rated cabinets, ensure all combustible waste material is collected and disposed of properly including the storage of oily rags in approved containers, maintain a list of potential fire hazards at the plant including how sources of ignition will be controlled for each of these potential hazards.
- Perform periodic housekeeping inspections to find and mitigate any fire hazards found, ensure employees and sub-contractors are trained in fire prevention, and ensure employees are trained in the use of fire extinguishers.
- Combustible storage and trash on site during construction and operation phases will be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage will be orderly and be removed from the site as soon as possible.

5.3 Mitigation Measures

The fire impacts, PDFs, proposed mitigation measures, and level of significance after implementation PDFs and mitigation measures are presented below in **Table 8.** A detailed description of the significance criteria is further discussed in the Section 6.0, Conclusion.

At this time, the mitigation measures for the Tule Wind Project have not been finalized. Mitigation Measures FF-1 through FF-7 have been presented for public comment in the Draft EIR/EIS for the ECO Substation/Tule Wind/ESJ Gen-Tie Project. The Tule Wind Project will comply with the mitigation measures incorporated into the Final EIR/EIS, as well as any extra mitigation measures specified in this Fire Protection Plan, however, to the extent that any mitigation measures conflict, the Tule Wind Project will comply with and implement the mitigation measure(s) found in the Final EIR/EIS. Mitigation measures that are consistent with the EIR/EIS mitigation measures have been numbered as such with the previous corresponding FPP mitigation number provided in parenthesis.

Table 8. Impacts, Project Design Features, Mitigation Measures, and Significance Criteria

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
First Line of Inquiry – County of San Diego Guidelines			
• Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	***Construction Activities*** (PDF 1-8) ***Electric Collector and Transmission*** (PDF 15) ***Wind Turbine*** (PDF 16 and 17) ***Operations and Maintenance*** (PDF 1, 2, 18–26)	***Construction Activities*** **MM FF-1 (FPP-1): Develop and implement a Construction Fire Prevention/Protection Plan.** The applicant shall develop a multiagency Construction Fire Prevention/Protection Plan for the Tule Wind Project and monitor construction activities to ensure implementation and effectiveness of the plan. Plan reviewers shall include the following: CAL FIRE, Rural Fire Protection District, and SDCFA. The applicant shall provide a draft copy of this plan to each listed agency at least 90 days before the start of any construction activities. Comments on the plan shall be provided by the applicant to all other participants, the applicant shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, Rural Fire Protection District, and SDCFA. The final plan will be approved by the commenting agencies prior to the initiation of construction activities and provided to the applicant for implementation during all construction activities. At minimum, the plan will include the following: o Procedures for minimizing potential ignition	***Construction Activities*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Electric Collector and Transmission*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact will be less than significant with the installation of fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		o Vegetation clearing o Fuel modification establishment o Parking requirements o Smoking restrictions o Hot work restrictions • Red Flag Warning restrictions • Fire coordinator role and responsibility • Fire suppression equipment on-site at all times work is occurring • Requirements of Title 14 of the CCR, Article 8 #918 "Fire Protection" for private land portions • Access Road widening (28 foot County roads, 18-foot-wide spur roads) • Applicable components of the SDG&E Wildland Fire Prevention and Fire Safety Electric Standard Practice (2009) • Emergency response and reporting procedures • Emergency contact information • Worker education materials; kick-off and tailgate meeting schedules • Other information as provided by CAL FIRE, Rural Fire Protection District, SDCFA, BLM, California State Land Commission (CSLC),and Tribal Governments Additional restrictions will include the following:	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		• During the construction phase of the project, the applicant shall implement ongoing fire patrols. The applicant shall maintain fire patrols during construction hours and for one (1) hour after end of daily construction, and hotwork. • Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), the applicant shall update in writing the 24-hour contact information and on-site fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the Rural Fire Protection District, SDCFA, and CAL FIRE • During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and LRAs, and when the USFS PAL is Very High on CNF (as appropriate), all non-essential, non-emergency construction and maintenance activities shall cease or be required to operate under a Hot Work Procedure (see TULE-PDF-1). • The applicant and contractor personnel shall be informed of changes to the Red Flag event status and PAL as stipulated by CAL FIRE and CNF. • All construction crews and inspectors shall be provided	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		with radio and cellular telephone access that is operational throughout the project area route to allow for immediate reporting of fires. • Each crew member shall be trained in fire prevention, initial attack firefighting, and fire reporting. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards shall be updated and redistributed to all crewmembers as needed, and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect. • Each member of the construction crew shall be trained and equipped to extinguish small fires with hand-held fire extinguishers in order to prevent them from growing into more serious threats. Each crew member shall at all times be within 100 yards of a vehicle containing equipment necessary for fire suppression as outlined in the final Construction Fire Prevention/Protection Plan. • Water storage tanks (TULE-PDF-7) shall be installed and operational at the time of start of construction, except where construction of new	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		access roads is necessary to reach the SDRFPD's preferred location for the water tank, in which case the water tank will be installed along with access road construction. The applicant shall fully implement the plan during all construction and maintenance activities. All construction work on the ECO Substation Project, ESJ Project, and the Tule Wind Project shall follow the Construction Fire Prevention/ Protection Plan guidelines and commitments, and plan contents are to be incorporated into the standard construction contracting agreements for the construction of the Tule Wind Project. Primary plan enforcement implementation responsibility shall remain with the applicant and monitored by CAL FIRE, Rural Fire Protection District, and SDCFA. **FPP-3: MOU -** Ensure coordination for emergency fire suppression. IBR shall ensure that personnel, construction equipment, and aerial operations do not create obstructions to firefighting equipment or crews. The following provisions shall be defined based on consultation with CAL FIRE, SDCFA, and SDRFPD. Onsite IBR and contracted personnel shall coordinate fire suppression activities through the active fire agency designated Fire Incident Commander, and emergency ingress and egress to	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		construction-related access roads will remain unobstructed at all times. Construction and/or maintenance work shall cease in the event of a fire within 1,000 feet of the work area. The work area includes the transmission ROW, construction laydown areas, pull sites, access roads, parking pads, turbines, O&M building, and substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored. **FPP-4: Remove hazards from the work area.** TULE WIND, LLC shall comply with Public Resource Code 4291, *Reduction of Fire Hazards Around Building*, to provide 100 feet fuel modification around all buildings, and the County Consolidated Fire Code regarding brush management. TULE WIND, LLC and/or its contractor shall clear brush and dead and decaying vegetation from the work area prior to starting construction and/or maintenance work. The work area includes only those areas where personnel are active or where equipment is in use or stored, and may include portions of the transmission ROW, construction laydown areas, pull sites, access roads, parking pads, turbine pads, O&M building, substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		FPP-5: Helicopter Use. TULE WIND, LLC shall contact CAL FIRE, SDCFA, and SDRFPD dispatch centers two days prior to helicopter use and will provide dispatch centers with radio frequencies being used by the aircraft, aircraft identifiers, the number of helicopters that will be used while working on or near SRA lands at any given time, and the flight pattern of helicopters to be used. Should a wildfire occur within one (1) mile of the work area, upon contact from a CAL FIRE Incident Commander and/or Forest Aviation Officer, helicopters in use by TULE WIND, LLC will immediately cease construction activities and not restart aerial operations until authorized by the appropriate fire agency. **FPP-6: Roads.** Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box at the time the gates are installed. **FPP-7: Combustible Storage. (CFC Chapter 3):** Combustible storage and trash on site during construction and operation phases shall be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage shall be orderly and be removed from the site as soon as possible.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		Electric Collector and Transmission **FPP-8: Perform visual inspections.** TULE WIND, LLC shall perform visual inspections using telescopic equipment on 10 percent of project structures supporting overhead lines annually, such that every project structure has been visually inspected at the end of a 10-year period, for the life of the project. If visual inspection does not reasonably allow inspection of project structures, then Tule Wind, LLC shall perform climbing inspections to supplement such visual inspections. In addition, TULE WIND, LLC will keep a detailed inspection log of inspections, and any potential structural weaknesses or imminent component failures shall be acted upon immediately. The inspection log will be maintained on-site and available for review by CAL FIRE/SDRFPD upon request. **FPP-9: Line Clearance.** For the 138 kV transmission line, TULE WIND, LLC shall establish and maintain adequate line clearance in conformance with CPUC GO 95. Only trees or vegetation with a mature height of 15 feet or less shall be permitted within the transmission right of way except where the transmission line spans a canyon. In addition, tree branches that overhang the ROW within 10 horizontal feet of any	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		conductor shall be trimmed or removed, as appropriate, including those on steep hillsides that may be many vertical feet above the facility. Conductor clearance of 10 radial feet under maximum sag and sway will be maintained at all times. Cleared vegetation shall be removed to comply with requirements of the County of San Diego. During the life of the project, TULE WIND, LLC shall maintain adequate conductor clearances by inspecting the growth of vegetation along the entire length of the overhead transmission line at least once each spring and documenting the survey and results. The inspection log shall be maintained on-site and available for review by CAL FIRE/ SDCFA / SDRFPD upon request. ***Wind Turbine*** **MM FF-5 (FPP-10): Wind Turbine Generator Fire Protection Systems.** Fire detection, warning, and suppression systems for each wind turbine generator will include modern technology and will address, at minimum, the following: a. Use of non-combustible or difficult to ignite materials b. Early fire detection and warning systems c. Maintenance according to manufacturer specifications d. Auto switch-off and complete disconnection from the power supply system	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		e. Ongoing hazard/fire safety training for staff f. Automatic fire extinguishing systems in the nacelle of each wind turbine (stationary, inert gas, or similar). Tule Wind, LLC will implement this technology through the wind turbine manufacturer or an aftermarket supplier. Non-combustible or high flash point lubricant oils. ***Operations and Maintenance*** **MM FF-2 (FPP-2): Revise Existing Wildland Fire Prevention and Fire Safety Electric Standard Practice Plan (2009) to Create the Wildland Fire Prevention and Fire Safety Electric Standard Practice Operation and Maintenance Plan.** Revised plan will address the ECO Substation Project, ESJ Project, and the Tule Wind Project and will be implemented during all operation and maintenance work associated with the project for the life of the project. Important fire safety concepts that will be included in this document are as follows: a. Focused Fire Protection Plan content applicable to the applicant's ongoing operation b. Guidance on where maintenance activities may occur (non-vegetated areas, cleared access roads, and work pads that are approved as part of the project design plans)	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		c. Fuel modification buffers required by the FPP d. When vegetation work will occur (prior to any other work activity) e. Timing of vegetation clearance work to reduce likelihood of ignition and or fire spread f. Coordination procedures with fire authority g. Integration of the project's Construction Fire Prevention/Protection Plan content h. Personnel training and fire suppression equipment. Prior to energizing the Tule Wind Project, Tule Wind, LLC will install a skid-mounted Type VI firefighting unit with at least 100 gallons water capacity and a pump rate of approximately 25- 30 gallons per minute into two (2) of its operations and maintenance pick-up trucks. In addition, also prior to energizing the Tule Wind Project, Tule Wind, LLC personnel will undergo training by San Diego Rural Fire Protection District personnel, or another entity certified to conduct such training, on the proper use of Type VI firefighting equipment to fight incipient fires. i. Red Flag Warning restrictions for operation and maintenance work j. Fire safety coordinator role as manager of fire	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		prevention and protection procedures, coordinator with fire authority and educator k. Communication protocols l. Incorporation of CAL FIRE, San Diego Rural Fire Protection District, and SDCFA reviewed and approved Response Plan mapping and assessment. m. Other information as provided by CAL FIRE, San Diego Rural Fire Protection District, SDCFA, BLM, CSLC, Tribal Governments, and USFS. The applicant will provide a draft copy of the Wildland Fire Prevention and Fire Safety Electric Standard Practice to the agencies listed previously for comment a minimum of 90 days prior to the start of any construction activities. The comments will be provided back to the applicant and plan revisions will address each comment to the satisfaction of the commenting agency. The final plan will be approved by the commenting agencies and provided to the applicant for implementation during all operation and maintenance activities. **MM FF-3: Development Agreement with Rural Fire Protection District and San Diego County Fire Authority (SDCFA).** Provide funding for the training and acquisition of necessary firefighting equipment and services to Rural Fire Protection District/SDCFA to improve the response and	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		firefighting effectiveness near wind turbines, electrical transmission lines, and aerial infrastructure based on fire protection needs and each agency's professional judgment. Although not implementable on BLM or other federal land, the local fire authority will respond through mutual aid to wildfires within its jurisdiction, regardless of land ownership designation. Funding would be provided through a Development Agreement between the applicant and the Rural Fire Protection District and SDCFA which shall be executed prior to construction. **FPP-15: Funding for Fire Inspection.** Tule Wind, LLC shall provide funding to increase SDCFA's fire inspection capabilities to reduce baseline fire risk to offset any risk of wildfire ignition posed by the Tule Wind Project. This funding shall be applied to those uses that in SDCFA's best judgment increase its fire inspection abilities, including but not limited to (1) SDCFA Fire Code Specialist II position to enforce existing fire code requirements, including but not limited to implementing required fuel management requirements (e.g., defensible space), in priority areas to be identified by the SDCFA for the life of the project, and employing volunteer/reserve firefighters as part-time code inspectors on a stipend basis for up to 90 days per year for the life of the	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		project. Tule Wind, LLC's funding for fire inspection will be provided through its Development Agreement with the SDCFA (see MM FF-3), which shall be executed prior to construction.	
• Would the project result in inadequate emergency access?	As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.
• Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?	As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
• Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	PDF-7	No mitigation is required.	Yes, sufficient water supplies are available. A less than significant impact is identified.
Second Line of Inquiry – County of San Diego Guidelines			
1. Can the project demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	No mitigation is required.	Yes, a less than significant is identified.
2. Will the project be consistent with the recommendations of the Fire Protection Plan, including fuel modification?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	The project will be consistent with the requirements of this plan.	Yes, a less than significant impact is identified.
3. Can the project meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect?	As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	Yes, a less than significant impact is identified.
Third Line of Inquiry – CPUC / BLM Guidelines			
1. Would the presence of project facilities (overhead transmission lines, and/or wind turbines) significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
			Electric Collector and Transmission – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact is less than significant with the installation of a fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation.
2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Decommissioning*** – These activities are very similar to Construction

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
			discussed above. Yes, impact reduced to a level less than significant after implementation of mitigation measures.
3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?	PDF-9 through PDF-15	**See also FPP-7 and FPP-8** **FPP-11: De-Energize Electrical System**. TULE WIND, LLC shall immediately de-energize the electrical collector and transmission systems during fire emergencies at the direction of SDG&E. The fire agency liaison will coordinate with the SDG&E liaison during a fire incident to identify which, if any, particular electrical lines need to be de-energizes energized. Appropriate fire agencies responding to the incident shall be immediately notified of the line de-energizing. Additionally, TULE WIND, LLC shall provide all appropriate local, state, and federal fire dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. If the transmission line is de-energized, prior to re-energizing Tule Wind, LLC shall require notify and receive approval from the SDG&E liaison and fire agency representing the responsible fire agencies. **FPP-12: Site Maps**. All responsible agencies shall be provided with maps indicating the location of the water tanks,	Potential impact reduced to a level less than significant after implementation of PDFs and mitigation measures.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		turbines, access roads, and project layout prior to construction, as well as "as-built" maps after completion of construction. Tule Wind, LLC. Will coordinate with the SDCFA to ensure that its construction plans and "as-built" plans are incorporated into the SANGIS public safety layer for GIS mapping purposes prior to energizing the project. **FPP-13: Communication Devices.** In order to easily communicate immediate fire incidence during construction, operation or maintenance of the project, all crews and inspectors shall be equipped with radio and/or cellular phone access that is throughout the project area to allow for immediate reporting of fires and open communication pathways shall be established prior to energizing the project.	
4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants		**MM FF-7 (FPP-14): Preparation of Disturbed Area Revegetation Plan.** All areas disturbed during construction activities that will not be continuously included in the long-term maintenance access ROW will be provided native plant restoration in order to prevent non-native, weedy plants from establishing. Disturbed areas that will be included in the long-term maintenance program will not be revegetated as any plants that establish in these areas will be removed on an ongoing (at least annual) basis. This mitigation directs that the temporary disturbance areas will	No, with the implementation of the Noxious Weed and Invasive species Control Plan a less than significant impact is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		be revegetated with native plants common to the area through direction detailed in a Habitat Restoration Plan. The Habitat Restoration Plan will be prepared to restore native habitat and to reduce the potential for non-native plant establishment. The restoration plan will incorporate a Noxious Weeds and Invasive Species Control Plan to assist in restoring the construction area to the prior vegetated state and lessen the possibility of establishment of non-native, flammable plant species. A copy of the Revegetation Plan will be provided to the BLM and San Diego County. In addition, prior to the termination of the ROW authorization, a decommissioning plan will be developed and approved by the BLM and other agencies having jurisdiction. The decommissioning plan will include a site reclamation plan and monitoring program. As the wind facility is removed from the site, topsoil from all decommissioning activities will be salvaged and reapplied during final reclamation. All areas of disturbed soil will be reclaimed to native habitat conditions found naturally in the area.	

6.0 CONCLUSION

6.1 Analysis of Additional County Guidelines for Determining Significance

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the first line of inquiry can be made.

6.1.1 Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on **Figure 11**. As described in Section 5.1, the potential sources of fire risk associated with the proposed project include the following. An analysis of potential impacts associated with each fire risk is provided below.

- ***Construction Activities*** – Fire ignition risks and PDFs that address those risks are identified in Section 5.1.1, **Table 4**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1 through PDF-8), a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FF-1, FF-3 and FFP-3 through FPP-7 (**Table 8**) will reduce this impact to a level less than significant.
- ***Electrical 34.5 kV Collection and 138 kV Transmission System -*** Fire ignition risks and PDFs that address those risks are identified in Section 5.1.2, **Table 5**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDF (PDF-9 through PDF-15), a significant impact related to potential fire ignition associated with the electrical collection and transmission system will occur. Implementation of the Mitigation Measures FPP-8 and FPP-9 (**Table 8**) will reduce this impact to a level less than significant.
- ***Wind Turbines*** - Fire ignition risks and PDFs that address those risks are identified in Section 5.1.3, **Table 6**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FF-5 **(Table 8)** and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.
- ***Operations and Maintenance Activities*** - Fire ignition risks and PDFs that address those risks are identified in Section 5.1.4, **Table 7**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1, 2, 8, 18 through 26) a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FF-2, FF-3, FPP-7 through FPP-9, and FPP-11 through FPP-12, and FPP-15 (**Table 8**) will reduce this impact to a level less than significant.

6.1.2 Would the project result in inadequate emergency access?

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and a mitigation measure to reduce the risk of fire, as summarized in **Table 8**. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2, Fire Access for additional information). A less than significant impact is identified for this issue.

6.1.3 Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

As described above, the project will comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access for additional information). The project will not result in substantial adverse impacts associated with the provision of new or physically altered governmental facilities that would cause a significant environmental impact. However, the project is required to upgrade access roads and to provide adequate fuel modification areas to meet fire code requirements. Additionally TULE WIND, LLC shall enter into a Fire and Emergency Protection Services Agreement with the SDCFA, SDRFPD, and other agencies as appropriate. These aspects of the project will result in impacts to biological resources, which area addressed separately as part of the Biological Technical Report (August 2010). This issue will result in a less than significant impact.

6.1.4 Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

As discussed in Section 4.3, Water, the project has sufficient water supplies available to meet the peak construction demand, and operational demand. A less than significant impact is identified for this issue.

6.2 <u>County of San Diego Wildland Fire and Fire Protection Significance Criteria Guidelines</u>

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the second line of inquiry can be made.

6.2.1 Can the Project Demonstrate Compliance With Fire Regulations?

The project will comply with California Fire Code, California Code of Regulations, County Fire Code and the County Consolidated Fire Code as listed in Section 1.3. Accordingly, the project will have a less than significant wildland fire impact.

6.2.2 Has a Fire Protection Plan Been Required and Will the Project Be Consistent With Its Recommendations, Including Fuel Modification?

An FPP has been required for the proposed project. The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

As part of this FPP, as it relates to the topics identified above, the plan identifies PDFs and mitigation measures to comply with the County of San Diego Consolidated Fire Code, including fuel modification.

As described in Section 5.2.4, the O&M building will have a 4-acre cleared area surrounding building and the substation facility, and the building will be placed such that a 100' fuel modification zone will give adequate spacing form transformers and potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the area would be performed, annually prior to May 1 and more often as needed.

In addition, TULE WIND, LLC will implement a brush management plan for the O&M building and substation facility in accordance to San Diego County Consolidated Fire Code to clear brush away from structures.

Accordingly, the project will have a less than significant wildland fire impact.

6.2.3 Can the Project Meet the Emergency Response Objectives Identified in the Public Facilities Element of the County General Plan, or Offer Same Practical Effect?

As discussed in Section 4.1 Adequate Emergency Services, the project is serviced by several fire entities; CAL FIRE; Boulevard Fire Department; Campo Volunteer Fire Department; San Diego Rural Fire Protection District; and Campo Indian reservation.

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and mitigation measures to reduce the risk of fire, as summarized in Section 5.2.3 Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit. Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area. Therefore, the project will have a less than significant wildland fire impact.

6.3 Additional Questions Considered By the California Public Utility Commission and Bureau of Land Management

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the third line of inquiry can be made.

6.3.1 Would the Presence of Project Facilities (Overhead Transmission Lines, Overhead Collector Lines, and/or Wind Turbines) Significantly Increase the Probability of a Wildfire?

34.5 kV Overhead Collector Lines and 138 kV Transmission Lines

The majority of the 34.5 kV collector lines are proposed to be undergrounded and would not significantly increase the probability of a wildfire. The overhead collector system is approximately 9.3 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead.

The presence of the turbines and overhead 138 kV transmission line will create a new source of potential wildfire ignitions. Line faults could occur as a result of any of the reasons and the fire hazards associated with the turbines is discussed in Section 5.1.2. Any line faults or turbine related events that create sparks that ignite vegetation could result in a wildland fire if the

ignition was to occur during extreme weather conditions. Due to the existing high-fire hazard conditions in and surrounding the project area, construction of the project components (transmission line and turbines) could increase the risk of fire. This impact is considered significant because certain ignition sources are unavoidable, for example contact with floating or windblown debris.

The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

Due to the potential for ignitions related to the 34.5 kV overhead lines, 138 kV transmission and lines, or turbines during extreme fire weather, construction and operation of the project within area could significantly increase the likelihood of a fire. A significant impact is identified related to this issue.

The risk of ignitions and risk of damage from a project-related ignition can be reduced to a level of less than significant through the application of PDF-8 through PDF-15 and the Mitigation Measures FPP-8 and FPP-9. (**Table 8**).

Wind Turbine

It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

Fire ignition risks and PDFs that address fire ignition risks associated with wind turbines are identified in Section 5.1.3, **Table 6**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FF-5 (**Table 8**) and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.

6.3.2 Would Project Construction and/or Operation and Maintenance and Decommissioning Activities Significantly Increase the Probability of a Wildfire?

Construction activities associated with the proposed project would include, but not be limited to, use of vehicles and heavy equipment for vegetation removal and grading, the construction of transmission tower pads and towers, construction of collector tower and tower pads, and the installation of conductors. Additional heavy equipment, vehicles, and tools would be used for preparation construction of the turbine pads, of staging areas, and new roads. The use of heavy equipment along with the personnel required to construct, repair, and maintain the project features line introduce the potential for a variety of wildfire ignition sources to surrounding

vegetation fuels and combustible materials (such as diesel fuel and herbicide) associated with project activities.

The use of heavy equipment and the presence of personnel may increase the wildfire ignition potential in the project construction areas compared with existing conditions.

Maintenance activities would include the periodic use of vehicles and presence of personnel and could also include the use of heavy equipment for repairs or replacement of project components. These activities would be far less intensive than construction activities; however, they would recur periodically over the life of the project, supplying an ongoing source of ignitions for 30 years or more. Project-related ignitions within the proposed project corridor have the potential to escape initial attack containment and become catastrophic fires. The areas with heavy fuel loads, steep topography, and exposure to Santa Ana winds would have a higher burn probability and a higher potential for an ignition to escape.

During the operations and maintenance phase of the project, smoking would be limited to the cleared areas around the O&M building and as with the construction phase of the project hot work would be limited during Red Flag alerts.
Based on SDCFA estimates, baseline risk of wildfire exists to approximately 12,000 structures in the very high and high fire risk areas to the west of the Tule Wind project, regardless of whether the Tule Wind project is ever built. Given the very high and high fire risk areas where the project is located and the project's introduction of new potential fire ignition sources, the project has the potential to cause a wildland fire. This issue is considered a significant impact.

The Fire Protection Plan approved by the SDRFPD on November 3, 2010, concluded that the risk of new wildland fire ignition had been mitigated to a less than significant level. Based on coordination and discussion with the SDCFA, it is SDCFA's position that the Tule Wind project's risk of new wildland fire ignition cannot be mitigated below a level of significance without adjusting the baseline fire risk inherent to the project area through a proportional mitigation measure (FFP-15, *Funding for Fire Inspection.* Implementation of FFP-15 would increase the likelihood that structures in the very high and high fire risk areas to the west of the project area would survive a wildland fire, regardless of its cause. By applying a mitigation measure to baseline risk in this way, it is SDCFA's position that the Tule Wind project would offset the project's risk of increasing the probability of wildfire. In summary, FFP-15 would require the applicants to provide funding to increase SDCFA's fire inspection capabilities to reduce baseline fire risk to offset any risk of wildfire ignition posed by the Tule Wind Protect. This funding shall be applied to those uses that in SDCFA's best judgment to increase its fire inspection abilities, including but not limited to one (1) SDCFA Fire Code Specialist II position to enforce existing fire code requirements, including but not limited to implementing required fuel management requirements (e.g., defensible space), and employing volunteer/reserve firefighters as part-time code inspectors on a stipend basis for up to 90 days per year for the life of the project. The funding for the fire code positions would be provided through Development Agreements (see MM FF-3) with the SDCFA, which would be executed prior to construction.

The SDCFA's experience demonstrates that where a fire code inspection results in a notice of violation caused by a failure to maintain defensible space, the property owner rectifies the code violation approximately 80 percent of the time without a second notice. After a second notice,

but prior to triggering the time-intensive code enforcement process, approximately 98 percent to 99 percent of the property owners rectify the code violation. Accordingly, by increasing SDCFA's ability to perform fire code inspections, it is SDCFA's position that existing baseline risk of structural damage or destruction due to wildfire could be offset in a timely fashion to approximately 98 percent of the additional structures inspected. In addition, existing baseline risk to the remaining less than 2% of non-compliant structures could also be reduced, although the time period in which that risk can be reduced depends on the rate of SDCFA's code enforcement prosecution.

Accordingly, by increasing the SDCFA's ability to perform inspections to identify properties in violation of defensible space fire codes, it is SDCFA's position that implementation of Proposed FFR-15 would substantially reduce baseline risk of damage or destruction to structures in the very high and high fire risk areas to the west of the Tule Wind project. This reduction of baseline fire risk, which exists regardless of whether the Tule Wind project is built, would offset any additional unavoidable risk of wildfire ignition posed by the Tule Wind project.

Decommissioning

These activities are very similar to Construction discussed above. Impacts would be reduced to a level less than significant after implementation of mitigation measures.

The proposed project would require construction and maintenance activities that will increase the risk of fire to communities, firefighter health and safety, and natural resources. This issue is considered a significant impact. This increase can be mitigated to a level that is less than significant through the application of the PDF-1 through PDF-8 and PDF-17 through PDF-22 and the implementation of Mitigation Measures FF-1, FF-3, and FPP-3 through FPP-7 (**Table 8**).

6.3.3 Would the Presence of the Overhead 138 kV Transmission Lines, Overhead 34.5 kV Collector Lines, and/or Wind Turbines Reduce the Effectiveness of Firefighting?

As described previously, the project design will upgrade roadway widths to provide better infrastructure to the area for fire emergency vehicles. The project would increase the amount of overhead transmission lines, overhead collector lines, but they would be located along roadways and would not impede firefighting apparatus. In addition, the transmission lines will be at a height of approximately 74 feet with a typical span of 600 feet and a maximum of 700 feet, which would give adequate clearance for emergency vehicles and fire truck ladders. Turbines will have a maximum of 328 feet for the steel tower, with a rotor diameter of 328 feet for a maximum height of 492 feet. The turbines will be connected by an access roadway, located approximately one-quarter mile from each other.

Fire and Emergency Access: The project's upgraded access roads, which include County roads, BLM roads and turbine roads, will serve to improve access to areas that are currently not accessible by fire-fighting vehicles and reduce response times.

The project roads will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently, the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood Road and McCain Valley Road is proposed as a private road, however will not be gated. As a result this road will be available to the community in the event of an emergency. Additionally the

turbine roads will improve access allowing fire crews and tanker trucks faster initial response to remote portions of the BLM land and/or the project area. Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 4.2.

Aerial and Ground-based Firefighting: Any reduction in the ability of fire fighting/suppression activities to occur during extreme weather conditions could, in part, restrict fire fighting/suppression.

With respect to ground-based firefighting effectiveness, improved access roads will enable ground-based firefighters to reach places that were previously inaccessible by vehicle and will enable quicker ingress and egress to the project area to fight fires, and the one 10,000 gallon water tank at the O&M building and four (4) additional 10,000 gallon water tanks will be installed in SDRFPD-approved locations throughout the project area will improve both ground-based and aerial firefighting effectiveness. Furthermore, firefighters are trained to operate and fight fires around electrical transmission lines. Moreover, Development Agreements entered into with SDRFPD and SDCFA will provide funding for equipment, staffing, and training that will improve firefighting effectiveness.

Ground-based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. This issue is considered a potentially significant impact. Implementation of Mitigation Measure FPP-11 will reduce this significant impact to a level less than significant. Mitigation Measure FPP-11 provides for de-energizing the Tule Wind Project in coordination with the fire agency liaison and SDG&E, if necessary. Taken together, the Tule Wind Project features will improve ground-based firefighting effectiveness, not diminish it.

With respect to aerial firefighting effectiveness, the Tule Wind Project's 138kV transmission line has been designed to parallel the Sunrise Powerlink route. The Tule Wind 138kV transmission line will be approximately 75' high, while the Sunrise Powerlink will be approximately 130' to 160' in height. Accordingly, the Tule Wind project's 138kV line will not add any significant vertical obstructions that will not already be part of the built environment. Furthermore, for those few places where the Tule Wind 138kV transmission line does not parallel the Sunrise Powerlink, its 75' height will not impede aircraft maneuverability, or significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground, otherwise known as the "150 foot drop zone." The 138kV transmission towers are proposed to be 75 feet in height, about half the height of the "150 foot drop" zone.

Pursuant to FAA regulations, all turbines will be equipped with safety lighting and low-reflectivity neutral white paint. These safety features will enable firefighting aircraft to operate safely around the turbines. Furthermore, due to the rugged nature of the terrain and existing Campo Wind Project turbines, aerial firefighting professionals will be focused on aerial impediments during the course of firefighting in the project area. Chief Nissen (SDRFPD) spoke with Ray Chaney (CAL Fire Battalion Chief, Special Ops Battalion), who stated that the determination to perform aerial operations would be made on a case by case basis and would not be prohibited just by the presence of the Tule Wind project (Robin Church personal conversation with Chief Nissen). Aerial firefighting efforts would not be compromised by implementation of

the project. This issue is considered a less than significant impact. Implementation of PDFs and Mitigation Measures FF-1, FPP-11 through FPP-13 will be implemented to further reduce impacts to below a level of significance.

Prepare and Implement a Multi-agency Fire Prevention MOU

A Memorandum of Understanding (MOU) for the project shall be created and implemented between IBR, SDCFA, SDRFPD, CAL FIRE, BLM, and other agencies as appropriate. The MOU shall be adopted by all parties prior to energizing the new transmission line. The purpose of this Multi-agency Fire Prevention MOU is to efficiently coordinate all aspects of agency and utility fire prevention plans and practices. The MOU will integrate the following components of the IBR fire plan with existing agency fire plans: fire prevention, firefighter safety, and emergency communication, firefighter training of both ground and aerial utility personnel, and others as appropriate.

6.3.4 Would Project Activities Contribute to an Increased Ignition Potential and Rate of Fire Spread Through the Introduction of Non-Native Plants?

Project activities create the potential for the introduction and spread of non-native, invasive plants. Non-native plants are often spread by human and vehicle vectors in areas of large-scale soil disturbance and importation. These actions along with the opening of the vegetation canopy through the clearing of trees and shrubs involved with the construction and maintenance of the proposed project could contribute to the introduction and proliferation of non-native, invasive plants. Certain invasive plants, like cheatgrass, medusa head and Saharan mustard, can contribute to changes in wildfire frequency, timing and spread (Cal-IPC, 2007). Cheatgrass and medusa head, for example, dry out earlier in the season than native grasses creating fine fuels that are easily ignited. These fine fuels contribute to wildfires igniting earlier in the year and an increased level of fire recurrence. In addition, non-native grasslands have a “spotting” effect during a wildfire, where embers from these grasslands are blown ahead of the fire line, contributing to an increased rate of fire spread. Invasive annual grasses also influence fire spread by creating a fine fuel continuum between patchy, perennial shrubs allowing wildfires to expand further into otherwise sparsely vegetated wildlands (USGS, 2007). Saharan mustard creates dense stands of dry vegetation in desert scrub and coastal sage scrub communities which increases the fire fuels in these otherwise low fire risk areas (Cal-IPC, 2007). The introduction and spread of specific invasive plants within the proposed project ROW would adversely influence fire behavior by increasing fuel load, fire frequency, and fire spread.

The project has been designed to place gravel on roads and around the base of the turbines. This will reduce the area in which invasive weeds can invade in these locations.

The introduction of non-native plants with an increased ignition potential and rate of wildfire spread. To minimize fire impacts due to non-native plants mitigation measure FF-7 will be implemented, with the preparation and implementation of a Noxious Weed and Invasive Species Control Plan. The plan addresses monitoring, education of personnel on weed identification, and methods for treating infestations.

TULE WIND, LLC will prepare and implement the Noxious Weed and Invasive Species Control Plan for pre-construction and long-term invasive weed abatement. The plan will be prepared

prior to construction. Where TULE WIND, LLC owns the ROW property, the Plan will include specific weed abatement methods, practices and treatment timing developed in consultation with the San Diego County Agriculture Commissioner's Office and the California Invasive Plant Council (Cal-IPC**)**, or the tribal government, as appropriate. On the ROW easement lands administered by public agencies (BLM, CSLC), and Wildlife Agencies the Noxious Weed and Invasive Species Control Plan will incorporate all appropriate and legal agency-stipulated regulations. The Plan will be submitted to the ROW land-holding governmental entities for final authorization of weed control methods, practices, and timing prior to implementation of the plan on public lands. For those ROW easements located on private lands TULE WIND, LLC will work with the landowners to obtain authorization of the weed control treatment that is required.

In addition to the Noxious Weed and Invasive Species Control Plan, a Habitat Restoration Plan will also be developed upon the completion of the biological technical report and in compliance with the report to minimize or mitigate negative impacts on vulnerable plants and wildlife to the project area. The combination of these two monitoring plans will help to ensure that both revegetation and weed control efforts are successful. Based on implementation of Mitigation Measure FF-7, the Noxious Weed and Invasive Species Control Plan and Habitat Restoration Plan, would reduce impacts to less than significant for the potential for ignitability of fuels through the introduction of non-native plants during construction and/or maintenance is identified. As is previously presented in **Table 8**, the impacts due to the construction and the operations and maintenance of the project would be reduced to a level of less than significance with the implementation of the proposed project design features and required mitigation measures, provided suppression systems are provided in the nacelle, including the associated electrical equipment in the nacelle. All impacts under the first, second, and third lines of inquiry to the significance guidelines have been determined to be a less than significant impact after implementation of project design features and mitigation measures that could expose people and/or structures to a significant risk of loss, injury or death involving wildland fires.

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

Robin Church
Principal
RC Biological Consulting, Inc.
P.O. Box 1568
Lemon Grove, CA 91946-1568

Technical Input:
Jim Hunt
Hunt Research Corp.
P.O. Box 291
Solvang, CA 93464

8.0 PERSONS AND ORGANIZATIONS CONTACTED

- Chief Nissen, Rural Fire Protection District
- Chief Hendrie, Rural Fire Protection District
- CAL FIRE Monte Vista Dispatch Center
- Boulevard Fire Department
- CAL FIRE Boulevard Fire Station
- James Pine, San Diego County Fire Authority
- FireTrace International

9.0 REFERENCES

Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11

CAL FIRE. 2009. "San Diego County Fire Hazard Severity Zones in SRA." March, 2010. Accessed at: http://frap.cdf.ca.gov/webdata/maps/san_diego/fhszs_map.37.jpg

CAL FIRE (California Department of Forestry and Fire Protection) website http://frap.cdf.ca.gov

CAL FIRE. 2008. Power Line Fire Prevention Field Guide, November 2008

California Building Code 2007. Chapter 7A.

California Code of Regulations. Title 14 of the California Code of Regulations (14 CCR), Chapter 7. Fire Protection, Article 4. Fire Prevention Standards for Electrical Utilities.

California Fire Code 2007. California Code of Regulations Title 24, Part 9.

County of San Diego 1979. General Plan – Safety Element.

County of San Diego 2009. Consolidated Fire Code. Adopted 2009.

County of San Diego 2008. Guidelines For Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire Code, Ordinance No. 9915, new series.

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire and Building Code, Ordinance No. 9915, new series.

CPUC and BLM. 2008a. *Final Environmental Impact Report/Environmental Impact Statement and Proposed Land Use Amendment for the Sunrise Powerlink Project*. SCH # 2006091071; DOI Control # FES-08-54. Prepared by Aspen Environmental Group for CPUC and BLM. Agoura Hills, California: Aspen Environmental Group. October 2008. Declercq, Janm Dr, and Raymond Van Schevensteen. *Performance and Fire Behavior of Step-up Transformers in Wind Turbines*. Belgium.

FERC 2004. Utility Vegetation Management and Bulk Electric Reliability Report from the Federal Energy Regulatory Commission, September 7, 2004. htp://www.ferc.gov/industries/electric/indus-act/reliability/veg-mgmt-rpt-final.pdf

Geo-Logic Associates, December 2010, Groundwater Investigation Report.

Johnson, M. L.J. Rew, B.D. Maxwell and S. Sutherland. 2006. The Role of Wildfire in the Establishment and Range Expansion of Nonnative Plant Species into Natural Areas: A review of current literature.

Keeley, J.E. 1998. Postfire ecosystem recovery and management: the October 1993 large fire episode in California. Pages 69-90 in J. M. Moreno, editor. Large forest fires. Backhuys Publishers, Leiden, The Netherlands.

Keeley, J.E. 2002. Native American impacts on fire regimes of the California coastal ranges. Journal of Biogeography, vol. 29, pp.303-320.

Keeley, J.E. 2004. Invasive Plants and Fire Management in California Mediterranean-climate Ecosystems. In M. Arianoutsou (ed) 10th MEDECOS – International Conference on Ecology, Conservation and Management, Rhodes Island, Greece, electronic, no page numbers.

Keeley, J.E. and C.J. Fotheringham. 2003. Impact of past, present and future fire regimes on North American Mediterranean shrublands, pp.218-262. In T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam (eds.), Fire and Climatic Change in Temperate Ecosystems of the Western Americas. Springer-Verlang, New York.

Keeley, J.E., and C.J. Fotheringham. 2006. Wildfire Management on a Human-Dominated Landscape: California Chaparral Wildfires in The Wildfire Reader: A century of Failed Forest Policy, George Wuerthner, Ed. 116-131.

Keeley, J.E., C.J. Fotheringham, and Moritz. 2004. Journal of Forestry. "Lessons from the October 2003 Wildfires in Southern California." October/November.

National Fire Protection Association (NFPA) 2010. NFPA® 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations 2010 Edition. NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471.

Public Utilities Commission (PUC) of the State of California. 2006. GENERAL ORDER No. 95 January 2006.

SDG&E Electric Standard Practice Draft Fire Plan, 7/6/06.

SDG&E East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Project Cumulative Scenario Approved and Pending Project List. Provided by Rica Nitka, Dudek via email.

San Diego Geographic Information Source (SanGIS) www.sangis.org

San Diego Rural Fire Protection District. Fire Code – Ordinance 2002-03.

U.S. Dept. of Health & Human Services, National Institute for Occupational Safety and Health (NIOSH): *Firefighters Exposed to Electrical Hazards During Wildland Fire Operations: Hazard ID 15*, Jan.2002.

VdS 3523en : 2008-07 (01). Wind Turbines Fire Protection Guidelines.

10.0 PREPARERS' LIABILITY STATEMENT

RC Biological Consulting, Inc. disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document by TULE WIND, LLC, or any regulatory or permitting agency.

Technical Input Liability Statement:

As fire is dynamic and unpredictable, the technical information provided by Hunt Research Corporation does not guarantee that a fire will not occur or will not cause property damage, injury or loss of life. No expressed or implied guarantees are made regarding the adequacy or effectiveness of the recommendations and requirements in those sections for all situations. Engineering, architecture and construction are out of the scope of Jim Hunt with Hunt Research Corporation.

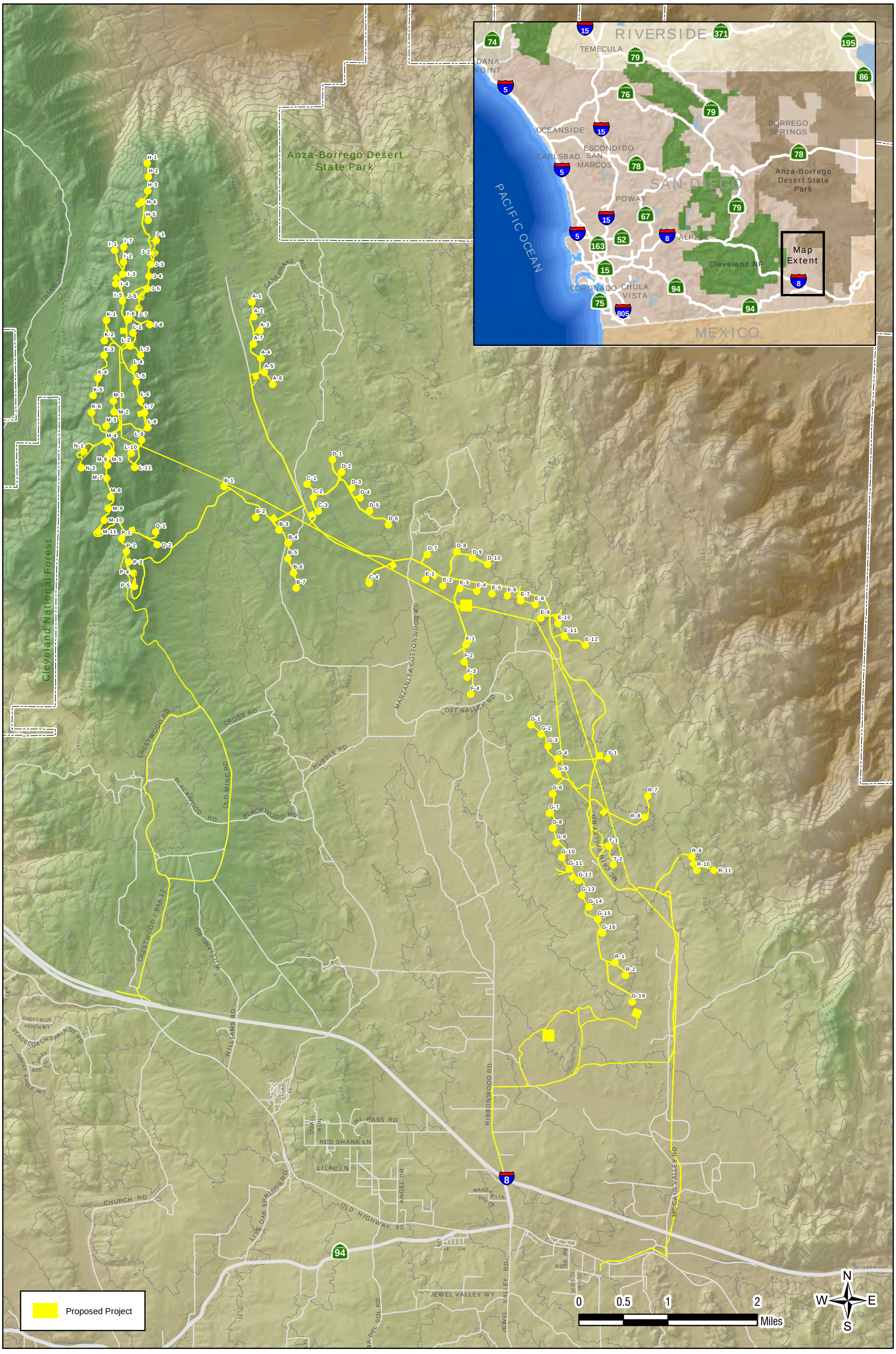


Figure 1
Region and Vicinity

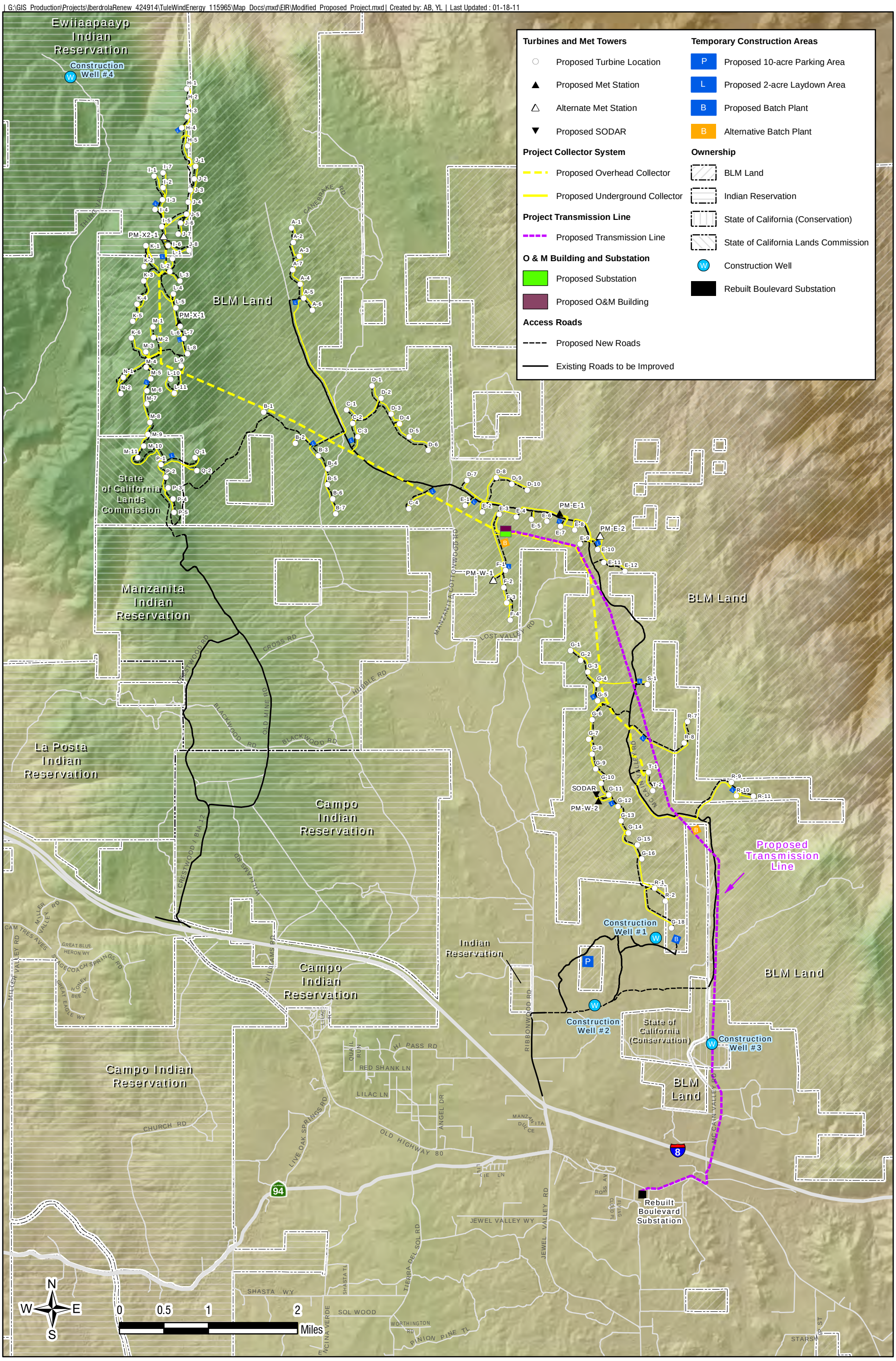


Figure 2
Proposed Project

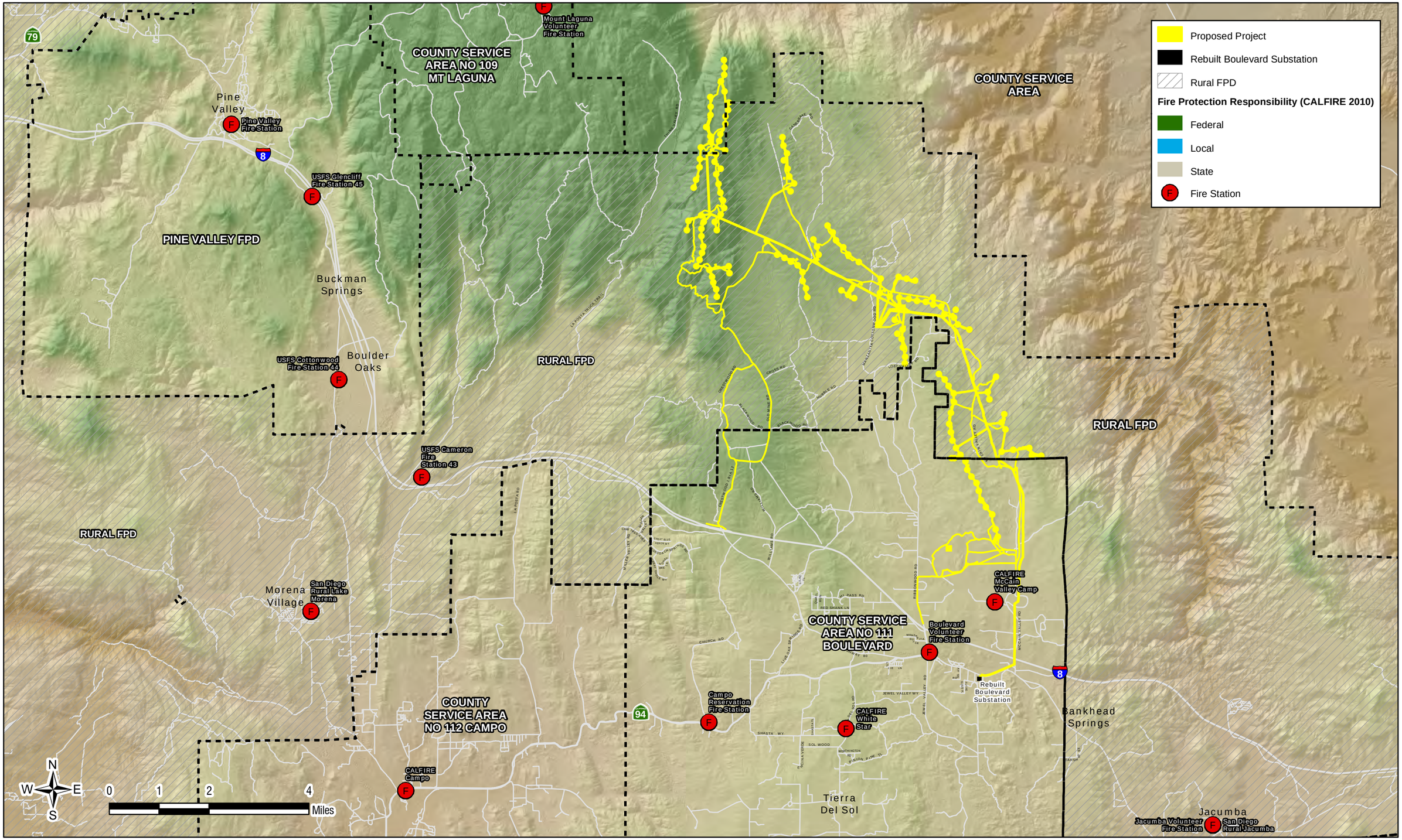
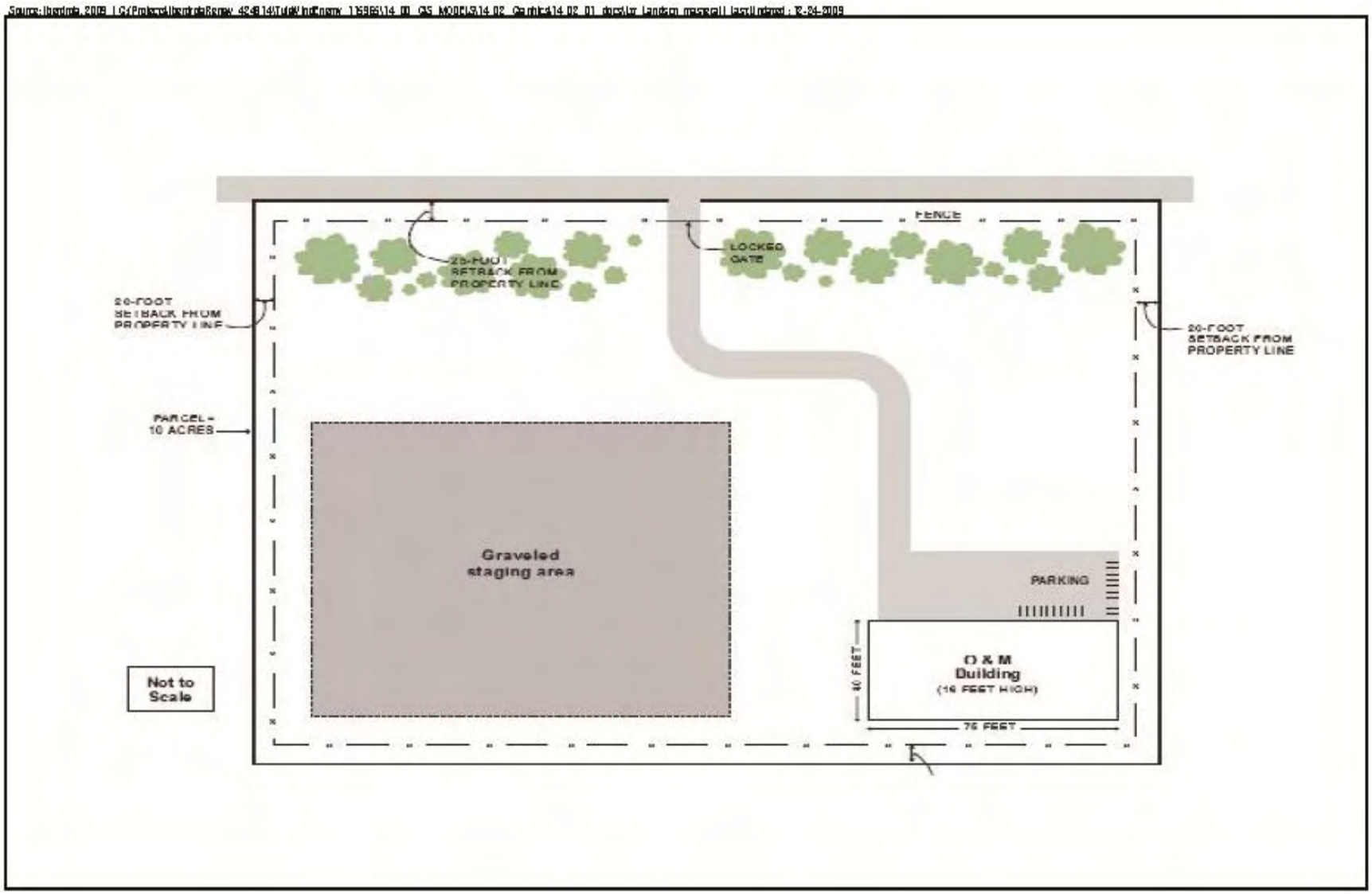
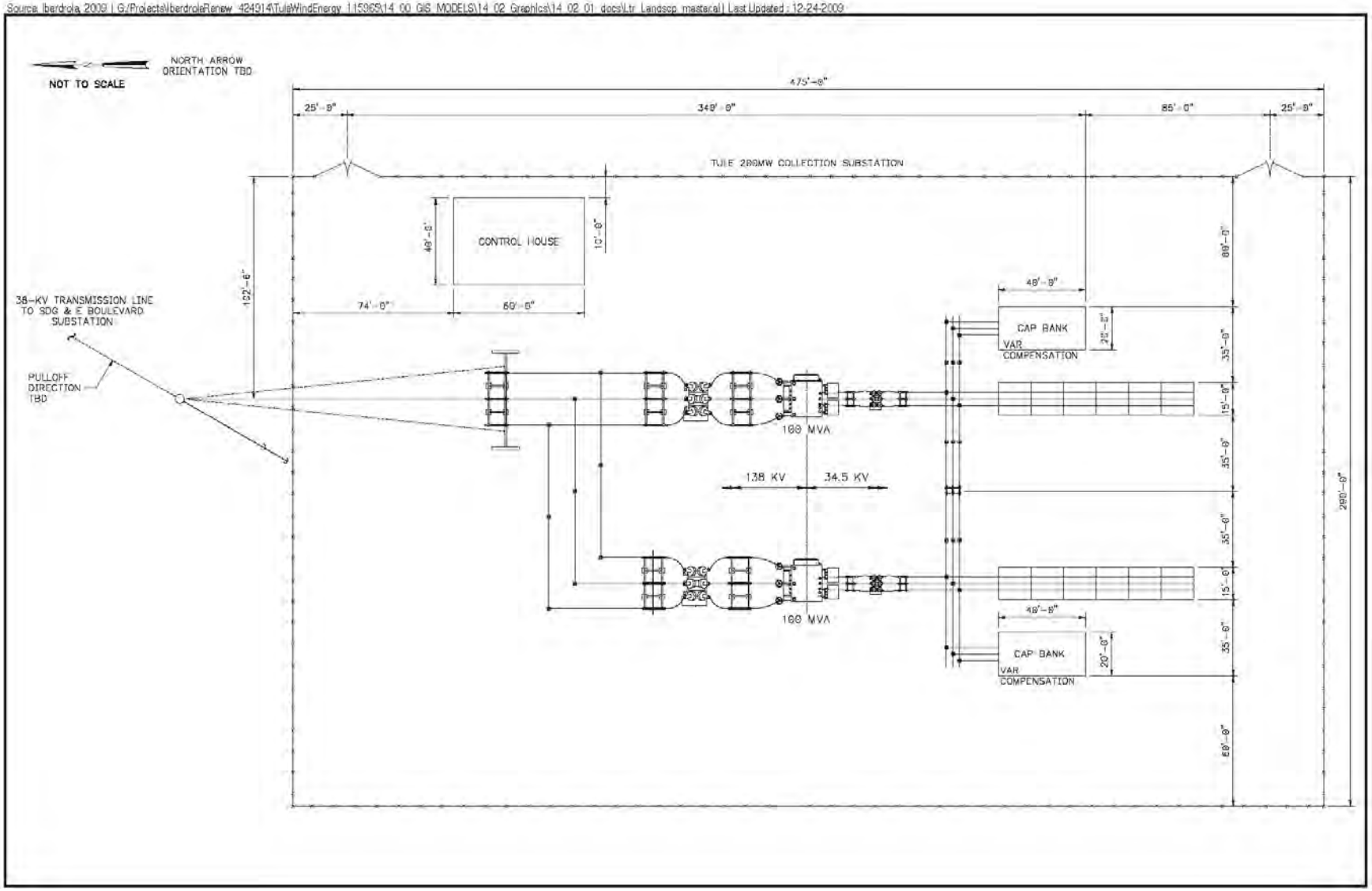


Figure 3
Fire Facilities and Fire District Areas

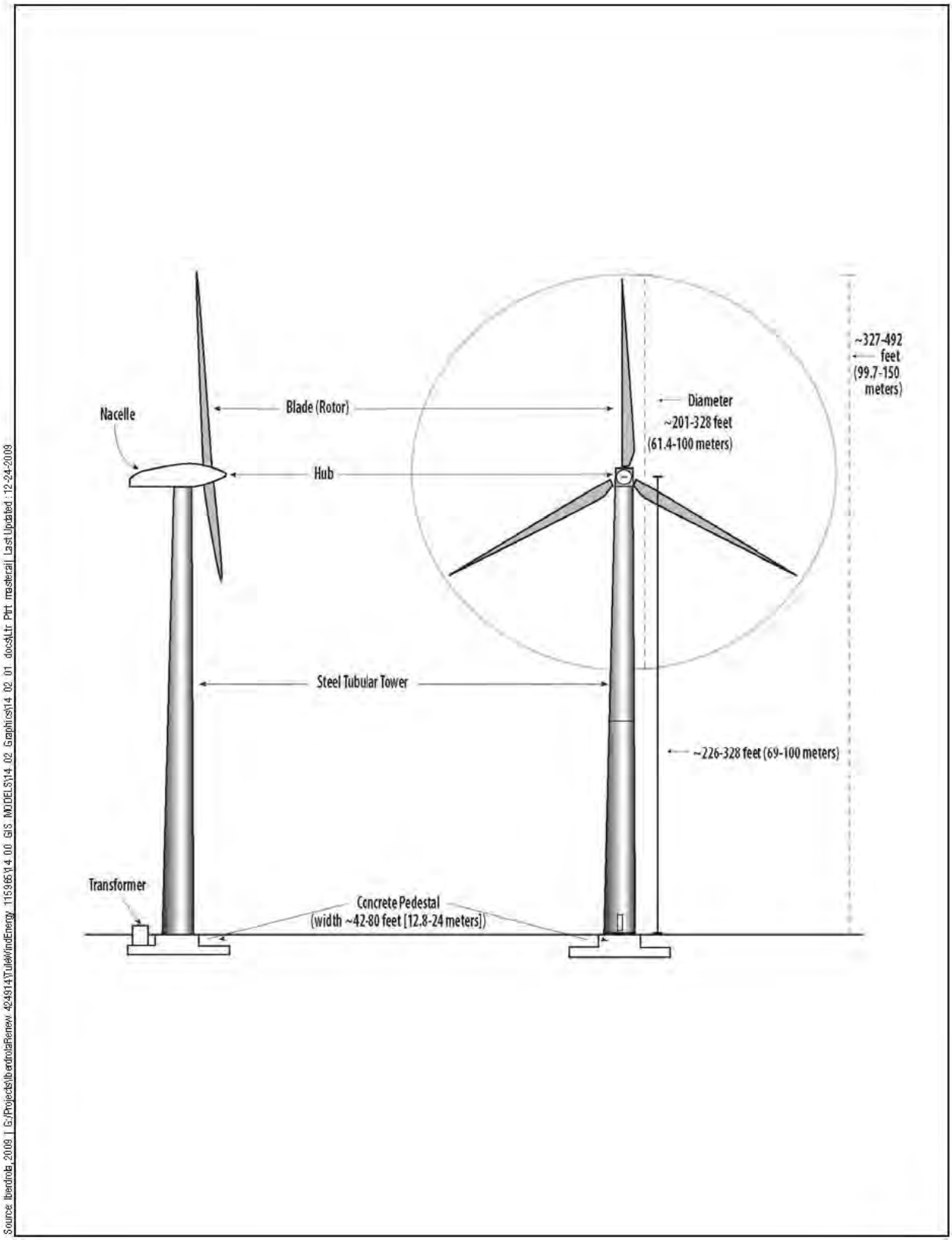


Typical Operations and Maintenance Facility Site **Figure 4**

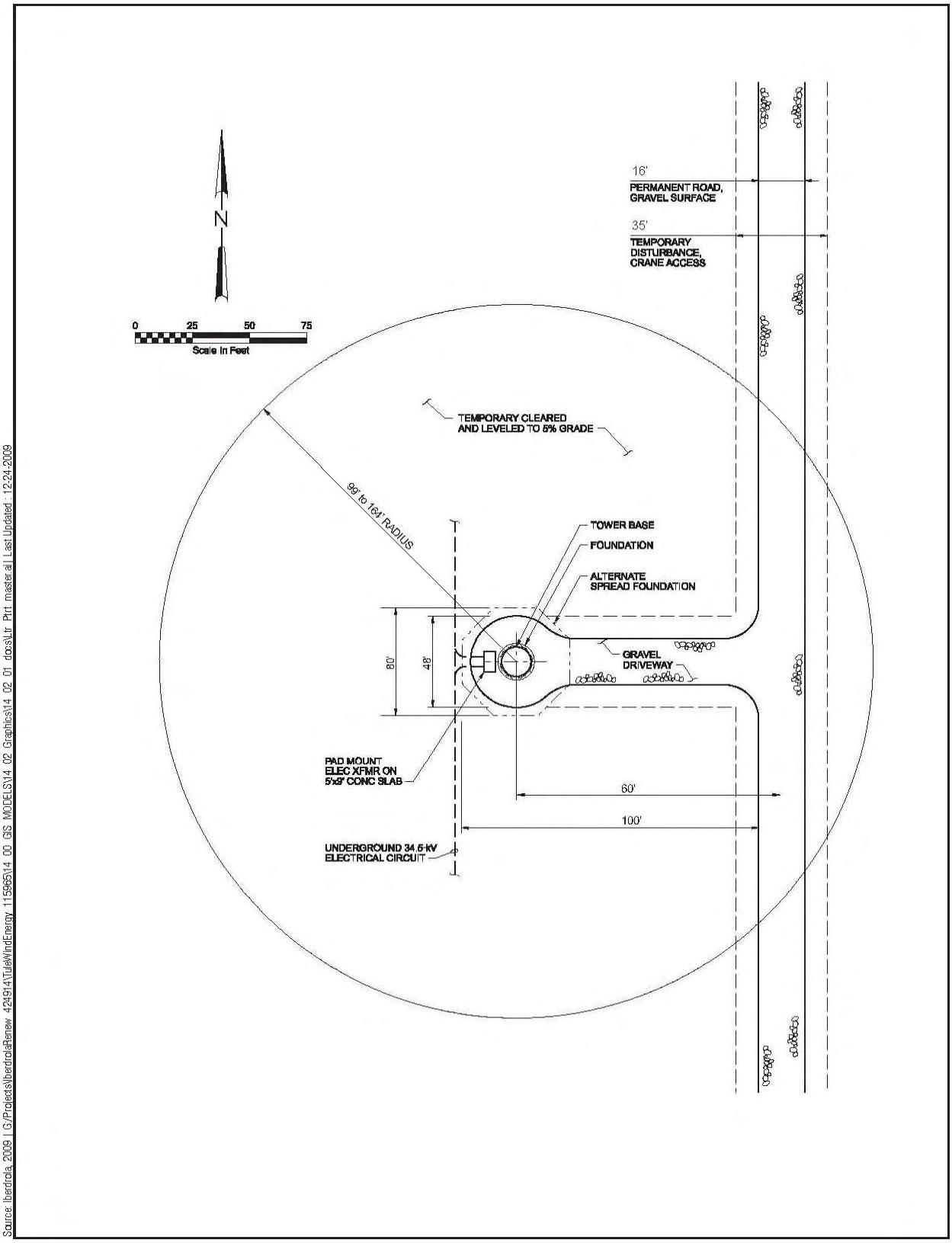
Source: Iberdrola 2009 | G:/Projects\IberdrolaRenew 424914\TuleWindEnergy 115365\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Landscp master.dj | Last Updated : 12-24-2009



200 MW Collection Plan Station View **Figure 5**

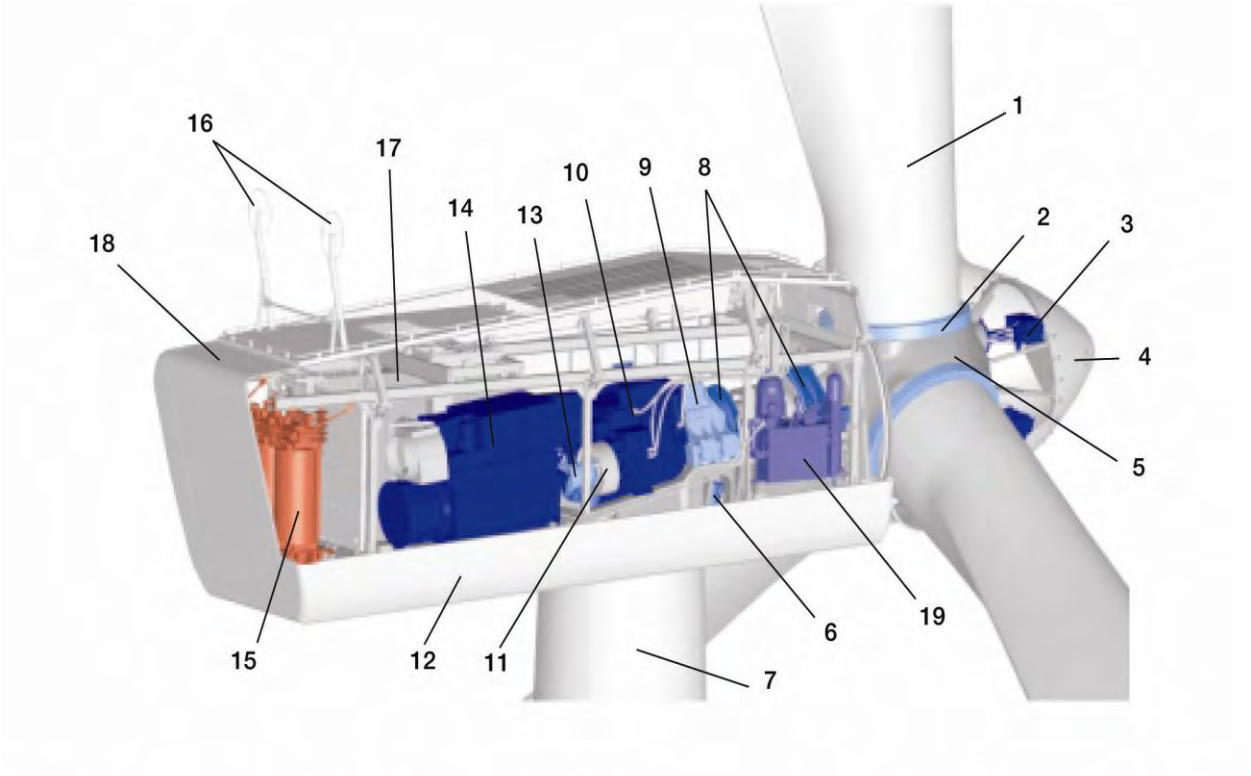


Preliminary Turbine Tower Design **Figure 6**



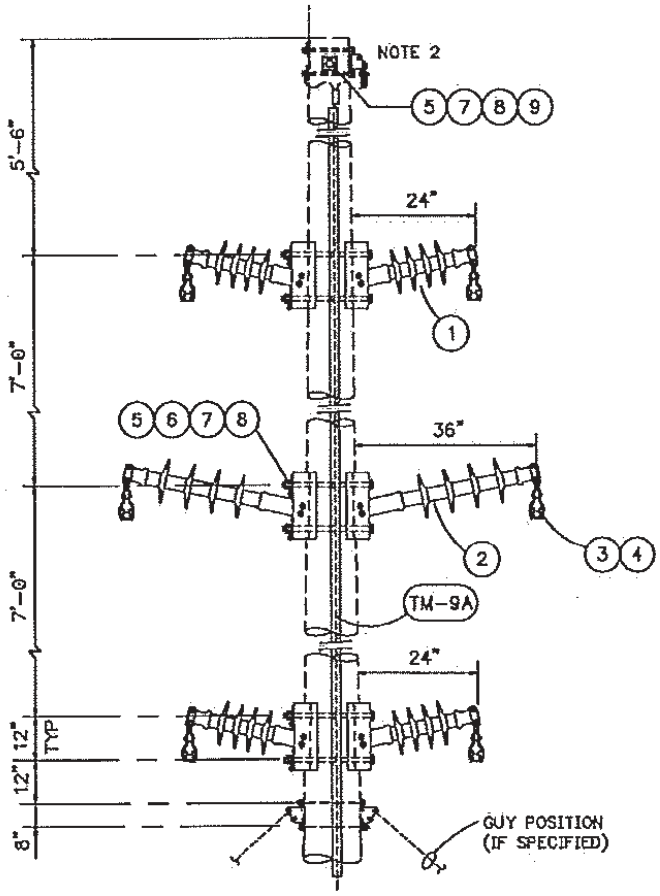
Source: Iberdrola, 2009 | G:/Projects\IberdrolaRenew 4249141\TuleWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prt master.aii | Last Updated : 12-24-2009

Typical Turbine Site **Figure 7**



1. Blade
2. Blade bearing
3. Hydraulic pitch actuator
4. Hub cover
5. Hub
6. Active yaw control
7. Tower
8. Main bearing house
9. Gear tie rod
10. Gearbox
11. Main disc brake
12. Nacelle support frame
13. Cardan or composite shaft
14. Doubly fed generator
15. Transformer
16. Anemometer and wind vane
17. Top controller
18. Nacelle cover
19. Hydraulic unit

Figure 8



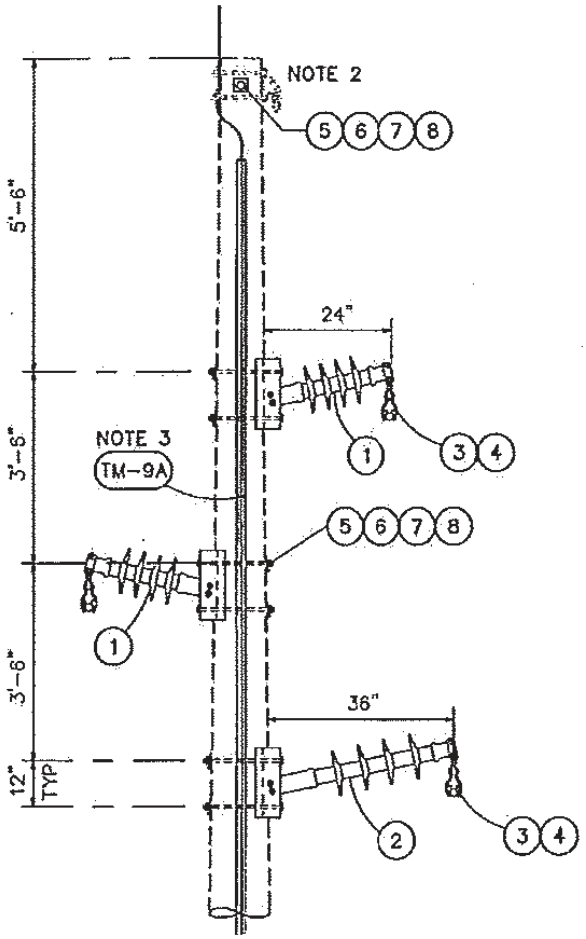
NOTES:

1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHEILD WIRE ASSEMBLIES ARE CALLED OUT ON STAKING SHEETS.

ITEM	QTY	MATERIAL
1	4	Insulator, Polymer, Post, Horizontal, 24", 34.5-kV, MACLEAN H291024VX02
2	2	Insulator, Polymer, Post, Horizontal, 36", 34.5-kV, MACLEAN H391036VX01
3	6	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	6	Clamp, suspension, Armor Grip, 1272 AAC "NARCISSUS", PREFORMED AGS-5138
5	7	Bolt, machine, 7/8", by required length
6	6	Washer, round 2"x 1/4", 15/16" dia. hole
7	7	Locknut, 7/8", MF type
8	7	Washer, spring, 7/8"
9	2	Washer, curved, 4" Sq. x 1/4", 15/16" Dia. Hole
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola,2009 | G:/Projects\Iberdrola\Renew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prtrt master.ai | Last Updated: 12-24-2009

Typical Overhead 34.5 kV Single Circuit Collector Line **Figure 9a**

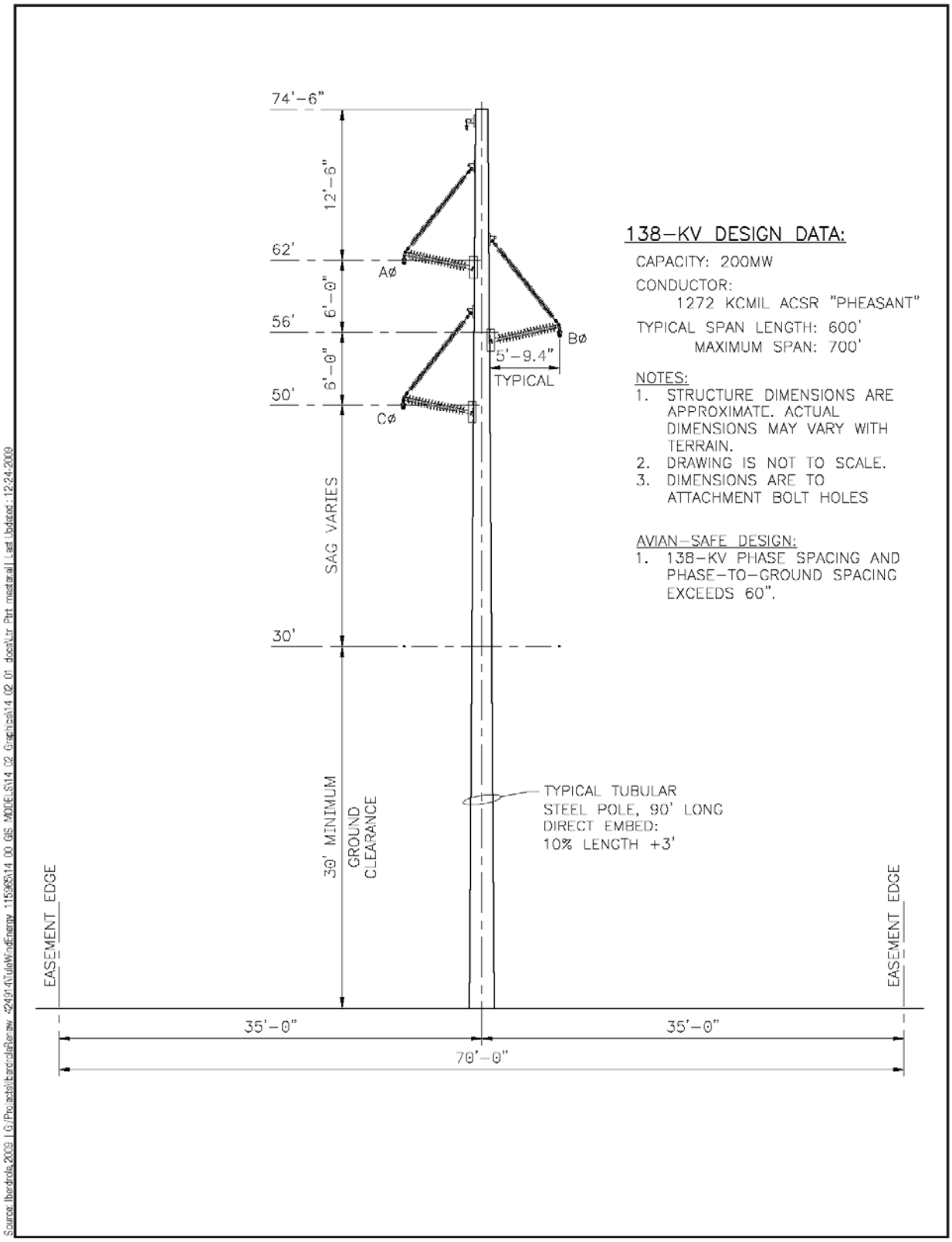


NOTES:
1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHIELD WIRE ASSEMBLIES ARE CALLED OUT SEPARATELY ON STAKING SHEETS.
3. SPECIAL MOLDING REQUIRED FOR RAPTOR-SAFE DESIGN.

ITEM	QTY	MATERIAL
1	2	Insulator, polymer, post, horizontal, 24", 34.5-kV, 2½" rod, MACLEAN H291024VX02 OR LAPP CL2-024-216-29-A
2	1	Insulator, polymer, post, horizontal, 36", 34.5-kV, 3" rod, MACLEAN H391036VX01
3	3	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	3	Clamp, suspension, Cushion-Grip, 1272 AAC "NARCISSUS", PREFORMED CGS-1115
5	7	Bolt, machine, ⅞", by required length
6	8	Washer, curved, 4" sq.x ¼", 15/16" dia. hole
7	7	Locknut, ⅞", MF type
8	7	Washer, spring, ⅞"
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola 2009 | G:/Projects/IberdrolaRenew 424914/TuleWindEnergy 115965/14 00 GIS MODELS/14 02 Graphics/14 02 01 docs/Ltr Prt master.ai | Last Updated: 12-24-2009

Typical Overhead 34.5 kV Double Circuit Collector Line **Figure 9b**



Typical 138kV Steel Tangent Pole **Figure 10**

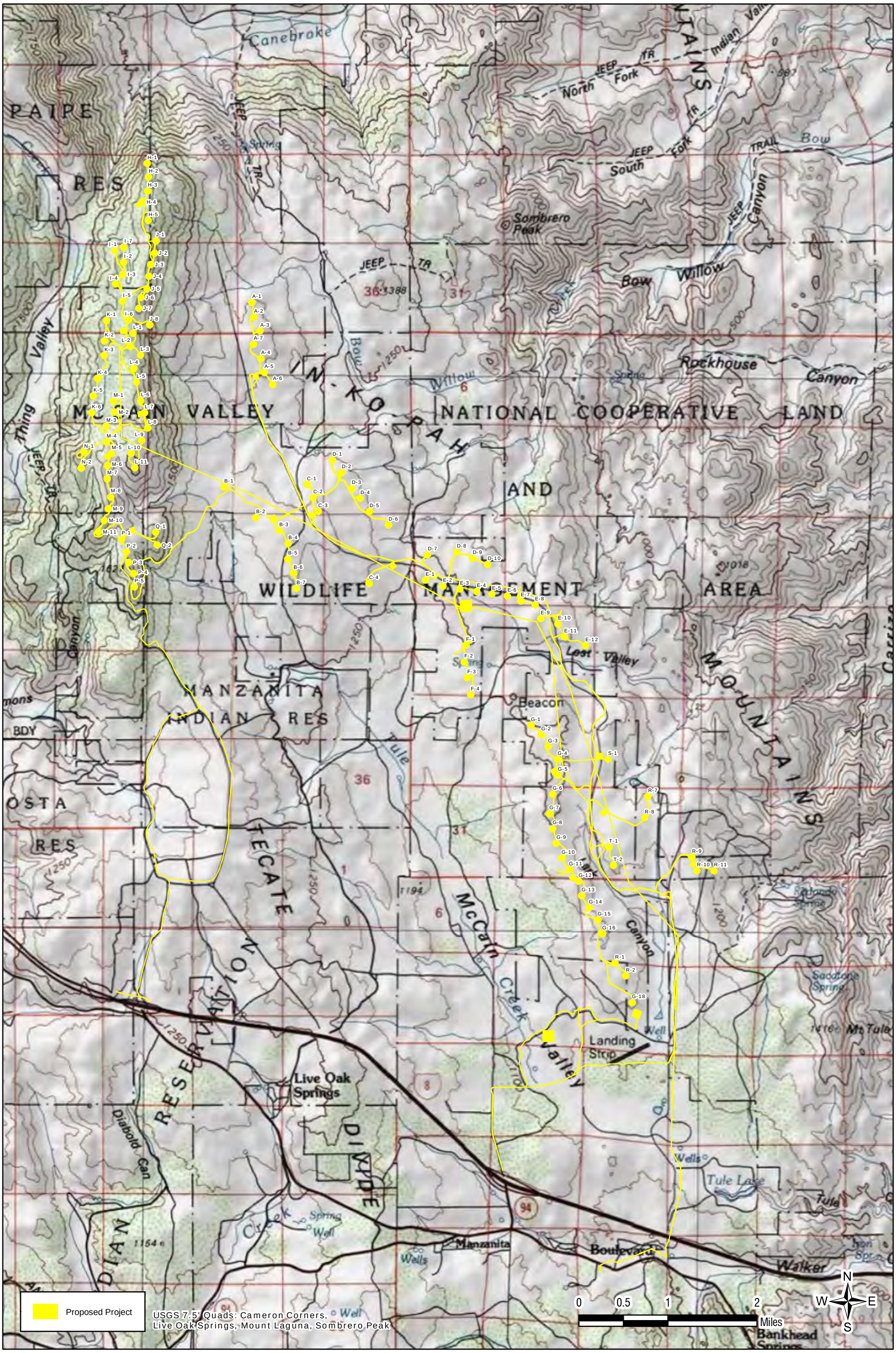


Figure 11
Topographic Map

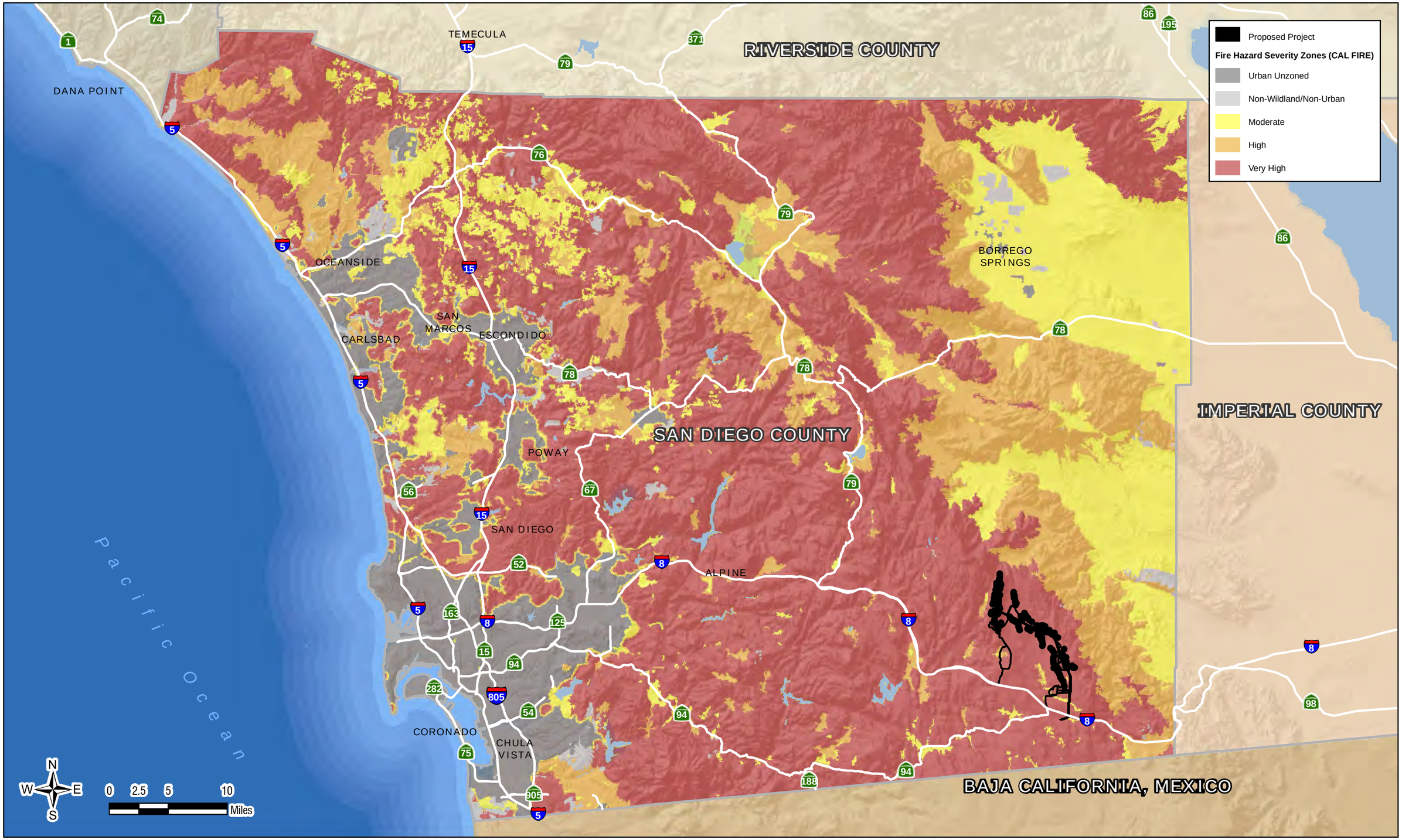


Figure 12
San Diego County Fire Hazard Severity

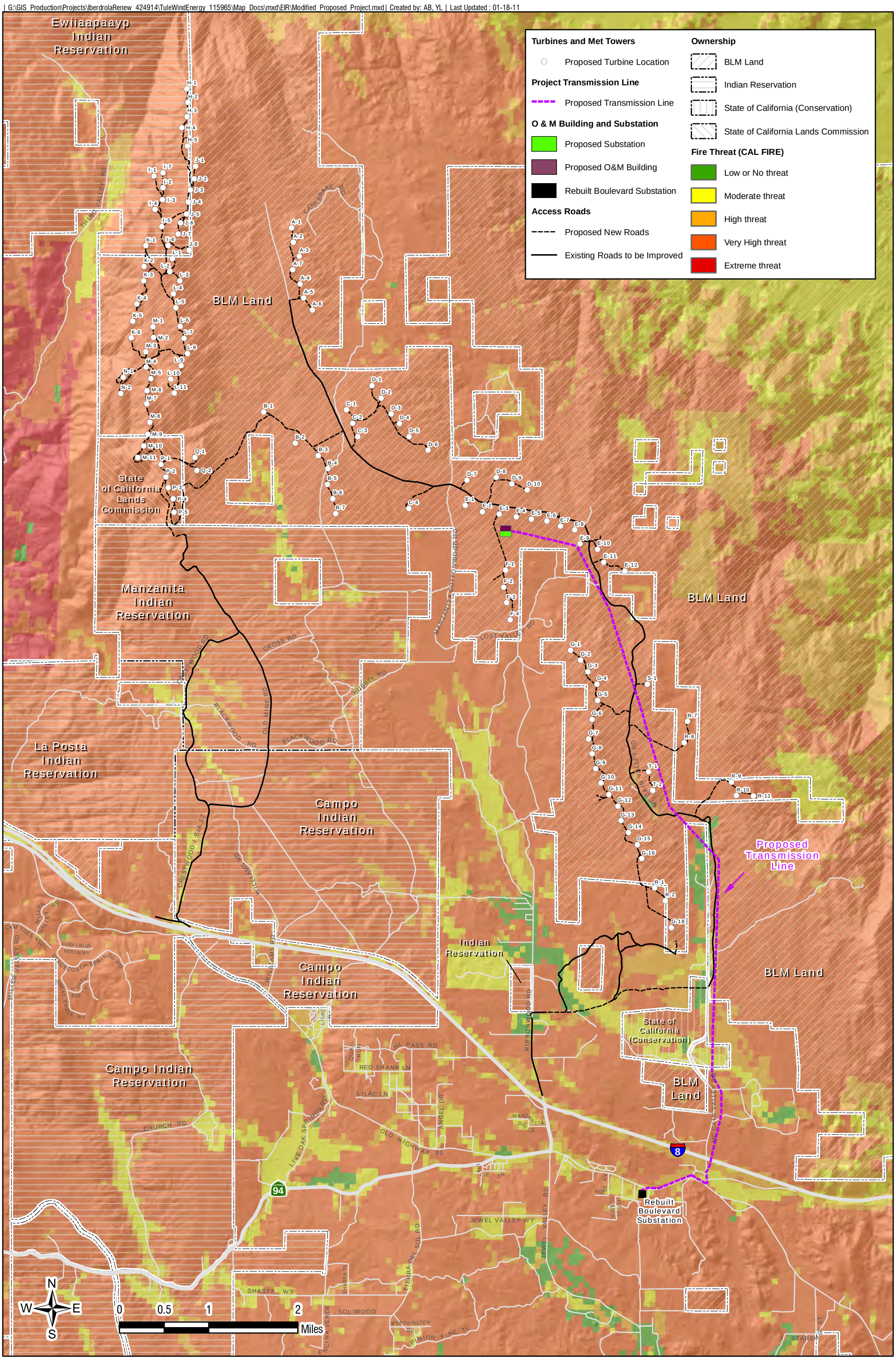


Figure 13
Fire Threat

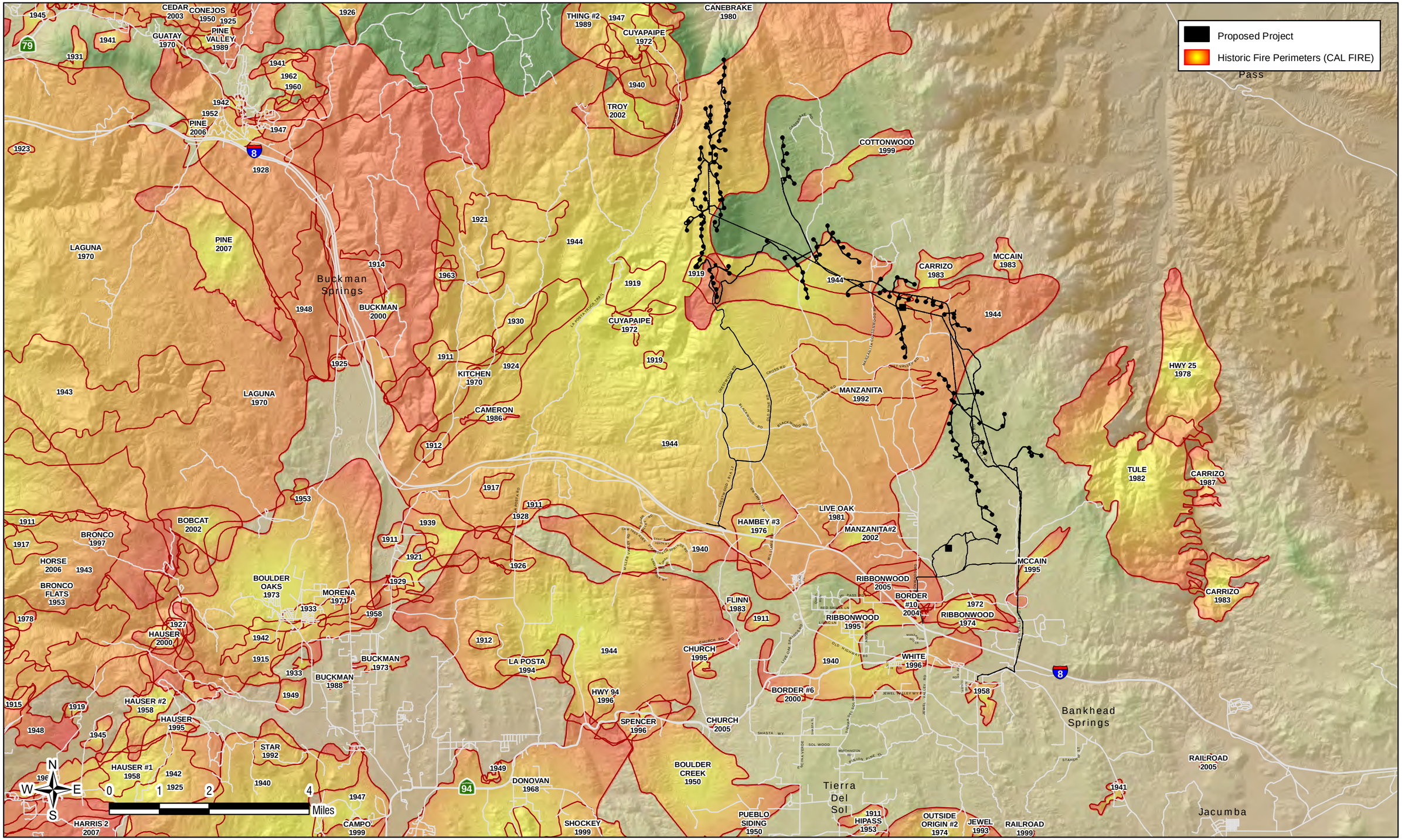


Figure 14
Fire History

| G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\Map_Docs\mxd\EIR\Modified_Proposed_Project.mxd | Created by: AB, YL | Last Updated : 01-18-11

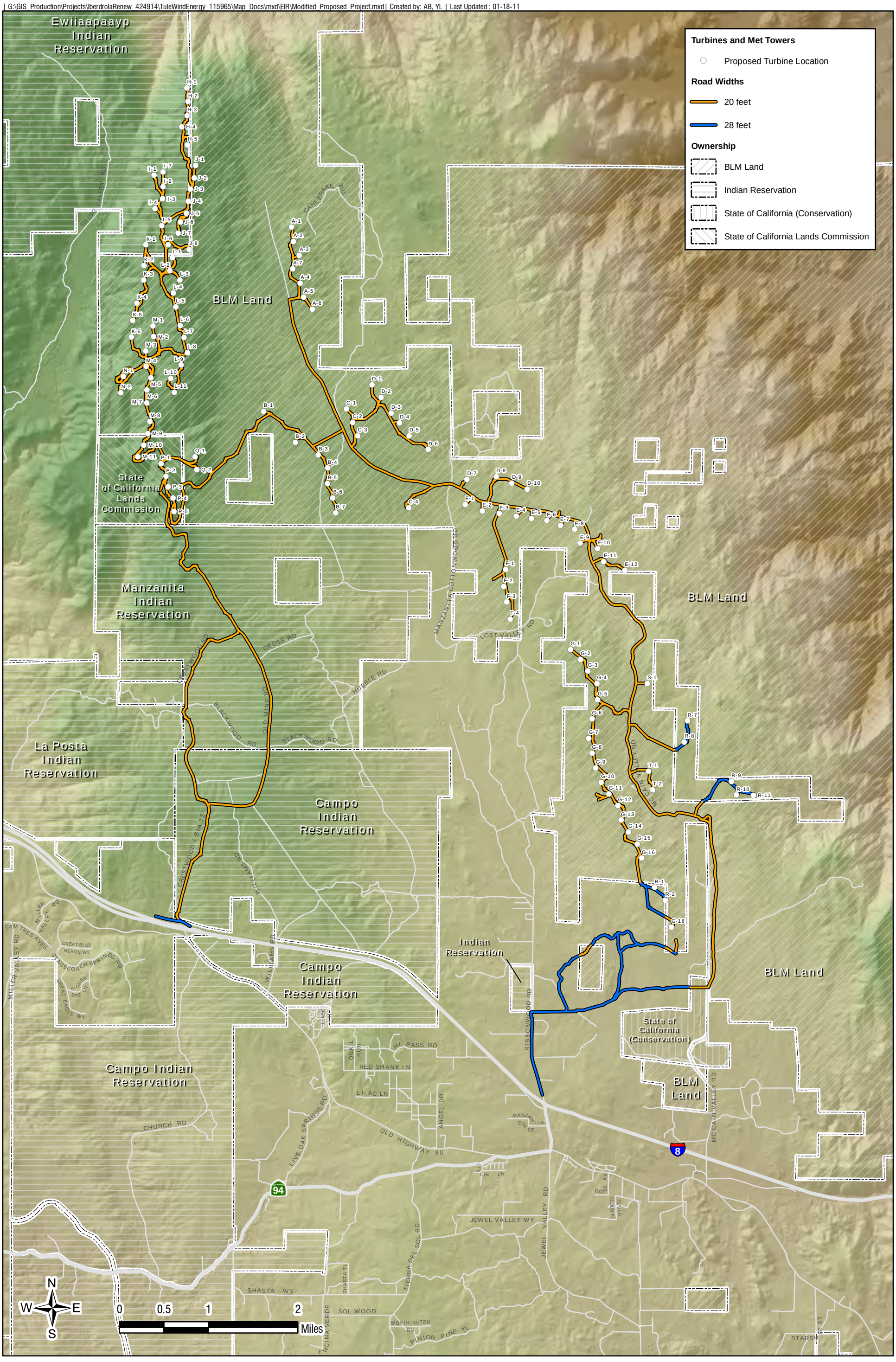
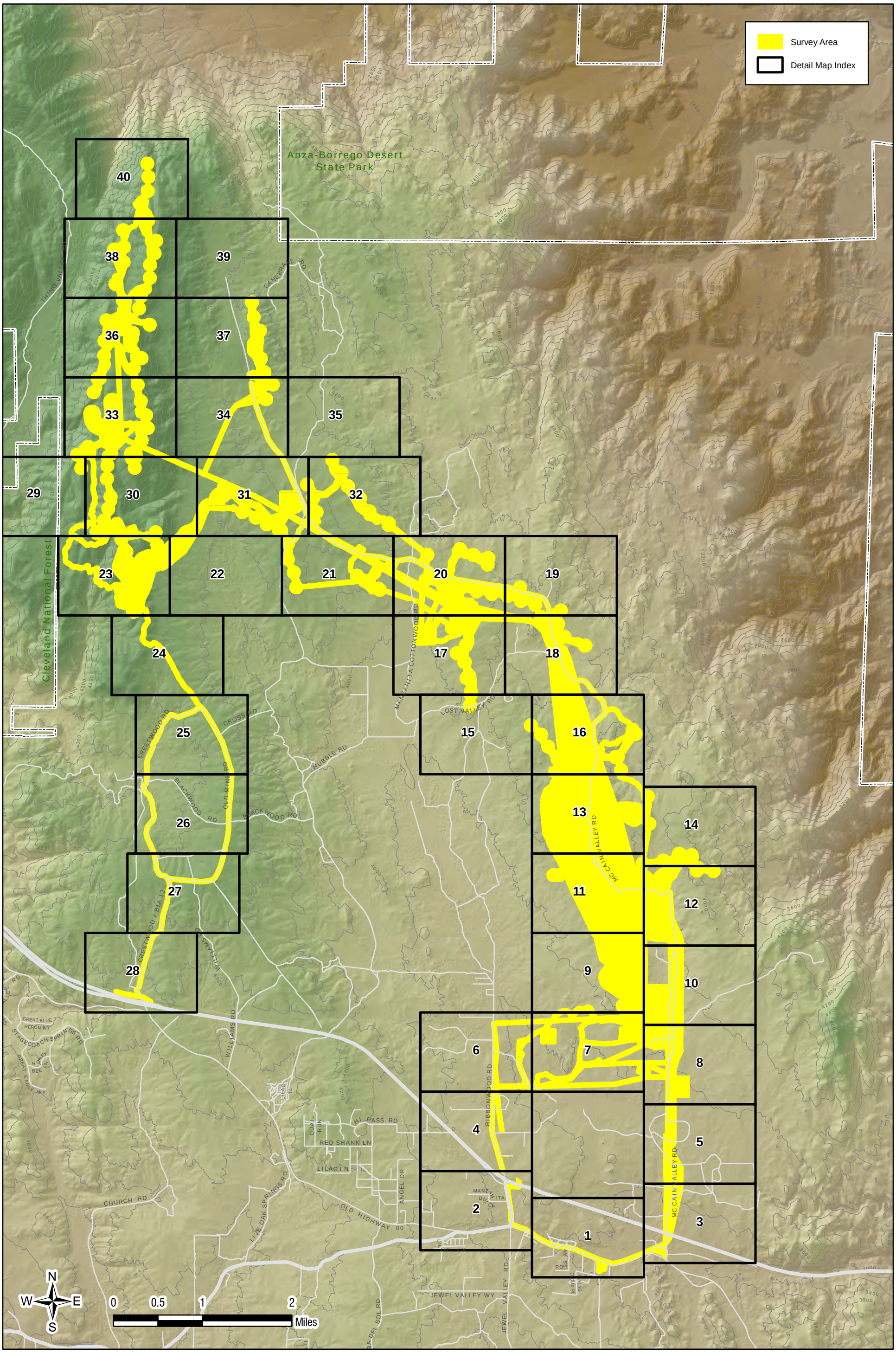


Figure 15
County Roadway Improvments

TECHNICAL APPENDICES

APPENDIX A

Biology Resources Maps



HDR
ONE COMPANY | *Many Solutions*℠

Map Index

FIGURE 1

Tule, LLC | Tule Wind Project | BTA

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 1)

Figure 2

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CSLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OSLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

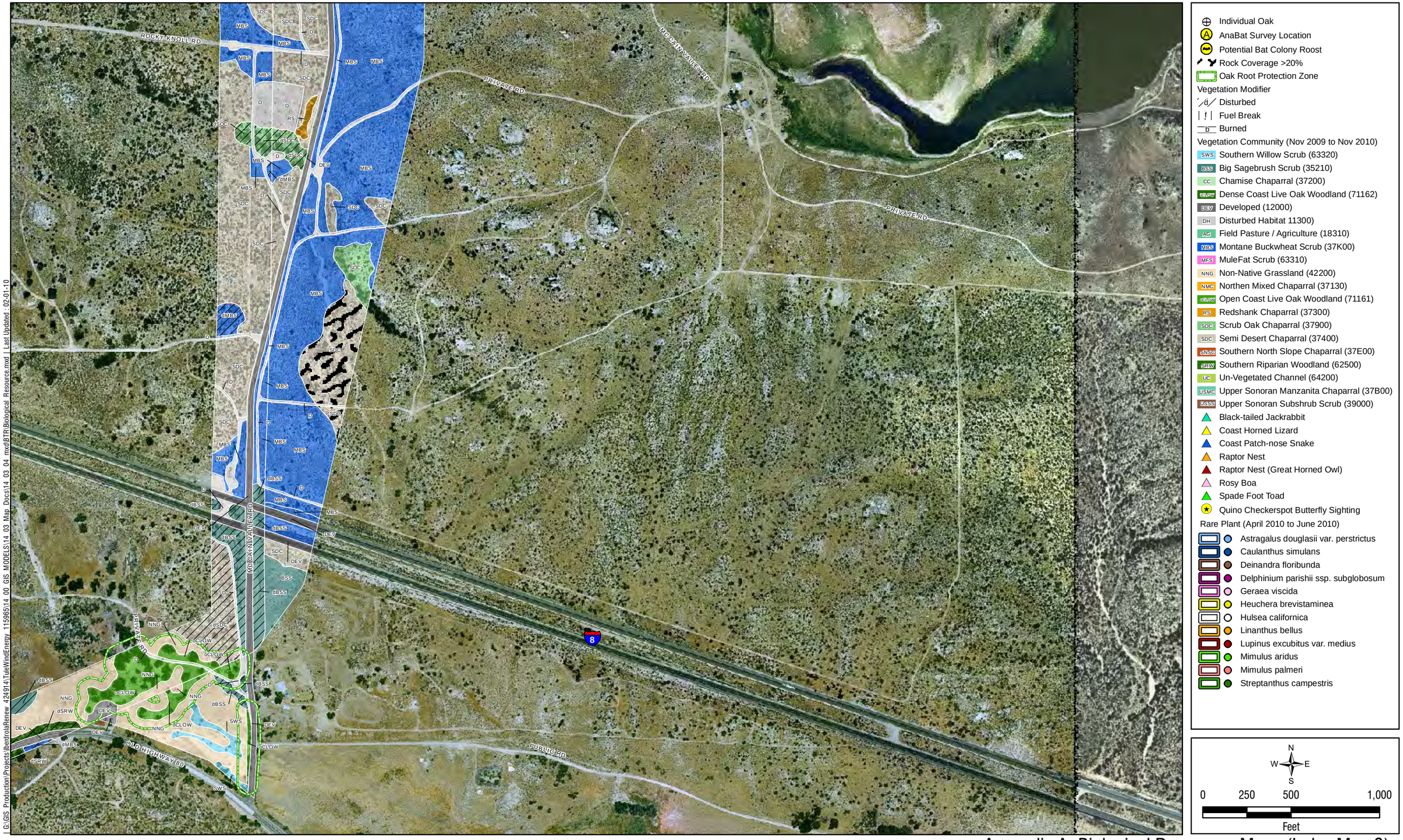
I:\GIS_Production\Projects\Iberdrola\Renew_4\24914\TuleWindEnergy_1115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

Appendix A: Biological Resources Maps (Index Map 2)

Figure 3

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



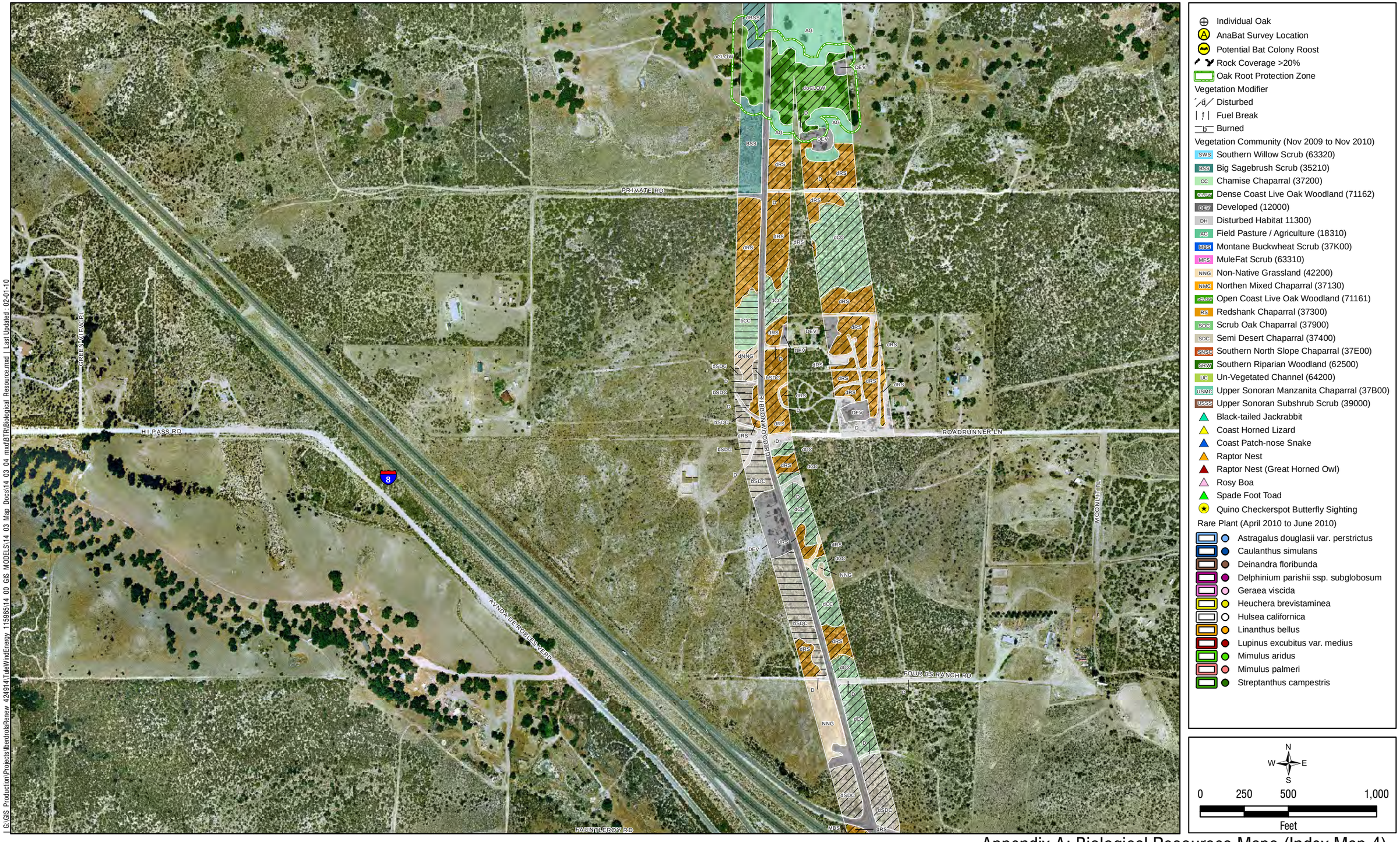
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 3)

Figure 4

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



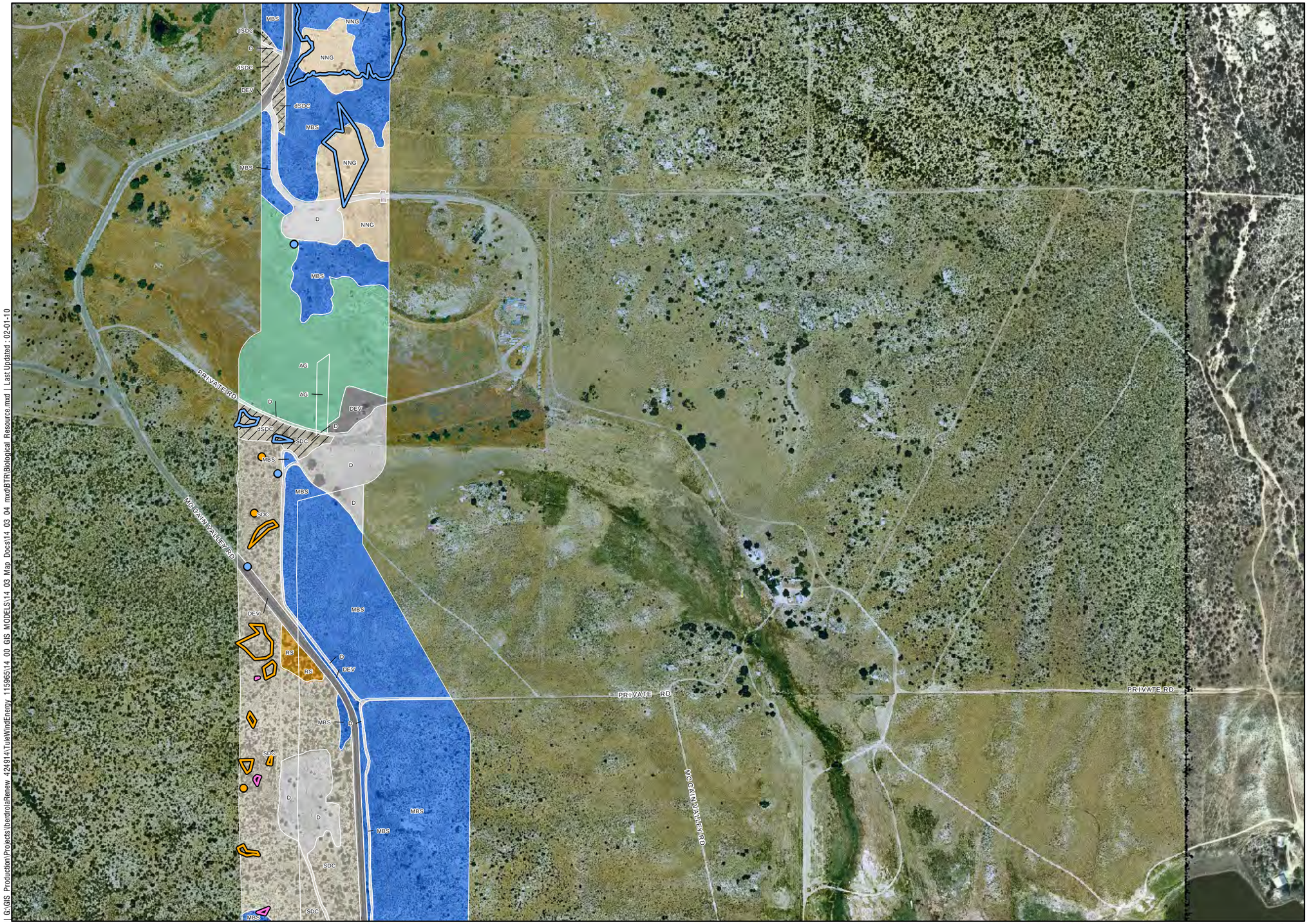
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 4)

Figure 5

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*℠



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

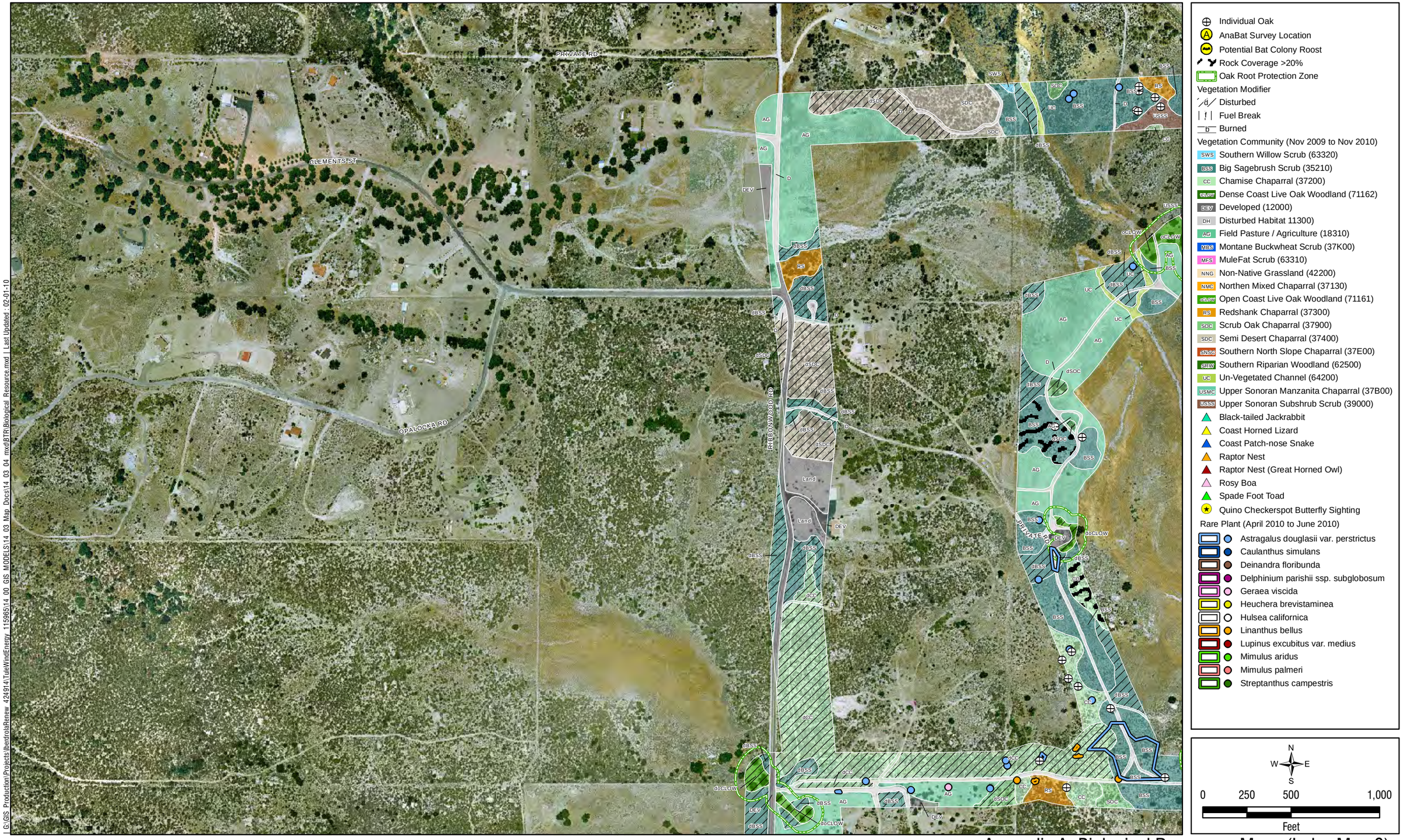
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 5)

Figure 6

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 6)

Figure 7

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

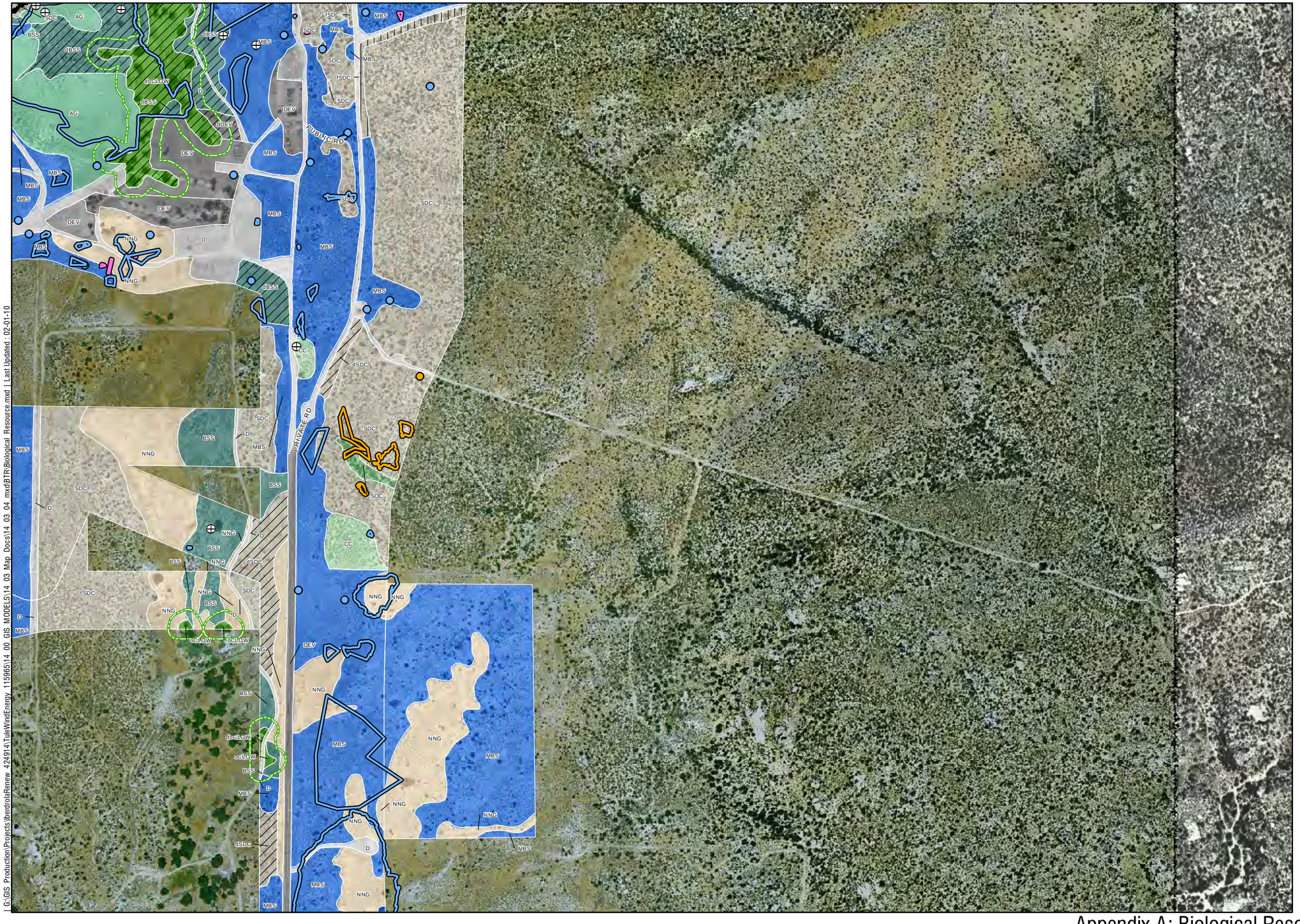
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 7)

Figure 8

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- OCLoW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLoW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

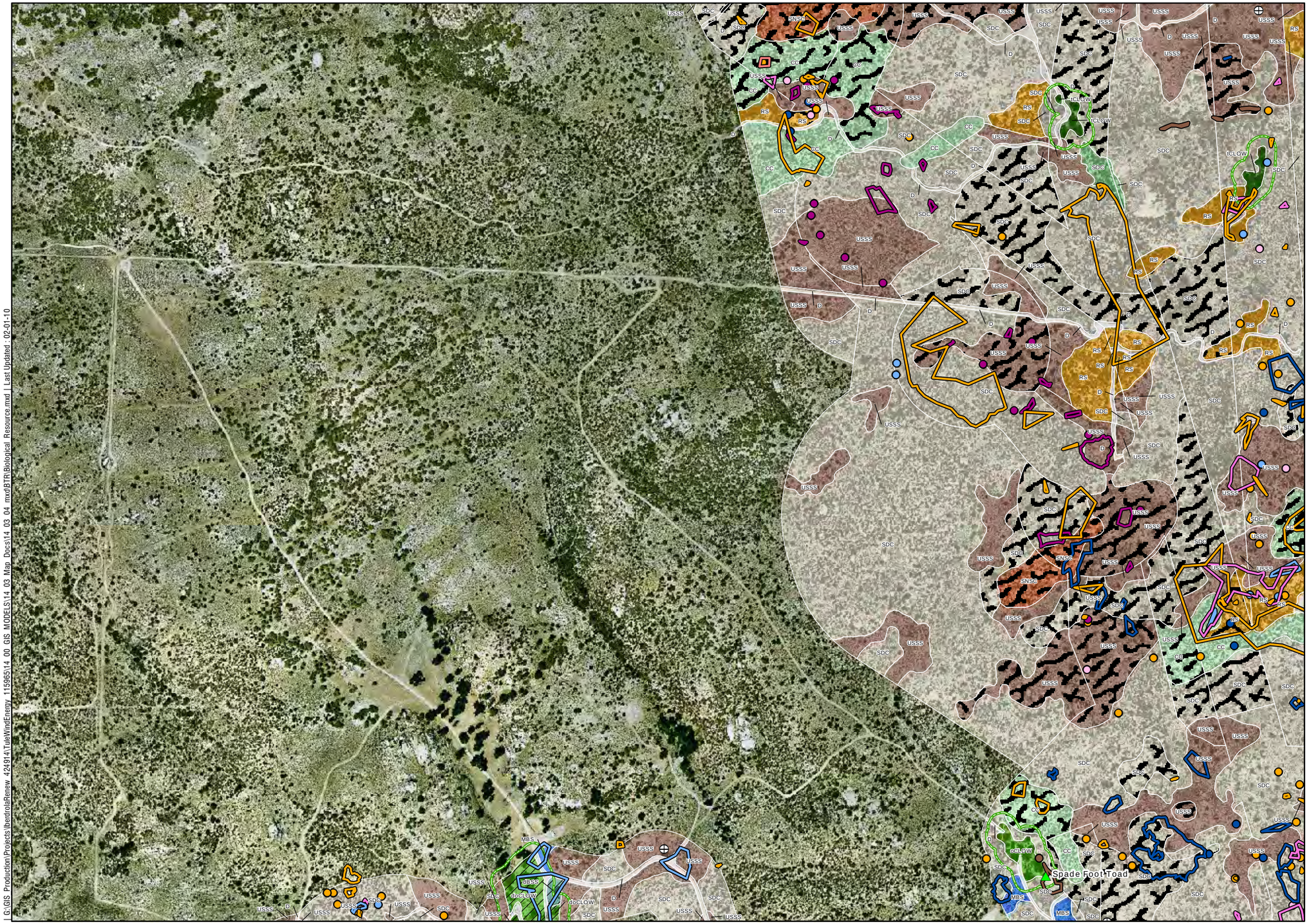
G:\GIS_Production\Projects\Iberdrola\Renew_4\24914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

Appendix A: Biological Resources Maps (Index Map 8)

Figure 9

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | Many Solutions℠



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS_Production\Projects\bardrola\Renew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 9)

Figure 10

Tule, LLC | Tule Wind Project | BTA

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

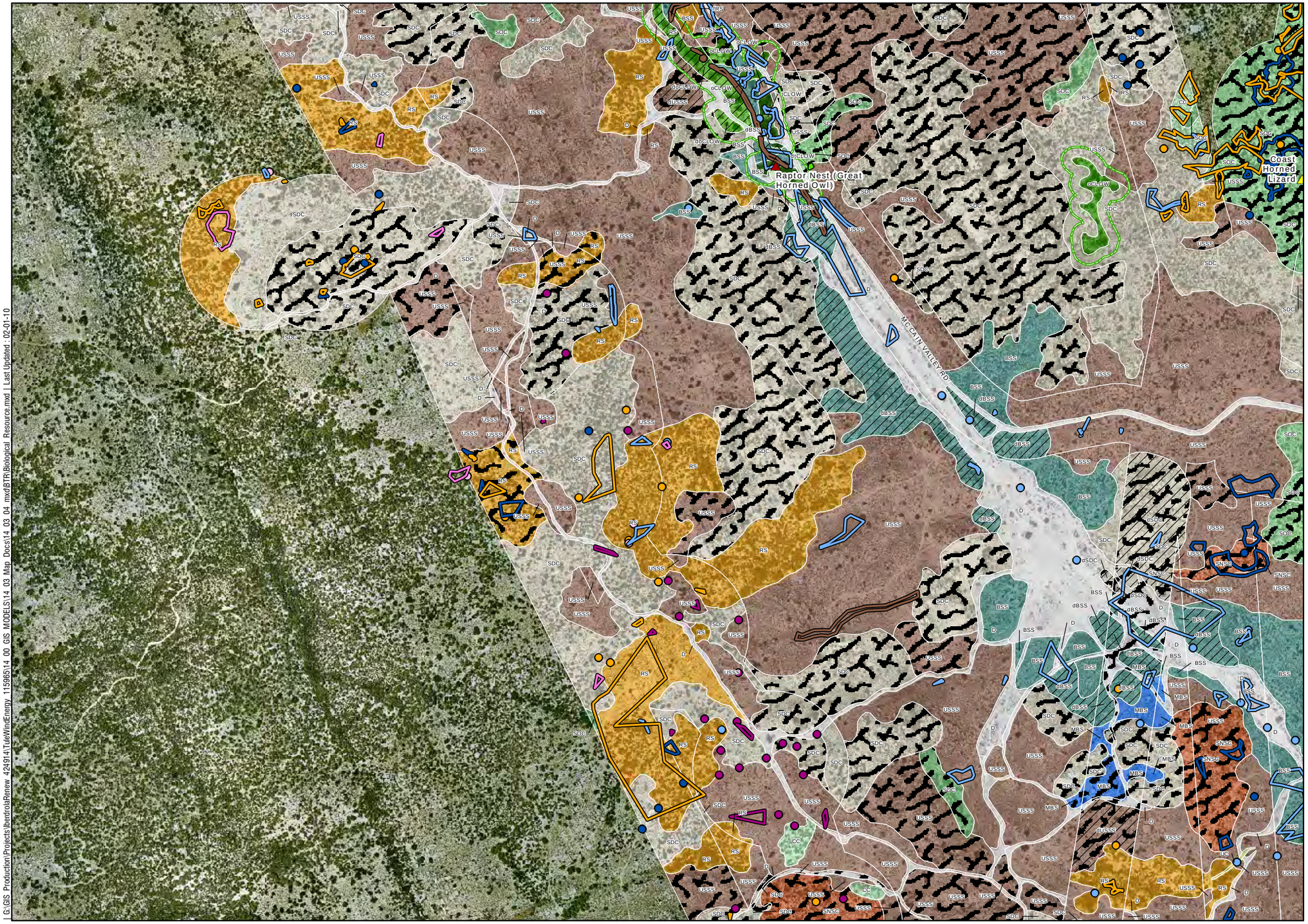
G:\GIS_Production\Projects\Iberdrola\Renew_424914\TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 10)

Figure 11

Tule, LLC | Tule Wind Project | BTA



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

I:\GIS_Production\Projects\IberdrolaRenew_4242914\TuleWindEnergy_1159651\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 11)

Figure 12

Tule, LLC | Tule Wind Project | BTA

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- oCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

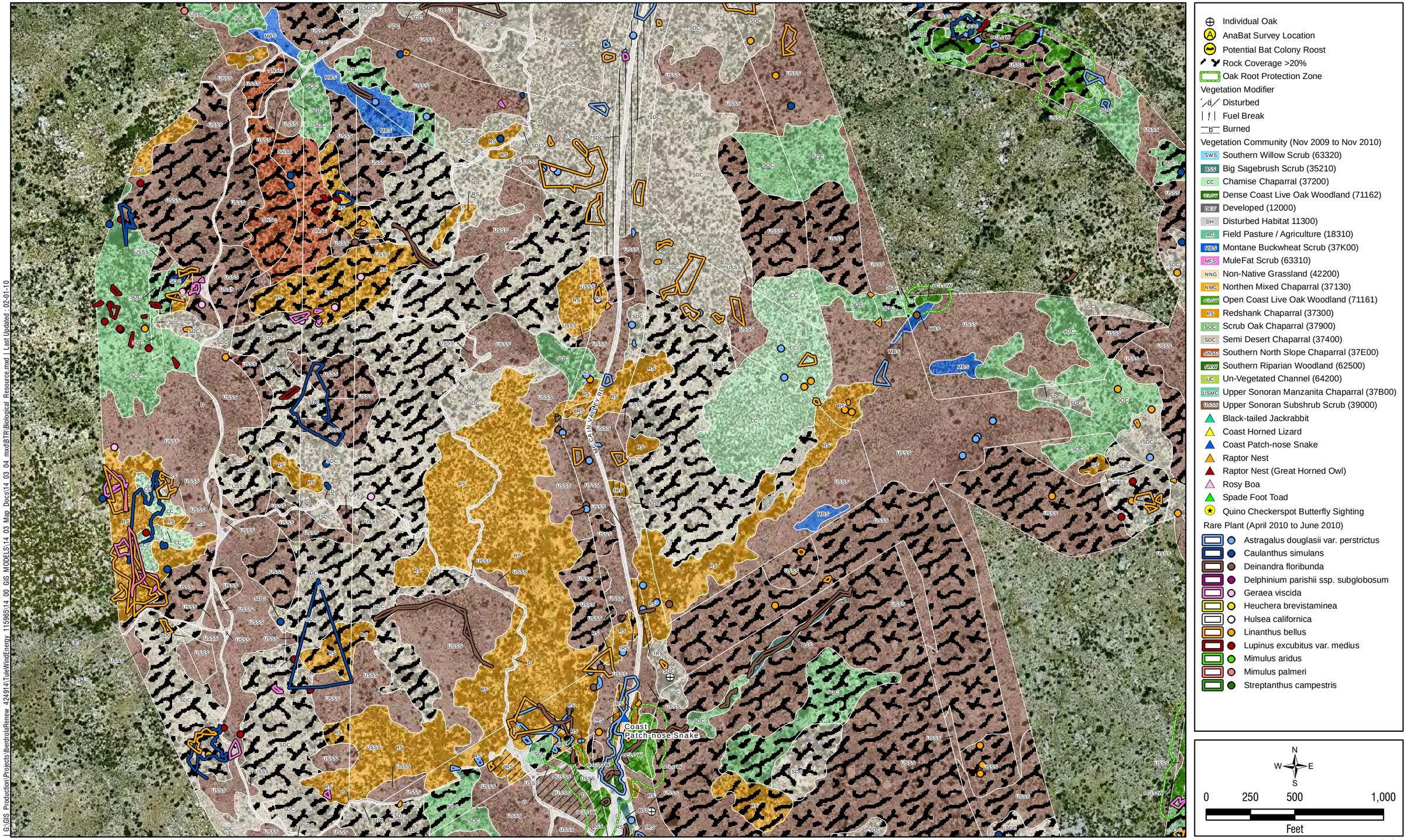
G:\GIS_Production\Projects\IberdrolaRenew_4249141TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

Appendix A: Biological Resources Maps (Index Map 12)

Figure 13

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



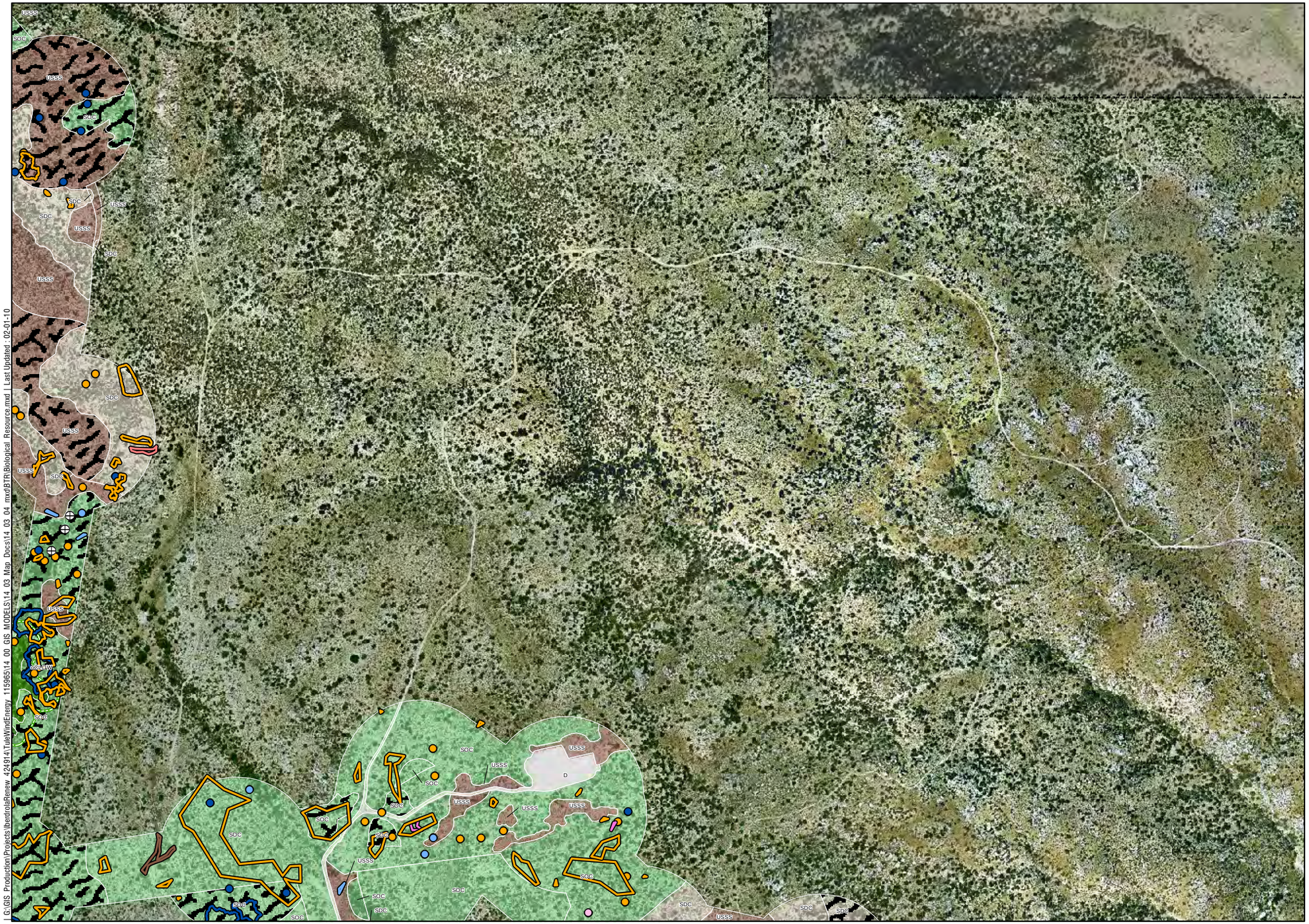
I:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 13)

Figure 14

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CSLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OSLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N
W E
S

0 250 500 1,000
Feet

G:\GIS Production\Projects\Iberdrola\Renew 4\24914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | *Many Solutions*

Appendix A: Biological Resources Maps (Index Map 14)

Figure 15

Tule, LLC | Tule Wind Project | BTA

I:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 15)

Figure 16

Tule, LLC | Tule Wind Project | BTA

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N
W E
S

0 250 500 1,000
Feet

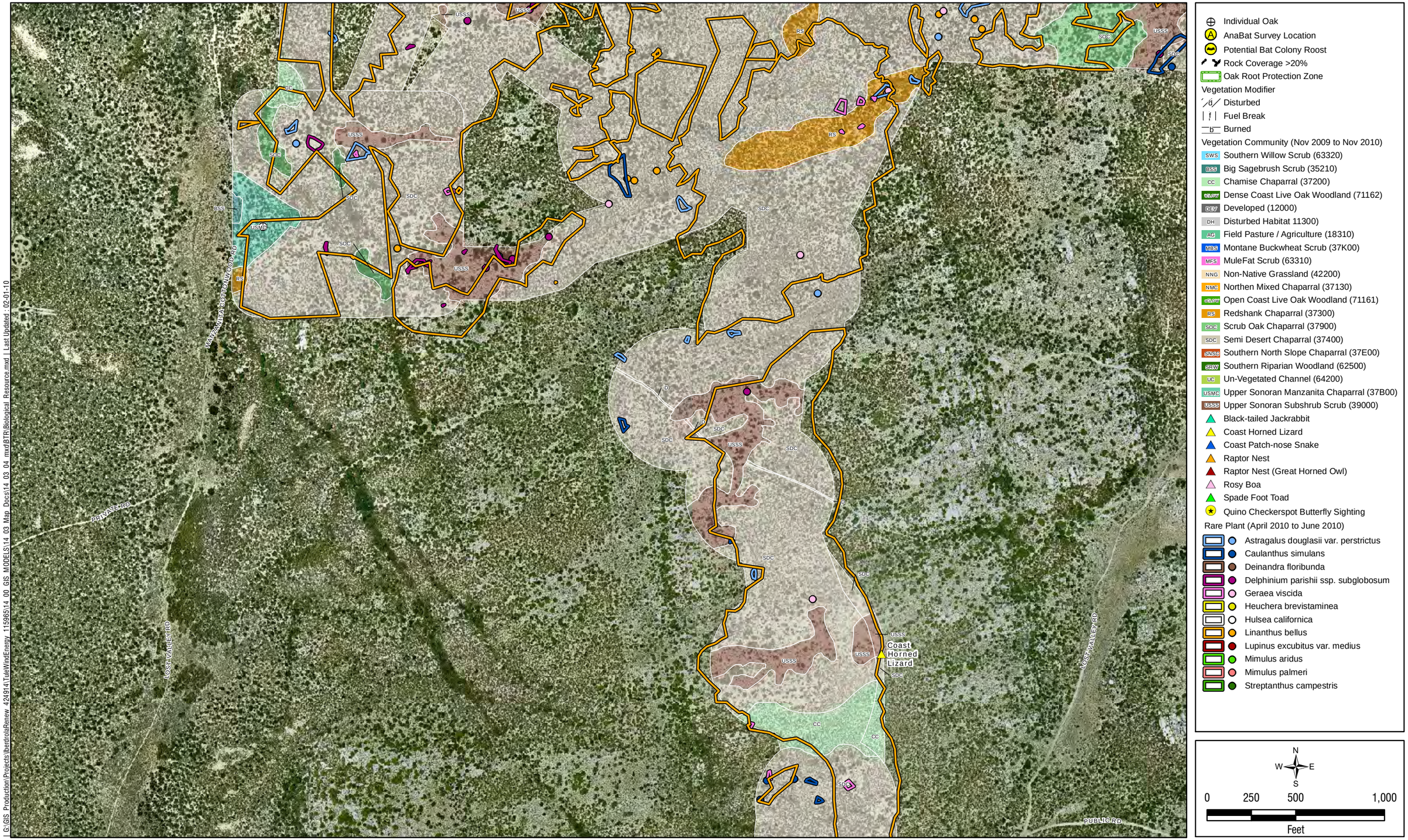
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 16)

Figure 17

Tule, LLC | Tule Wind Project | BTA



I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 17)

Figure 18

Tule, LLC | Tule Wind Project | BTA

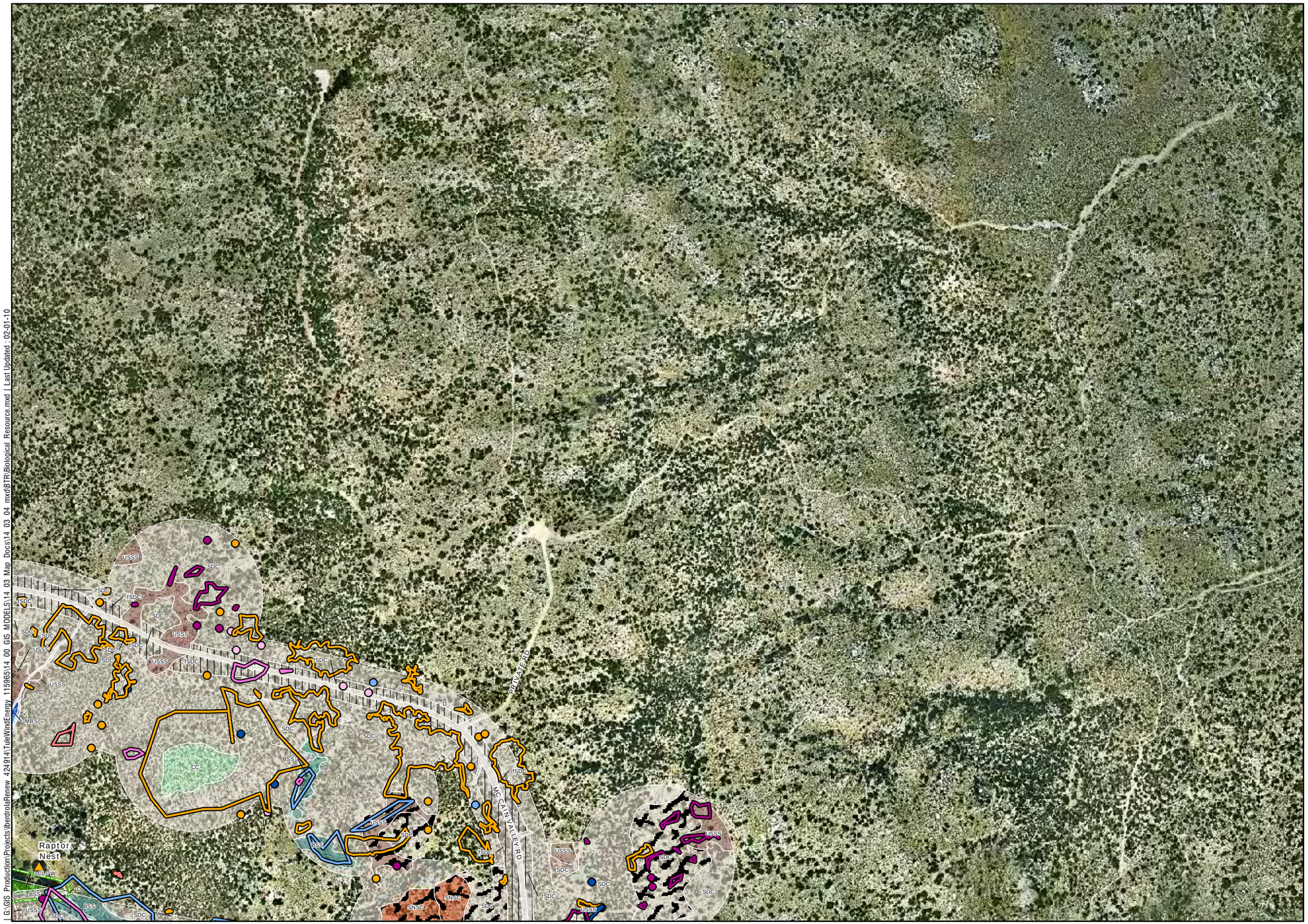
I:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 18)

Figure 19

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- ocLSW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- ocLSW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

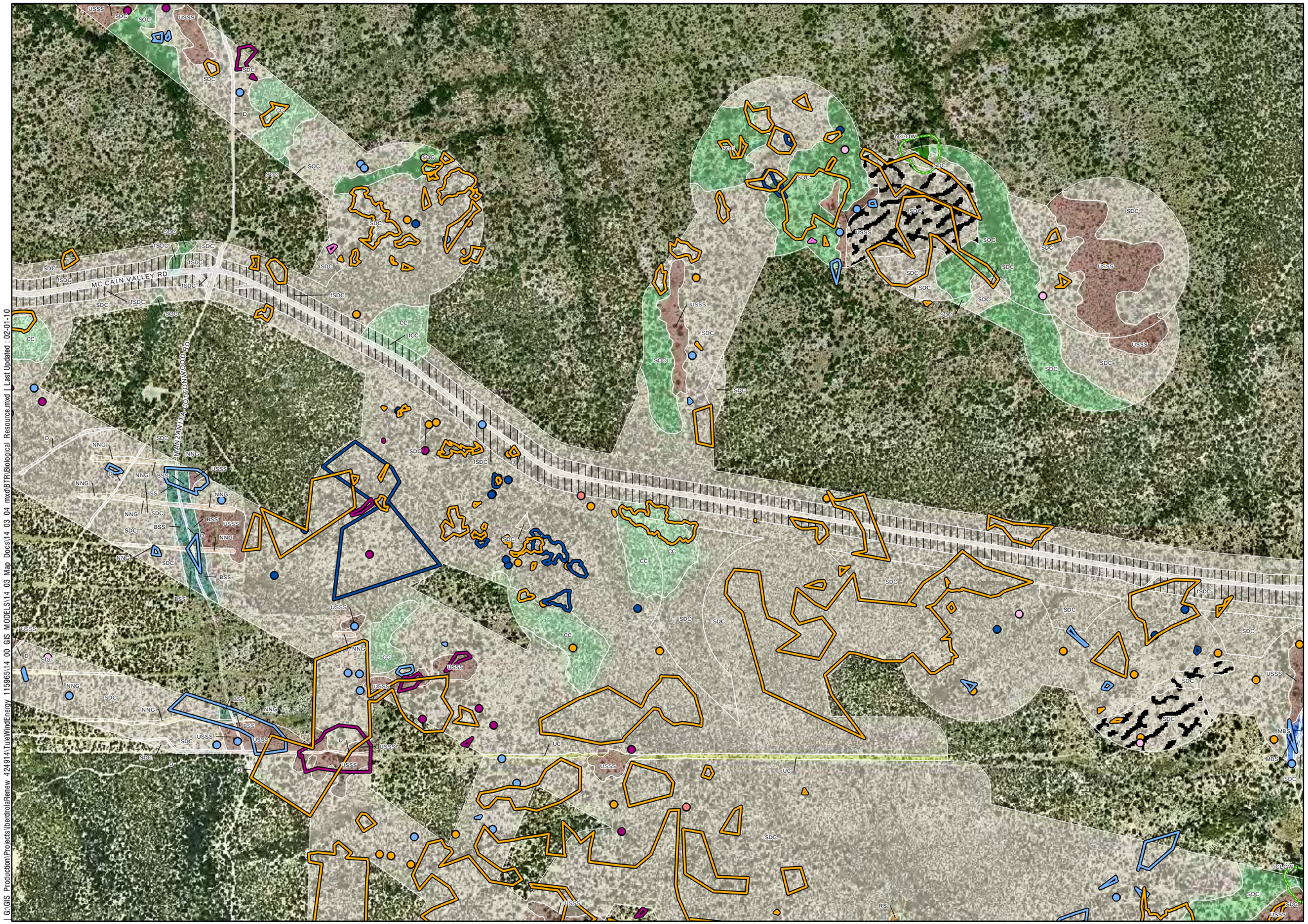
G:\GIS_Production\Projects\Iberdrola\Renew_4249144\TuleWindEnergy_1159965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 19)

Figure 20

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- OCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

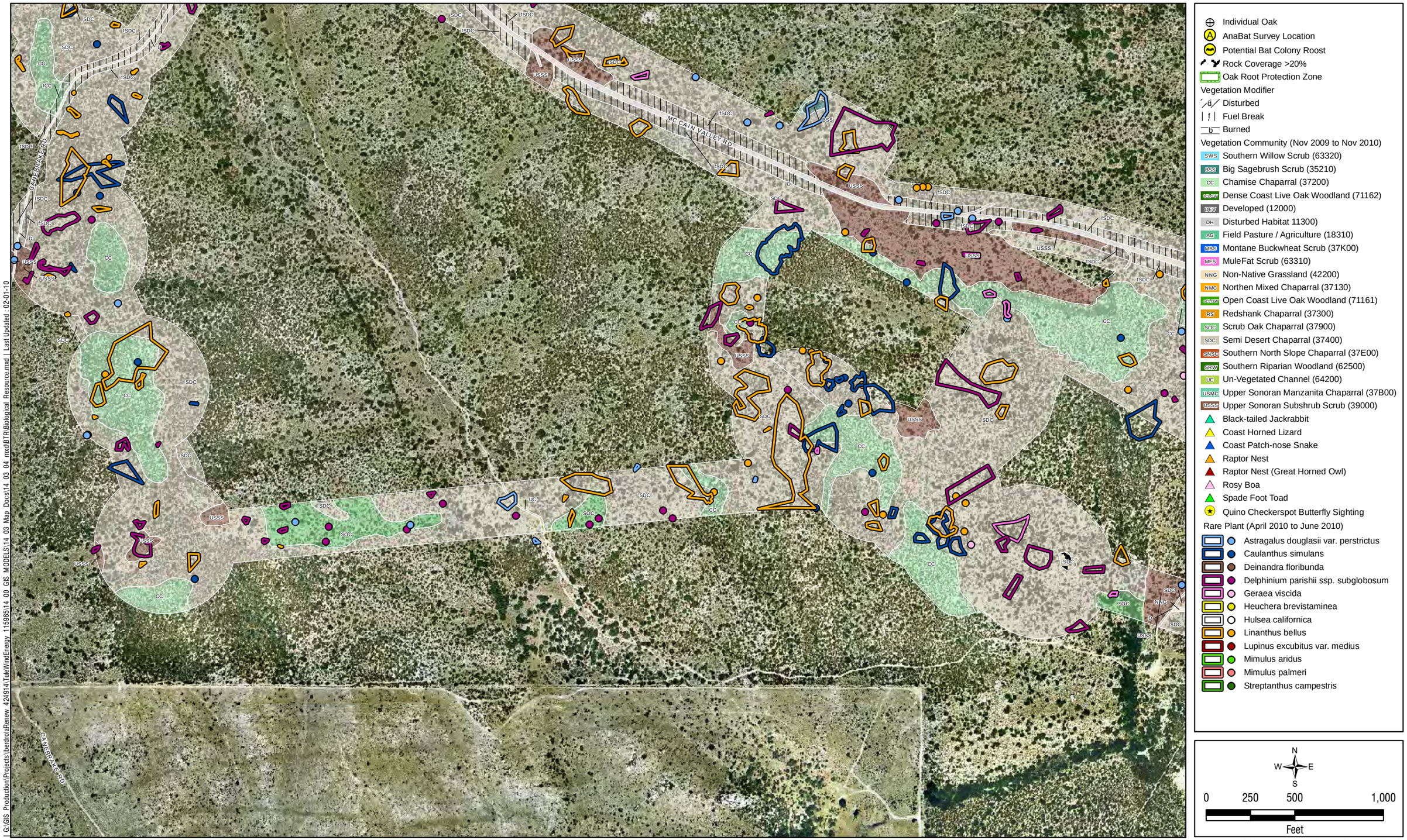
G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | Many Solutions℠

Appendix A: Biological Resources Maps (Index Map 20)

Figure 21

Tule, LLC | Tule Wind Project | BTA



I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 21)

Figure 22

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- COLW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

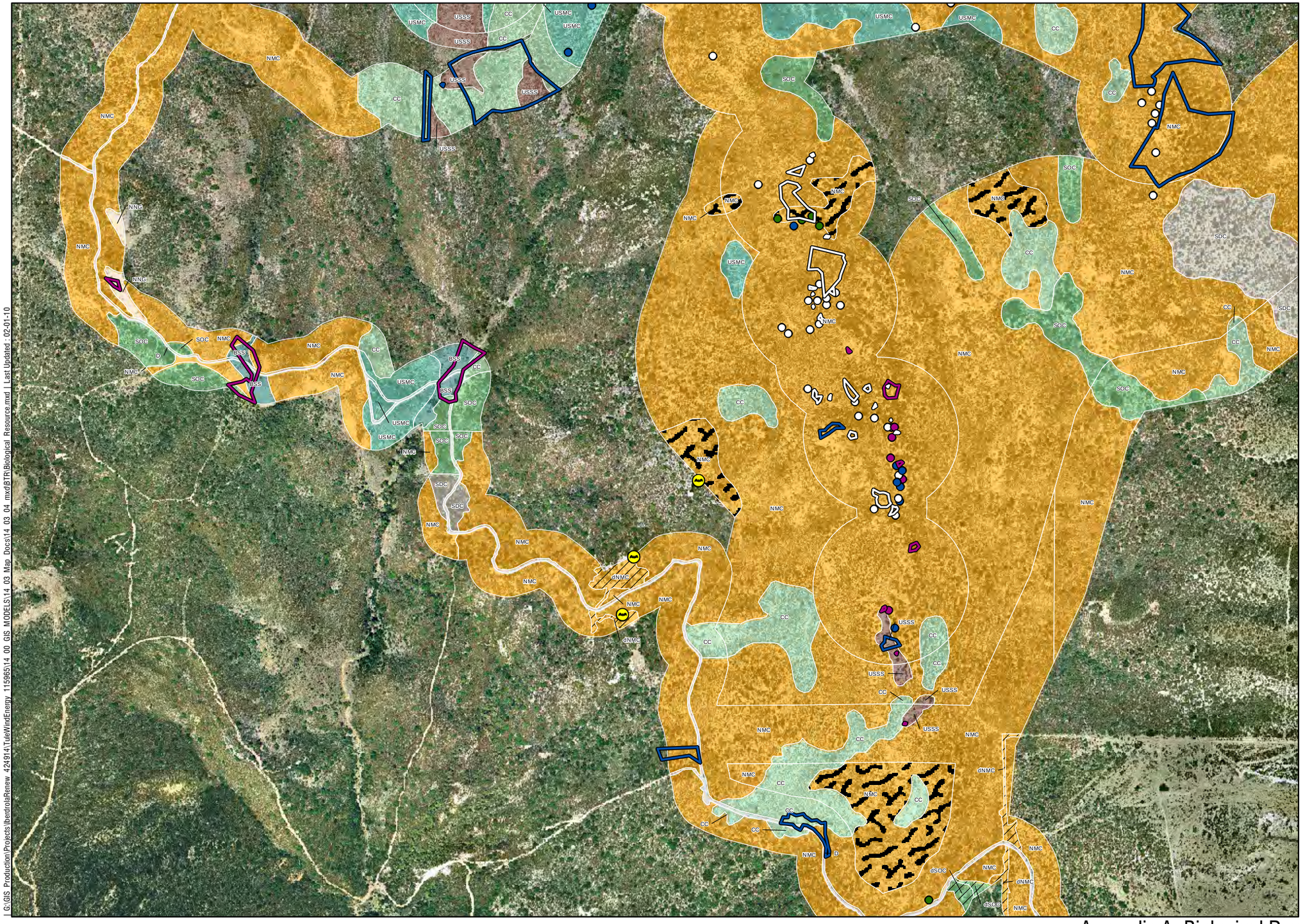
I:G:\GIS_Production\Projects\IberdrolaRenew_4294914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 22)

Figure 23

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*℠



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CSLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

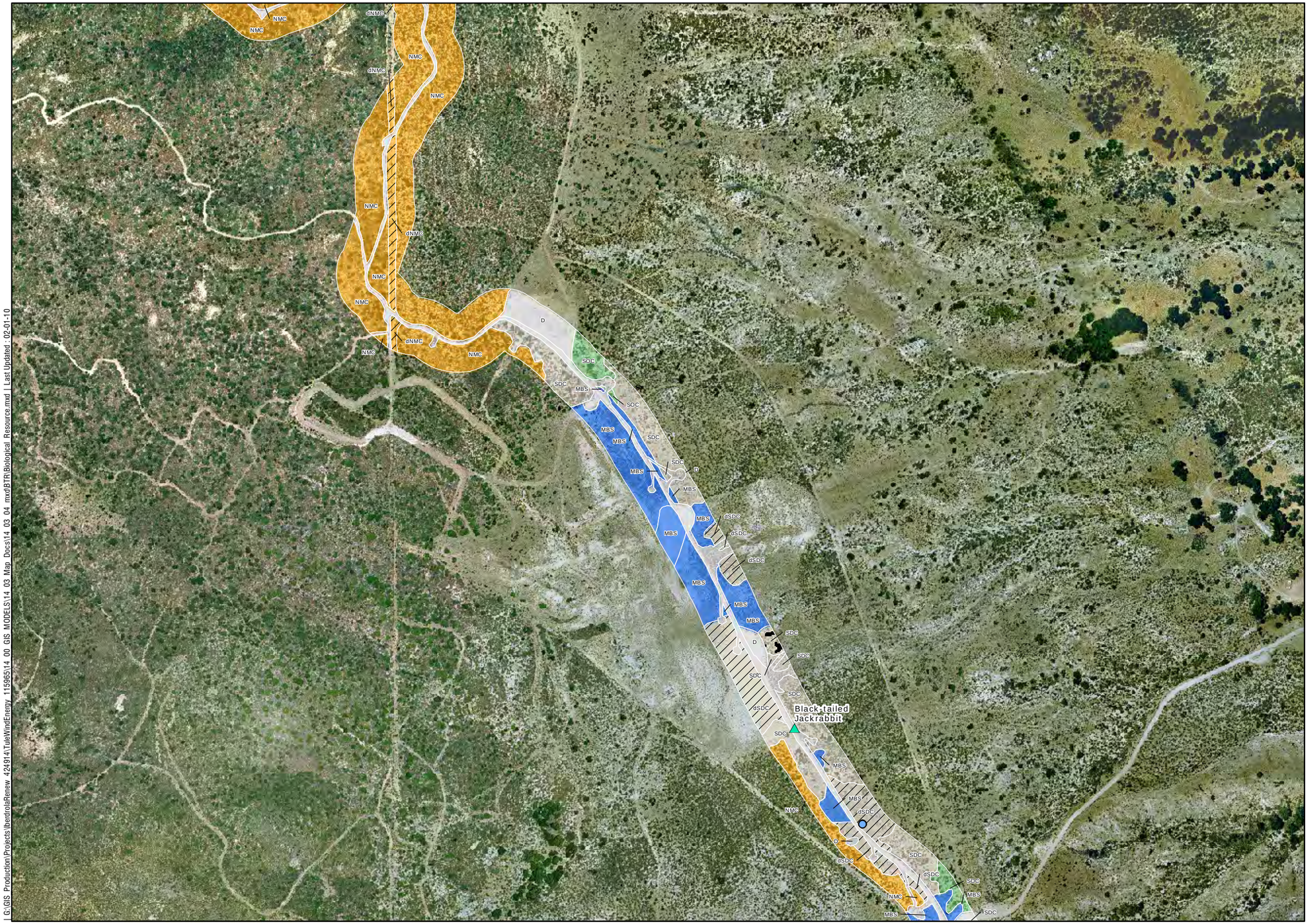
G:\GIS_Production\Projects\IberdrolaRenew_429914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 23)

Figure 24

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 24)

Figure 25

Tule, LLC | Tule Wind Project | BTA

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 25)

Figure 26

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

I:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 26)

Figure 27

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | Many Solutions℠

I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 27)

Figure 28

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

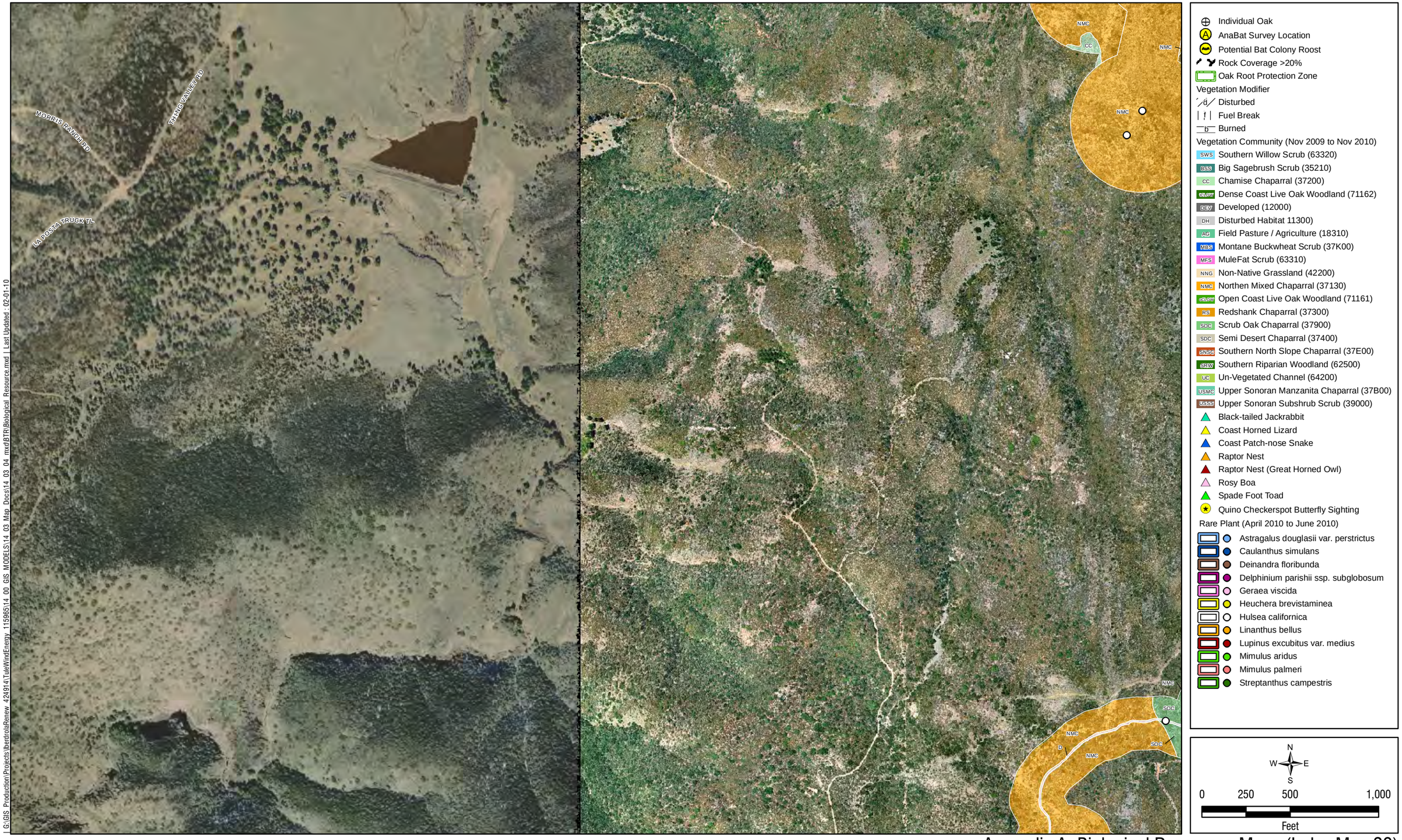
Appendix A: Biological Resources Maps (Index Map 28)

Figure 29

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

I:\GIS_Production\Projects\IberdrolaRenew_4249\14\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10



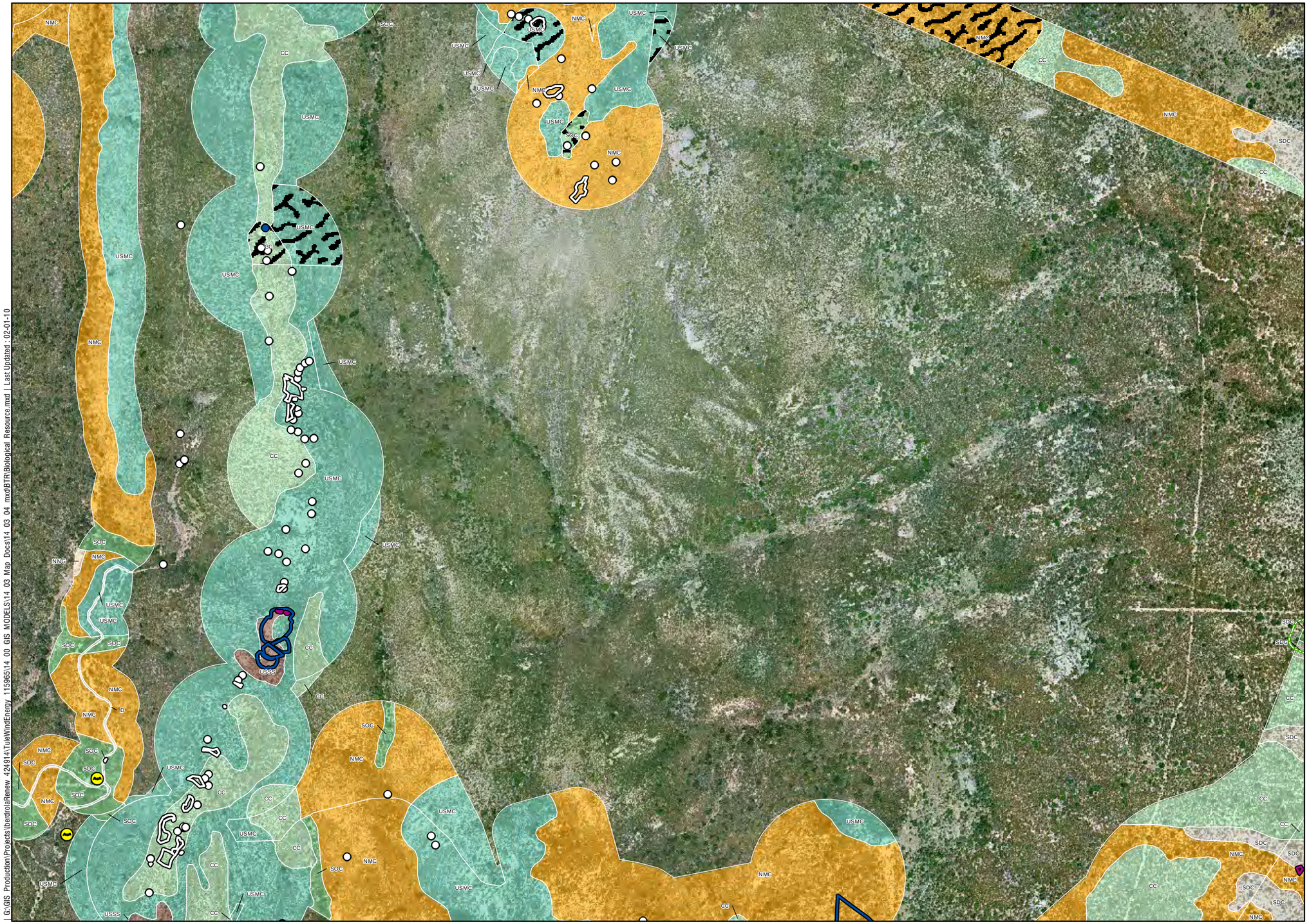
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 29)

Figure 30

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CSLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OSLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

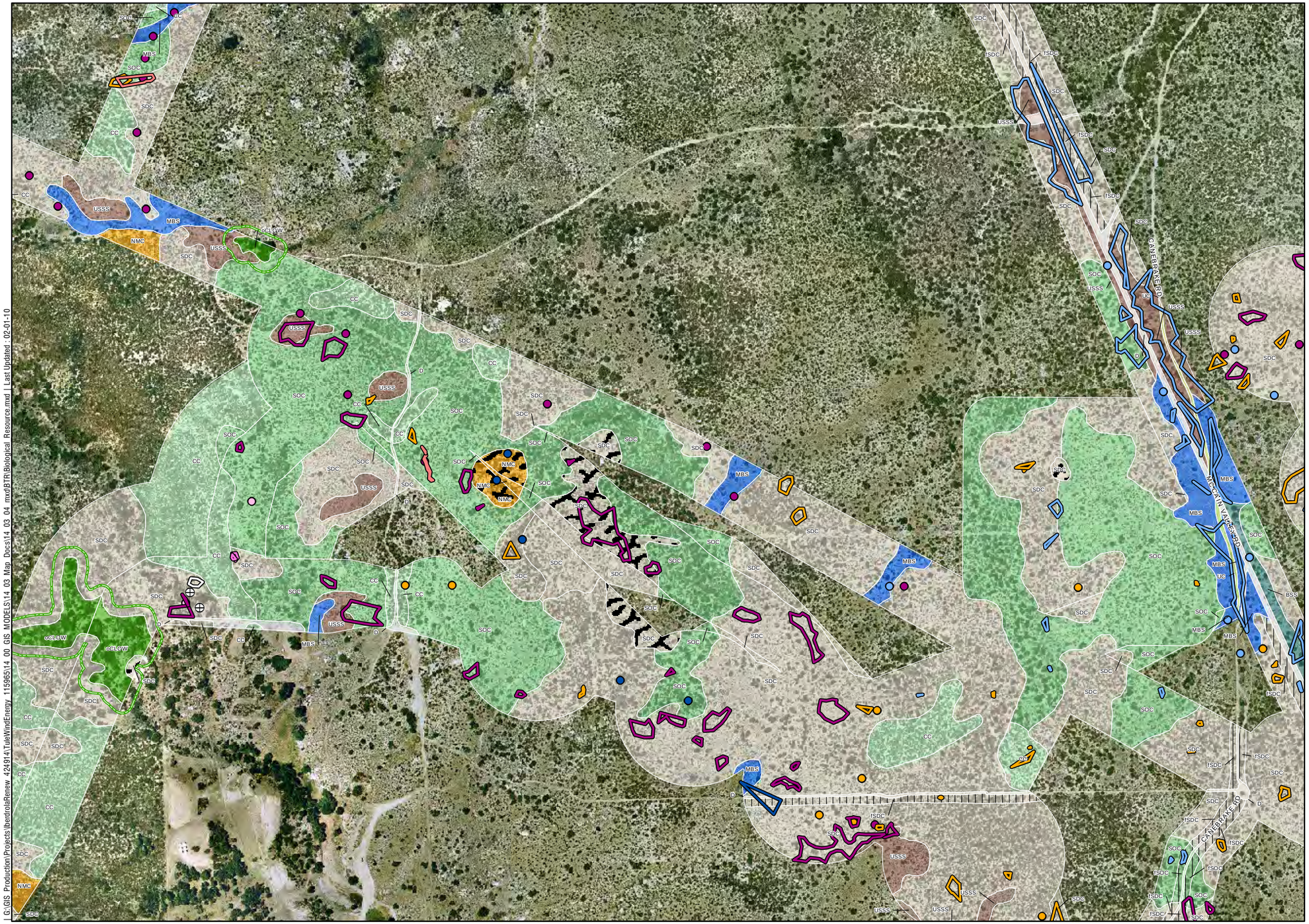
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

Appendix A: Biological Resources Maps (Index Map 30)

Figure 31

Tule, LLC | Tule Wind Project | BTA

HDR
ONE COMPANY | *Many Solutions*



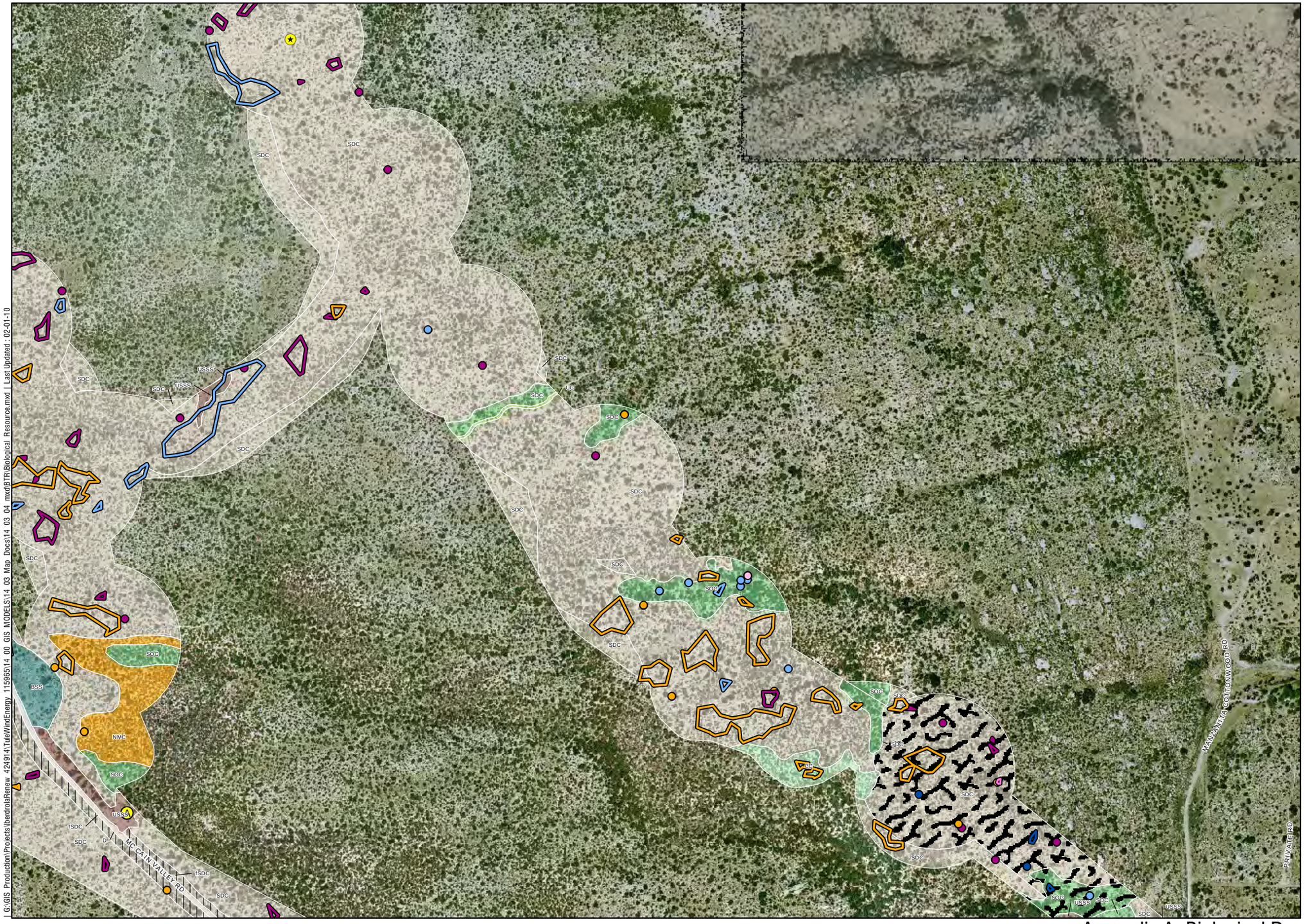
G:\GIS Production\Projects\IberdrolaRenew 4249141\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 31)

Figure 32

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- CLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

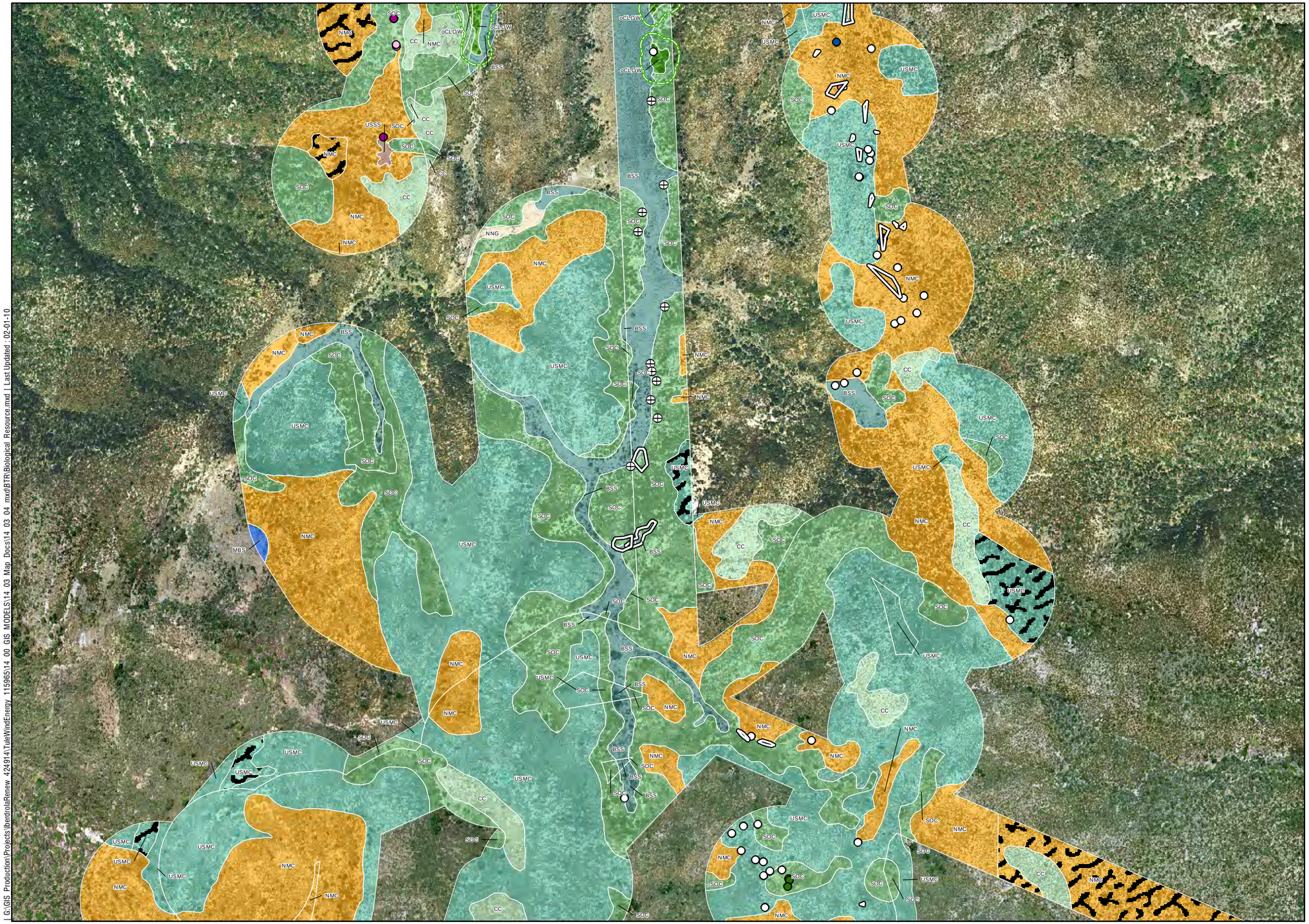
I:\GIS_Production\Projects\Iberdrola\Renew_4\24914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 32)

Figure 33

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- oCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- oCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N
W E
S

0 250 500 1,000
Feet

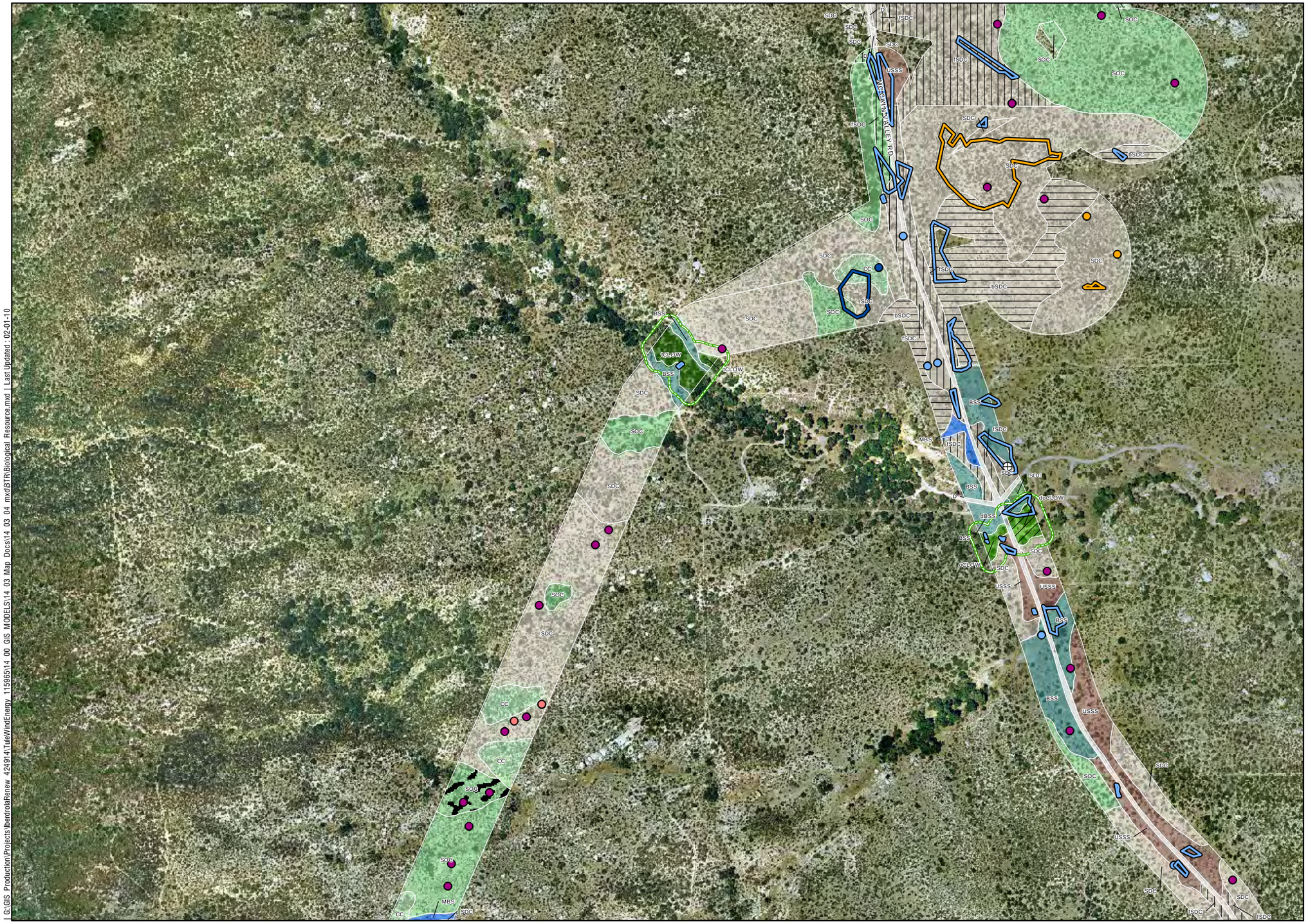
G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | *Many Solutions*

Appendix A: Biological Resources Maps (Index Map 33)

Figure 34

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000
Feet

G:\GIS Production\Projects\IberdrolaRenew 4249\14\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

HDR
ONE COMPANY | *Many Solutions*

Appendix A: Biological Resources Maps (Index Map 34)

Figure 35

Tule, LLC | Tule Wind Project | BTA

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N
W E
S

0 250 500 1,000
Feet

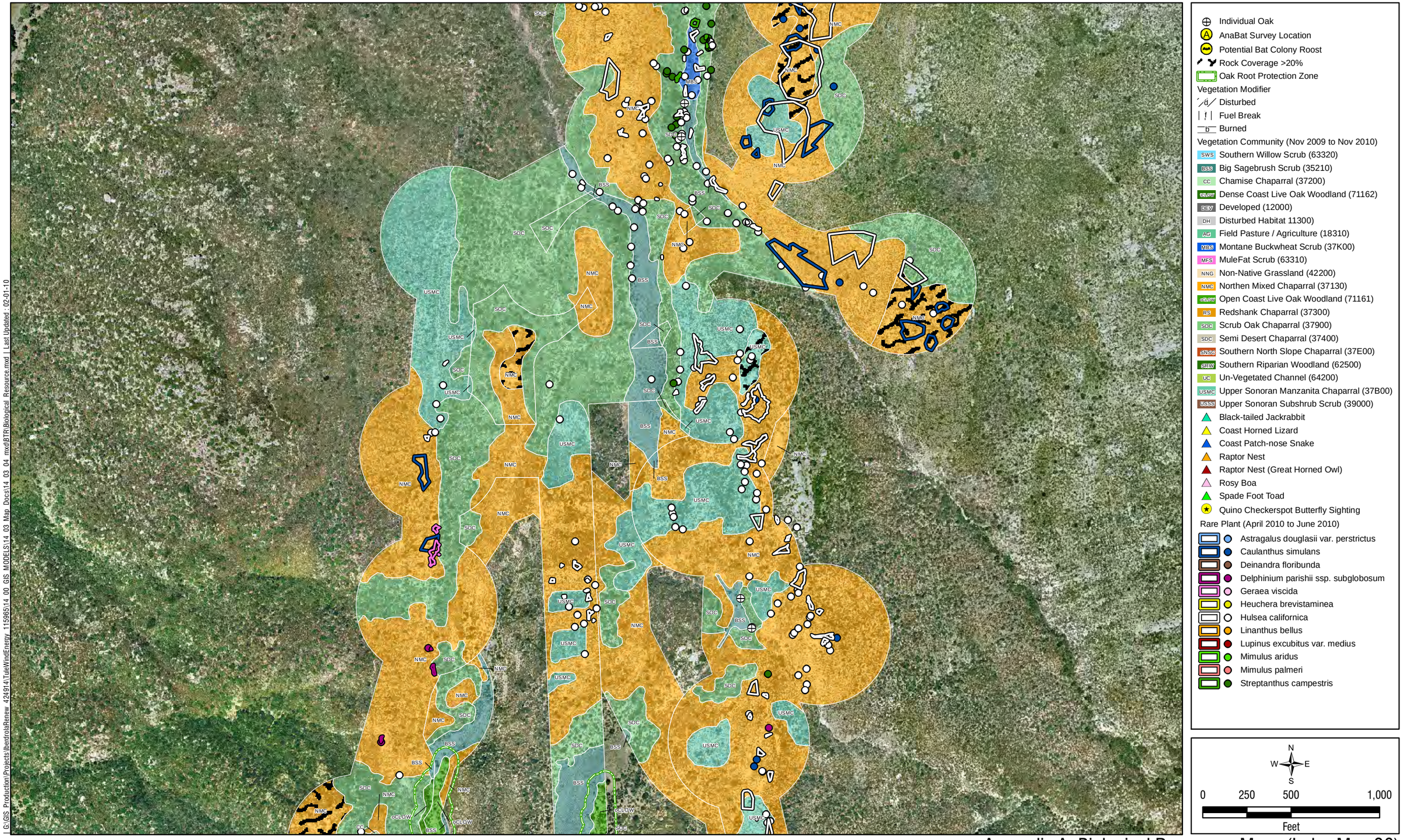
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 35)

Figure 36

Tule, LLC | Tule Wind Project | BTA



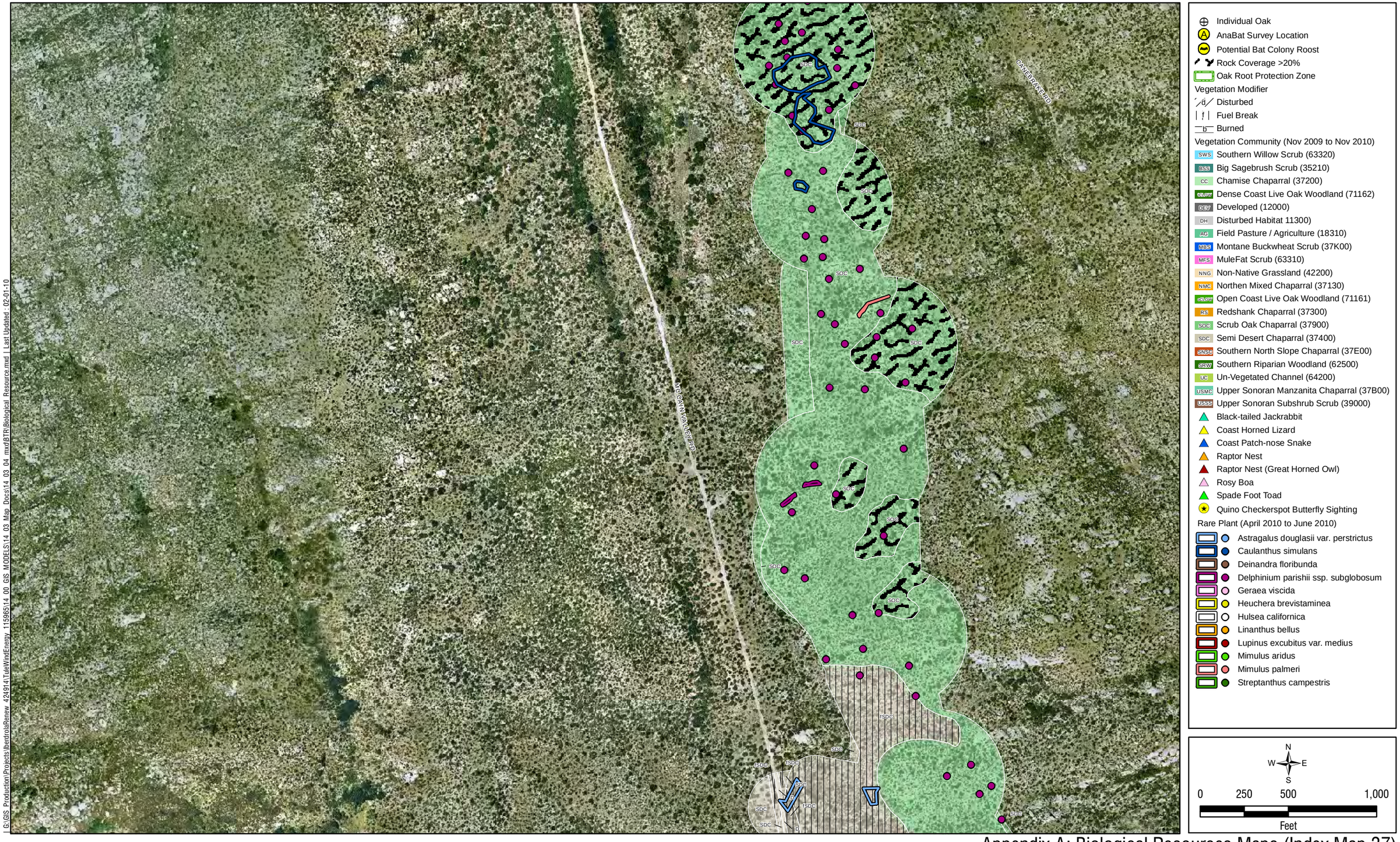
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 36)

Figure 37

Tule, LLC | Tule Wind Project | BTA



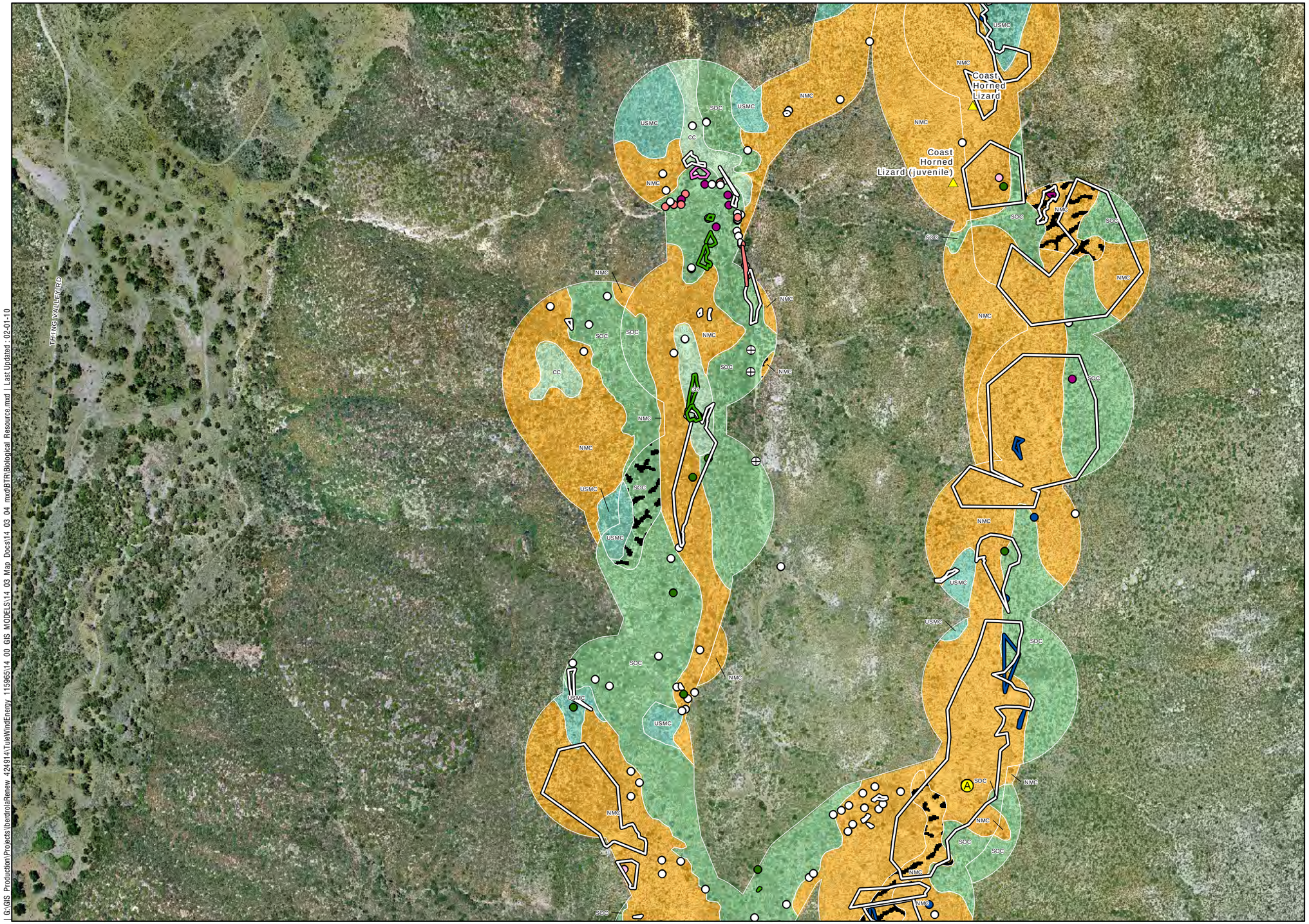
I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 37)

Figure 38

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*℠



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CSLW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- CSLW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

0 250 500 1,000

Feet

G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\BTR\Biological Resource.mxd | Last Updated 02-01-10

Appendix A: Biological Resources Maps (Index Map 38)

Figure 39

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CoLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- CoLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N
W E
S

0 250 500 1,000
Feet

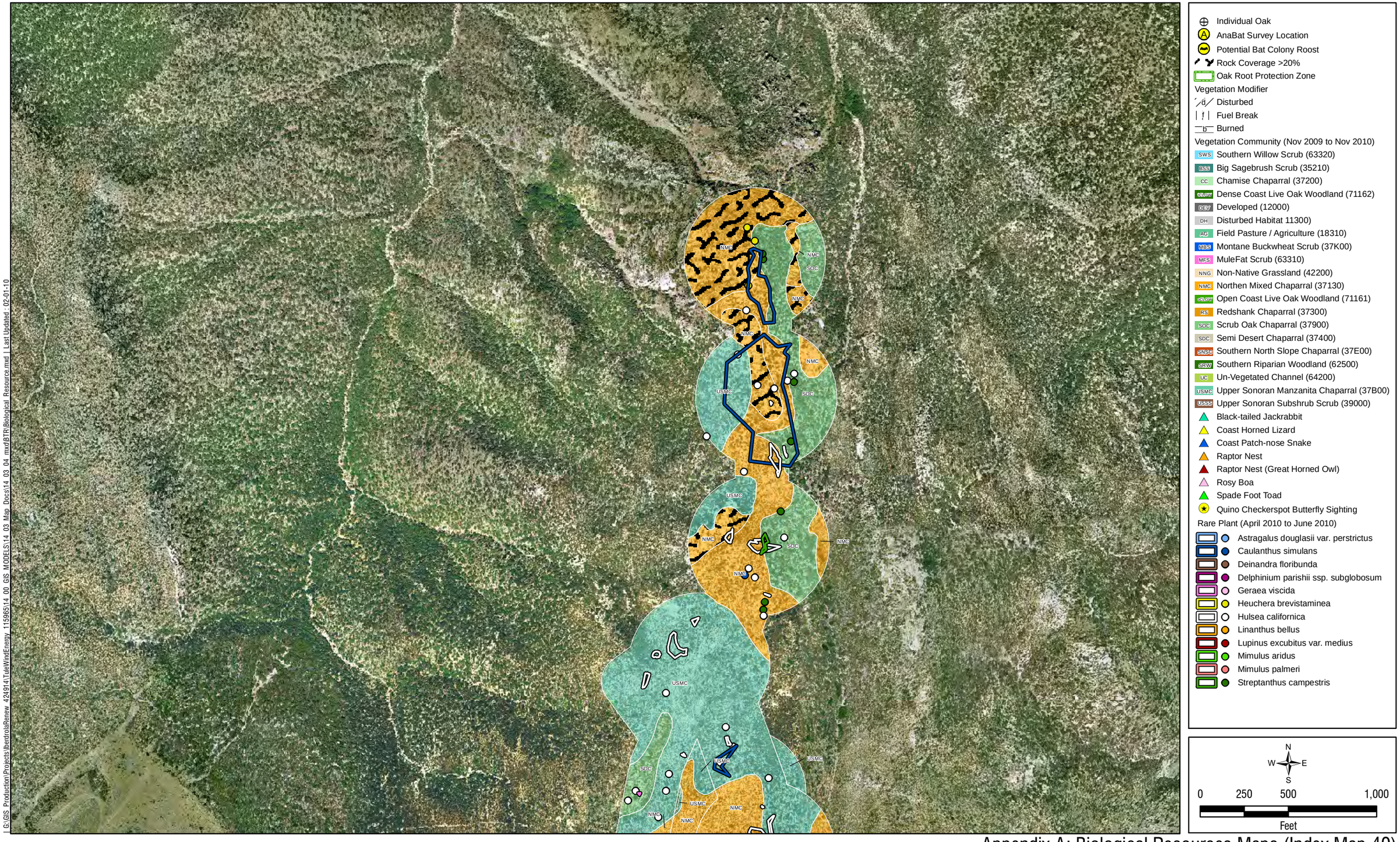
I:\G\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115985\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated: 02-01-10

HDR
ONE COMPANY | *Many Solutions*℠

Appendix A: Biological Resources Maps (Index Map 39)

Figure 40

Tule, LLC | Tule Wind Project | BTA



I:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10

Appendix A: Biological Resources Maps (Index Map 40)

Figure 41

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*℠

APPENDIX B

Groundwater Investigation Report,
Geo-Logic Associates
December 2010

GROUNDWATER INVESTIGATION REPORT

TULE WIND FARM
EAST SAN DIEGO COUNTY, CALIFORNIA

Project Proponent:
Jeffrey Durocher, Wind Permitting Manager
Iberdrola Resources
1125 NW Couch Street, Suite 700
Portland, Oregon 97209
Case No. 3300-09-019
ER No. 09-21-001

Prepared for:
HDR, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123-1502

and

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, CA 92123

Prepared By:

Sarah J. Battelle, CHG 619

Geo-Logic Associates
16885 W. Bernardo Drive, Suite 305
San Diego, CA 92127
JN:2010-0005

DECEMBER 2010

TABLE OF CONTENTS

SECTION **PAGE**

EXECUTIVE SUMMARY v

1.0 INTRODUCTION 1
- **1.1 Purpose of the Report** 1
- **1.2 Project Location and Description** 1
  - **1.2.1 Thing Valley Water Production Area** 2
  - **1.2.2 Rough Acres Ranch Water Production Area** 2
  - **1.2.3 Project Description** 2
- **1.3 Applicable Groundwater Regulations** 3

2.0 EXISTING CONDITIONS 3
- **2.1 Topographic Setting** 4
  - **2.1.1 Thing Valley Water Production Area** 4
  - **2.1.2 Rough Acres Ranch Water Production Area** 4
- **2.2 Climate** 4
  - **2.2.1 Climate of the Thing Valley Water Production Area** 4
  - **2.2.2 Climate of the Rough Acres Ranch Water Production Area** 5
- **2.3 Land Use** 5
  - **2.3.1 Land Use Surrounding the Thing Valley Water Production Area** 5
  - **2.3.2 Land Use Surrounding the Rough Acres Ranch Water Production Area** 5
- **2.4 Water Demand** 5
- **2.5 Geology and Soils** 6
  - **2.5.1 Geology and Soils of the Thing Valley WPA** 7
  - **2.5.2 Geology and Soils of the Rough Acres Ranch WPA** 7
- **2.6 Hydrogeologic Units** 8
  - **2.6.1 Hydrogeologic Units of the Thing Valley WPA** 8
  - **2.6.2 Hydrogeologic Units of the Rough Acres Ranch WPA** 9
- **2.7 Hydrologic Inventory and Groundwater Levels** 9
  - **2.7.1 Thing Valley WPA Hydrologic Inventory** 9

2.7.2 Rough Acres Ranch WPA Hydrologic Inventory 10
2.8 Water Quality.....12

3.0 WATER QUANTITY IMPACT ANALYSIS 12
3.1 Guidelines for Determination of Significance 13
3.2 Methodology 14
3.3 Well Test Results.....15
3.4 Cumulative Impacts Analysis 16
3.4.1 Groundwater Recharge.....17
3.4.2 Groundwater Demand.....17
3.4.3 Groundwater in Storage.....18
3.4.4 Long-Term Groundwater Availability 18
3.5 Significance of impacts Prior to Mitigation.....18
3.6 Mitigation Measures and Design Considerations 19
3.7 Conclusions.....19

4.0 SUMMARY OF PROJECT IMPACTS AND MITIGATIONS.....19

5.0 CLOSURE 20

6.0 REFERENCES 20

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED 21

FIGURES

Figure 1 Project Location Map
Figure 2A Well Location Map – Thing Valley Aquifer Test Site
Figure 2B Well Location Map – Rough Acres Ranch Aquifer Test Site
Figure 3A Watershed Map – Thing Valley Aquifer Test Site
Figure 3B Watershed Map – Rough Acres Ranch Aquifer Test Site
Figure 4A Soils Map – Thing Valley Aquifer Test Site
Figure 4B Soils Map – Rough Acres Ranch Aquifer Test Site
Figure 5 Geologic Map – Thing Valley Aquifer Test Site

Figure 6 **Conceptual hydrogeologic Cross-Section – Thing Valley Study Area**

Figure 7 **Geologic Map – Rough Acres Ranch Aquifer Test Site**

Figure 8 **Conceptual Hydrogeologic Cross-Section – Rough Acres Ranch Study Area**

APPENDIXES

Appendix A **Observations and Analyses of Aquifer Characteristics – Ewiiaapaayp Reservation, Thing Valley**

Appendix B **Observations and Analyses of Aquifer Characteristics – Rough Acres Ranch, McCain Valley**

Appendix C **Cumulative Impact Analysis**

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

af	Acre feet
APN	Assessor's Parcel Number
CIMIS	California Irrigation Management Information System
DWR	Department of Water Resources
ETo	Evapotranspiration
Ft	Feet
gpd	Gallons per day
gpm	gallons per minute
msl	mean sea level
SCS	Soil Conservation Survey
t/t'	Time since pumping started divided by time since pumping stopped

EXECUTIVE SUMMARY

A groundwater investigation was conducted to evaluate the groundwater resources within Thing Valley on the Ewiiaapaayp Reservation and Rough Acres Ranch in McCain Valley. The purpose of the investigation was to assess the availability of groundwater as a resource in support of the Tule Wind Farm construction project, which proposes to be extracted at these locations over a nine-month construction period. The groundwater investigation included long-term 72-hour constant rate pumping tests and subsequent analysis of the data to assess the hydraulic properties of the aquifer at each of these locations.

Results of the groundwater investigation suggest that both locations provide viable groundwater resources in support of project construction. Although groundwater resources on Tribal land are not within the jurisdiction of the County, pumping test results indicate that the Reservation well appears to be somewhat limited at the test pumping rate of 80 gallons per minute (gpm). Based on a boundary condition identified during the course of the aquifer pumping test, it is recommended that a reduced pumping rate and a reduced frequency be used at this well. However, pumping from other Reservation wells may be used to supplement pumping from the test well.

At the Rough Acres Ranch, pumping at 50 gpm showed no evidence of well interference, or significant depletion of the groundwater in storage within the pumping well. In fact, analysis of the data suggests that pumping could be doubled without any significant impact. Based on the results of the aquifer test, no significant impacts to this groundwater resource are anticipated associated with pumping at the Rough Acres Ranch test well.

1.0 INTRODUCTION

1.1 Purpose of the Report

This groundwater investigation report describes field conditions, and presents the results of field and analytical procedures used to evaluate groundwater resource availability within the Thing Valley area of the Ewiiaapaayp Reservation and the Rough Acres Ranch area of McCain Valley to support construction of the proposed Tule Wind Project. The Tule Wind Project will include the construction of 134 wind turbines, and associated service roads, transmission lines and ancillary structures over a period of approximately nine months during which time groundwater will be extracted from the underlying aquifers to support construction activities. This investigation also addresses the sustainability of groundwater withdrawal from the aquifers with respect to the existing and proposed future uses. Construction is slated to begin in the third quarter 2011, and the wind turbine facility is scheduled to come on line in the fourth quarter 2012.

Engineering estimates indicate that construction, and associated groundwater extraction, is expected to last approximately nine months. According to the project developer, groundwater demand for the project is expected to occur in four phases. Initially the project will require approximately 120,000 gallons of water per day (gpd) during road building (60 gallons per minute [gpm]), increasing to 250,000 gpd (equivalent to a constant rate of 124 gpm) while both road and turbine foundation construction and construction-related dust suppression. Water demand will then decrease to approximately 130,000 gpd (a constant rate of 65 gpm) following completion of the 72-day road construction portion of the project, while turbine foundation construction continues, and finally decrease to 100,000 gpd (50 gpm) for dust control during the remainder of the project. Subsequent site work is not expected to require additional groundwater supply. The total volume of extracted groundwater to support the project is anticipated to be approximately 65 to 125 acre-feet.

When the Tule Wind Project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

1.2 Project Location and Description

The Tule Wind Farm will be developed on 15,350 acres in eastern San Diego County. The project area is located approximately one mile north in Interstate 8 (I-8), generally between La Posta Truck Trail on the west and McCain Valley Road on the east (Figure 1). Given the large size of the project area and the need for water throughout, two sites were identified for water production: Thing Valley and McCain Valley (Rough Acres Ranch). These areas are described in more detail in the following sections.

1.2.1 Thing Valley Water Production Area

The Thing Valley Water Production Area is located approximately 10 miles north of I-8 off La Posta Truck Trail/Thing Valley Road on the Ewiiaapaayp Reservation (Figure 2A). The reservation is located in an isolated, triangular-shaped, southeasterly-draining

valley near the headwaters of La Posta Creek. Ground surface elevations range from 5000 to 5100 feet on the valley floor, but rise to over 6200 feet along the surrounding ridgelines. Reservation structures dot the valley floor, and include a fire station, an abandoned water bottling facility, and several abandoned, vacant, or partially-occupied residential structures. Two groundwater production wells ("north well" and "south well") were constructed in August 1980 near the center of the valley. The "south well" is connected to a series of solar panels that power an electric submersible pump. This well pumps water to a storage tank at the northwestern end of the valley, and the stored water supplies the Reservation. The "north well" is located approximately 60 feet northeast of the "south well". It is equipped with an electric submersible pump, but it is not currently used for water production. According to personal communications with the tribal representative and review of the tribal website, there are no permanent inhabitants within the valley, through tribal members visit the location periodically. The nearest residence is approximately 4 miles south of the subject valley in the larger Thing Valley. The "north well" and "south well" occupy Assessor's Parcel Number (APN) 4130800300, and the remainder of the valley spans APNs 4131503000, 4130800100, and 4130800200. The "far field" observation well is located within APN 4131503200.

1.2.2 Rough Acres Ranch Water Production Area

The Rough Acres Ranch Water Production Area is located approximately one mile north of I-8 between Ribbonwood Road on the west and McCain Valley Road on the east (Figure 2B). This site occupies the broad alluviated, southeasterly-draining McCain Valley that, within the project area, is bounded on the north and south by low-relief granitic hills. Ground surface elevations in the valley range from approximately 3600 feet above mean sea level at the northwestern corner of the project area and along the northern bounding hills to about 3450 feet above mean sea level at the southeastern corner of the project area. Within the project area, Rough Acres Ranch is surrounded by scattered residences on the west and south, a low-security detention facility and landing strip on the east, and open space on the north. The valley floor is used for livestock grazing. The Rough Acres Ranch property is crossed by a series of graded dirt roads, and contains a number of active and idle groundwater production wells that are used for domestic and agricultural supply. The area of the aquifer test spans APNs 6110600300, 6110700100, 6110900200, 6110900300, 6110900400, 6110901800, and 6111100100.

1.2.3 Project Description

The Tule Wind Farm project will include the construction of up to 134 wind turbines and associated roads, transmission lines and support facilities. Based on information provided by the project developer, IBR, the following water requirements have been estimated for the project construction (all work is anticipated to be performed over five-day work weeks):

1. Road Construction – Up to 120,000 gallons per work day will be required over a 72-day construction period. This translates to an average pumping rate of approximately 60 gpm assuming sufficient storage is available to allow for pumping seven days a week (83 gpm if the pumps are only active during work days).

2. Turbine Foundation Concrete Mixing – Turbine foundation construction is estimated to require 7,500 to 15,000 gallons of water per foundation. With 134 foundations to build, water demand will be approximately 15,000 and 30,000 gpd (assuming that two foundations are constructed each day in accordance with the 72-day work schedule). This much water use equals an average maximum pumping rate of approximately 15 gpm. The maximum continuous pumping rate (24-hours per day, seven days per week), required to support concrete mixing for three turbine foundations per day (45,000 gallons) is equivalent to 31 gpm.

3. Dust Control – During subsequent construction activities, approximately 50,000 to 100,000 gallons of water per working day will be required for dust control on project roads. The average continuous pumping rate required during these activities would be 50 gpm for an estimated nine-month construction period.

The pumping rates stipulated above are based on the assumption that there will be sufficient storage space to allow for groundwater extraction 24 hours per day, seven days per week. If there is insufficient water storage capacity to allow for continuous pump operation, higher incremental pumping rates would be required. Based on the aquifer testing performed for this report, the wells may not be able to pump at higher incremental pumping rates for peak demand.

1.3 Applicable Groundwater Regulations

Groundwater utilization for projects within the County of San Diego must address the requirements in the *County of San Diego Groundwater Ordinance No. 9826*, which stipulates that development and utilization of groundwater will not affect those who are dependent upon groundwater unless it can be demonstrated that there is an adequate supply to provide both the project and the existing users. In addition, since the project is proposing to use more than 20,000 gallons per day, it is considered a water intensive project according to the Groundwater Ordinance, and requires an evaluation of the cumulative groundwater impacts. The Ordinance provides for methods of analysis to determine potential impacts to the groundwater resource, and this investigation endeavors to address those potential impacts following the Ordinance-prescribed guidelines.

This project will result in groundwater extraction and utilization that may affect the local environment, a unique resource, and groundwater-dependent habitats. As a result, the California Environmental Quality Act (CEQA) requires an evaluation of environmental impacts associated with groundwater extraction, as well as other components of the project.

2.0 EXISTING CONDITIONS

This section of the water investigation report describes the existing conditions of the project areas, including topography, climate, geology and hydrogeology, surrounding land use, hydrology, and water quality.

2.1 Topographic Setting

2.1.1 Thing Valley Water Production Area

The Thing Valley Production area is situated in a triangular shaped valley near the headwaters of La Posta Creek. Ground surface elevations range from approximately 5100 feet above mean sea level (amsl) at the north end of the valley floor to about 5000 feet amsl at the south end of the valley floor (Figures 3A). Bounding ridgelines rise to over 6300 feet amsl. The watershed for the production area is approximately 2310 acres, draining the area to the northwest that includes the eastern flanks of the Laguna Mountains to the west and the southwestern flanks of the Sawtooth Mountains to the northeast.

2.1.2 Rough Acres Ranch Water Production Area

The Rough Acres Ranch Water Production Area is situated in McCain Valley, a broad south- to southeasterly trending valley that is generally bounded by the eastern flanks of the Laguna Mountains to the west and the In-Ko-Pah Mountains to the north and east. The valley is over 13 miles long, extending from the In-Ko-Pah Mountains to the north, and draining into Tule Canyon and Carrizo Gorge at the southeast. McCain Valley includes a large number of tributaries, including Tule Creek that passes through the Rough Acres Ranch study area as a dry wash at most times of the year. Because of the vast expanse of the drainage area, for purposes of this investigation and following guidance from the County Hydrogeologist, the watershed area is defined as an area of one-half mile radius surrounding the proposed production well (Figure 3B).

2.2 Climate

For purposes of this water supply study, the climate factors of most concern include precipitation and evapotranspiration. Data provided in this section comes from the County of San Diego Department of Planning and Land Use General Plan Update – Groundwater Study, State of California Department of Water Resources, and the California Irrigation Management System (CIMIS) databases.

2.2.1 Climate of the Thing Valley Water Production Area

At elevations of over 5000 feet, the Thing Valley WPA has a relatively mild climate. The site is located just east of the Laguna Mountains, and as a result, it sits in the rain shadow of these mountains. Historical climate data from the Campo area were used to conservatively represent conditions at this site. Based on information available from the California Department of Water Resources, the area receives an average of 15.6 inches of rainfall per year, with 80 percent of the rainfall occurring between November and March of each year. According to the State of California Reference Evapotranspiration Map developed by CIMIS, the site is located in Evapotranspiration Zone 16, with an average of 62.5 inches of evapotranspiration per year.

2.2.2 Climate of the Rough Acres Ranch Water Production Area

While 2000 feet lower in elevation, and about 10 miles east of the Thing Valley WPA, the Rough Acres Ranch WPA has similar values for rainfall and evapotranspiration. Using historical precipitation records from a monitoring station in Boulevard, California (approximately 2 miles south of the site), the average annual precipitation for the area is approximately 15.8 inches. The Rough Acres and Thing Valley WPAs are located in the same Evapotranspiration Zone, which indicates an average annual evapotranspiration of 62.5 inches.

2.3 Land Use

2.3.1 Land Use Surrounding the Thing Valley WPA

The Thing Valley WPA is located within the Ewiiaapaayp Reservation. According to the San Diego County General Plan, the site is located within the Mountain Area Community Planning Area with a land use designation as Indian Reservation. The highlands of the watershed area are located within the Cleveland National Forest, and the San Diego County General Plan identifies this area as the Central Mountain Community Planning Area, with an open space forest designation.

There are no full-time residents or industries within the Reservation limits, though the Reservation includes several abandoned structures and structures that are used periodically, as well as a fire station and a structure that was to be used as a water bottling plant. Aside from these structures, the surrounding land is undeveloped mountain and valley terrain. The nearest residents are located approximately 3 miles south of the WPA at Thing Valley Ranch.

2.3.2 Land Use Surrounding the Rough Acres Ranch WPA

The Rough Acres Ranch WPA is located in a sparsely populated region of the county. According to the San Diego County General Plan, the site is located within the Mountain Area Community Planning Area and has a land use designation as general agricultural. Properties surrounding the site are designated as general rural, and one parcel to the east is designated as National Forest/State Parks.

Consistent with the designated land uses, the Rough Acres Ranch is used for livestock grazing, and this property is surrounded by large lot residences to the west and south, a low-security detention center and rural air field to the east, and high desert open space to the north and east.

2.4 Water Demand

Because there are no residents or uses for groundwater within the Thing Valley WPA, and the County has no jurisdiction over groundwater use on tribal lands, there is no requirement to evaluate water demands in this area.

For the Rough Acres Ranch WPA, a conservative approach was used to ensure that the proposed project would not affect adjacent groundwater users. It is assumed that all groundwater for this project will be derived from the Rough Acres Ranch WPA even though the project will also utilize water from the Thing Valley WPA.

As recommended by the County Groundwater Geologist, the water production area was restricted to a one-half mile radius surrounding the production wells (the estimated maximum area of interference from the pumping well). However, to evaluate other groundwater uses, the evaluation radius was extended in some instances to about three quarters of a mile. Within this evaluation area, seven single family residences were identified, including one residence that operates an apparent poultry farm. In addition to the residences, the Rough Acres Ranch property is utilized for free-range livestock grazing, with an estimated head count of 100 animals. Using residential water demand values provided by the County's Guidelines for Determining Significance and published values for livestock water usage, the groundwater demand for the project is estimated in the following table:

Water Use	Demand (Acre-Feet per Year)	Demand (Acre-Feet per Month)
Proposed Project Construction (9 month duration)	60	6.7
Post-Project Maintenance	2.8	0.23
Residential Water Use (7 residential properties; 0.5 acre-feet per year per residence)	3.5	0.29
Livestock Grazing (100 head; 19 gallons per day per animal)	2.13	0.18
Poultry Raising (500 birds; 770 liters per 1000 birds per day)	0.11	0.01
Totals:	**65.74**	**7.18**

2.5 Geology and Soils

The Thing Valley and Rough Acres Ranch WPAs are situated within batholithic rocks of the Peninsular Ranges Geomorphic Province. Batholithic rocks were generally emplaced in the late Mesozoic to early Cenozoic eras. Post-emplacement uplift, weathering, and erosion has resulted in formation of surficial soils and alluvial deposits that mantle the crystalline bedrock. Due to the remote locations and paucity of mineral resources, neither site has been studied in detail, and most of the available geologic information comes from regional geologic studies, including the "Preliminary Geologic Map of the 30' x 60' El Cajon Quadrangle" (Todd, 2004) and "Mineral Resources of the Sawtooth Mountains and Carrizo Gorge/Eastern McCain Valley Wilderness Study Areas (Todd, et al., 1987). Soils information is provided by the United Sates Department of Agriculture - Soil Conservation Service and Forest Service. Geologic and soils conditions specific to each WPA and its watershed are described below.

2.5.1 Geology and Soils of the Thing Valley WPA

The Thing Valley WPA is flanked by the Laguna Mountains to the west and the Sawtooth Mountains to the north and east. Based on the available geologic information, in the vicinity of the WPA, the two mountain ranges are geologically similar, and are composed of the early Cretaceous-age Las Bancas Tonalite, an assemblage of lightly foliated tonalite, granodiorite, and quartz diorite. In addition, at the northernmost portion of the watershed, the Sawtooth Mountains are also underlain by a variety of Triassic and Jurassic-age metasedimentary rock units.

Along the valley floor, the crystalline bedrock is overlain by recent alluvium. Based on the logs of the groundwater production wells, the thickness of alluvium is estimated to be approximately 30 to 50 feet.

Based on maps prepared by the Soil Conservation Service (now Natural Resources Conservation Service), and presented on Figure 4A the following table presents the soil types and their properties within the Thing Valley WPA watershed area:

Soil Type	Moisture Holding Capacity (in)	Runoff Potential	Maximum Runoff Percentage	Area (acres)
Acid Igneous Rock Land (AcG)	0.10	Rapid	100%	250
Bancas Stony Loam (BbG)	3-5.5	Rapid to Very Rapid	81%	1000
Crouch Coarse Sandy Loam (CtE)	4.5-7	Medium	71%	50
Crouch Coarse Sandy Loam (CtF)	4-6	Rapid	74%	40
Crouch Rocky Coarse Sandy Loam (CuE)	3.5-5	Medium	78%	30
Crouch Rocky Coarse Sandy Loam (CuG)	3.5-5	Rapid to Very Rapid	78%	100
Mottsville Loamy Coarse Sand (MvC)	4-5	Slow to medium	74%	40
Mottsville Loamy Coarse Sand (MvD)	4-5	Medium	74%	30
Sheephead Rocky Fine Sandy Loam (SpG2)	2-3	Rapid to Very Rapid	87%	750
Steep Gullied Land (StG)	Not Available	Rapid	100%	10

2.5.2 Geology and Soils of the Rough Acres Ranch WPA

The Rough Acres Ranch WPA is located at the eastern edge of the Peninsular Ranges. Available geologic information in the vicinity of the WPA indicates that the area is underlain by the early to late Cretaceous era La Posta Tonalite, an assemblage of horneblende-biotite trondhjemite and granodiorite that is exposed on the low-relief highlands surrounding and within McCain Valley. Along the valley floor, the crystalline bedrock is overlain by recent alluvium. Based on the logs of the groundwater production wells in the valley, the thickness of alluvium is estimated to be 30 and 70 feet.

Based on maps prepared by the Soil Conservation Service (now Natural Resources Conservation Service), presented on Figure 4B, the following table presents the soil types and their properties within the Rough Acres Ranch WPA watershed area:

Soil Type	Moisture Holding Capacity (in)	Runoff Potential	Maximum Runoff Percentage	Area (acres)
Acid Igneous Rock Land (AcG)	0.1	Rapid	100%	10
Calpine Coarse Sandy Loam (CaC)	4.5-6.5	Slow to medium	72%	5
La Posta Loamy Coarse Sand (LaE2)	2-3	Medium	87%	60
La Posta Rocky Loamy Coarse Sand (LcE2)	1-2	Medium	94%	150
Loamy Alluvial Land (Lu)	6-9	Slow	62%	120
Mottsville Loamy Coarse Sand (MvC)	4-5	Slow to medium	75%	110
Tollhouse Rocky Coarse Sandy Loam (ToE2)	1-2	Medium to rapid	94%	50

2.6 Hydrogeologic Units

This section of the water investigation report describes the water-bearing units at each site and their general hydraulic properties.

2.6.1 Hydrogeologic Units of the Thing Valley WPA

The hydrogeologic units of the Thing Valley WPA include the recent alluvial soils and the underlying fractured Las Bancas Tonalite. The alluvium is restricted to the lowest portion of the valley floor; based on available geologic maps and Soil Conservation Service surveys, it underlies less than 10 percent of the watershed. In contrast, the Las Bancas Tonalite underlies the entire watershed area, either directly or beneath the alluvium.

A California State Department of Water Resources well completion report (no. 058539) is available for the "south" well that was used as the observation well for the aquifer testing in this study. Drilling logs for the "north" aquifer pumping test well and far-field observation wells were not available. Based on the log for the south well, the alluvium at this location is approximately 12 feet thick. Relatively weathered "granitic" bedrock extends from 12 to 50 feet below ground surface, and relatively unweathered "granitic" rock was encountered from 50 feet to the bottom of the hole at 400 feet. The geologic conditions at the north and far-field wells would be expected to be generally similar based on inspection of the surface geology.

A static water level was measured at each of the three test wells prior to the start of the step-drawdown test (Section 2.7). The static water levels in each well were sufficiently deep, and is likely below the base of alluvium. This suggests that alluvium groundwater is ephemeral, and does not contribute significantly to the available groundwater resource at this site.

The fractured Las Bancas Tonalite appears to be the most significant aquifer within the Thing Valley WPA. Using the recommendations from the County Groundwater

Geologist, a specific yield of 0.1 percent has been established for this unit. Figure 6 presents a conceptual hydrogeologic cross section through the Thing Valley WPA.

2.6.2 Hydrogeologic Units of the Rough Acres Ranch WPA

The hydrogeologic units of the Rough Acres Ranch WPA include the recent alluvial soils and the underlying weathered and fractured La Posta Tonalite. As shown on Figure 7, the alluvium covers the broad valley floor, and based on available geologic maps and Soil Conservation Service surveys (Figure 4B), it underlies approximately 50 to 60 percent of the watershed. The alluvium is directly underlain by the Las Bancas Tonalite, which is also exposed as outcroppings throughout the watershed. Figure 8 depicts a conceptual hydrogeologic cross section through this WPA.

While seven wells were used for the aquifer test in this study area, only the pumping well and two observation wells are within the prescribed one-half mile radius watershed. A California State Department of Water Resources well completion report (no. 1089956) is available for the pumping well. Geologic information suggests that the alluvium in the center of the valley is approximately 70 to 80 feet thick. Weathered bedrock extends to a depth of about 230 feet, and below that depth to the total depth of boring (420 feet), the crystalline rock is relatively unweathered. Static water levels measured in the pumping and observation well suggest that the lower 45 to 50 feet of alluvium is saturated. Little alluvium is noted on the logs for other observation wells in the test area, and well depths typically range from 400 to 900 feet, indicating that the fractured La Posta Tonalite is the primary source of groundwater for production wells in the area.

The fractured La Posta Tonalite appears to be the most significant aquifer within the Rough Acres Ranch WPA, with the alluvium providing at least seasonal recharge to the subjacent bedrock aquifer. Using the recommendations from the County Groundwater Geologist, a specific yield of 0.1 percent has been established for this bedrock aquifer. Published specific yield values for mixed sand and gravel aquifers (Driscoll, 1986) indicate a range of 10 to 25 percent.

2.7 Hydrologic Inventory and Groundwater Levels

2.7.1 Thing Valley WPA Hydrologic Inventory

As described in Section 2.6.1, two groundwater production wells are located within the Thing Valley WPA watershed. The wells are owned by the Ewiiaapaayp Tribe. The "south" well is currently used for as-needed water supply and pumps water to a storage tank. The "north" well was constructed to supply water to a proposed water bottling facility, but it is not currently used. Outside of the project watershed area, approximately one mile south of the north and south wells, is the "Thing Valley" observation well that is located near the confluence of La Posta Creek and an unnamed tributary. No other wells are known to exist within the watershed area. Well construction information and static water levels are provided in the following table.

Well Name	Total Depth (ft)	Seal Depth (ft)	Production Rate (gpm)	Water Level – August 2010 (feet below top of casing)
"North" Well	400	22	Idle	54.81
"South" Well	Unknown	Unknown	Up to 30 gpm	49.34
"Thing Valley" Well	Unknown	Unknown	Idle – No Pump	77.62

Locations for these wells are shown on Figure 5. The locations and elevations of these wells are not surveyed; however, using approximate ground surface elevations to establish an approximate groundwater elevation, a hydraulic gradient of 0.05 feet per foot is estimated. The approximated groundwater elevations suggest a southeasterly flow direction down Thing Valley.

According to a report provided by the Ewiiaapaayp Tribe, the "South" well has the potential to produce water at a rate of about 30 gpm. It is used to provide water to a storage tank that supplies water to tribal members at the residences and the fire station. Since there are no permanent residents in the reservation, the south well only pumps occasionally to maintain the water level in the tank.

The North well is capable of producing groundwater at up to 90 gpm, and a pumping test conducted on the well following its construction indicates a specific yield of 55 gpm. The North well was constructed to provide water to a commercial water bottling facility constructed adjacent to the tribal fire station, though the bottling facility never opened and the North well remains idle.

The Thing Valley well is located approximately one mile south of the north and south wells and is not equipped with a pump or power. The well has no cap, and is open to the atmosphere and needs to be secured to be in compliance with California State Well Standards (Bulletin 74-90).

Surface water bodies within the Thing Valley WPA watershed include the ephemeral La Posta Creek and its unnamed, ephemeral tributaries. La Posta Creek passes within approximately 400 feet to the west of the south well. There are no reservoirs or ponds within the watershed, and no springs have been mapped in the area.

2.7.2 Rough Acres Ranch WPA Hydrologic Inventory

While only two wells (Wells 6 and 6a) are located within the prescribed 502-acre watershed area, seven wells surrounding the project area were evaluated during this project. Of these, four are equipped with pumps and are actively used for municipal water supply or to provide water to livestock. The remaining three well are either equipped with pumps and are not currently used, or have not been equipped with pumps. Well construction, current estimated production, and static water levels are provided on the following table.

Well Name	Total Depth (ft)	Seal Depth (ft)	Production Rate (gpm)	Water Level – August 2010 (feet below top of casing)
Well No. 6a "North" Well	385	75	1	28.0
Well No. 6 "South" Well	Unknown	Unknown	1	27.80
Walker Residence Well	Unknown	Unknown	<0.5	54.78
Well No. 9 Livestock Supply Well	Unknown	Unknown	<0.5	29.45
Well No. 2	185	24	No Power	23.92
Well No. 4	185	91	No Pump	10.98
Well No. 8	970	50	Pump	17.95

Locations for these wells are shown on Figure 7. The locations and elevations of these wells are not surveyed; however, using approximate ground surface elevations to establish an approximate groundwater elevation, a hydraulic gradient of 0.01 feet per foot is estimated. The approximated groundwater elevations suggest convergent flow toward McCain Valley, with a general southeasterly flow within the valley.

Based on aquifer testing conducted as part of this investigation and well testing conducted during construction, Well No. 6 and No. 6a are capable of producing groundwater at 50 to 60 gpm. The well test conducted on well No. 6a after construction indicates a specific yield of 60 gpm. Currently these wells are principally used to supply water to grazing livestock, and are estimated to provide water at a rate of about 1500 gallons per day, or 1.05 gpm on average.

Well logs were not available for the Walker residence well, which provides potable water for a single-family residence. Using recommendations provided by the County Groundwater Geologist for a typical residential well, it is estimated that this well produces about one-half acre-foot per year, or about 0.5 gpm on average.

Well logs were also not available for the "Livestock" Well No. 9 located between the Walker residential well and Wells No. 6 and No. 6a. This well provides water for grazing livestock in troughs located throughout the ranch. It is estimated that this well produces water at a rate of about 500 gallons per day, or about one third of a gpm on average.

Well No. 2 is located approximately one mile northeast of Wells No. 6 and No. 6a. First groundwater was encountered at a depth of 70 feet below ground surface in "black and white rock" interpreted to be the La Posta tonalite. Well tests conducted during construction indicate a specific yield of 10 gpm over a three hour test period. Currently, the well is idle.

Well No. 4 is located approximately one mile north of Wells No. 6 and No. 6a. First groundwater was encountered at a depth of 35 feet in "decomposed granite". Well tests conducted during construction indicate a specific yield of 15 gpm over a one hour test period. There is no pump in this well.

Well No. 8 is located about 3 miles east of Wells No. 6 and No. 6a, just east of McCain Valley Road. First groundwater was encountered at a depth of 30 feet in "weathered granitic rock". A specific yield was not achieved during the post-construction well test, which pumped the well at 50 gpm for 8 hours and recorded 800 feet of drawdown.

In addition to the wells within the prescribed watershed and those used as observation wells during the aquifer testing conducted as part of this study, there are seven residences within three-quarters of a mile of the project site, and each has its own water supply well. It is estimated that each of the seven additional residences utilizes about one-half acre-foot of water per year, and one of the residences has a small poultry farm with an estimated 500 birds that utilizes an additional 0.11 acre-foot of water per year. In total, the additional water use in the vicinity of the site is estimated to be about 3.61 acre-feet per year, or about 2.25 gpm on average.

Surface water bodies within the Rough Acres Ranch WPA watershed include the ephemeral Tule Creek. Although the USGS topographic map of the area identifies a small reservoir near the northwestern portion of the watershed, that feature was not observed within the study area. Rough Acres Ranch discharges water from Wells No. 6 and No. 6a to a small livestock watering reservoir about 2000 feet north of these wells. The reservoir is not lined, and as a result, water infiltrates rapidly into the ground. A groundwater spring was observed on the canyon wall adjacent to Well No. 4. The estimated flow rate from the spring is less than 1 gpm. No other surface water bodies are present within the watershed or surrounding study area.

2.8 Water Quality

Because this water development project is intended to provide water for construction rather than for potable use, no water quality evaluation has been conducted.

3.0 WATER QUANTITY IMPACT ANALYSIS

Water quantity impact analyses were performed in accordance with the County of San Diego *Groundwater Ordinance*, the County's *Guidelines for Determining Significance and Report Format and Content Requirements – Groundwater Resources* and the approved Groundwater Investigation Workplan and Well Test Plan developed for the Tule Wind Project. Based on the County guidelines for determining significance and correspondence with the County, the water quantity analysis section must address well interference, and 50 percent reduction of groundwater in storage associated with groundwater extraction for construction. In addition, in accordance with the County's Groundwater Ordinance, because it is anticipated that groundwater extraction will exceed 20,000 gpd, which is considered a water intensive use, a cumulative groundwater evaluation is required.

This section provides an analysis of the groundwater conditions and a determination of significant impacts to the groundwater resources, based on CEQA guidelines. It should be noted however that the County does not have jurisdiction over water use on tribal lands, including the wells in Thing Valley on the Ewiiaapaayp Reservation. Aquifer testing on

the Reservation was performed to assess available water for the project construction and a summary of these results is included herein.

Because the Thing Valley WPA is located within the Ewiiaapaayp Reservation, there is no regional authority governing the use of this water. As a result, the water quantity impact analysis has been limited to performance of a 72-hour aquifer pumping test from the North Well at a rate of 80 gpm followed by measurements of recovery back to static conditions. Over the test, the water level was drawn down approximately 80 feet in the pumping well, and about 17 feet in the nearest observation well, and less than one quarter of a foot in the Thing Valley observation well about one mile downgradient of the pumping well. Analysis of the test data as presented in Appendix A.

Thing Valley Water Quantity Impact Analysis. Thing Valley test data were recorded by Solinst Levelogger Gold pressure transducer data loggers placed in the pumping well and two observation wells. The aquifer transmissivity (the capacity of the well to transmit water) was calculated by a variety of methods using AquiferTest Pro, Version 3.5, numerical modeling software (Röhrich and Waterloo Hydrogeologic, 2002) and ranges from about 100 to 835 ft^2/day depending on the data (early, middle, late portions of the test) obtained during pumping and recovery; the average transmissivity was calculated to be 393 ft^2/day. A summary of the calculated transmissivity values and additional calculated values from the pumping test are provided in Appendix A.

A plot of time versus drawdown was developed from the aquifer pumping test data. Based on the data, a projected total drawdown in the pumping well of 190 feet is expected. A negative boundary condition occurs after 1700 minutes (about 28 hours) and pumping of 136,000 gallons of water. During the intial 1700 minutes of the pumping test, the drawdown cone around the pumping well was likely pulling water from the portion of the fractured rock within Thing Valley. As the cone developed further, the cone is interpreted to have intercepted less fractured bedrock (most likely along the canyon walls) resulting in diminished production (the negative boundary effect).

Considering that the pump has been inoperable for some time prior to the aquifer pumping test, it may be beneficial to remove the pump and conduct an inspection of the well casing and pump for corrosion damage and encrustation to ensure that the well(s) are optimally operable for the duration of the construction program.

3.1 Guidelines for Determination of Significance

For groundwater extraction projects in this fractured rock basin such as the Tule Wind Project, the County Guidelines state:

> "groundwater impacts will be considered significant if a soil moisture balance, or equivalent analysis, conducted using a minimum of 30 years of precipitation data, including drought periods, concludes that at any time groundwater in storage is reduced to a level of 50 percent or less as a result of groundwater extraction. Groundwater impacts are considered significant if a soil moisture balance or equivalent analysis conducted using a minimum of 30 years of precipitation data,

> including drought periods, concludes that at any time groundwater in storage is reduced to a level of 50 percent or less as a result of the project groundwater demands."

The Guidelines also state:

> "As an initial screening tool, offsite well interference will be considered a significant impact if after a five year projection of drawdown, the results indicate a decrease in water level of 20 feet or more in the offsite wells. If site-specific data indicates water bearing fractures exist which substantiate an interval of more than 400 feet between the static water level in each offsite well and the deepest major water bearing fracture in the well(s), a decrease in saturated thickness of 5% or more in the offsite wells would be considered a significant impact."

In addition, based on conversations with the County Groundwater Geologist, a basin-wide cumulative analysis is not required because the project's groundwater extraction period is limited to approximately 9 months. For purposes of the cumulative analysis, with the approval of the County Groundwater Geologist, the Rough Acres Ranch Water Production Area boundary has been defined as an area with a one-half mile radius surrounding the projected ranch groundwater extraction well No. 6a.

3.2 Methodology

In accordance with the approved well test plan for the Tule Wind Project, a step test followed by a 72-hour constant rate aquifer pumping test was conducted at Well No. 6a at the Rough Acres Ranch to evaluate hydraulic characteristics in this proposed construction supply well. Prior to initiating the pumping test, area residents were contacted to request their participation in the test. In order to participate, the resident was asked to discontinue pumping and allow measurement of changes in water levels in their supply well over the testing period. The following residents listed with their Assessor's Parcel Number (APN) were contacted:

Resident	APN	Response
Dave and Linda Shannon	611-091-14	No domestic water storage on site
Dennis and Celeste Wilson	611-091-15	No domestic water storage on site
York Heimerdinger	611-091-02	Has storage but refused the test
Jeff and Peggy Garber	611-090-15	Has storage but refused the test
Lynn Wilson	611-050-24	No domestic water storage on site
Wayne and Frankie Thibodeau	611-091-07	No return call

As presented in this table, none of the surrounding residents agreed to participate in the test. However, because the well pumping test was being performed on the Rough Acres Ranch, most of the available wells on the ranch were made available for monitoring. In addition, the Ranch Manager, Mr. Walker, made his residential supply well available for the duration of the test. A Solinst Levelogger Gold data logger was placed in each of the

available ranch wells prior to the long-term constant rate pumping test. These well locations are presented on Figure 7.

The 72-hour aquifer pumping test was conducted between August 24, and 27, 2010, followed by measurement of well recovery to static conditions. Direct water level measurements could not be performed in 4-inch diameter cased pumping well No. 6a, because of limited access through the well head, with only sufficient room to place the levelogger pressure transducer into the well to a depth of 114 feet below the water level for measurements of the water level in this well. Because of limited access through the wellhead at Well No. 6, located approximately 36 feet from the pumping well, water levels in this observation well were measured manually with an electric water level meter. Flow from the pumping well (at about 50 gpm) was measured with an in-line flow meter and water was discharged to a stock pond location approximately 2000 feet northeast of the pumping well. In addition, barometric pressure was measured with the Solinst Barologger Gold transducer, placed in the pumping well pump house adjacent to the pumping well. The pumping well static water level at the start of the test was about 28 feet below ground surface (bgs) and the pump depth was reportedly positioned at an estimated depth of 350 feet, though the pump depth could not be verified. During the pumping test, the maximum drawdown in the pumping well was 77.5 feet. In the nearest observation Well No. 6, the water level was drawn down a maximum of 3.7 feet. An estimated 216,000 gallons of water was pumped to the stock pond.

Results of the pumping and recover tests were plotted on semilog plots to evaluate the data. County Guidelines were reviewed and incorporated into the analysis. In addition, the long-term aquifer test data were analyzed using AquiferTest Pro, Version 3.5, numerical modeling software (Röhrich and Waterloo Hydrogeologic, 2002) to calculate aquifer hydraulic properties.

3.3 Well Test Results

As required by the County Guidelines, a plot of the pumping test time versus drawdown curve in the pumping well was used to estimate the drawdown in the pumping well after five years (2,600,000 minutes) of pumping at an average of 50 gpm as performed during the pumping test. From the graphed pumping data, the projected draw down is 87 feet after five years (Figure 3; Appendix B). Recognizing the project water requirements are needed over an estimated 9-month construction period, 84 feet of drawdown is predicted. In the event that during the construction, a higher pumping rate is needed, using proportions, doubling the pumping rate to 100 gpm would produce a drawdown of 174 feet after five years.

Using the plot of the drawdown plotted against time presented logarithmically since pumping started (Figure 3; Appendix B), aquifer transmissivity can be calculated using the Cooper-Jacobs approximation to the Theis equation:

$$T = {2.3Q} \big/ {4\pi\Delta s}$$

where,

T = transmissivity in square feet per day
Q = average pumping rate in ft^3 / day (e.g., 50 gpm multiplied by 193 = 9650 ft^3 / day)
π = 3.14
Δs = change in drawdown over one logarithm of time (3.13 ft. from Appendix B, Figure 3)

Based on this equation, a transmissivity of 563 square feet per day is calculated from the pumping data. Using Aquifer Test Pro numerical modeling software, curve matching methods were used on the time versus drawdown plots to calculate transmissivity, hydraulic conductivity, and storativity by different methods. The transmissivity values obtained from the pumping well ranged from between 26.9 and 630 square feet per day. The analytical results show higher transmissivity (and hydraulic conductivity values) for curves matched to the observation well No. 6 and range from 0.375 to 3750 square feet per day. It is believed that the relatively thick alluvial section in this area of McCain Valley acts as a reservoir recharging the underlying fractured bedrock system. If the fractures in the bedrock are limited, the actual volume of groundwater available may be controlled by these thicker sections of alluvium and the more highly fractured bedrock. A summary of the calculated hydraulic properties from the aquifer tests, are presented in Table 1 included in Appendix B.

The recovery data were evaluated to assess long-term affects on the groundwater aquifer. The plot of residual drawdown versus t/t' (the ratio of time to time since pumping stopped) plotted on a logarithmic scale was used to evaluate aquifer storage. At t/t' equal to 1, a residual drawdown would indicate permanent dewatering of the aquifer and greater than 2 feet of residual drawdown would indicate a failed pumping test. As shown on Figure 4 in Appendix B, when the resultant recovery curve is projected back to t/t' equals 1, a residual drawdown of 0.33 feet is obtained indicating a successful test.

Based on the lack of significant drawdown (3.7 feet) in the nearest observation well 36 feet away, and no evidence of an effect in more distal observation wells suggests that the there is significant water within this water production area. Interference with the nearest off-site wells approximately one half mile from the pumping well are not anticipated from the level of pumping proposed during project construction.

3.4 Cumulative Impacts Analysis

Because the project water needs exceed 20,000 gallons of water per day, a cumulative basin analysis is required. To address these cumulative requires, GLA worked directly with the County's Groundwater Geologist, Mr. Jim Bennett, to develop a reasonable approach. Because the McCain Valley is an extensive groundwater basin and pumping is proposed from a limited area of the basin, it was agreed that the cumulative analysis would be limited to a ½ mile radius about the pumping Well No. 6A. The cumulative analysis was performed using spreadsheets and calculations initially developed by Mr. Bennett.

Initially, project groundwater extraction at 50 gpm (72,000 gpd) and area residential and operational water demands were evaluated against monthly groundwater recharge during a drought condition to determine if project extraction will exceed 50 percent of the total storage capacity within an effective area of McCain Valley defined as approximately within one half mile of the proposed pumping Well No. 6a. A second analysis was performed with double the pumping (100 gpm) to further evaluate increased water utilization at this well. Using drought year precipitation data from the Boulevard gauging station (July 1998 through June 2005), when groundwater recharge is minimal and water is extracted from storage, a conservative assessment of possible groundwater impacts was developed.

3.4.1 Groundwater Recharge

In the spreadsheet, groundwater recharge was estimated from available precipitation data for the Boulevard gauging station over a seven year drought period from July 1998 through June 2005, provided by the County Groundwater Geologist. The recharge area was considered to be an area encompassing the ½-mile radius surrounding the pumping well, equivalent to 502 acres. The groundwater recharge also accounts for evapotranspiration based on an average of 62.5 inches per month as established by California Reference CIMIS ETo map, Zone 16.

3.4.2 Groundwater Demand

For the groundwater demand, the project water needs were incorporated with standard assumptions of water needs for other known potential groundwater users including residents, livestock, and other users identified within approximately ½ of the pumping well. To be conservative some land uses within ¾ mile of the pumping well were included into the overall area groundwater demand calculations. The groundwater demand calculation assumed that there were seven residents using 0.5 acre feet of water per year in accordance with County Guidelines. From literature (The Ohio State University Extension, 2002), an estimated 100 head of cattle graze on the Rough Acres Ranch, would require an estimated daily intake of 19 gallons per animal per day (the maximum estimated daily water intake required for a bull in 90 degree temperatures), equivalent to 2.13 acre feet of water. It should be noted that slightly lower water consumption values (up to 15 gallons per day) are estimated for various classes of horses that may also be grazing on the Ranch lands. A poultry farm, estimated to include 500 poultry, is located to the south of Rough Acres Ranch and based on available literature from Pennsylvania State University (2002), a conservative estimate of 100 gallons per day or 0.11 acre feet of water consumption each year is assumed to support these animals.

These water quantities in combination with the estimated 9-month construction schedule of water demand from the pumping well on Rough Acres Ranch of 50 gpm resulted in an overall groundwater demand of 7.18 acre-feet per month, or 65.74 acre-feet per year. The groundwater demand would increase to 13.88 acre-feet per month and 125.74 acre-feet per year with a corresponding doubling of the production from the pumping well to 100 gpm.

3.4.3 Groundwater in Storage

The groundwater storage capacity was calculated using conservative estimated of the saturated thickness of each of the hydrogeologic units underlying the water production area as observed in boring logs within the McCain Valley. For this analysis, it is assumed that the saturated thicknesses include 20 feet of alluvium, 10 feet of residuum, and 500 feet of fractured bedrock. Assuming that these materials are continuous over the 502 acre water production area, conservative estimates of the specific yield for each unit was obtained from the County. As summarized in Table 1 in Appendix C, the greatest specific yield is associated with the alluvium at 10%, the specific yield for the residuum is 5%, and because the fractured bedrock yields water only within the fractures, the specific yield for this unit is 0.10%.

By multiplying the 502 acres by the specific yield and by the saturated thickness for each hydrogeologic unit, the total groundwater in storage within the ½-mile water production area is 1002 acre feet of water.

3.4.4 Long-Term Groundwater Availability

Based on the proposed 9-month construction period and the project groundwater demand along with adjacent water users, subtracted from the existing groundwater in storage, in combination with the anticipated groundwater recharge generated over a seven year drought cycle, there will be no long-term groundwater requirements in support of the project. As shown on Table 2 in Appendix C, the maximum drawdown within the subject area is about 66 acre-feet, well above the 50% basin depletion level of 500 acre-feet. Even if project pumping were to be increased to 100 gpm, a maximum of 136 acre-feet of drawdown is calculated within the basin (Table 3; Appendix C). In fact, until pumping is increased by eight times to 54 acre-feet per month or nearly 486 acre-feet per year would the basin approach the 50% depletion level of 500 acre-feet (Table 4; Appendix C).

Based on these analyses, the long-term result of pumping at 50 gpm reduces the groundwater in storage to 94% and a maximum reduction to 92% of the total groundwater in storage during the 7-year drought period. Under an increased (100 gpm) pumping scenario, the groundwater in storage is reduced to 86% of the total with an average of 89%.

Following the project construction phase, the estimated water demand for the project site is estimated to be 2500 gallons per business day or about 2 acre-feet per year, associated with the operations and maintenance facility for the wind turbines. Based on the calculations of groundwater availability this level of use would have no significant impact on the groundwater in storage within McCain Valley.

3.5 Significance of Impacts Prior to Mitigation

Based on the results of the aquifer pumping test at the Rough Acres Ranch well No. 6a, the criteria for well interference and 50% depletion of groundwater in storage associated

with the proposed project will not be met. No significant impacts to groundwater are anticipated associated with the project.

3.6 Mitigation Measures and Design Considerations

Based on the lack of significant impacts to groundwater associated with the proposed project, no groundwater mitigation measures are proposed for the project.

3.7 Conclusions

Based upon the analyses performed, well interference is not anticipated to be a significant impact for the Tule Wind Farm construction project. During the pumping test, a maximum of 3.7 feet of drawdown was observed in the nearest observation well 36 feet away from the pumping well. No observed drawdown was identified in wells located within one third and one half mile of the pumping well.

The potential for depletion of groundwater in storage within the McCain Valley is not anticipated. Results of the groundwater demand during a drought period indicate that eight times the anticipated groundwater pumping would be required to drawn groundwater to the 50% depletion level.

4.0 SUMMARY OF PROJECT IMPACTS AND MITIGATION

Based on the results of pumping tests and analysis of the data, there is sufficient groundwater to meet the project demands. Review of cumulative analyses performed within a ½ mile radial area of McCain Valley about the aquifer pumping test well indicates based on the available groundwater storage within McCain Valley, it is possible to increase pumping at the Rough Acres Ranch aquifer test well significantly without well interference or significant groundwater depletion.

Although there are no requirements for analysis of groundwater use on tribal lands, the aquifer pumping test and analyses indicate that there is sufficient storage for use of groundwater within Thing Valley and no significant impacts to groundwater storage are anticipated. However, the pumping test data and the noted boundary condition identified during the test after 1700 minutes suggests that to support the project water needs, it may be necessary to pump at a lesser rate or lesser frequency at the aquifer pumping test well, and supplement the water from this well with water from another well within Thing Valley such as the observation well. In addition, because the well has been inoperable for some time, it is recommended that this well and pump be inspected and rehabilitated as necessary to ensure that the well operates optimally for the duration of the construction project.

5.0 CLOSURE

This report was prepared in general accordance with acceptable professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included herein. Although the groundwater investigation performed included constant rate pumping over a 72-hour period, it is not possible to fully anticipate an aquifer's behavior over the proposed 9-month construction period. It is understood that the project intends to obtain will serve letters to purchase water from off-site vendors if it is needed. The use of off-site water suppliers is recommended in the event that groundwater supplies are not fully supportive of the project. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

6.0 REFERENCES

California Department of Water Resources (DWR), California Irrigation Management Information System (CIMIS) Reference Evapotraspiration, 1999.

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

County of San Diego, DPLU, Groundwater Ordinance No. 9826.

County of San Diego, DPLU, Guidelines of Determining Significance and Report Format and Content Requirements, Groundwater, March 19, 2007.

Driscoll, D.G., 1986, Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Ohio State University Extension, Fact Sheet, Water Effects on Livestock Performance, prepared by Mark Landefeld and Jeff Bettinger, 2002.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Pennsylvania State University, Cooperative Extension in the Capital Region, Fact Sheet, Water Needs for Poutry – Are you Prepared?, 2002.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

Soil Conservation Service (SCS), Soil. Survey, San Diego Area, California, December 1973.

Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

United States Geological Survey, Preliminary Geologic Map of the El Cajon 30' x 60' Quadrangle, Southern California, compiled by Victoria R. Todd, 2004.

United States Geological Survey, 7.5 Minute Series (topographic) Mount Laguna (1997) and Sombrero Peak (1975), California Quadrangles.

United States Geological Survey, 7.5 Minute Series (topographic) Live Oak Springs (1975), California Quadrangle.

Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

Sarah J. Battelle, CHG 609
Principal Geologist, Geo-Logic Associates

John M. Hower, CEG 2142
Supervising Geologist, Geo-Logic Associates

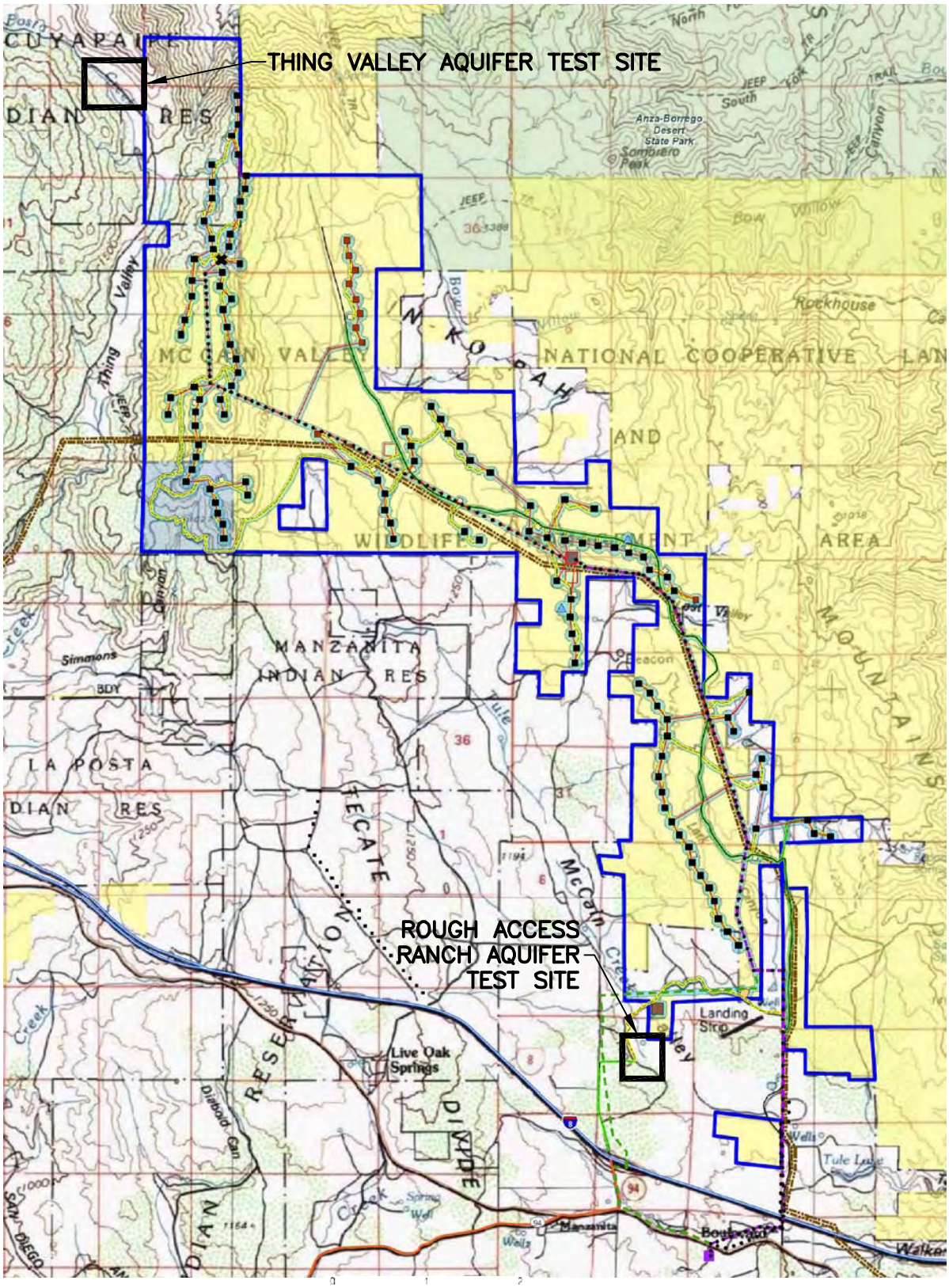
Mark W. Vincent, CHG 865
Senior Geologist, Geo-Logic Associates

Eric White, CHG 881
Project Geologist, Geo-Logic Associates

Mr. Robert Walker
Rough Acres Ranch Manager

Desi Vela
Field Technician, Ewiiaapaayp Band of Kumeyaay Indian

FIGURES



Legend

- Proposed Turbine
- Alternate Turbine
- Proposed Met Tower
- Proposed Junction Box
- Proposed Overhead Structure
- Preferred 138-kV Transmission Line
- Alternate 138-kV Transmission Line
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Existing Road - Improvements Needed
- Proposed New Access Road
- Freeway
- Highway
- Major Road
- McCain Valley Road
- Proposed 10-acre Parking Area
- Proposed 2-acre Lay Down Area
- Proposed Batch Plant
- Preferred O&M and Substation
- Alternate O&M and Substation
- Existing Substation
- Proposed Sunrise Powerlink Transmission ROW
- Development Corridor
- Project Area
- CA State Lands Commission
- BLM Land

REFERENCE:
IBERDROLA RENEWABLES, 2009

FIGURE 1

PROJECT LOCATION MAP

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

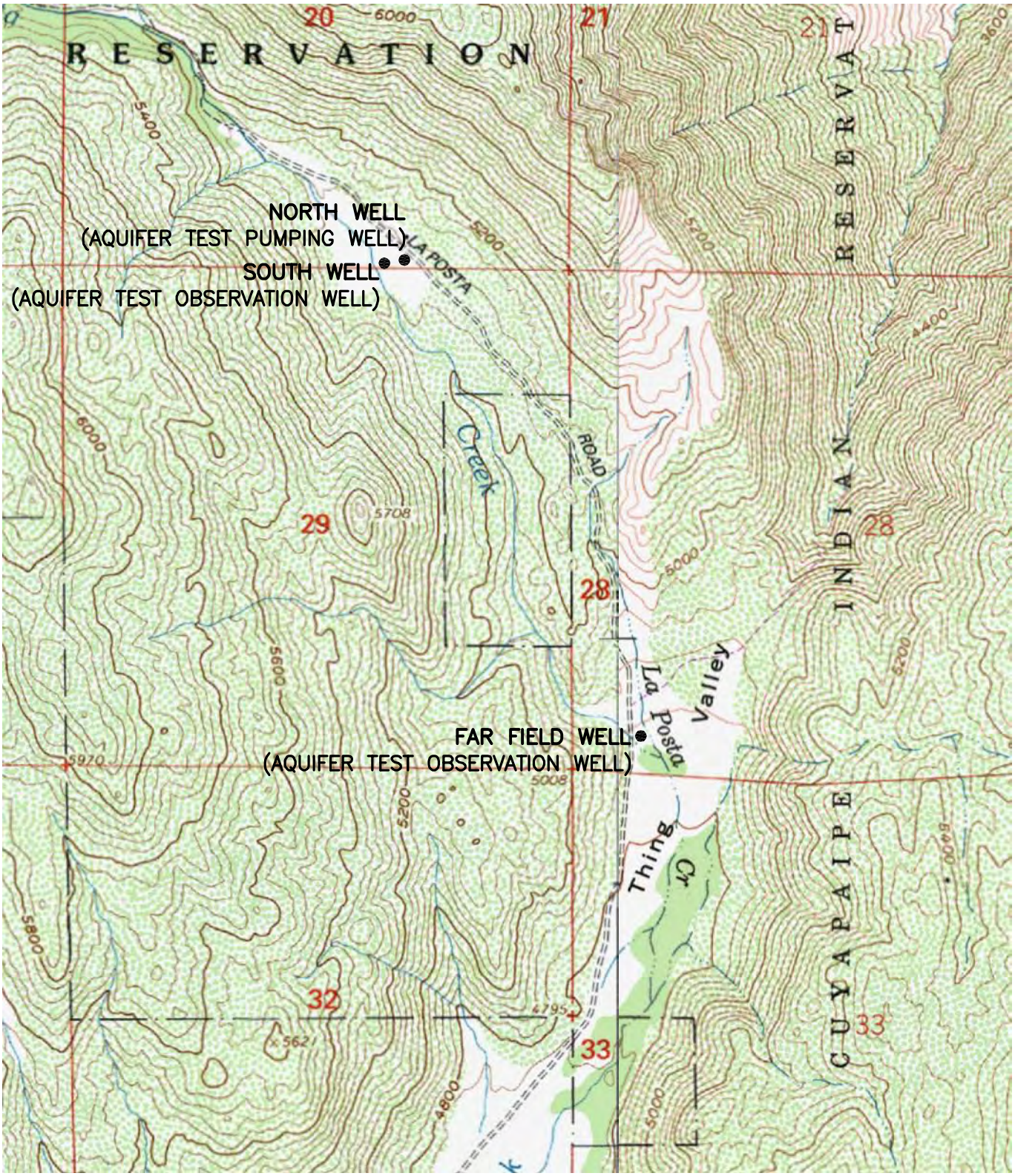


FIGURE 2A

GRAPHIC SCALE
750 0 375 750 1500
(in feet)
1 inch = 1500 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

WELL LOCATION MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

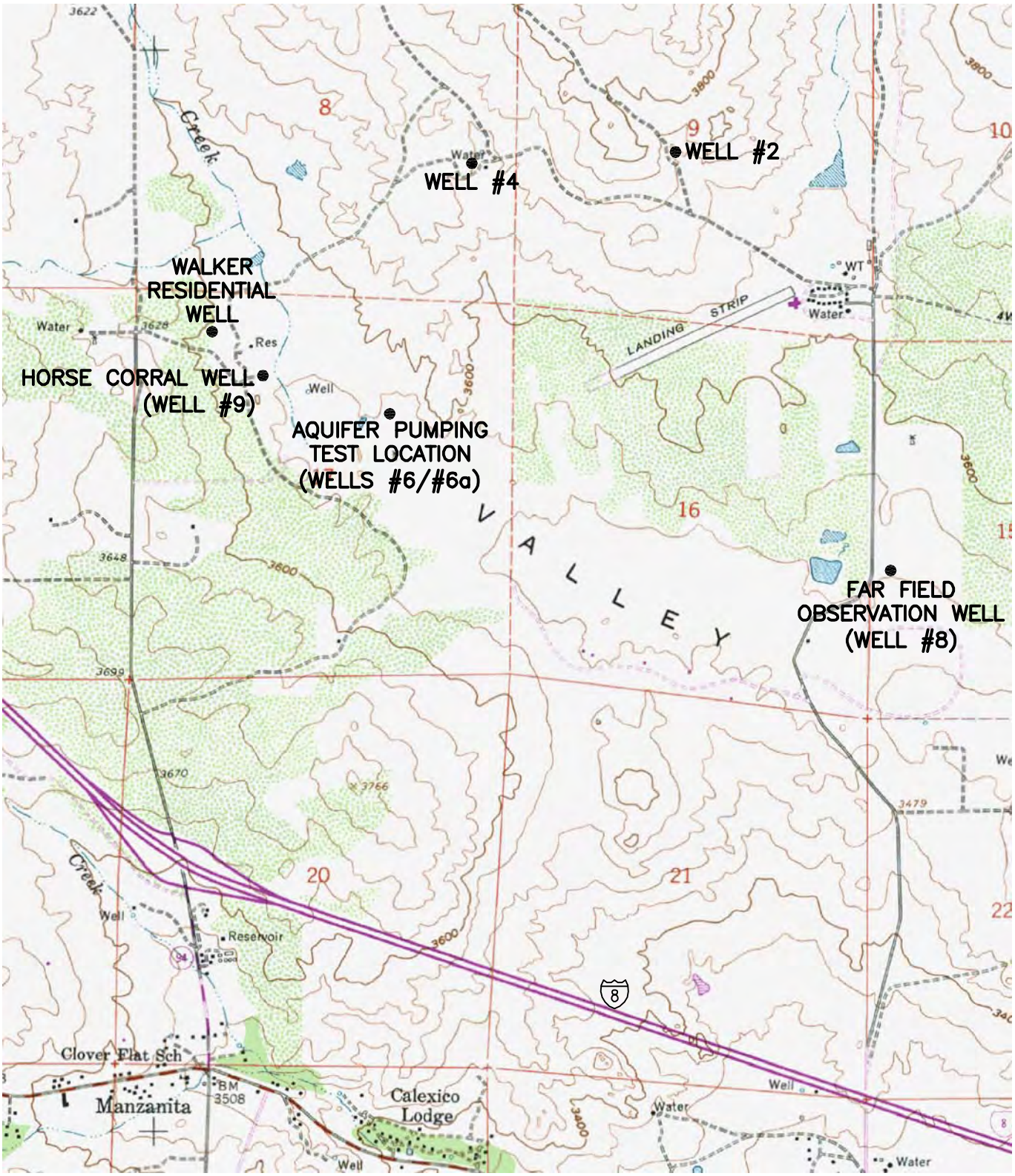


FIGURE 2B

GRAPHIC SCALE
1000 0 500 1000 2000
(in feet)
1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

WELL LOCATION MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

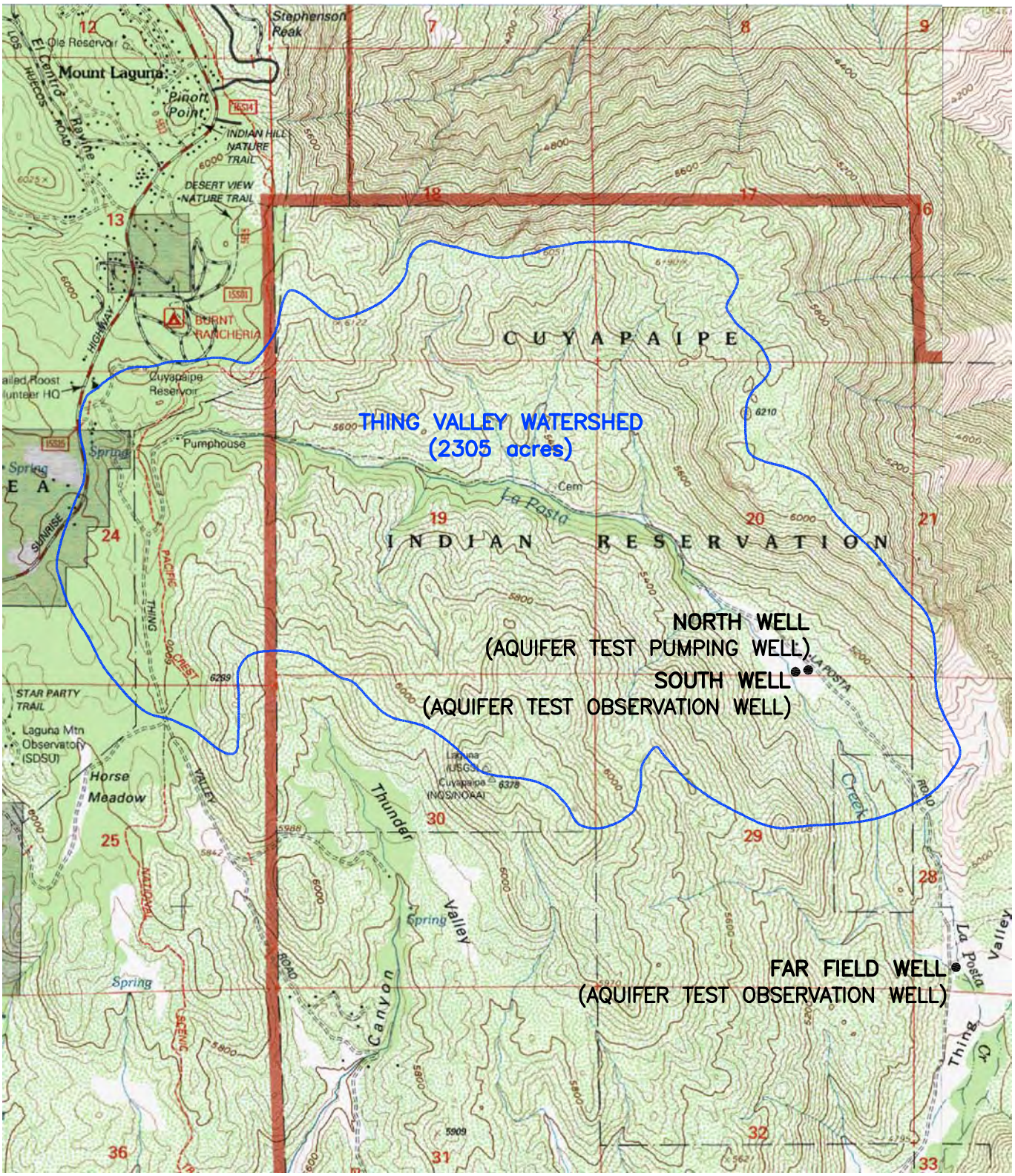


FIGURE 3A

GRAPHIC SCALE

1200 0 600 1200 2400

(in feet)

1 inch = 2400 ft.

N

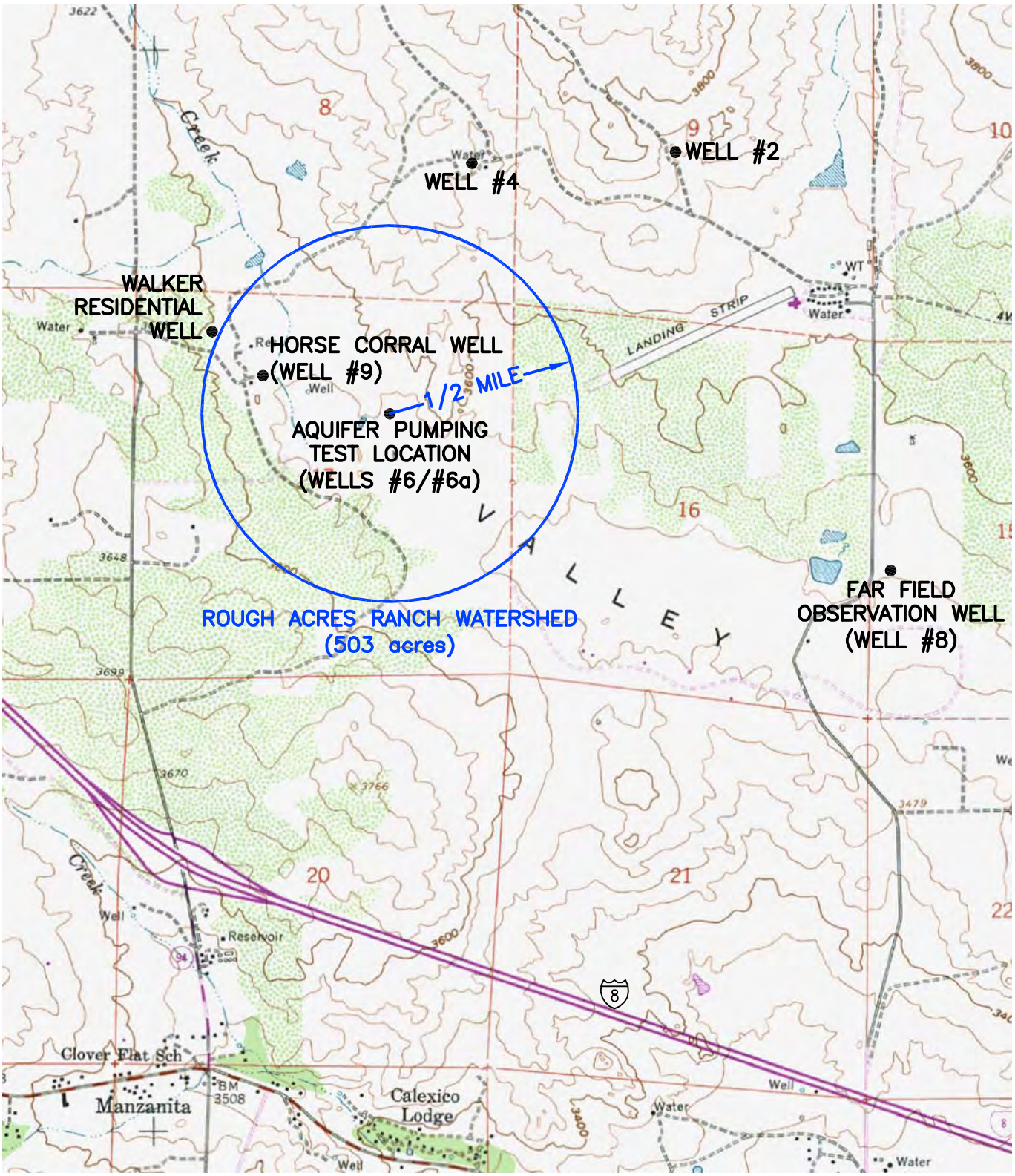
REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

WATERSHED MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

FIGURE 3B

WATERSHED MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

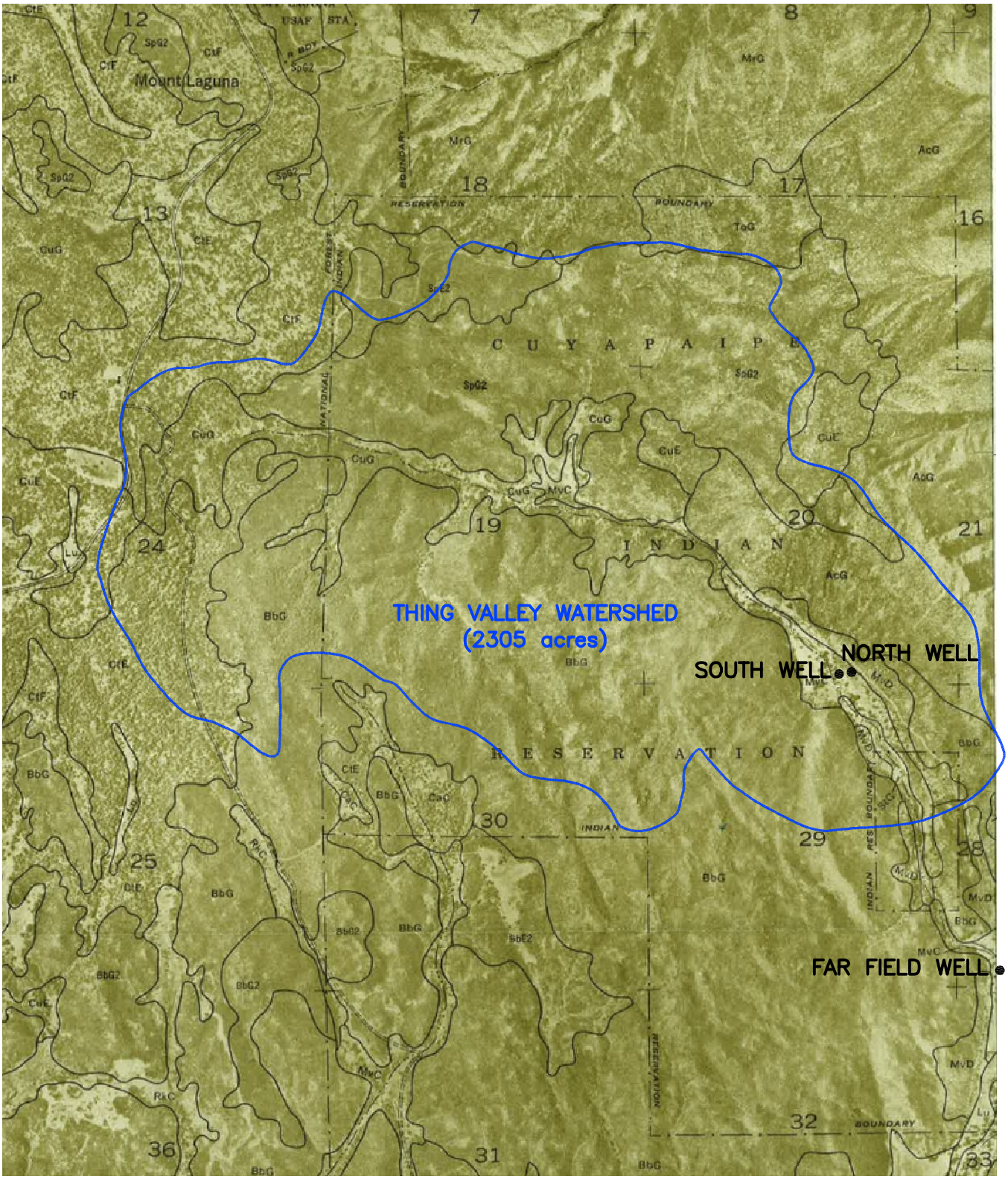


FIGURE 4A

GRAPHIC SCALE

1200 0 600 1200 2400

(in feet)

1 inch = 2400 ft.

N

REFERENCE: SOIL SURVEY, SAN DIEGO AREA SOIL CONSERVATION SERVICE, 1973 (SEE TEXT SECTION 2.5 FOR EXPLANATION)

SOILS MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

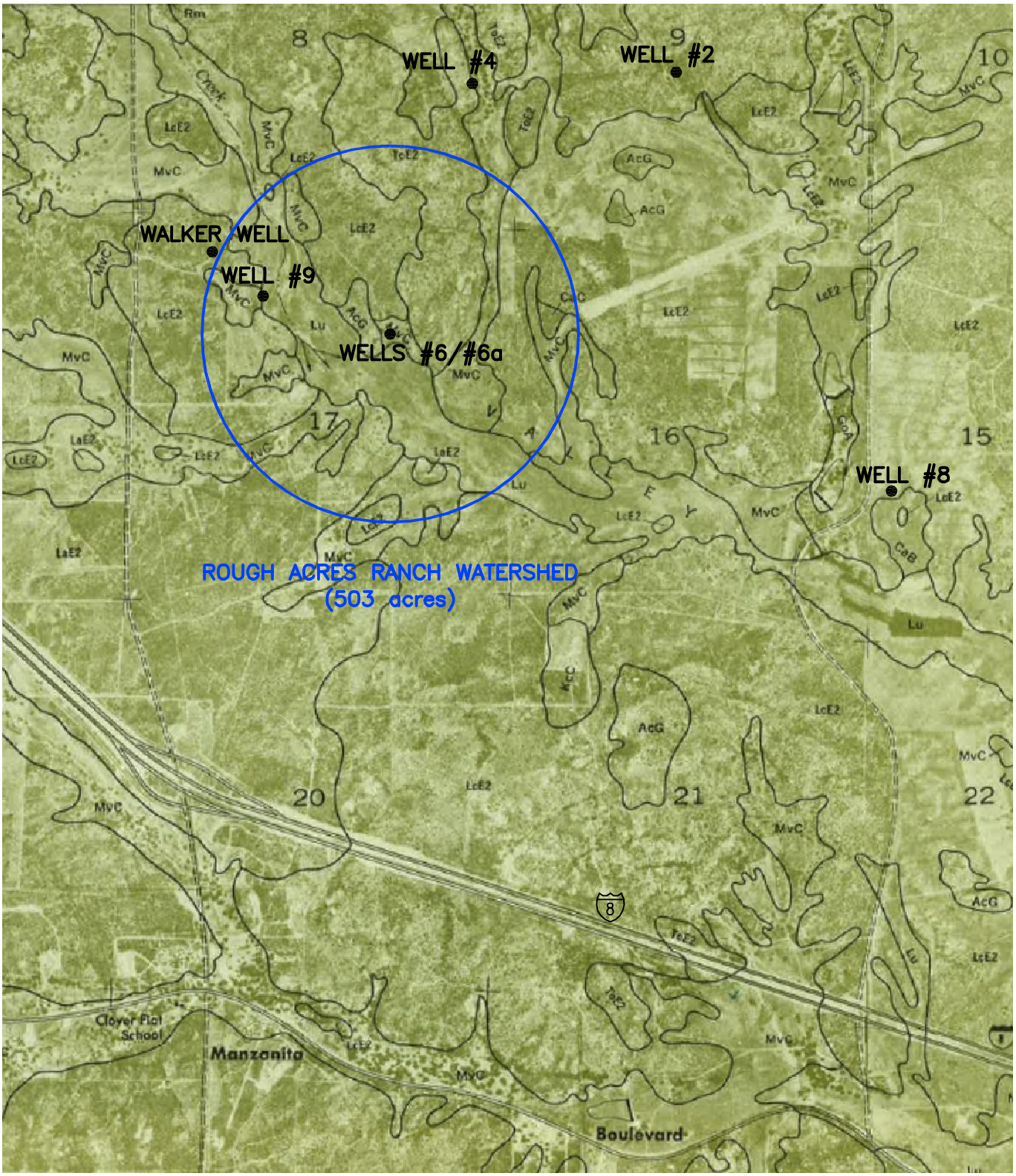


FIGURE 4B

GRAPHIC SCALE
1000 0 500 1000 2000
(in feet)
1 inch = 2000 ft.

N

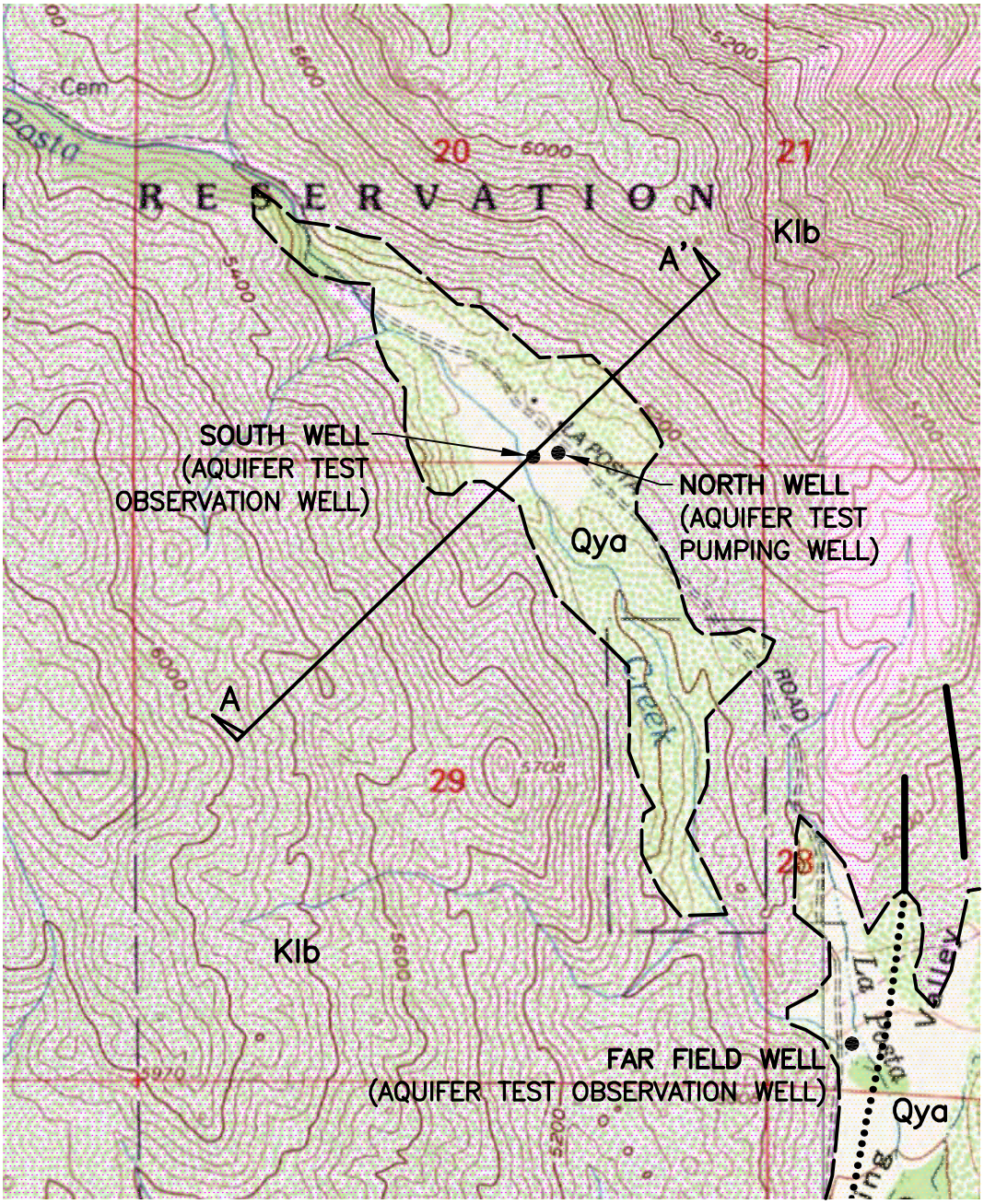
REFERENCE: SOIL SURVEY, SAN DIEGO AREA SOIL CONSERVATION SERVICE, 1973 (SEE TEXT SECTION 2.5 FOR EXPLANATION)

SOILS MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



EXPLANATION:

Qya	YOUNG ALLUVIUM (HOLOCENE)
Klb	TONALITE OF LAS BANCAS (EARLY CRETACEOUS)
— — — —	APPROXIMATE GEOLOGIC CONTACT
——— ·····	FAULT, DOTTED WHERE CONCEALED
A A'	CROSS-SECTION LOCATION

GRAPHIC SCALE

750 0 375 750 1500

(in feet)

1 inch = 1500 ft.

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

FIGURE 5

GEOLOGIC MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

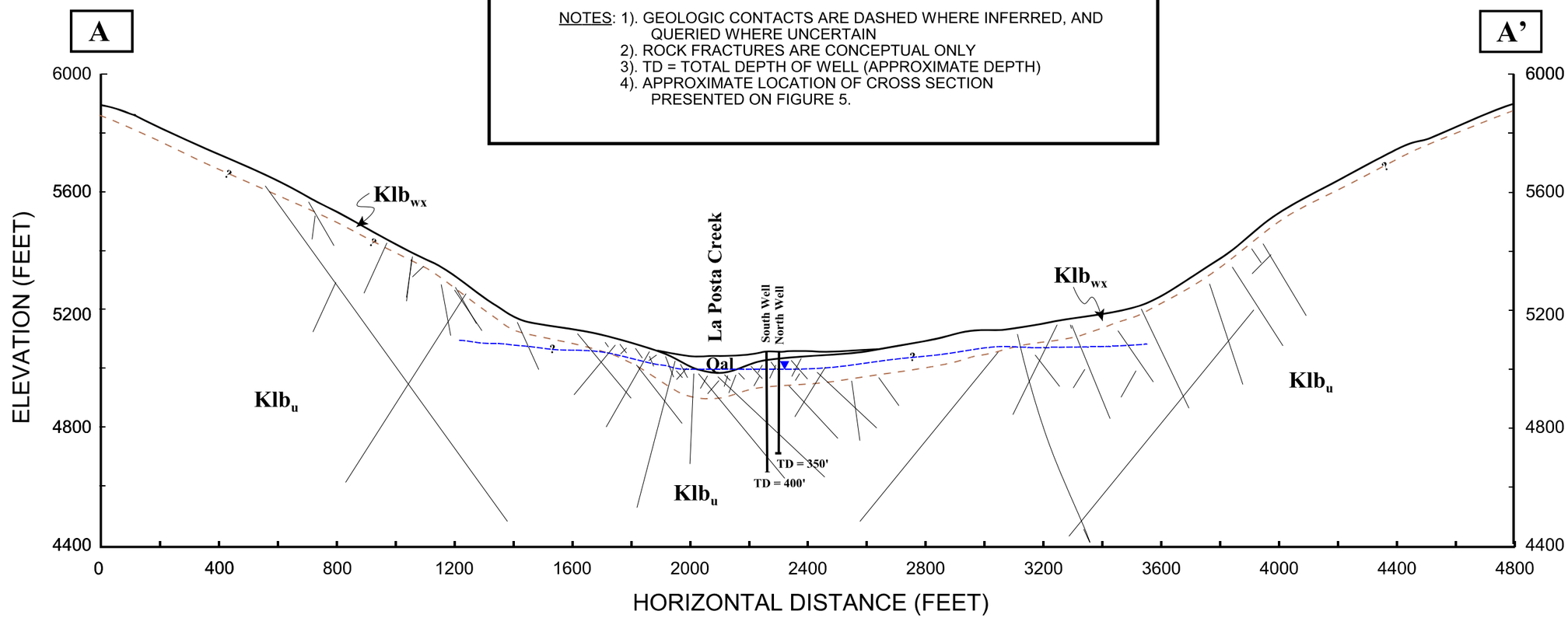
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

LEGEND

Qal	RECENT ALLUVIUM
Klb_{wx}	LOS BANCOS TONALITE, WEATHERED
Klb_{u}	LOS BANCOS TONALITE, UNWEATHERED
	APPROXIMATE GROUNDWATER TABLE
	ROCK FRACTURES

NOTES: 1). GEOLOGIC CONTACTS ARE DASHED WHERE INFERRED, AND QUERIED WHERE UNCERTAIN
2). ROCK FRACTURES ARE CONCEPTUAL ONLY
3). TD = TOTAL DEPTH OF WELL (APPROXIMATE DEPTH)
4). APPROXIMATE LOCATION OF CROSS SECTION PRESENTED ON FIGURE 5.



NORTH 45° EAST

HORIZONTAL SCALE: 1 INCH = 400 FEET
VERTICAL SCALE: 1 INCH = 400 FEET
(11 X 17 INCH FORMAT ONLY)

FIGURE 6

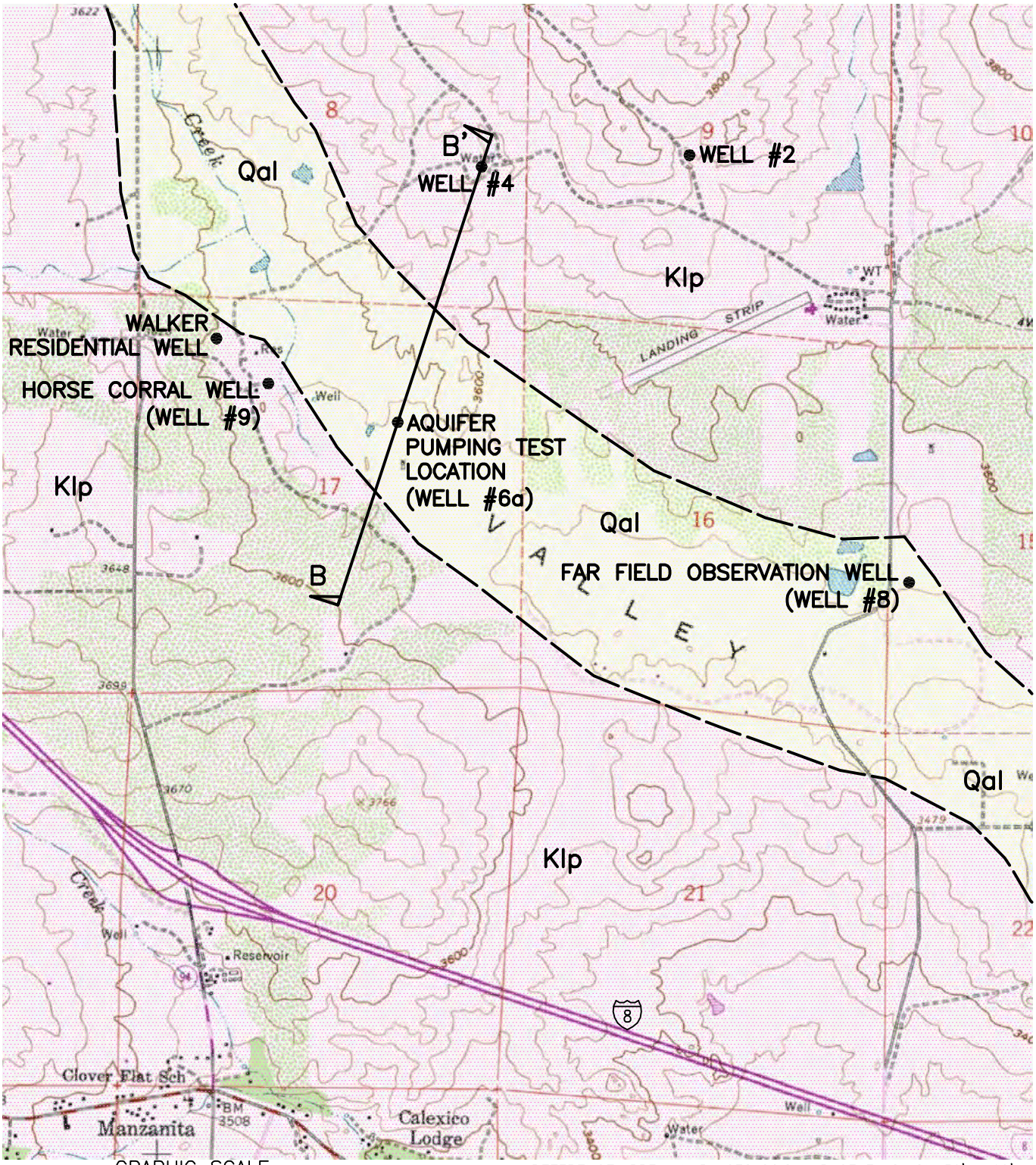
CONCEPTUAL HYDROGEOLOGIC CROSS SECTION

THING VALLEY STUDY AREA
SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	OCT 2010	2010-0005

References: USGS, 1997, 7.5' Mount Laguna and USGS, 1975, 7.5' Sombrero Peak, CA Quadrangles.



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

FIGURE 7

EXPLANATION:

Qal	ALLUVIUM
Klp	TONALITE OF LA POSTA (EARLY AND LATE CRETACEOUS)
— — —	APPROXIMATE GEOLOGIC CONTACT
B B'	CROSS-SECTION LOCATION

GEOLOGIC MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

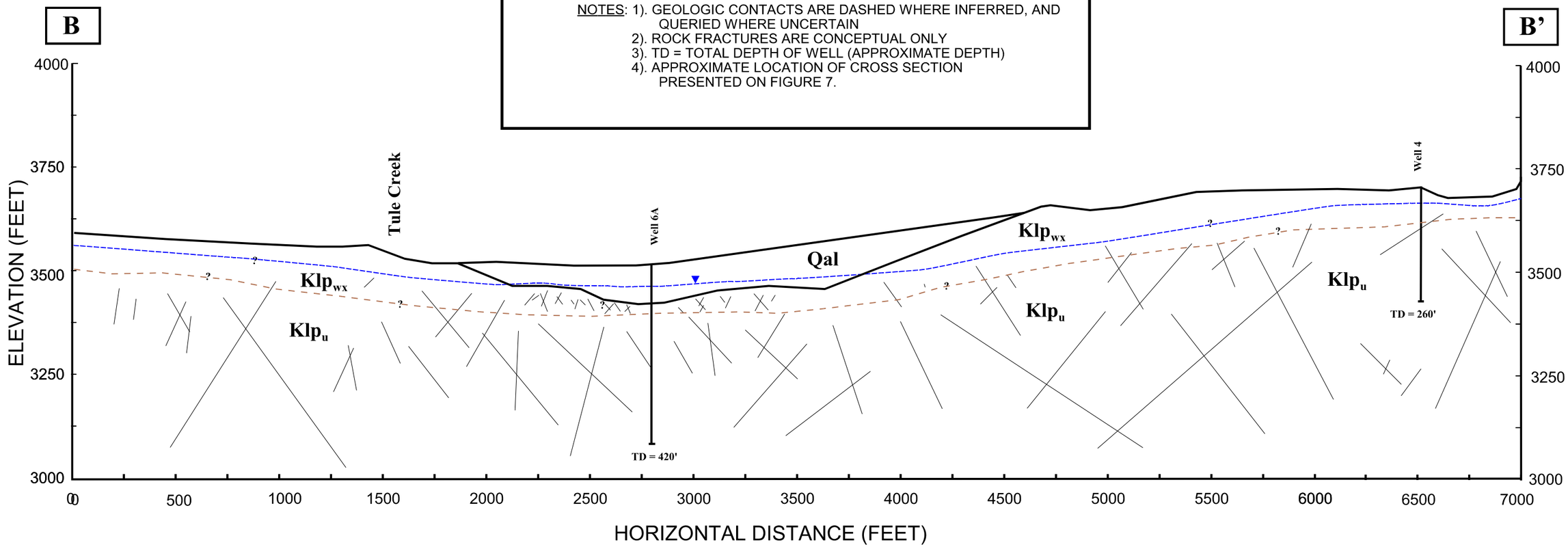
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

LEGEND

Qal	RECENT ALLUVIUM
Klp_{wx}	LA POSTA TONALITE, WEATHERED
Klb_u	LA POSTA TONALITE, UNWEATHERED
	APPROXIMATE GROUNDWATER TABLE
	ROCK FRACTURES (SCHEMATIC ONLY)

NOTES: 1). GEOLOGIC CONTACTS ARE DASHED WHERE INFERRED, AND QUERIED WHERE UNCERTAIN
2). ROCK FRACTURES ARE CONCEPTUAL ONLY
3). TD = TOTAL DEPTH OF WELL (APPROXIMATE DEPTH)
4). APPROXIMATE LOCATION OF CROSS SECTION PRESENTED ON FIGURE 7.



NORTH 18° EAST

HORIZONTAL SCALE: 1 INCH = 500 FEET
VERTICAL SCALE: 1 INCH = 250 FEET
2x VERTICAL EXAGGERATION
(11 X 17 INCH FORMAT ONLY)

References: USGS, 1975, 7.5' Live Oak Springs, CA Quadrangle.

FIGURE 8

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION

ROUGH ACRES STUDY AREA
SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	OCT 2010	2010-0005

APPENDIX A

OBSERVATIONS AND ANALYSIS OF AQUIFER CHARACERISTICS

EWIIAAPAAYP RESERVATION

THING VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES
Geologists, Hydrogeologists and Engineers

Date: November 8, 2010
Project No.: 2010-0005

To: John Hower, CEG
Sarah Battelle, CHG

From: Mark Vincent, CHG

Regarding: **Observations and Analyses of Aquifer Characteristics Thing Valley, San Diego County, California**

INTRODUCTION

This memo presents a summary of observations and analyses made following a stepped and a constant rate aquifer pumping and recovery test in wells located in Thing Valley located approximately 10 miles north of I-8 off La Posta Truck Trail/Thing Valley Road in the Ewiiaapaayp Reservation, in eastern San Diego County, California. The tests were performed to determine whether sufficient volumes of water are available for the Tule Wind Farm construction projects. Analyses performed included calculation of transmissivity, hydraulic conductivity, and storativity for a pumping well and observation wells.

WELL AND AQUIFER CONDITIONS

A well labeled as South Well was used as the pumping well for this test. Another well labeled as North Well is located 61.5 feet to the west of the pumping well and was monitored and analyzed as an observation well. A third well identified as Thing Valley Well is located approximately 5,517 feet south-southeast of the pumping well and was also used as an observation well (Figure 1).

Records for drilling and construction of the wells used for these pumping tests are incomplete or nonexistent. A well identified on Department of Water Resources (DWR) records as the "Cuyapaipe Community Well" (identified as Form No. 058539) is believed to be the log for South Well. No records are available for North Well or Thing Valley Well.

Although DWR records indicate that slotted well casing was installed to a depth of 122 feet, they do not indicate whether or not casing exists below that depth or if the casing was installed prior to drilling the well to a total depth of 400 feet. The North and South Wells used in this pumping test have existing electric submersible pumps installed in them. Based on the production rates achieved during the tests performed, the wells are likely to be outfitted with four-inch diameter electric submersible pumps. Based on the depth and pressure head on the transducers installed in the wells for the test, it was assumed that all of the boreholes are 400 feet deep and are 10-inches in diameter. It was

further assumed that the wells were constructed with 6-inch diameter well casing and that they are perforated or screened over the entire saturated thickness. Details of well construction could not be verified in the field because of the presence of pumps, discharge pipes, electrical wires, and surface sanitary seals.

The area immediately around North Well and South Well is underlain by alluvium comprised of poorly sorted sand, gravel, and silt derived from the crystalline basement rock exposed on the adjacent canyon sidewalls. The crystalline basement rocks are classified as tonalite and yield groundwater from fractures. The well log reportedly recorded for South Well indicates that there are about 12 to 15 feet of alluvium overlying the tonalite. An alternative interpretation of the log is that some of the materials described in the log to a depth of 50 feet could also be coarse-grained alluvium locally derived from the surrounding tonalite. Groundwater was measured at a depth of 54.81 feet below the top of sanitary seal on North Well (approximately 8-inches above ground surface) and was measured at a depth of 49.34 feet below the sanitary seal in South Well (also about 8-inches above ground surface). Groundwater was measure at a depth of 77.62 feet below the top of the conductor casing on Thing Valley Well (the conductor casing extends approximately 6-inches above ground surface).

TEST METHODS

Observations of groundwater elevation were recorded in a pumping well and two observation wells in Thing Valley. Data was collected using pressure transducers connected to data loggers. Barometric pressure changes were recorded during the test and corrections were made to the pressure head data collected during the tests.

A stepped aquifer pumping test was performed using North Well to determine the optimum pumping rate for a longer duration test. The pressure transducers were deployed and began recording data on August 12, 2010 to perform the stepped pumping test. The stepped pumping test was performed at pumping rates of 72 gallons per minute (gpm), 88 gpm, and 90 gpm. The pump could not be throttled down below 72 gpm without water exiting a by-pass / check valve and had a maximum yield of 90 gpm. A semi-logarithmic plot of elapsed time versus drawdown for the stepped pumping test is shown on Figure 2.

The constant rate pumping and recovery test was performed from August 16 through 19, 2010. The pump was powered-down on August 19, 2010 and allowed to recover until August 23, 2010 when the pressure transducers were removed from the wells. South Well was initially pumped at an average rate of 88 gpm and was corrected to 80 gpm during a period from about 1 to 2 hours into the test. Recovery tests were performed by turning off the pumps and recording the increasing head levels over time.

DATA ANALYSIS

Changes in groundwater level data recorded during this test were corrected for barometric pressure changes and used to generate a file containing tabulated time and changes in pressure head. The data was used to generate time-drawdown graphs for the pumping

and observation wells and imported into computer software used to calculate the transmissivity and storativity of the fractured tonalite.

The stepped pump test analysis consists of plotting the drawdown versus time for each pumping rate on a time versus drawdown plot with time plotted on a logarithmic scale. Forward projections of each segment representing a different pumping rate can be used to predict the likely drawdown for the pumping well during for the selected duration of the test. A pumping rate of 80 gpm was selected as the target pumping rate because it would allow for ample drawdown without the well running dry during the test.

The method of Schafer (1978) was employed to determine how much of the data set for North Well was impacted by casing storage effects. The method is a simplification of the method first developed by Papadopulos and Cooper (1967) but does not require prior knowledge of the transmissivity or well efficiency. The point at which casing storage effects are overcome was calculated to occur approximately 12 to 14 minutes into the test based on the assumptions about well construction practices, pumping rates, and drawdown. Very early pumping data was ignored in the analyses described below due to casing storage effects and the non-uniform drawdown curve caused by the change in the pumping rate from 88 to 80 gpm.

Time versus drawdown plots were prepared for the pumping and observation wells for the pumping and recovery portions of the test. The plots are shown with the time axis plotted on a logarithmic scale and drawdown on a linear scale.

Figure 3 shows the time-drawdown plot for North Well during pumping. The first 12 to 14 minutes of the test show the effects of attempting to establish a constant pumping rate and casing storage effects. A slight recovery in the drawdown is noted from around 14 minutes to approximately 33 minutes due to a reduction in the pumping rate from 88 to 80 gpm. The North Well drawdown plots as a straight line on the time-drawdown chart representing constant aquifer properties during that portion of the drawdown cone development. A sudden change in the drawdown curve starts at approximately 1,700 minutes and changes again at approximately 3,000 minutes. The steepening of the time drawdown curve noted at approximately 1,700 and 3,000 minutes likely indicates a negative boundary effect.

A residual drawdown plot for the North Well is shown on Figure 4. The plot shows the change in drawdown versus the ratio of the time since the pump test started divided by the time since the recovery portion of the test started (t/t`). An inflection point is noted at approximately t/t`=100 possibly due to some type of boundary effect. The residual drawdown at a t/t` ratio of 1 extends through the origin and there is no discernable change in storage noted in the pumping well over the course of the pumping and recovery portions of the aquifer stress test.

A time-drawdown plot of South Well located 61.5 feet away from the pumping well shows a sharp decrease in drawdown from approximately 51 minutes to approximately 65 minutes which is considered to be the result of the decrease in pumping rate from 88 to 80 gpm (Figure 5). The South Well plot shows a slight increasing slope to the semi-logarithmic plot but shows a very strong inflection point at approximately 1,700 minutes

into the test. This is interpreted to be the result of a negative boundary effect similar to that observed on the time-drawdown plot from North Well (compare Figures 3 and 5).

The South Well recovery portion of the test is plotted as the residual drawdown versus t/t` shows a concave upwards curvature to the semi-logarithmic plot (Figure 6) indicative of changing aquifer conditions from a t/t` ratio of about 10 to 200 into the recovery test period. The line segment from a t/t` ratio of 200 the end of the test is a straight line plot indicative of constant aquifer conditions. The residual drawdown value measured for a t/t' ratio of 1 is about -3.5 feet. Though this value is not within about one half of a foot as would be expected from a successful test, it may not be especially significant for an observation well when the pumping well shows no changes in storage effect.

The Thing Valley Well located approximately 5,517 feet south of the pumping well was monitored for changes in head. A possible cumulative drawdown of approximately 0.25 feet was observed from approximately 400 minutes until the end of the test (Figure 7). The recovery portion of the well is shown on Figure 8 and is shows a large sudden change in measured head near the end of the monitoring period. This is interpreted as a slippage of the transducer cable and is probably not a valid recovery curve.

Water level drawdown data were evaluated using the computer software program AquiferTest version 3.5 (Waterloo Hydrogeologic, 2002). The program performs curve matching of the time drawdown data to calculate transmissivity, hydraulic conductivity, and storativity using different methods. The methods employed included Cooper-Jacob (1946), Moench (1993), Neuman (1975), and Theis (1935).

DISCUSSION

As shown on Table 1, the calculated hydraulic conductivity values for all of the analytical methods employed ranged from a low of 0.285 feet/day for data collected from North Well using Neuman's method for the data collected from the end of the data set to a high of 2.39 feet/day for the early time recovery phase of South Well using the Theis Recovery method. An average conductivity of 1.122 feet/day was calculated from all methods from both South Well and North Well. The Storativity values range from a low of 3.33E-09 for North Well middle to late time data and a high of 4.19E+01 for a match to the very late time data recorded in South Well.

All of the analytical results show a higher transmissivity and hydraulic conductivity value for matches to the early time drawdown data and show lower values for matches to late time drawdown data. This is most likely the result of a higher degree of fracturing in the rock around the wells. North Well and South Well are located in a portion of Thing Valley which is entirely covered in up to 50 feet of alluvium (Figure 9). Inspection of aerial photographs from Google Earth show the local canyons and drainages are controlled by large scale joint sets. Areas of maximum fracturing will have higher transmissivity and hydraulic conductivity associated with them and also will be more prone to erosion.

During the pumping test, a cone of depression developed radially around the well until the cone intercepted lower transmissivity/less fractured rock at the canyon side walls (the

negative boundary effect observed approximately 1,700 minutes into the test). After that time, the majority of the water entering the wells is coming from directly up and down canyon. A later stage negative boundary effect near the 3,000 minute mark observed in North Well may be a secondary negative boundary effect associated with translation of the cone of depression outside the portions of the canyon overlain by alluvium. Although the alluvium was not thought to be saturated during the test it is likely to act like a sponge slowing the downgradient flow of groundwater.

Because the fractures in the bedrock appear to be of aerially limited extent, the actual volume of groundwater available may be limited with larger volumes of groundwater available within the canyon areas where fracturing may be most prevalent.

CLOSURE

This summary of observations and analyses has been prepared in general accordance with accepted professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included in it. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

Geo-**L**ogic **A**ssociates

Mark W. Vincent, PG 5767, CEG 1873, CHg 865
Senior Geologist

Attachments: Table 1 - Aquifer Stress Test Results
Figure 1 - Well Location Plan
Figure 2 - Step Test Time Drawdown Plot
Figure 3 - North Well Time Drawdown Plot Pumping
Figure 4 - North Well Time Drawdown Plot Recovery
Figure 5 - South Well Time Drawdown Plot Pumping
Figure 6 - South Well Time Drawdown Plot Recovery
Figure 7 - Thing Valley Well Time Drawdown Pumping
Figure 8 - Thing Valley Well Time Drawdown Recovery
Figure 9 - Geologic Map
Appendix A - Analytical Results from Aquifer Test Program

REFERENCES

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

Driscoll, D.G., 1986, Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

Table 1
Aquifer Stress Test Results
Thing Valley

Well Designation	Condition	Distance From Pumping Well (feet)	Groundwater Depth from TOC (feet)	Groundwater Depth from Ground Surface (feet)	Assumed Aquifer Thickness (feet)	Average Pumping Rate (gpm)	Analytical Method	Transmissivity (feet^2/day)	Conductivity (feet/day)	Storativity	Comments
North Well	Pumping	1	54.81	54.14	350	81	Cooper-Jacob	488	1.390	3.33E-09	Match to mid-late data.
North Well	Pumping	1	54.81	54.14	350	81	Cooper-Jacob	176	0.502	3.05E-02	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Moench	261	0.741	4.45E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Neuman	**99.8 Minimum**	**0.285 Minimum**	3.82E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Theis	256	0.733	3.57E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Walton	115	0.327	2.41E-02	Match to late data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	669	1.910	NA	Match to early data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	473	1.350	NA	Match to middle data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	337	0.963	NA	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Cooper-Jacob	513	1.470	8.29E+00	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Cooper-Jacob	294	0.841	4.19E+01	Match to very late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Moench	467	1.330	1.35E-05	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Neuman	469	1.340	9.12E-04	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Theis	477	1.360	2.10E-03	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Walton	477	1.360	8.76E+00	Match to late data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	**835 Maximum**	**2.39 Maximum**	NA	Match to early data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	508	1.450	NA	Match to middle data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	311	0.888	NA	Match to late data.
							Average Values	**393**	**1.122**	**3.88E-03**	

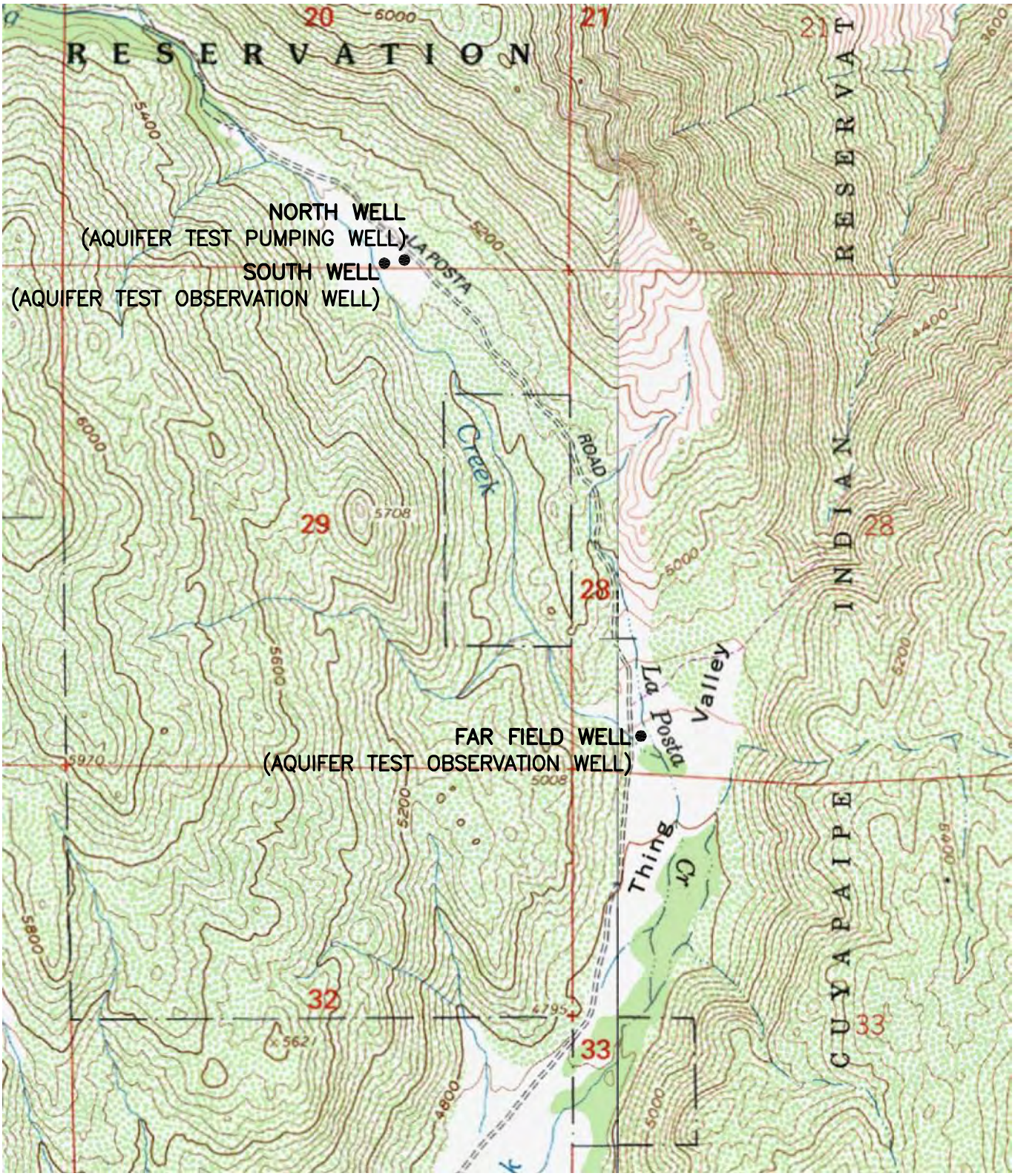


FIGURE 1

GRAPHIC SCALE
750 0 375 750 1500
(in feet)
1 inch = 1500 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

WELL LOCATION MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	NOVEMBER 2010	2010-005

Figure 2
North Well
(Pumping Well)
Time Drawdown Plot for Stepped Pump Test

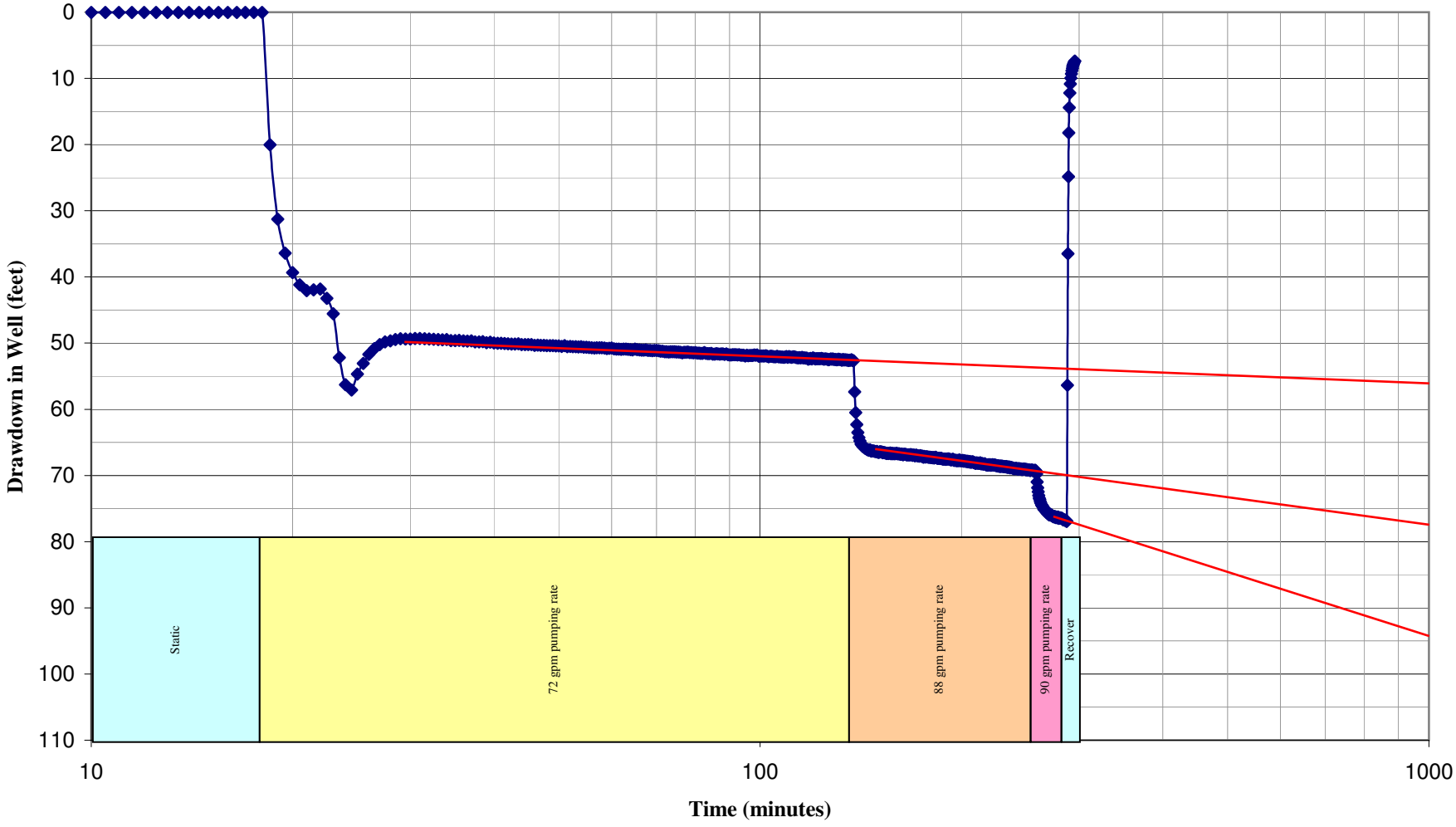


Figure 3
North Well
(Pumping Well)
Time-Drawdown Plot

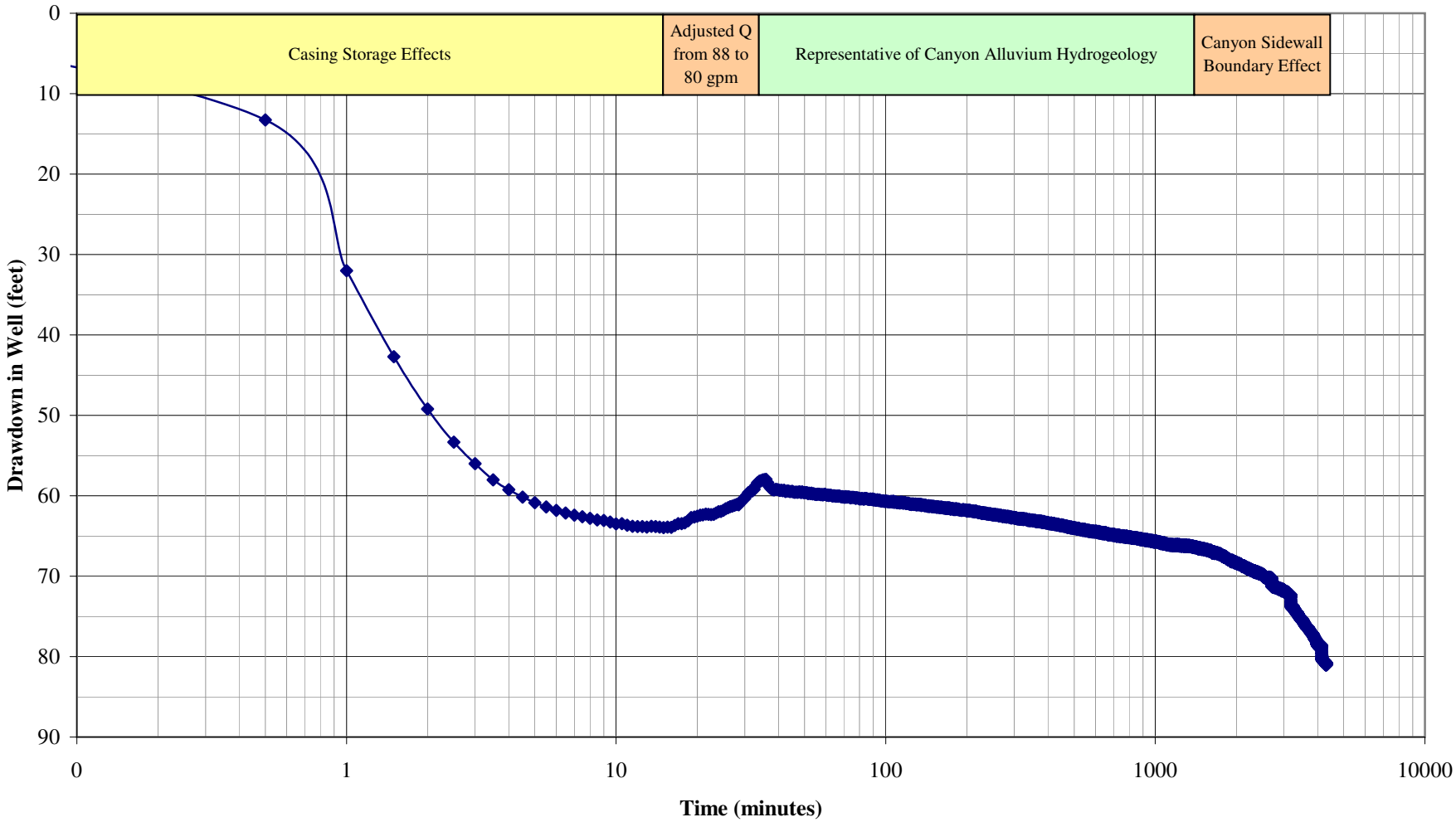


Figure 4
North Well
Recovery
Time-Drawdown Plot

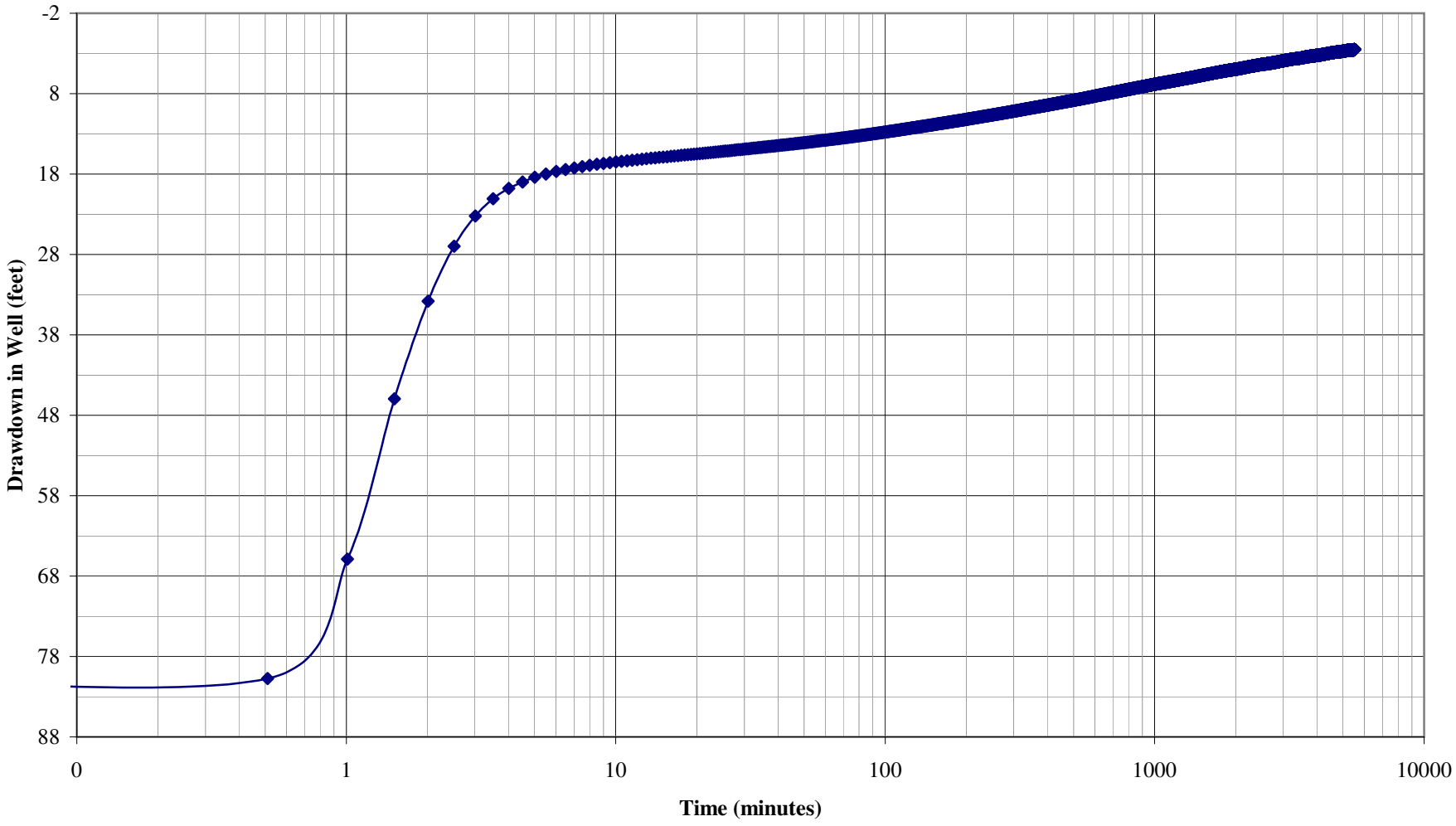


Figure 5
South Well
(Observation Well)
Time-Drawdown Plot

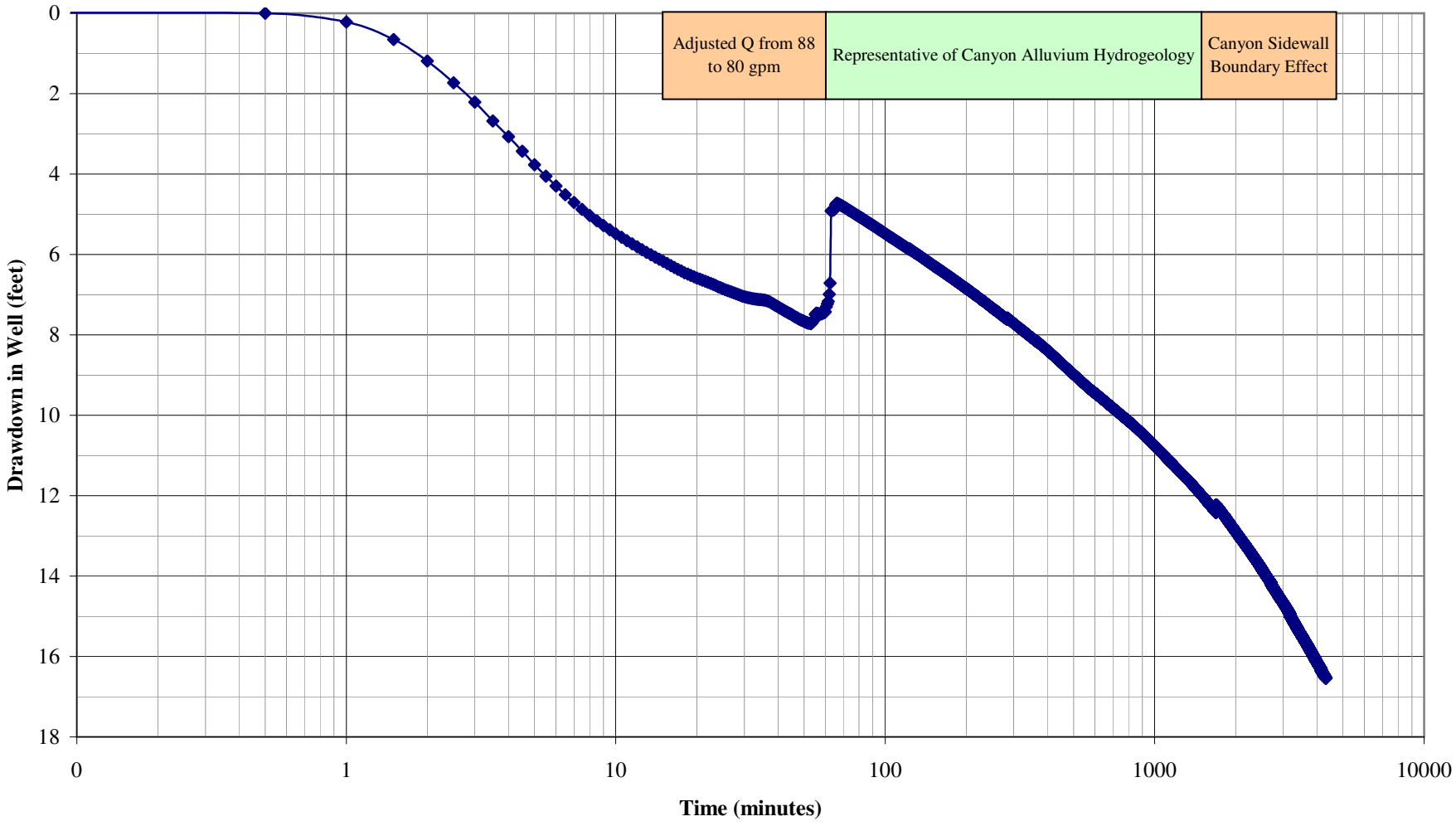


Figure 6
South Well
(Observation Well)
Recovery Time-Drawdown Plot

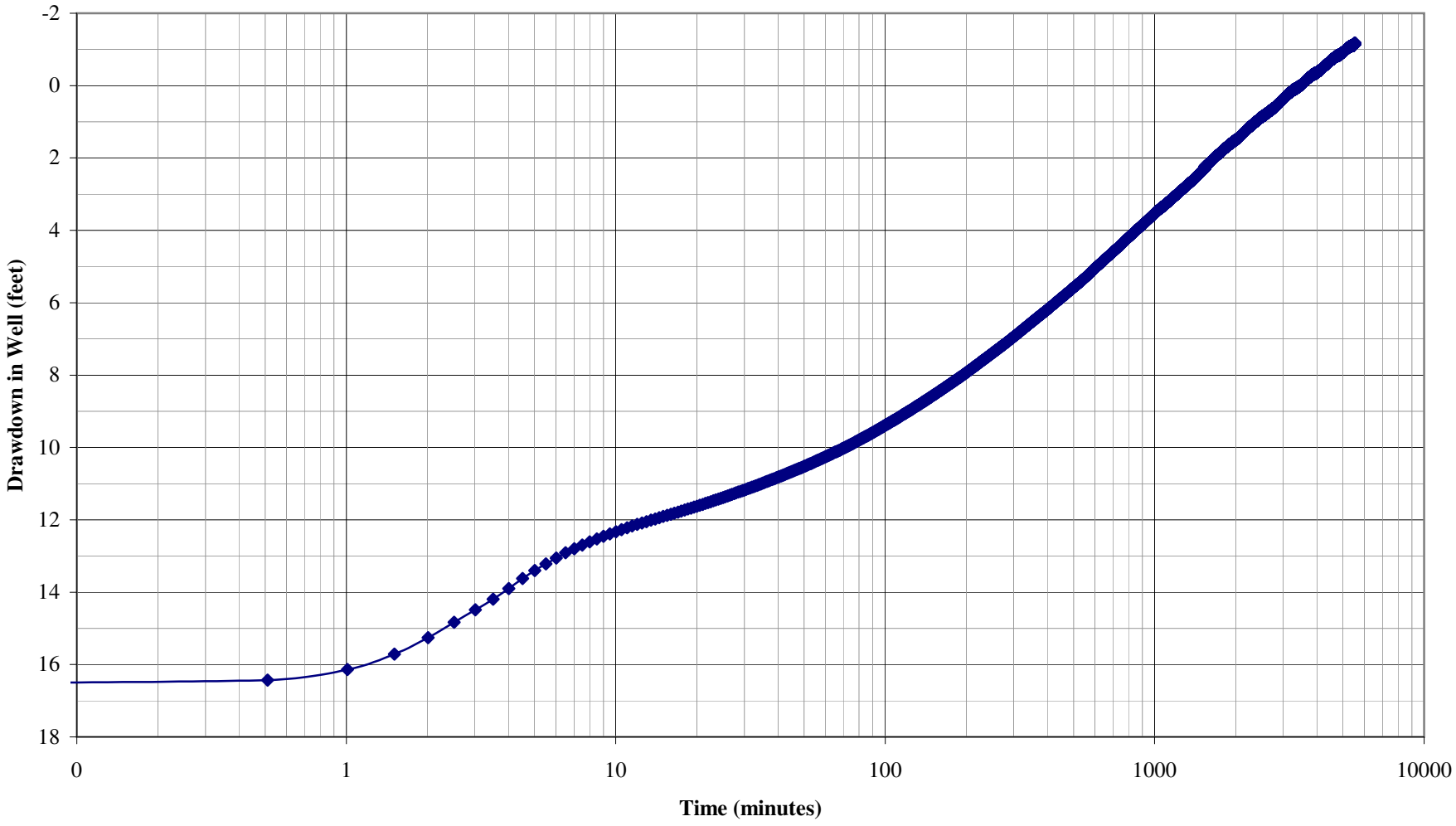


Figure 7
Thing Valley Well
(Observation Well)
Time-Drawdown Plot

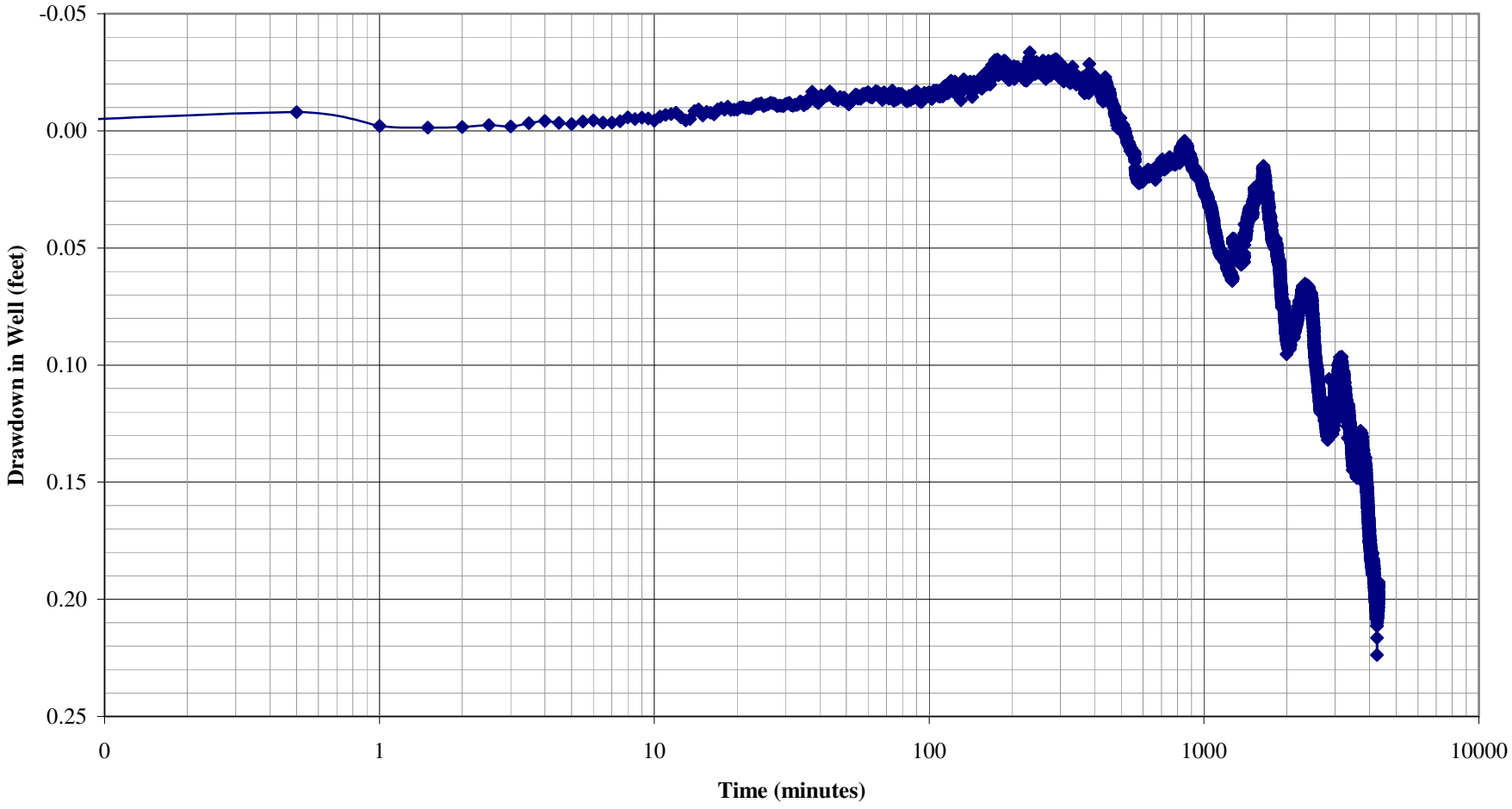
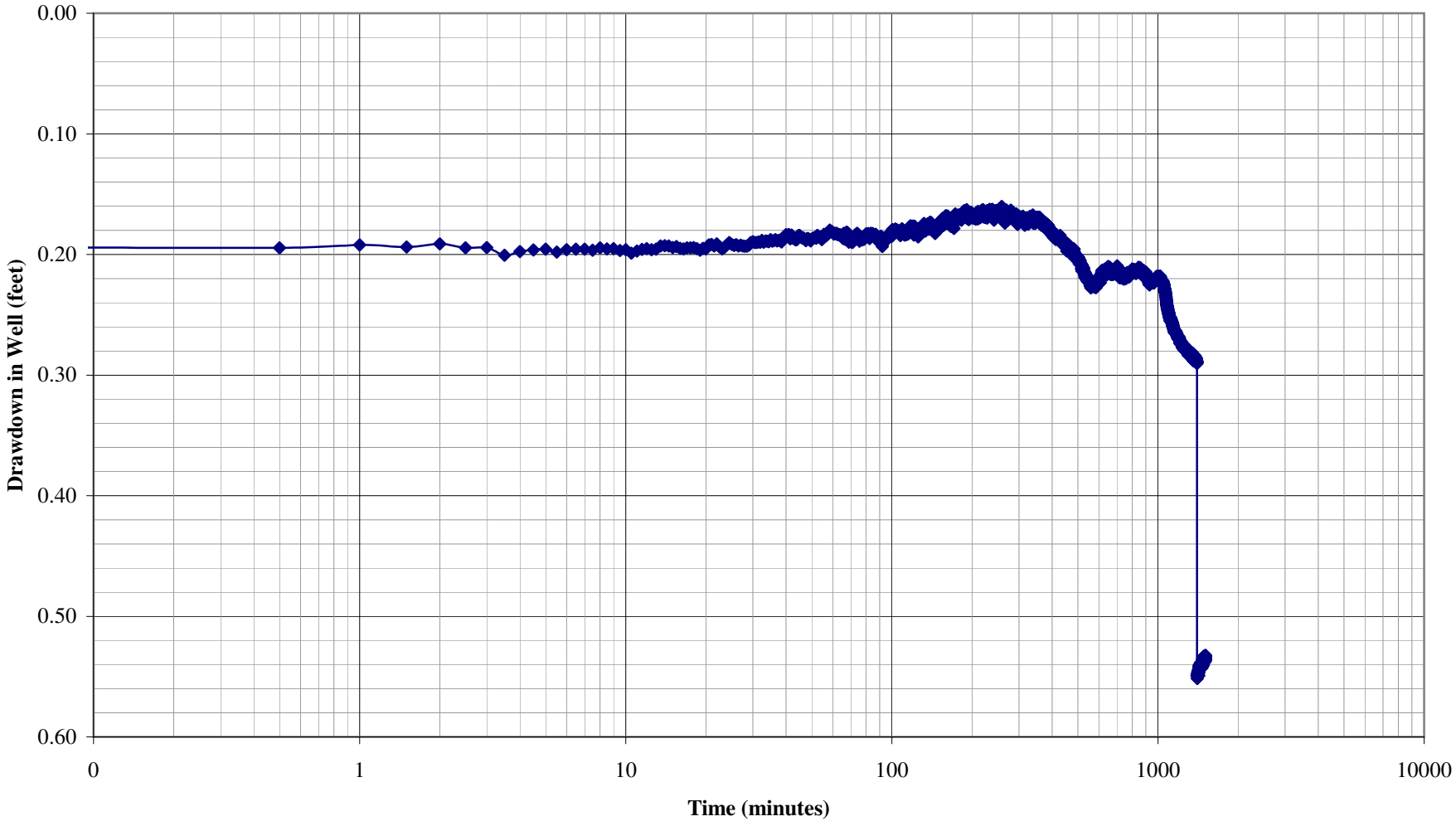
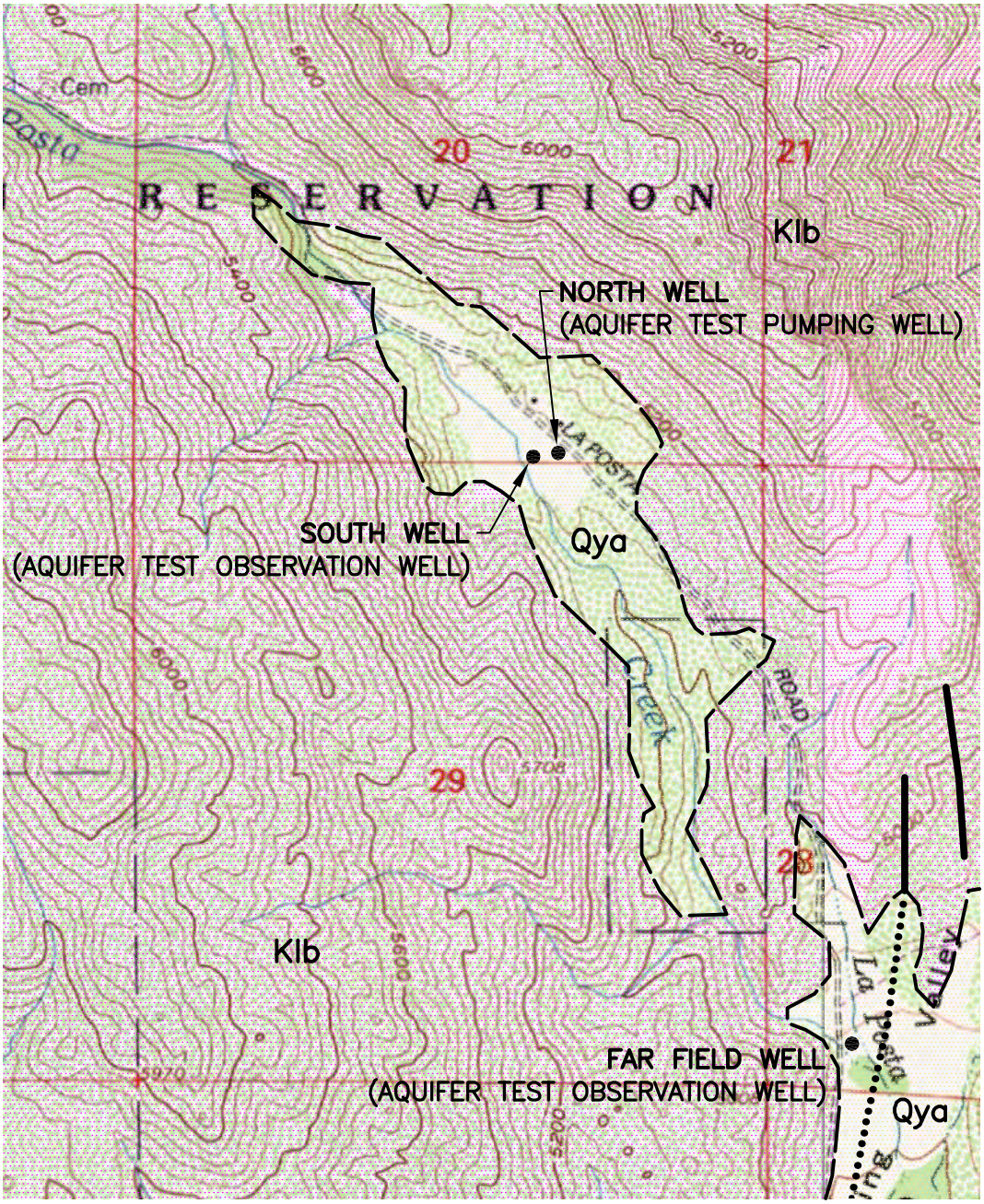


Figure 8
Thing Valley Well
Recovery
Time-Drawdown Plot





EXPLANATION:

Qya	YOUNG ALLUVIUM (HOLOCENE)
Klb	TONALITE OF LAS BANCAS (EARLY CRETACEOUS)
— — — —	APPROXIMATE GEOLOGIC CONTACT
——— ·····	FAULT, DOTTED WHERE CONCEALED

GRAPHIC SCALE

750 0 375 750 1500

(in feet)

1 inch = 1500 ft.

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

FIGURE 9

GEOLOGIC MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	NOVEMBER 2010	2010-005

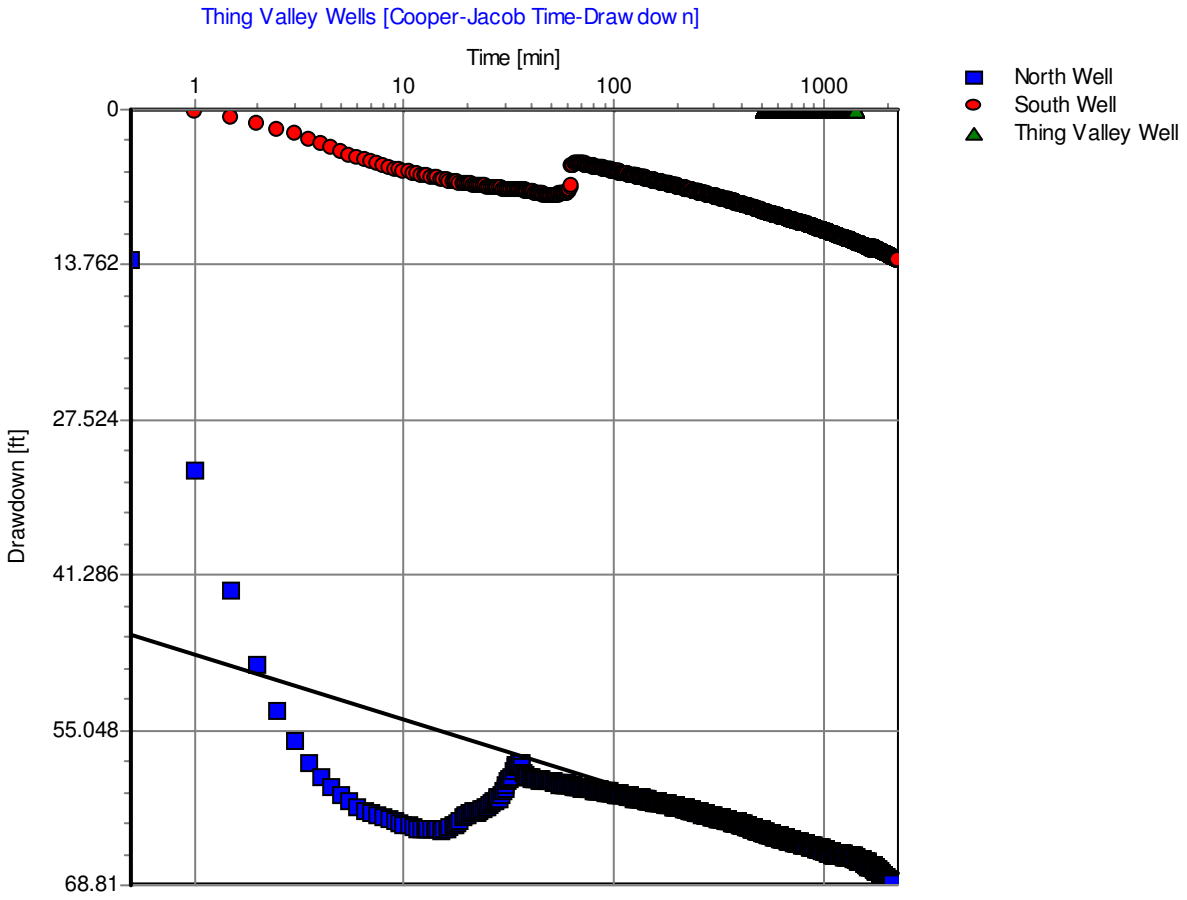
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	4.88E+2 [ft²/d]	Conductivity:	1.39E+0 [ft/d]
	Storativity:	3.33E-9		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: North Well Match to mid-late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

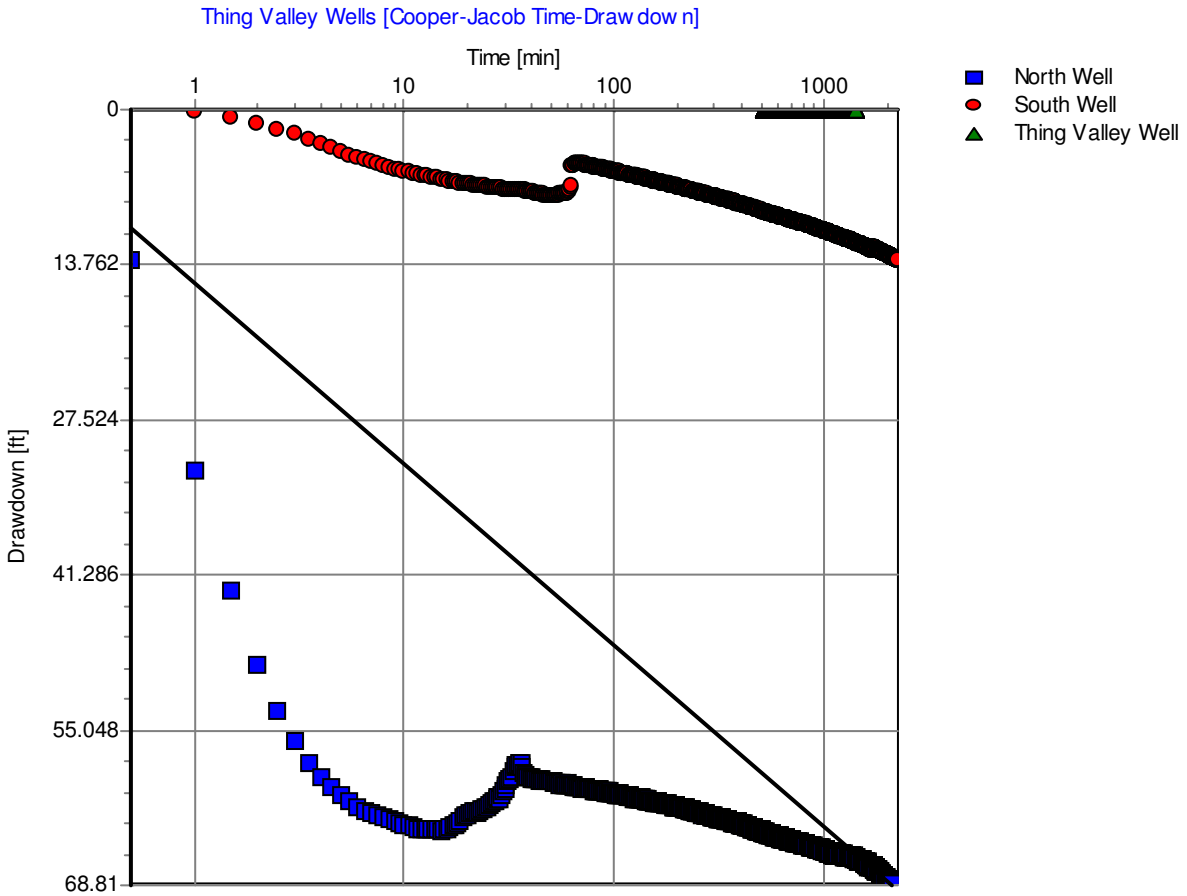
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	1.76E+2 [ft²/d]	Conductivity:	5.02E-1 [ft/d]
	Storativity:	3.05E-2		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: North Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

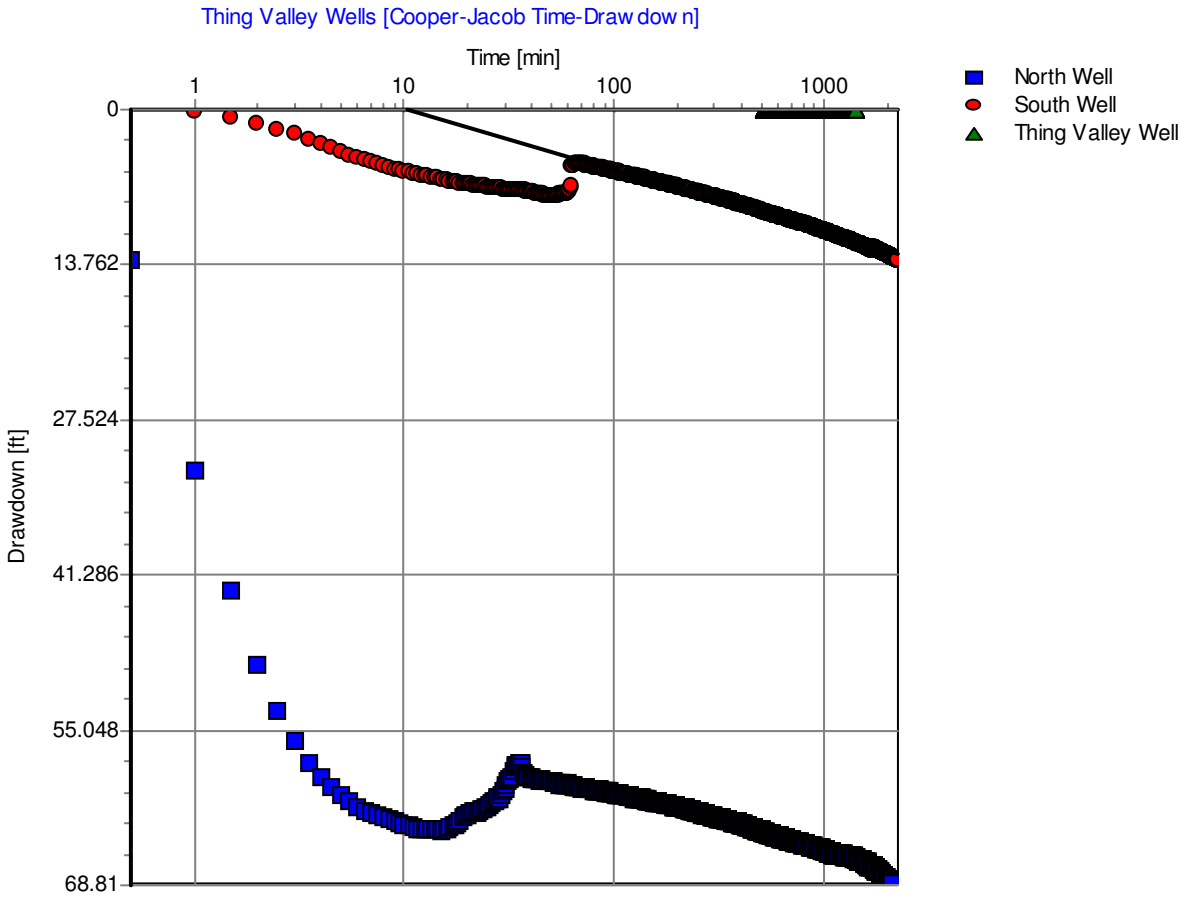
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

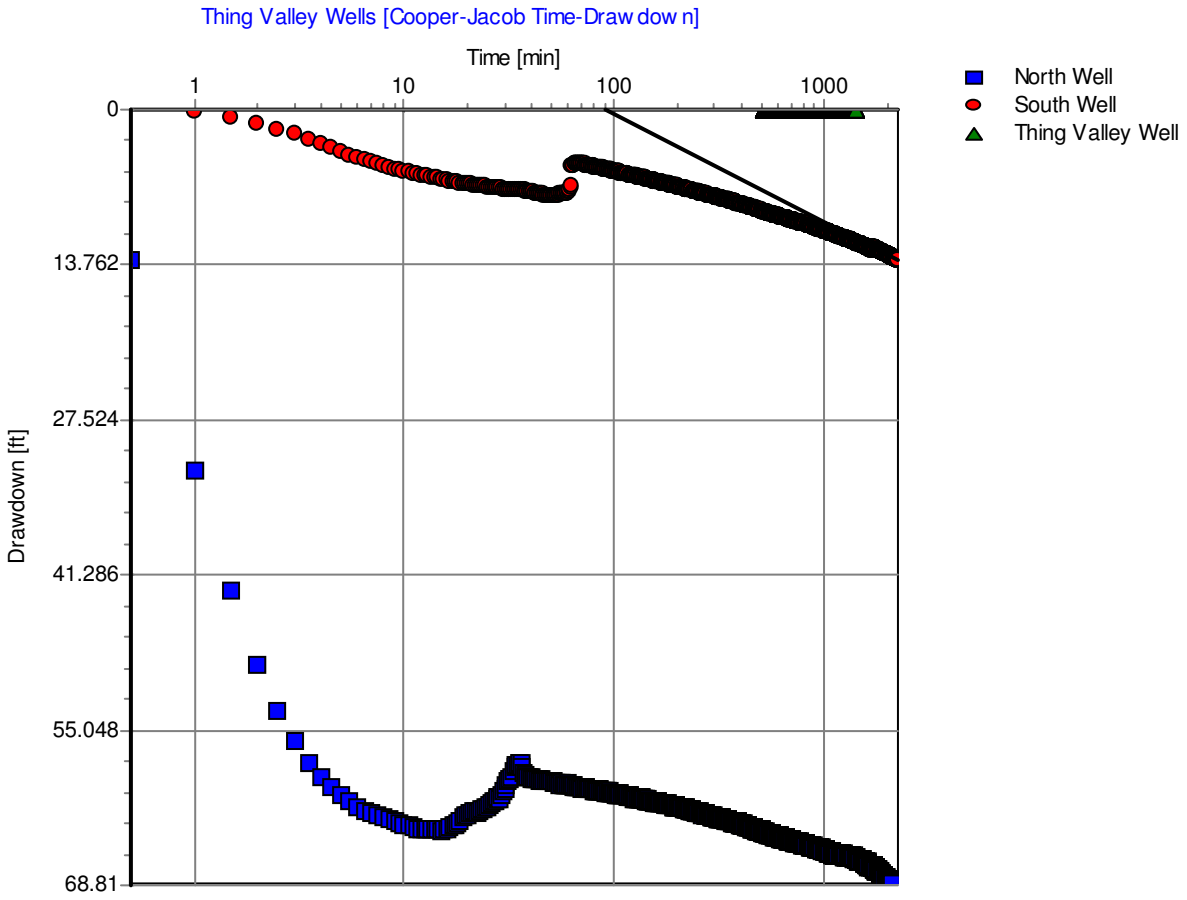
Analysis Results:	Transmissivity:	5.13E+2 [ft²/d]	Conductivity:	1.47E+0 [ft/d]
	Storativity:	8.29E+0		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: South Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:				
	Transmissivity:	2.94E+2 [ft²/d]	Conductivity:	8.41E-1 [ft/d]
	Storativity:	4.19E+1		

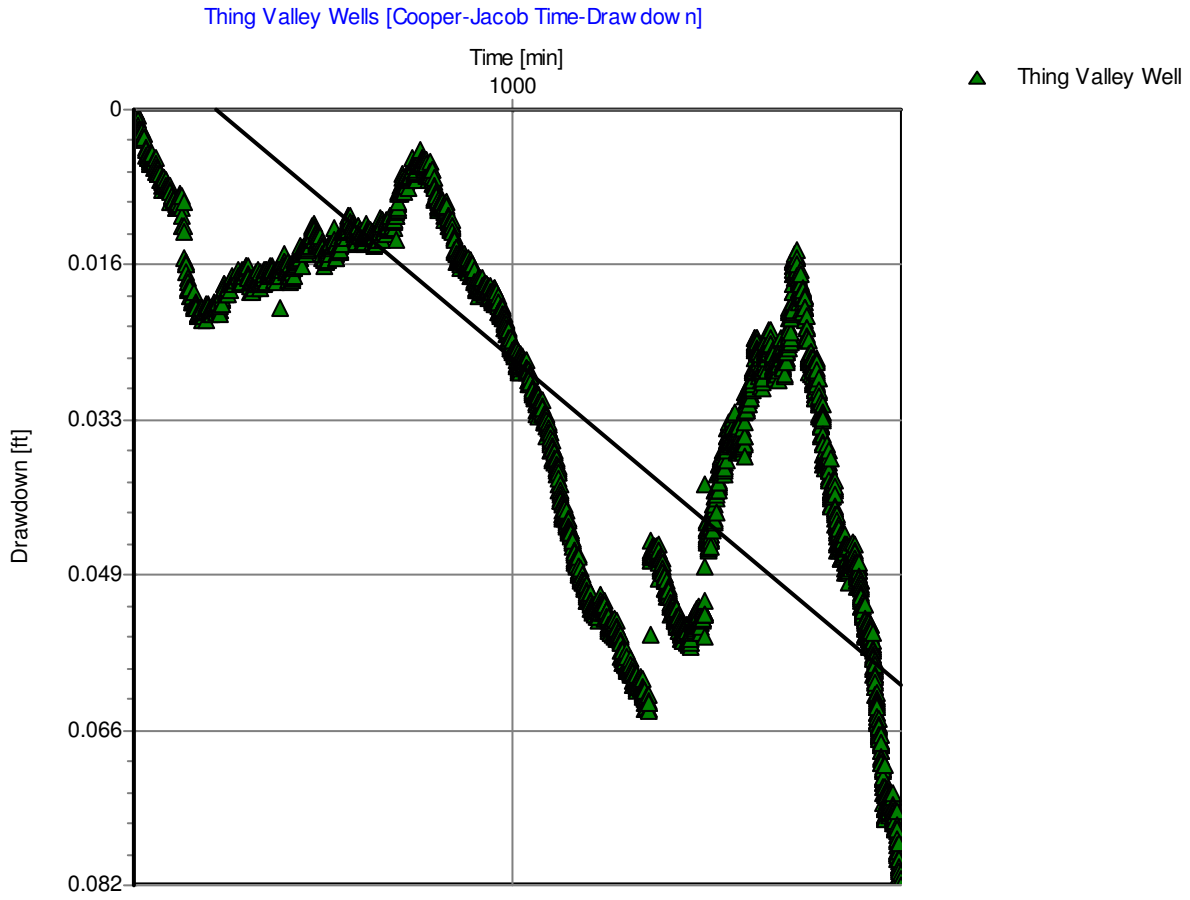
Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: South Well match to very late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	2.41E+4 [ft²/d]	Conductivity:	6.88E+1 [ft/d]
	Storativity:	7.34E-4		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: Thing Valley program best fit match.

Evaluated by: MWV

Evaluation Date: 11/4/2010

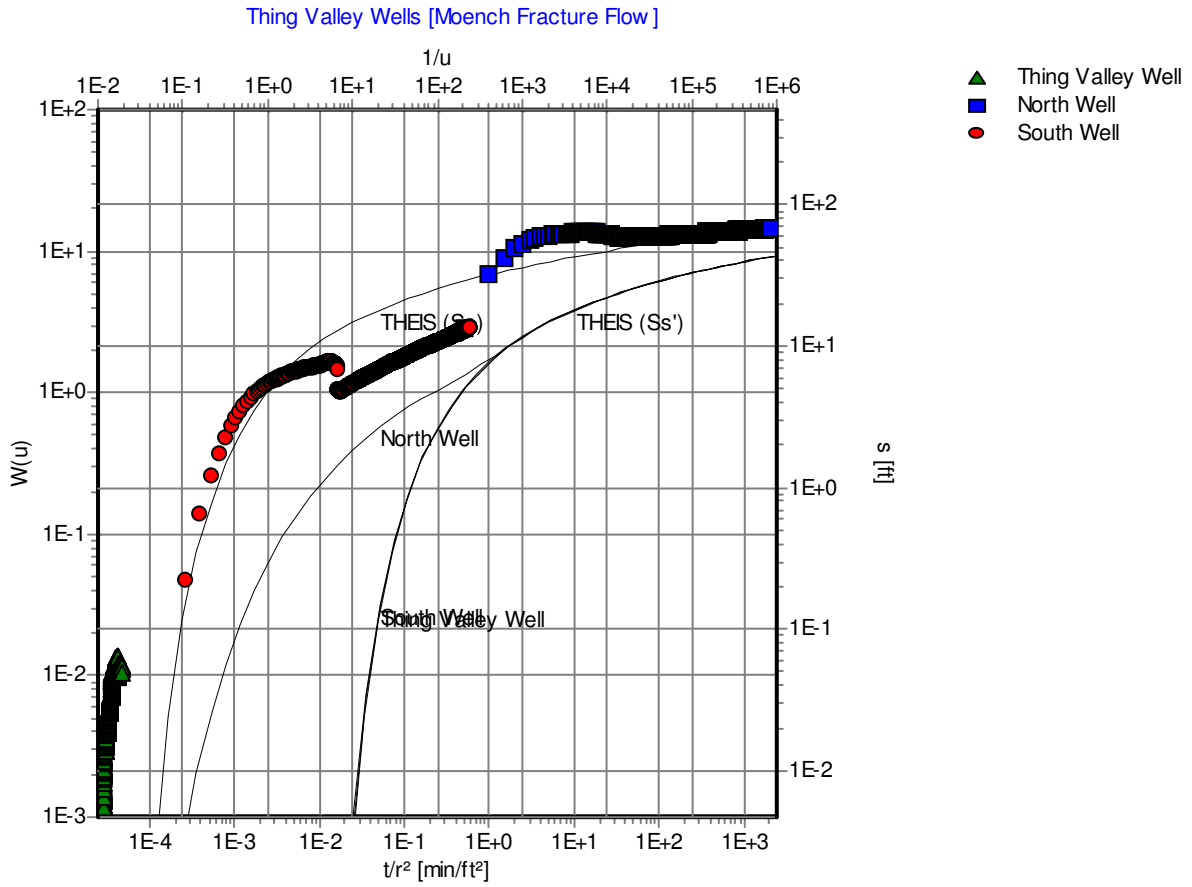
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Moench Fracture Flow**

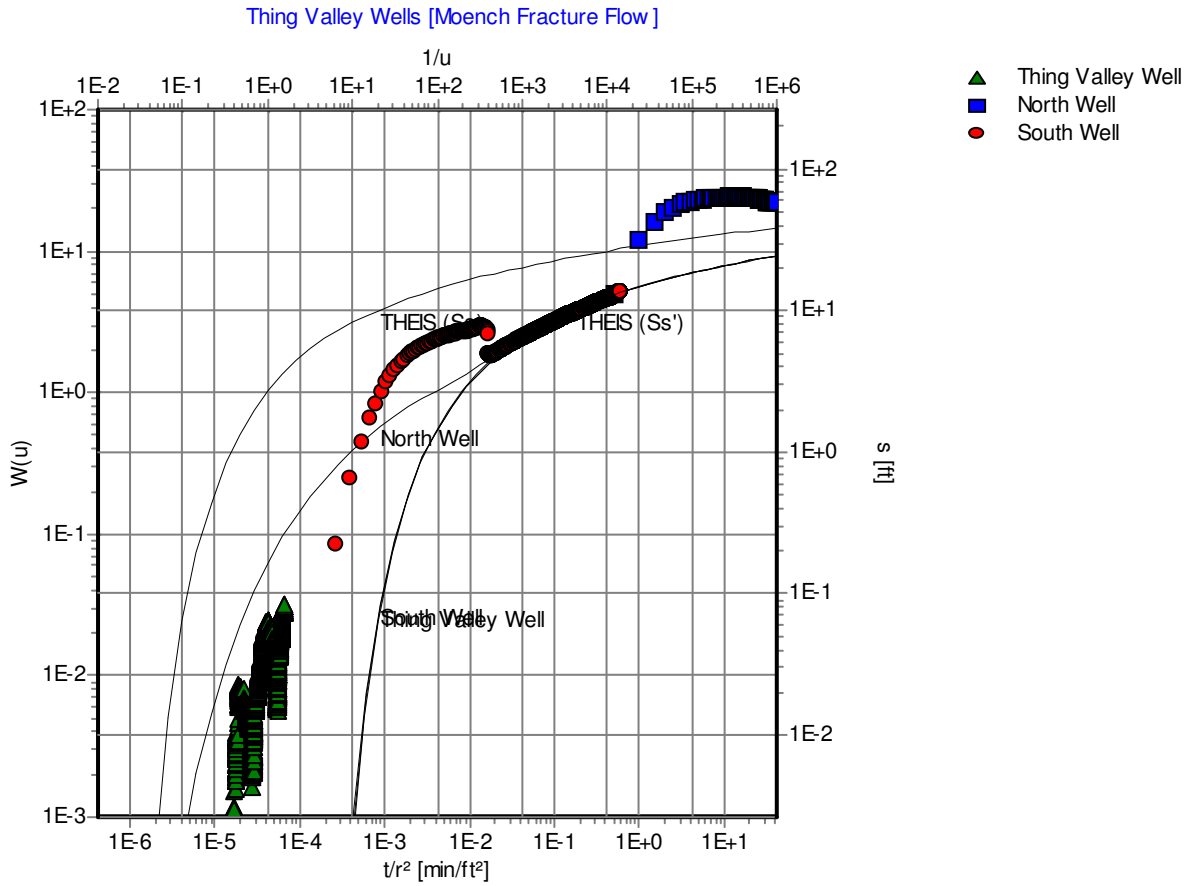
Analysis Results:	Transmissivity:	2.61E+2 [ft²/d]	Conductivity:	7.47E-1 [ft/d]
	Storativity:	4.45E-4		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

Comments: North Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Moench Fracture Flow**

Analysis Results:				
	Transmissivity:	4.67E+2 [ft²/d]	Conductivity:	1.33E+0 [ft/d]
	Storativity:	1.35E-5		

Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/min	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

Comments: South Well match to late data.

Evaluated by: MWV

Evaluation Date: 11/1/2010

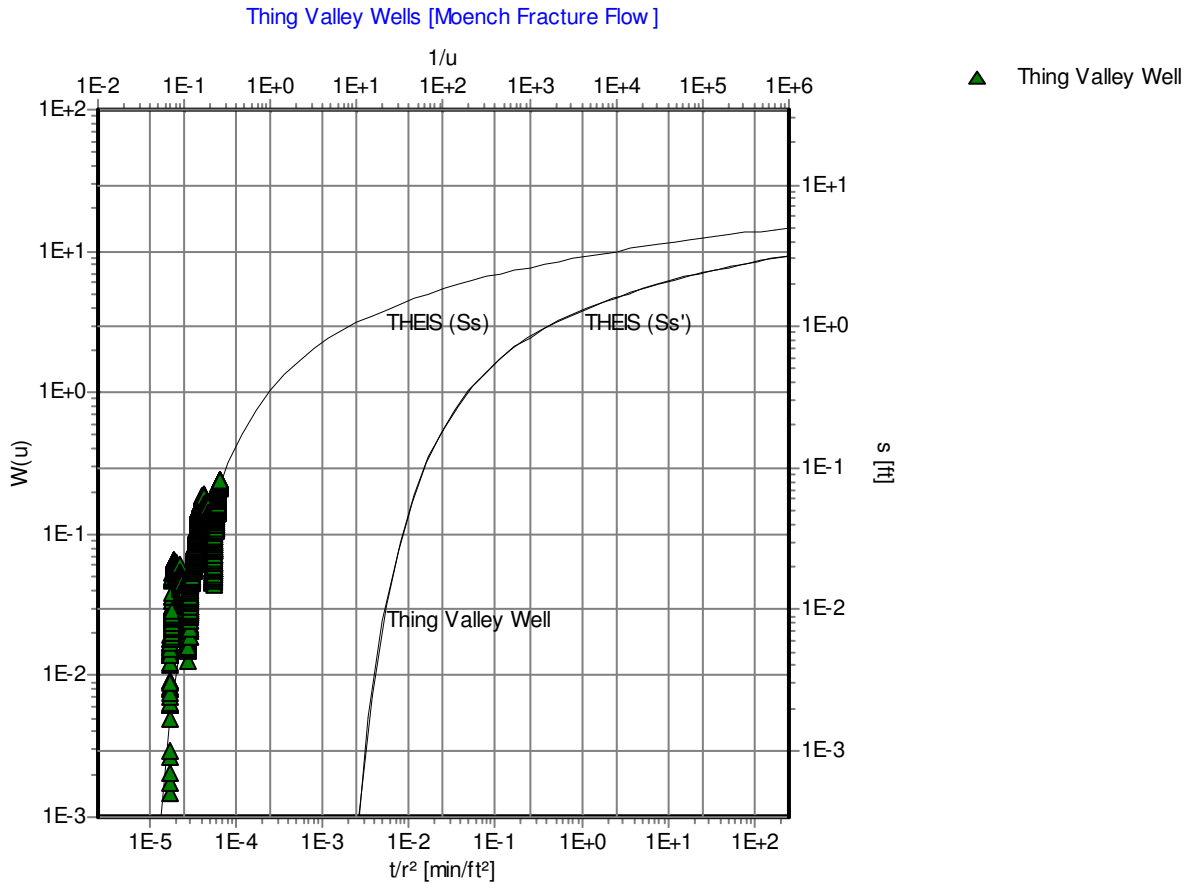
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Moench Fracture Flow**

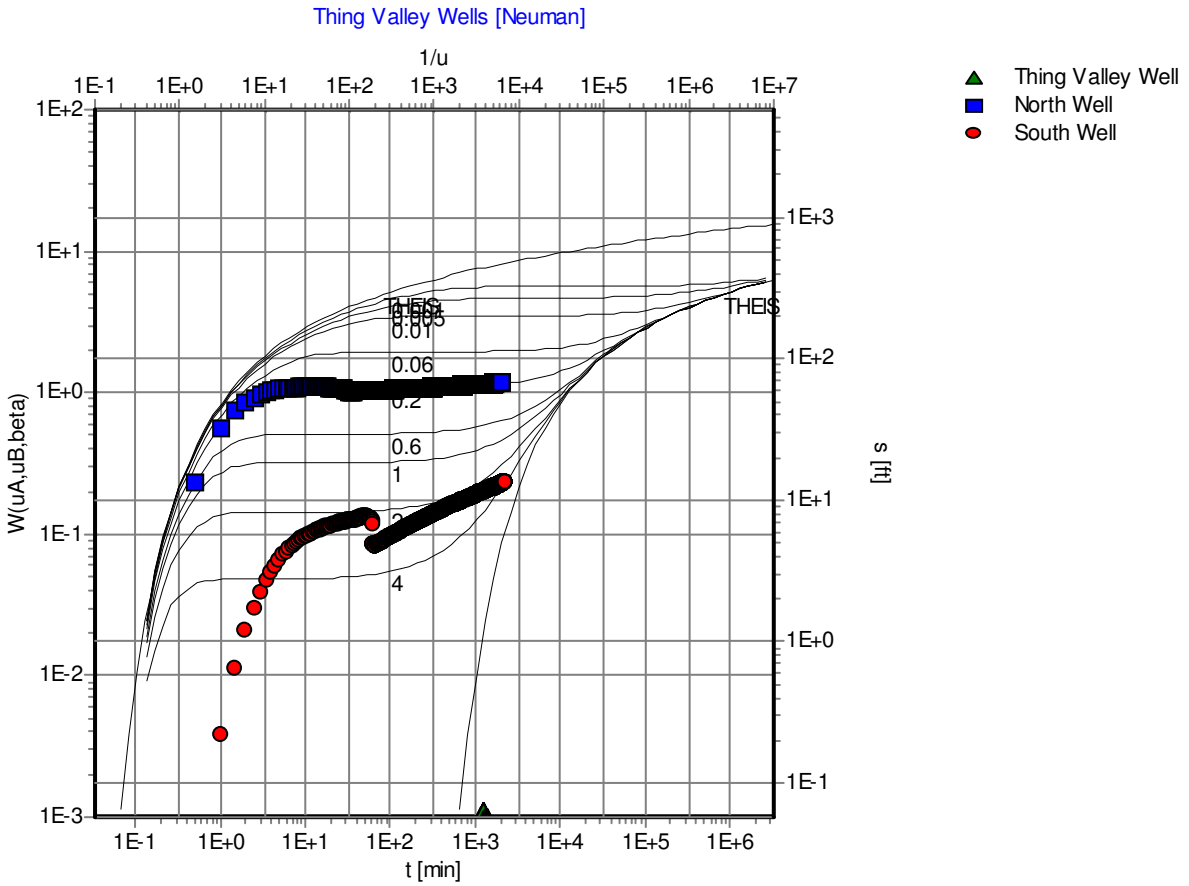
Analysis Results:	Transmissivity:	3.61E+3 [ft²/d]	Conductivity:	1.03E+1 [ft/d]
	Storativity:	6.28E-4		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

Comments: Moench match to Thing Valley Well data.

Evaluated by: MWV

Evaluation Date: 11/4/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report**
	Project: Thing Valley
	Number: 2010-0005
	Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	2.13E+1 [ft²/d]	Conductivity:	6.09E-2 [ft/d]
	Storativity:	1.96E-2	Specific Yield:	1.96E+2

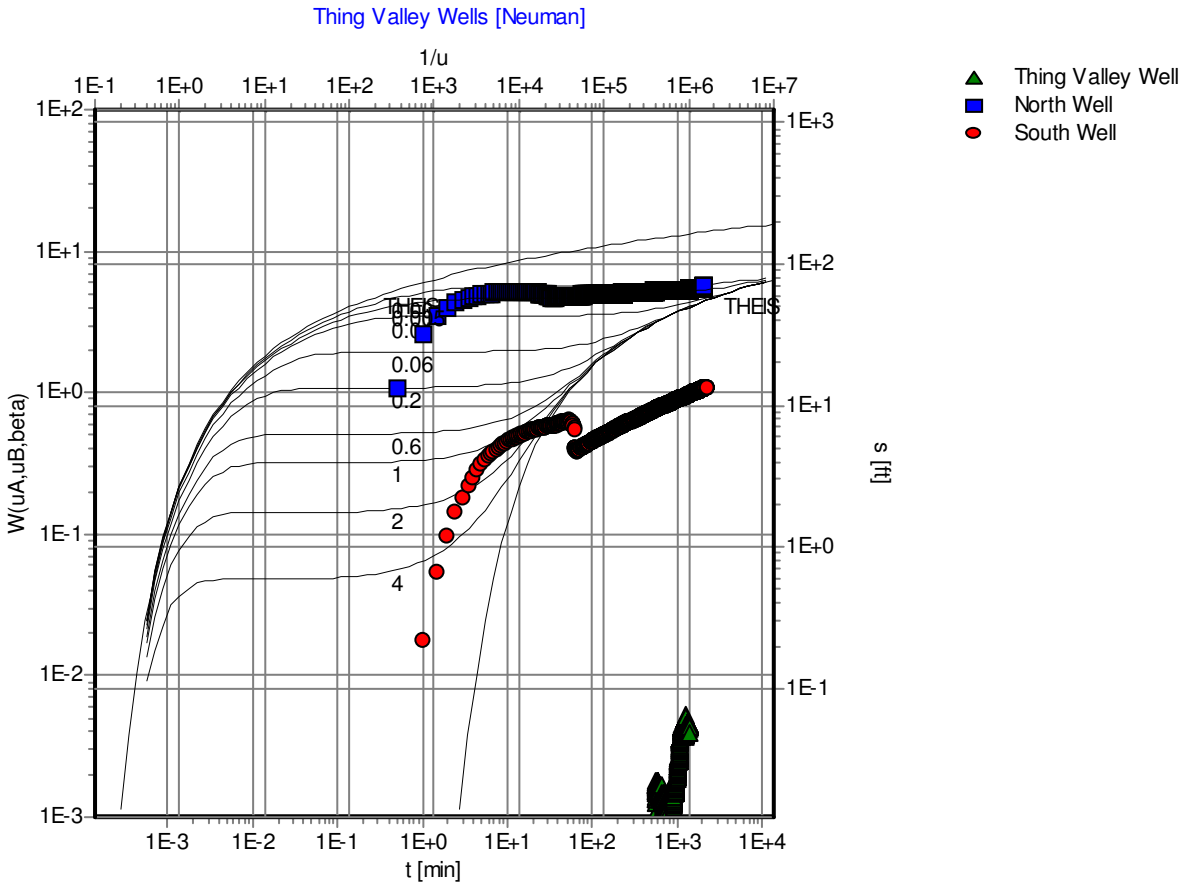
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: North Well match to all data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:				
	Transmissivity:	9.98E+1 [ft²/d]	Conductivity:	2.85E-1 [ft/d]
	Storativity:	3.82E-4	Specific Yield:	3.82E+0

Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: North Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

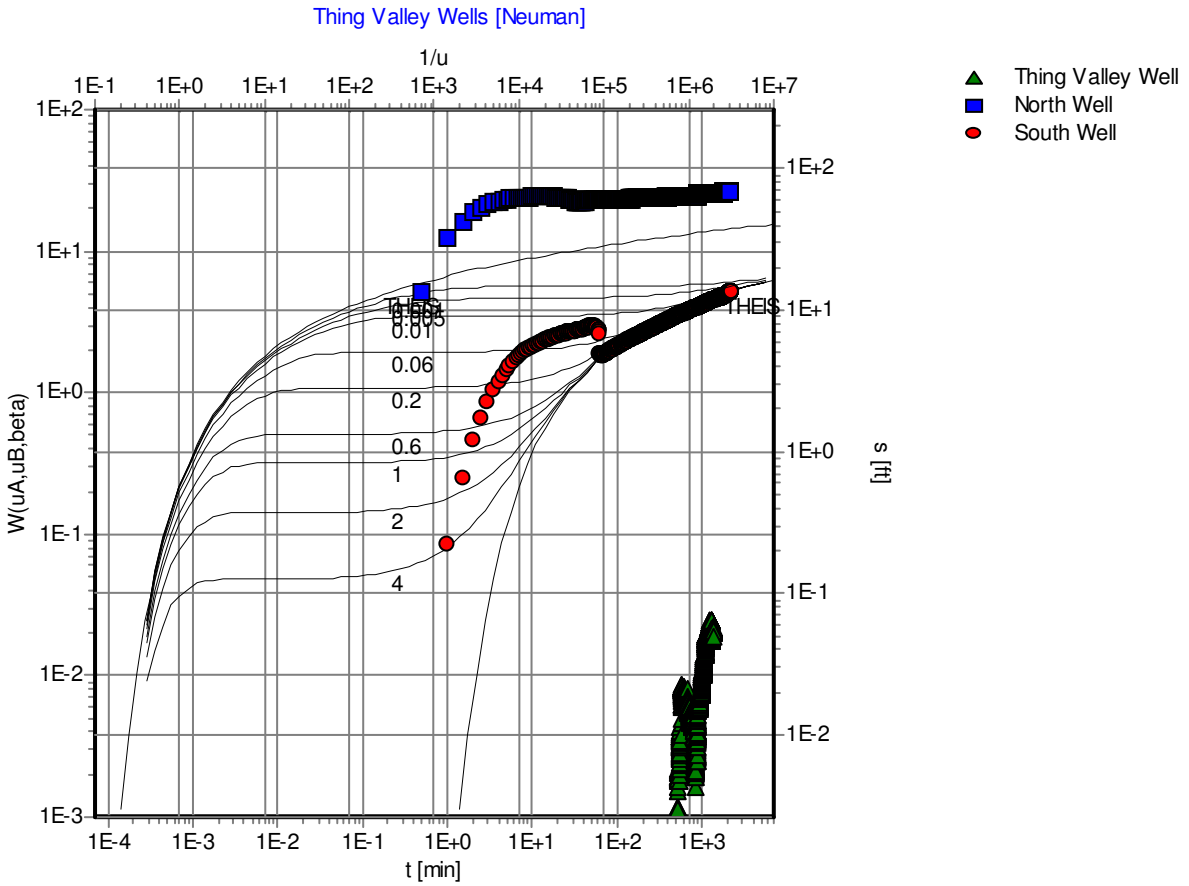
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	4.69E+2 [ft²/d]	Conductivity:	1.34E+0 [ft/d]
	Storativity:	9.12E-4	Specific Yield:	9.12E+0

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: South Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

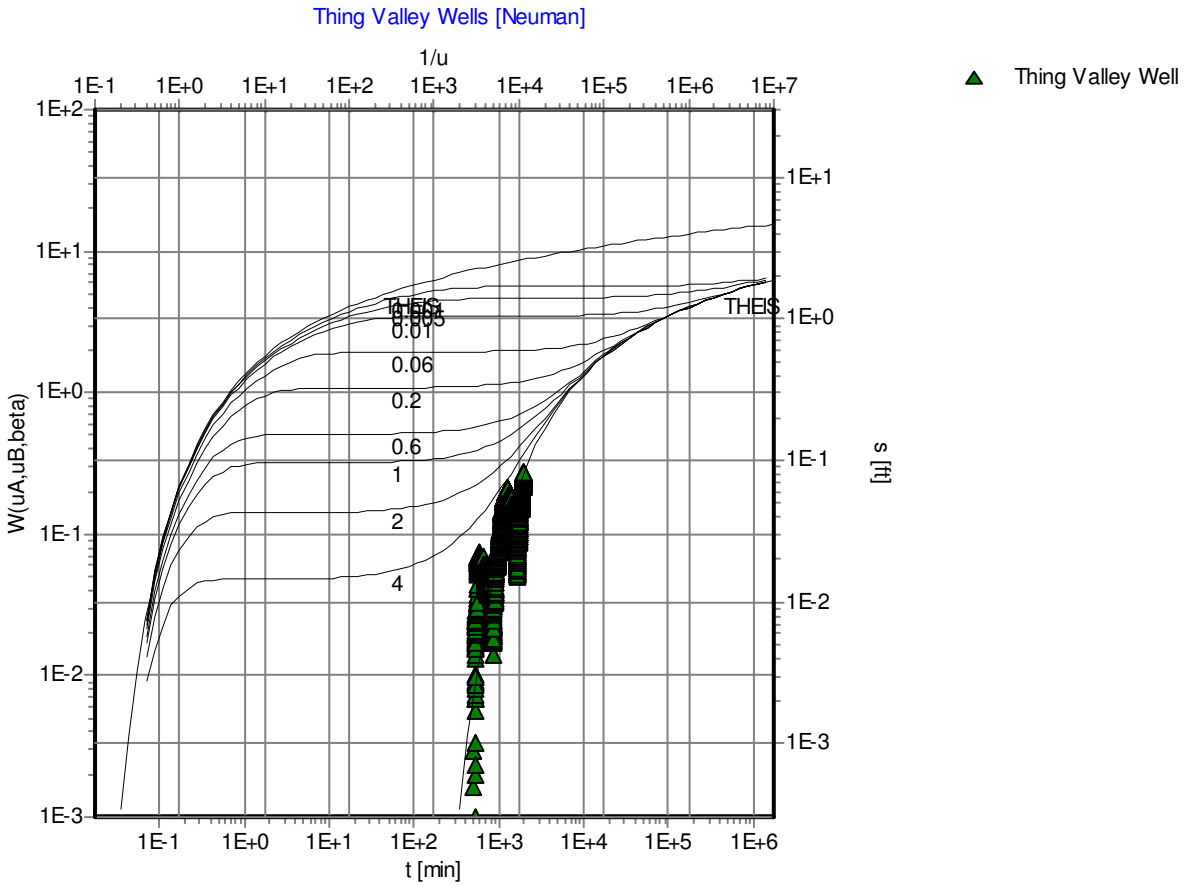
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	4.06E+3 [ft²/d]	Conductivity:	1.16E+1 [ft/d]

Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: Thing Valley data

Evaluated by: MWV

Evaluation Date: 11/4/2010

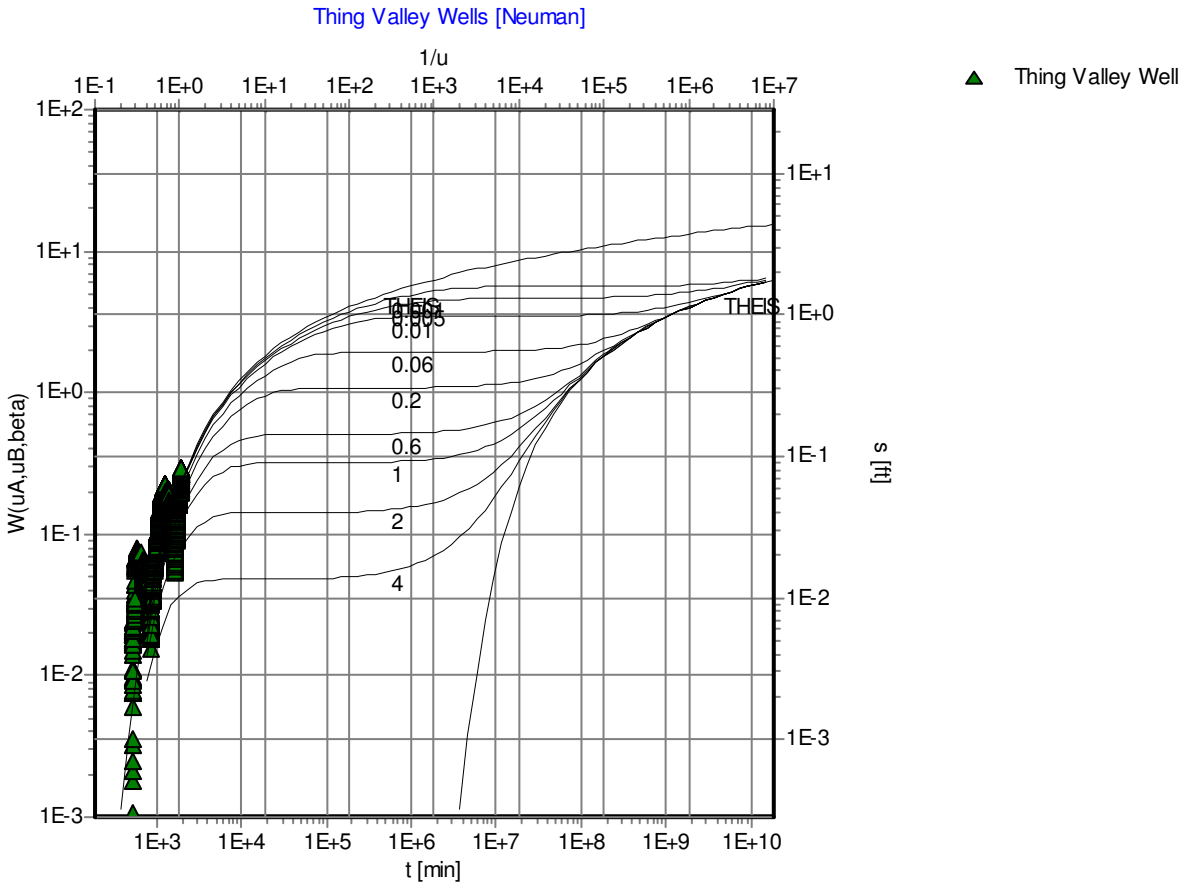
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	4.35E+3 [ft²/d]	Conductivity:	1.24E+1 [ft/d]

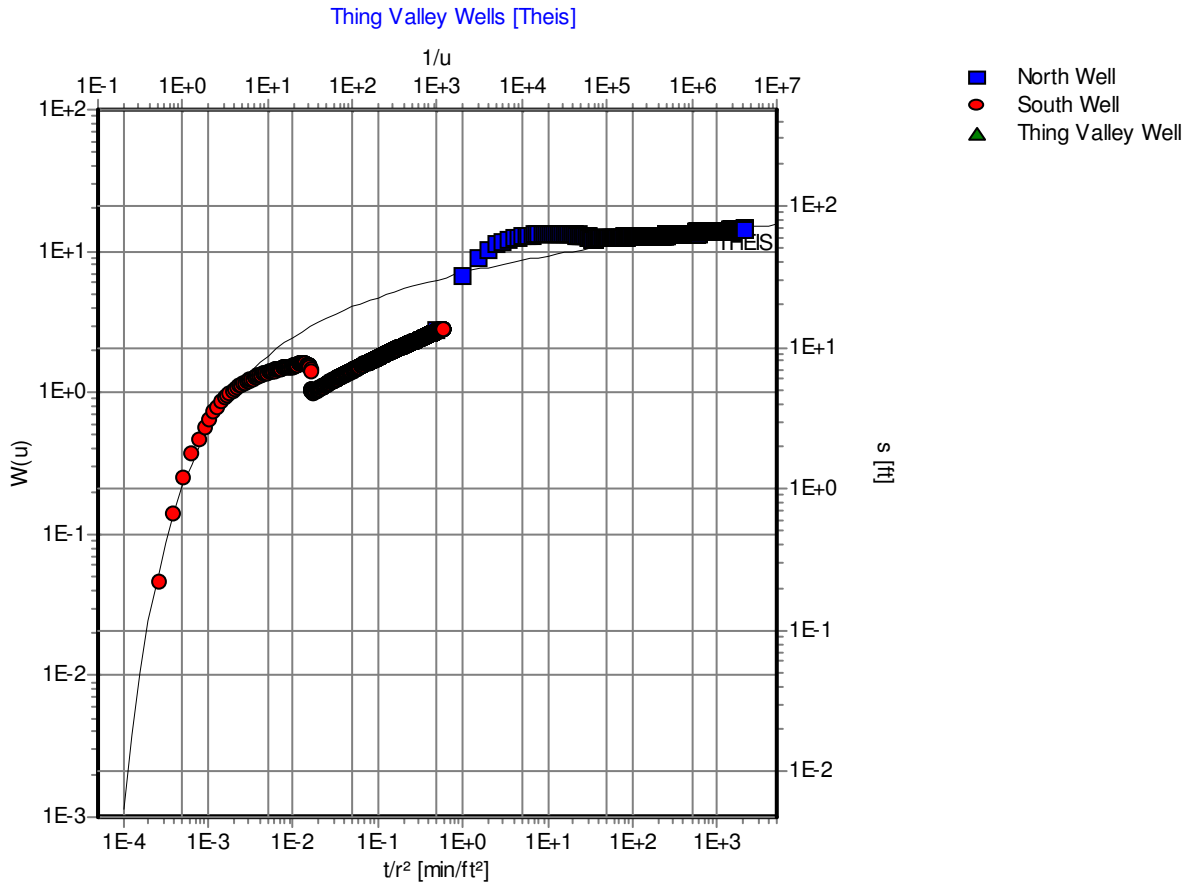
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: Thing Valley data

Evaluated by: MWV

Evaluation Date: 11/4/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	2.56E+2 [ft²/d]	Conductivity:	7.33E-1 [ft/d]
	Storativity:	3.57E-4		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: North Well match to late data.
South Well match to early data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

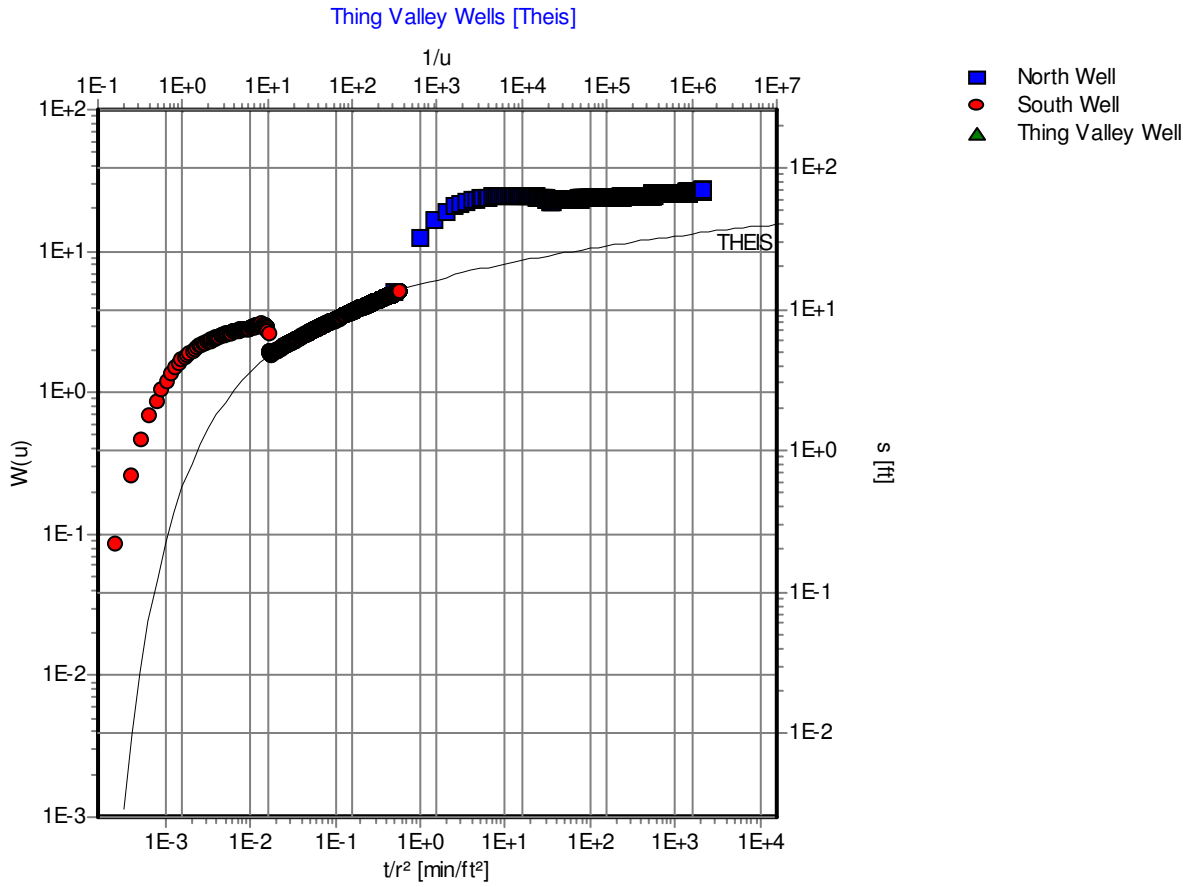
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Theis**

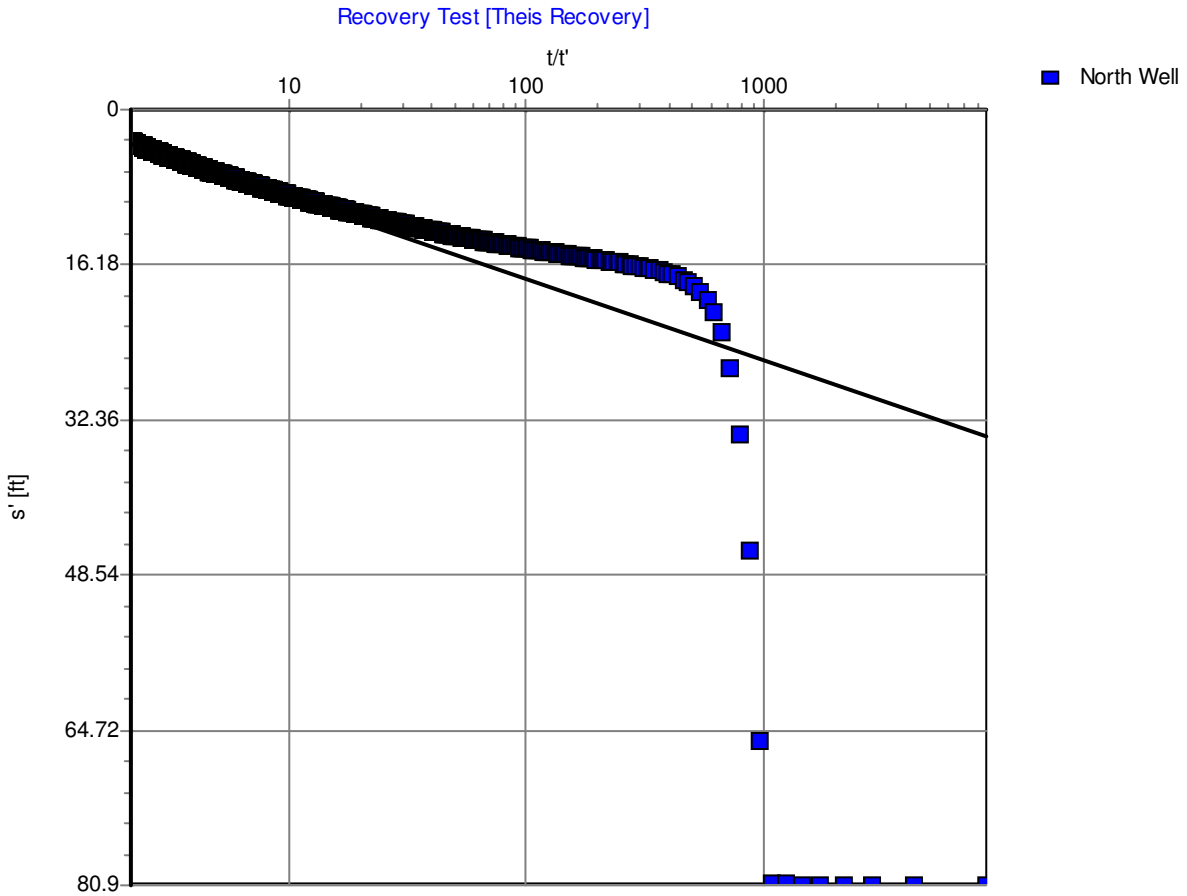
Analysis Results:	Transmissivity:	4.77E+2 [ft²/d]	Conductivity:	1.36E+0 [ft/d]
	Storativity:	2.10E-3		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: Match to South Well late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report**
	Project: Thing Valley
	Number: 2010-0005
	Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	3.37E+2 [ft²/d]	Conductivity:	9.63E-1 [ft/d]

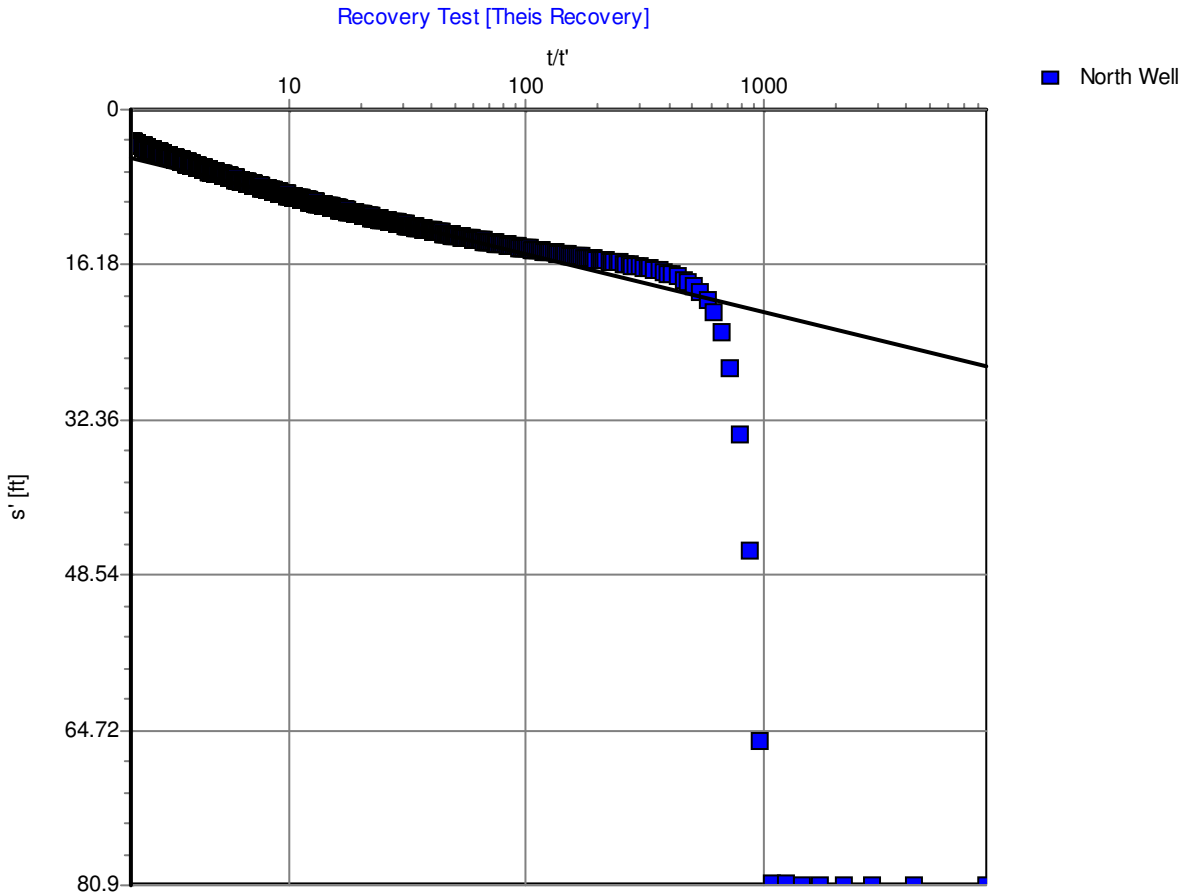
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: North Well recovery match to late data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

Waterloo Hydrogeologic, Inc.	Pumping Test Analysis Report
460 Philip Street - Suite 101	Project: Thing Valley
Waterloo, Ontario, Canada	Number: 2010-0005
Phone: +1 519 746 1798	Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	4.73E+2 [ft²/d]	Conductivity:	1.35E+0 [ft/d]

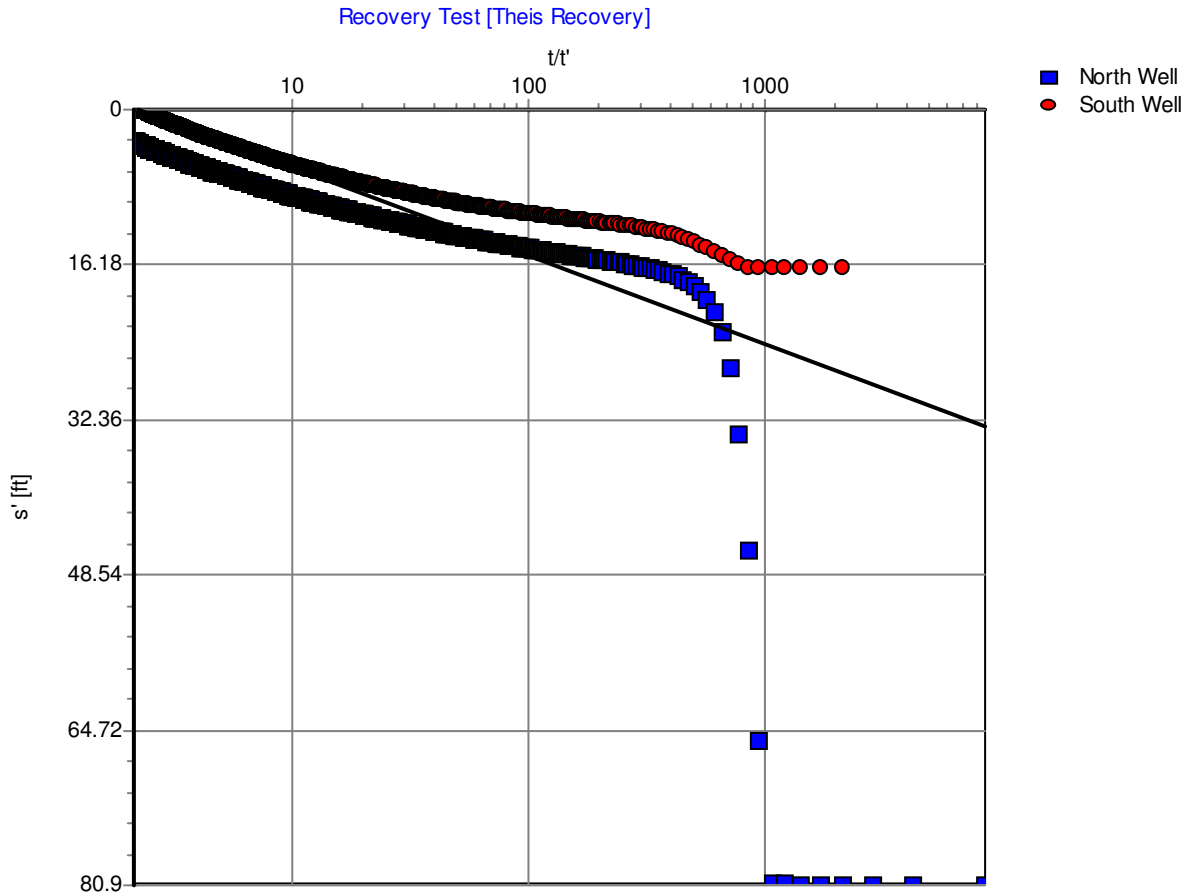
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments:

Evaluated by:

Evaluation Date: 11/2/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report**
	Project: Thing Valley
	Number: 2010-0005
	Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	3.11E+2 [ft²/d]	Conductivity:	8.88E-1 [ft/d]

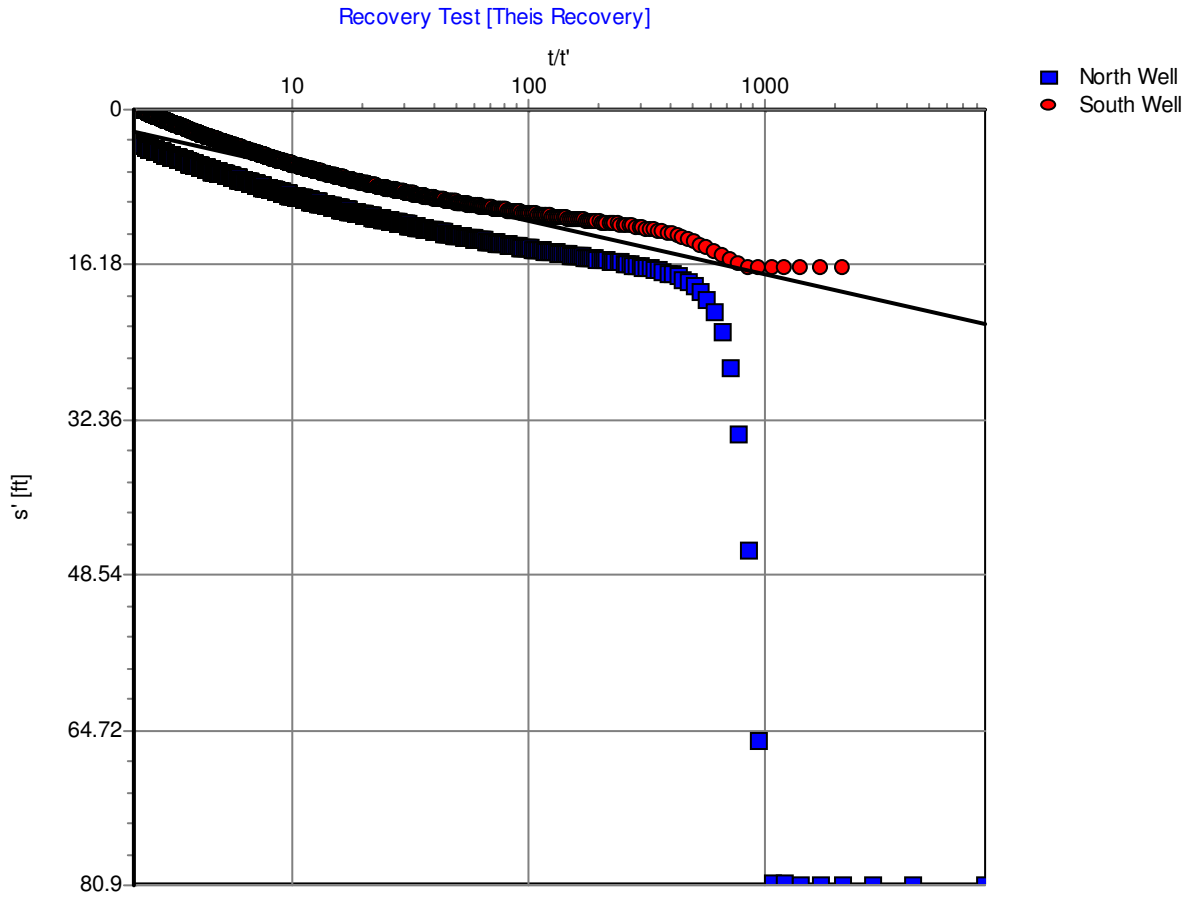
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: South Well Recovery match to late data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report**
	Project: Thing Valley
	Number: 2010-0005
	Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	5.08E+2 [ft²/d]	Conductivity:	1.45E+0 [ft/d]

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: South Well Recovery match to middle data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

1

ABANDONED/DESTROYED

TOO CLOSE TO
SEPTIC TANK

2

Pump in well
NO power

pumped this w/
generator worked
fine

Just east of
water storage
tank

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

WELL #2

INVOICE

ERMIT TYPE & NUMBER: LWEL 16225 INVOICE DATE: 16 SEP 2004

'ERMIT OWNER: CONTACT:
IANOS DRILLING & PUMP
6052 LAWSON VALLEY RD.

AMUL CA 91935

APN: ~~611-070-03-00~~ 611-060-03 611-070-01

APPLICANT:
FADEM ROBERT S&MARY O TRUST B1

SITE ADDRESS: ~~2750~~ MCCAIN VALLEY RD BOULEVARD 91905

LOCATION DESCRIPTION: ~~2750~~ MCCAIN VALLEY RD ~~JACUMBA 92036~~ --

'ROJECT DESCRIPTION/SCOPE
Number of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

FEE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			TOTAL AMOUNT DUE	$390.00

1-112
R 76
Sec: 9

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel #2 120 acres

DEH USE ONLY
PERMIT # W 16225
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hanson Companies Phone: 440-7424
   1100 Pioneer Way (Mailing Address) El Cajon (City) 92020 (Zip)
2. Well Location - Assessors Parcel Number ~~611-070-03~~ 611-060-03 611-070-01
   McCain Valley (Site Address) ~~Parcel H~~ Boulevard (City) (Zip)
3. Well Contractor - Well Driller Jim Mann Company Name: Jim Mann Drilling
   1655 Lanai Vista Ave. (Mailing Address) Jamul (City) 91935 (Zip)
   Phone#: 415 1926 C-57#: 316722 ☑ Cash Deposit ☐ Bond Posted
4. Use: ☐ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: Air Rotary
7. Depth of Well: Proposed: 300 Existing: 0
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: 150'	Depth: ft.	From: To:	From: To:
Diameter 7 in.	Diameter in.	Type:	From: To:
Wall/Gauge: 1/4	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: 50 ft. Sealing Material: Cement
   Borehole diameter: 11 in. Conductor diameter: in. Annular Thickness 2 in.
10. Date of Work: Start: 9-14-04 Complete: 10-4-04

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: Jim Mann Date: 9-16-04

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Jerry O'Call Date: 9/16/04

No public water to site

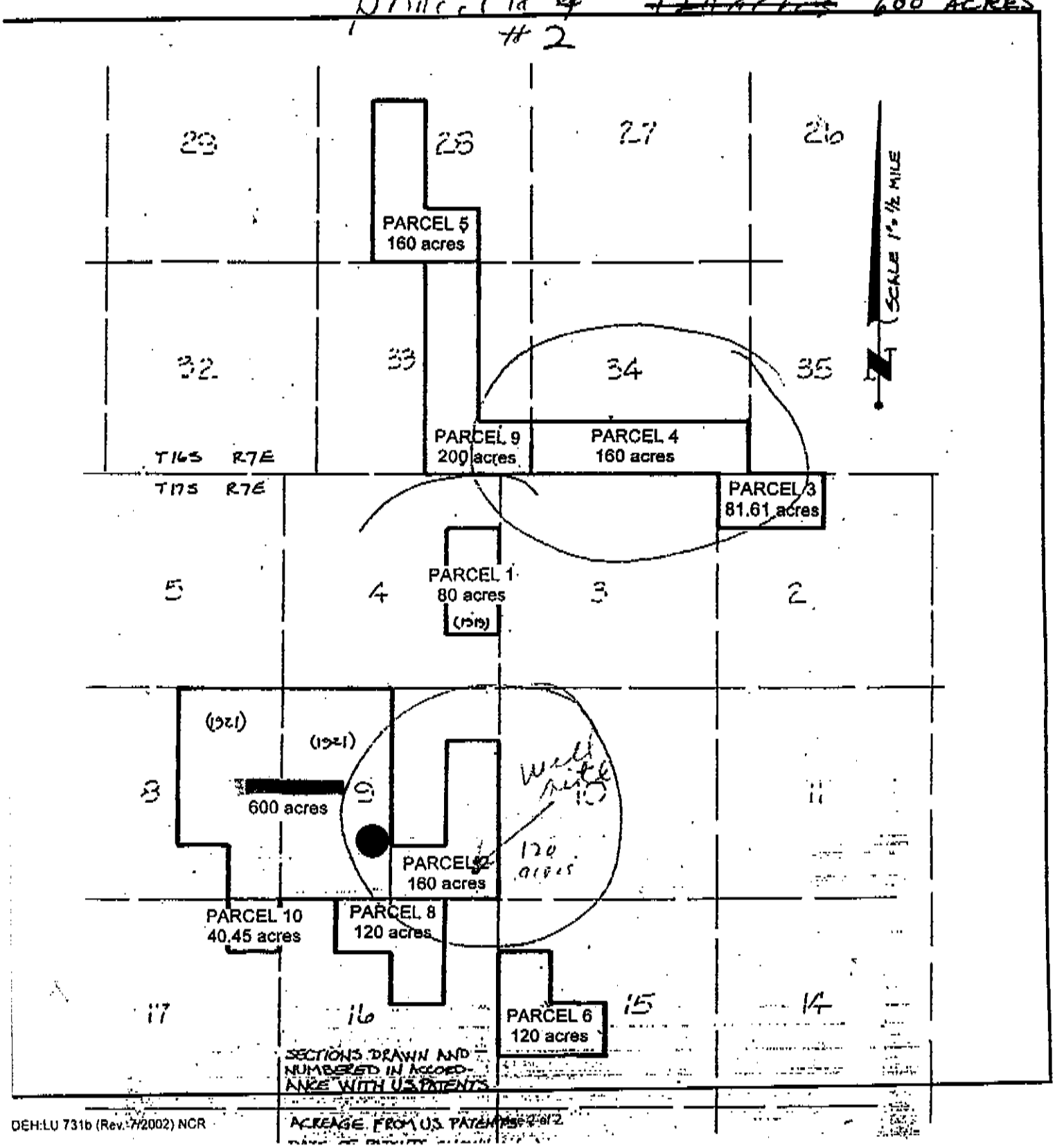
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16225
Assessor's Parcel Number: ~~611-070-03~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel #4 #2 ~~12 acres~~ 600 ACRES



-2-

County Mail Station —A-21

ASSESSORS PARCEL NUMBER:

FIRST CARBON COPY

PUMP 160

1/2000

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

Notice of Intent No. _____
Local Permit No. or Date _____

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

State Well No. _____
Other Well No. _____

(1) OWNER: Name John Gibson #6
Address _____
City _____ Zip _____

(2) LOCATION OF WELL (See instructions):
County _____ Owner's Well Number _____
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

(12) WELL LOG: Total depth 600 ft. Depth of completed well 185? ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-2 - LOOSE SOIL
2-15 - D.G. GRAY
15-70 - BLACK WHITE ROCK
70-71 - SOFTER (2 GPM)
71-90 - BLACK WHITE ROCK
90-92 - SOFTER ORANGE (2 GPM)
92-168 - BLACK WHITE ROCK, SOME SOFT AREAS
168-178 - VERY SOFT (6 GPM)

DEPARTMENT USE ONLY
Completed Well Construction:
Date _____
Date Inspected _____
Comments _____
Water Sample Taken? _____
Sanitarian's Approval: _____

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in item (12))

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

6/4

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack: NONE
Yes ☐ No ☒ Size _____
Diameter of above _____
Packed from _____ to _____ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	24'	7"	156			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing BENTONITE-CEMENT

(10) WATER LEVELS:
Depth of first water, if known 70' ft.
Standing level after well completion 45' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test — ft.
Discharge 10 gal/min after 3 hours Water temperature Cold
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

Work Started _____ 19 Completed _____ 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature]
(Well Driller)

NAME _____
(Person, firm, or Corporation) (Type or Print)

ADDRESS _____

CITY _____ ZIP _____

LICENSE NO. _____ DATE THIS REPORT _____

DHS:EHP-732 (83) CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1
Owner's Well No. 2
Date Work Began 10-1-04, Ended 10-1-04
Local Permit Agency San Diego E.H.E.
Permit No. LWEL16225 Permit Date 9-16-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909404

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 2	loose soil
2 15	dg, gray
15 70	black & white rock
70 71	softer
71 90	black & white rock
90 92	softer, orange
92 168	black & white rock
	some softer areas
168 178	very soft

TOTAL DEPTH OF BORING 600 (Feet)
TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER
Name Hamann Companies
Mailing Address 1040 Pioneer Way
CITY El Cajon, Ca 92020 STATE ZIP

WELL LOCATION
Address McCain Valley
City Jacumba
County San Diego
APN Book 611 Page 070 Parcel 02
Township 17 S Range 7E Section 9
Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH
NORTH
WEST EAST
See Attached
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)
x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 70 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 45 (Ft.) & DATE MEASURED 10-4-04
ESTIMATED YIELD * 10 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN - (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 24	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE: CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 24	x	x		

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
1 Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
15052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP
Signed [signature] 3-1-06
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER 360722

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SECTION

#3

NO PUMP

NO POWER

WELL IS CAPPED

LOW GPM

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#3

INVOICE

PERMIT TYPE & NUMBER: LWEL 16223 **INVOICE DATE:** 16 SEP 2004

PERMIT OWNER:
MANOS DRILLING & PUMP
16052 LAWSON VALLEY RD.

JAMUL CA 91935

CONTACT:

APPLICANT:
FADEM ROBERT S&MARY O TRUST B1

APN: ~~529-150-01-00~~ 611-060-03 611-070-01

SITE ADDRESS: ~~3057~~ MCCAIN VALLEY RD BOULEVARD 91905

LOCATION DESCRIPTION: ~~3057~~ MCCAIN VALLEY RD. ~~EL CAJON 92020~~

PROJECT DESCRIPTION/SCOPE
Number of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

FEE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:28 9773 773 429E01 CHECK	[illegible]
			TOTAL AMOUNT DUE	$390.00

T-11 S
R 7E
Sec. 34

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel # 4 ~~160 acres~~ 600 ACRES

DEH USE ONLY
PERMIT # WEL16223
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 446-7424
   1000 Pioneer Way (Mailing Address) — Oceanside (City) — 92020 (Zip)
2. Well Location - Assessors Parcel Number ~~S 29-150-34~~ 611-060-03 611-070-01
   McCain Vly (Site Address) — ~~[illegible]~~ (City) — BOULEVARD 91905 (Zip)
3. Well Contractor - Well Driller Jim Manes Company Name: Jim Manes Drilling
   16052 Lawson Vly (Mailing Address) — Jamul (City) — 91935 (Zip)
   Phone#: 445-1926 C-57#: 560722 ☒ Cash Deposit ☐ Bond Posted
4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other
5. Type of Work: ☒ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: Air Rotary
7. Depth of Well: Proposed: 300 Existing: 0
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: 20	Depth: ft.	From: To:	From: To:
Diameter 7 in.	Diameter in.	Type:	From: To:
Wall/Gauge: 155	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: 20 ft. Sealing Material: Bentonite Cement
   Borehole diameter: 11 in. Conductor diameter: in. Annular Thickness 2 in.
10. Date of Work: Start: 9-27-04 Complete: 9-30-04

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [signature] Date: 9-16-04

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Danny O'Calle Date: 9/16/04

No public water to site

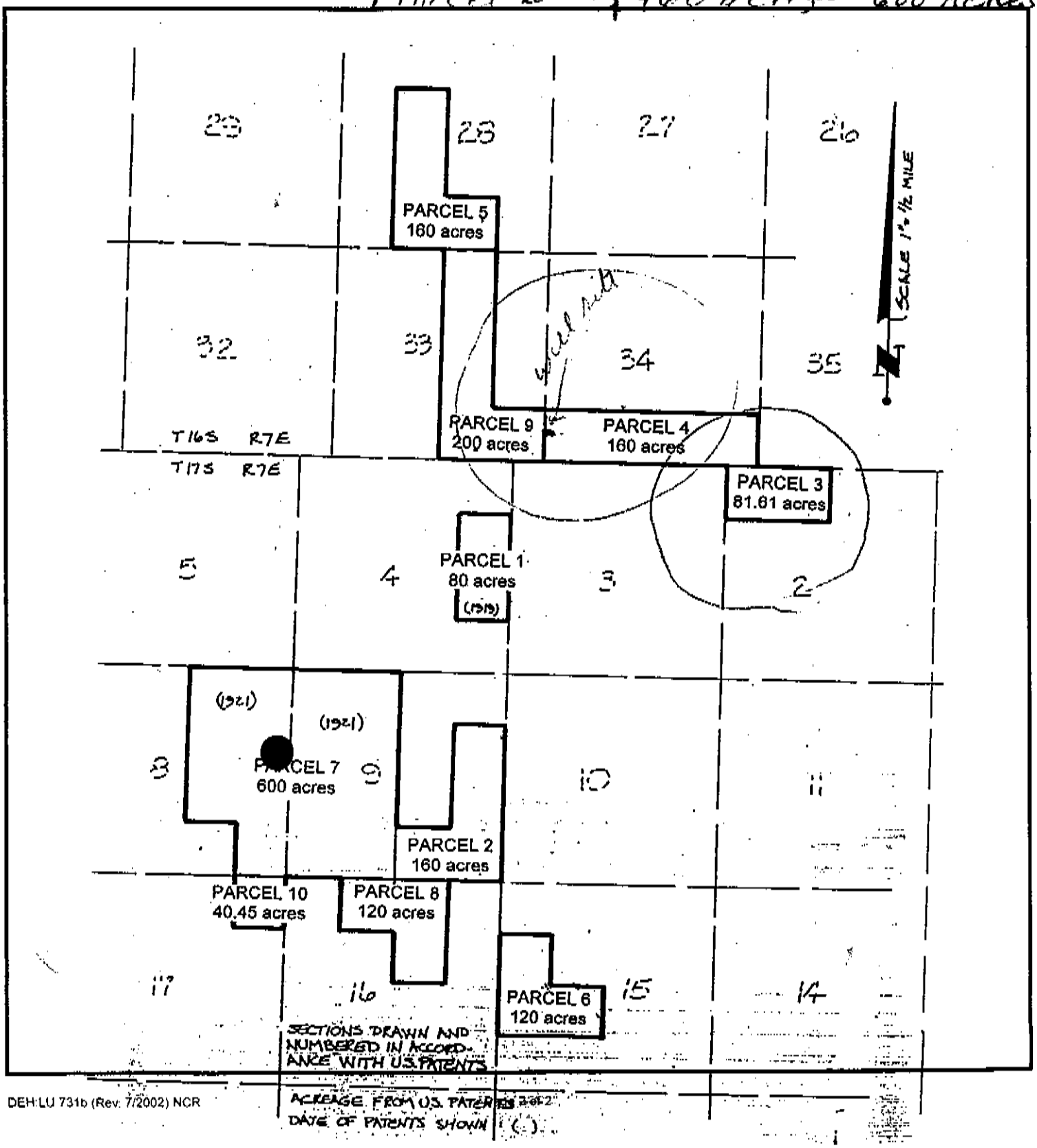
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16223
Assessor's Parcel Number: ~~529-150-17~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

PARCEL # ~~4~~ ~~160 acres~~ 600 ACRES



DEH:LU 731b (Rev. 7/2002) NCR

#3

County Mail Station —A-21

FIRST CARBON COPY

ASSESSORS PARCEL NUMBER:

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

Notice of Intent No. _____
Local Permit No. or Date _____

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

State Well No. _____
Other Well No. _____

(1) OWNER: Name John Gibson #5
Address MCAIN VALLEY
City _____ Zip _____

(2) LOCATION OF WELL (See instructions):
County _____ Owner's Well Number _____
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

DEPARTMENT USE ONLY
Completed Well Construction:
Date _____
Date Inspected _____
Comments _____
Water Sample Taken? _____
Sanitarian's Approval:
5 3/4

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack: Needs
Yes ☐ No ☒ Size _____
Diameter of above _____
Packed from _____ to _____ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	209	6 5/8	188			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval _____ ft.
Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:
Depth of first water, if known 50' ft.
Standing level after well completion 35' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test — ft.
Discharge 2 gal/min after 2 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 900 ft. Depth of completed well 900 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-2 - SANDY TOPSOIL
2-102 - BLACK, WHITE, ORANGE, VERY SOFT AREAS, LOOSE ROCKS, SAND (DRIP)
102-110 - BLACK, WHITE ROCK
110-112 - SOFTER (2 GPM) SAND
112-348 - BLACK, WHITE ROCK
348-349 - SOFTER (1 GPM)
349-900 - BLACK, WHITE ROCK, SOME SOFTER AREAS

Work Started _____ 19 Completed _____ 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature] (Well Driller)

NAME _____ (Person, firm, or Corporation) (Type or Print)

ADDRESS _____

CITY _____ ZIP _____

LICENSE NO. _____ DATE THIS REPORT _____

DHS:EHP-732 (83) CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1
Owner's Well No. 3
Date Work Began 9-27-04, Ended 9-30-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16223 Permit Date 9-16-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909443

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 2	sandy topsoil
2 102	black, white, orange, very soft areas, loose rocks & sand
102 110	black & white rock
110 112	softer
112 348	black & white rock
348 349	soft
349 900	black & white rock, some softer areas

TOTAL DEPTH OF BORING 900 (Feet)
TOTAL DEPTH OF COMPLETED WELL 900 (Feet)

WELL OWNER
Name Hamann Companies
Mailing Address 1000 Pioneer Way
CITY El Cajon, Ca 92020 STATE ZIP

WELL LOCATION
Address 7057 McCain Valley Rd
City Jacumba
County San Diego
APN Book 529 Page 150 Parcel 01
Township 16 S Range 7 E Section 34
Lat ___ DEG. ___ MIN. ___ SEC. N Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH
NORTH
WEST EAST
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

See attached map

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 50 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-30-04
ESTIMATED YIELD * 2 (GPM) & TEST TYPE airlift
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN - (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 209	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 209	x	x		

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
✓ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 16052 LAWSON VLY RD, JAMUL, CA 91935
CITY STATE ZIP
Signed [signature] (C-57 LICENSED WATER WELL CONTRACTOR)
DATE SIGNED 3-6-06
C-57 LICENSE NUMBER 360722

CONFIDENTIAL
NOT FOR PUBLIC RELEASE
WATER CODE SECTIONS

#4

Power at well

NO pump

across road from
bathrooms in
West Canyon

water was discolored
& hence quit using

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#4

INVOICE

ERMIT TYPE & NUMBER: LWEL 16226 — INVOICE DATE: 16 SEP 2004

ERMIT OWNER: — CONTACT:

ADEM ROBERT S&MARY O TRUST B1
53 OCEAN ST

92008

611-060-03 — APPLICANT:

PN: ~~611-110-01-00~~ 611-070-01 — FADEM ROBERT S&MARY O TRUST B1

ITE ADDRESS: ~~2533~~ MCCAIN VALLEY RD

OCATION DESCRIPTION: ~~2533~~ MCCAIN VALLEY RD,

ROJECT DESCRIPTION/SCOPE

umber of Wells on Permit Application:1
escription of Work:new
ype of Use for Each Well:private

EE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:30 9773 773 429E01 CHECK	[illegible]
			TOTAL AMOUNT DUE	$390.00

2 7E
c.15

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel # 67 600 ~~[illegible]~~

DEH USE ONLY
PERMIT # W LWCL162
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 440-7424
   1000 Pioneer Way (Mailing Address) [illegible] (City) 92020 (Zip)
2. Well Location - Assessors Parcel Number ~~611-110-01~~ 611-060-03 611-070-01
   [illegible] (Site Address) [illegible] (City) BOULEVARD 91905 (Zip)
3. Well Contractor - Well Driller Jim Manes Company Name: Jim Manes Drilling
   [illegible] (Mailing Address) [illegible] (City) [illegible] (Zip)
   Phone#: 445-1926 C-57#: [illegible]722 ☐ Cash Deposit ☐ Bond Posted
4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: Air Rotary
7. Depth of Well: Proposed: 3[illegible] Existing: [illegible]
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: [illegible]	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: [illegible]	Depth: ft.	From: To:	From: To:
Diameter 7 in.	Diameter in.	Type:	From: To:
Wall/Gauge: [illegible]	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: [illegible] ft. Sealing Material: [illegible]
   Borehole diameter: in. Conductor diameter: in. Annular Thickness in.
10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [illegible] Date: [illegible]

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Danny O'Call Date: 9/16/04

DEH-LU-731a (Rev. 4/02) NCR

[illegible]

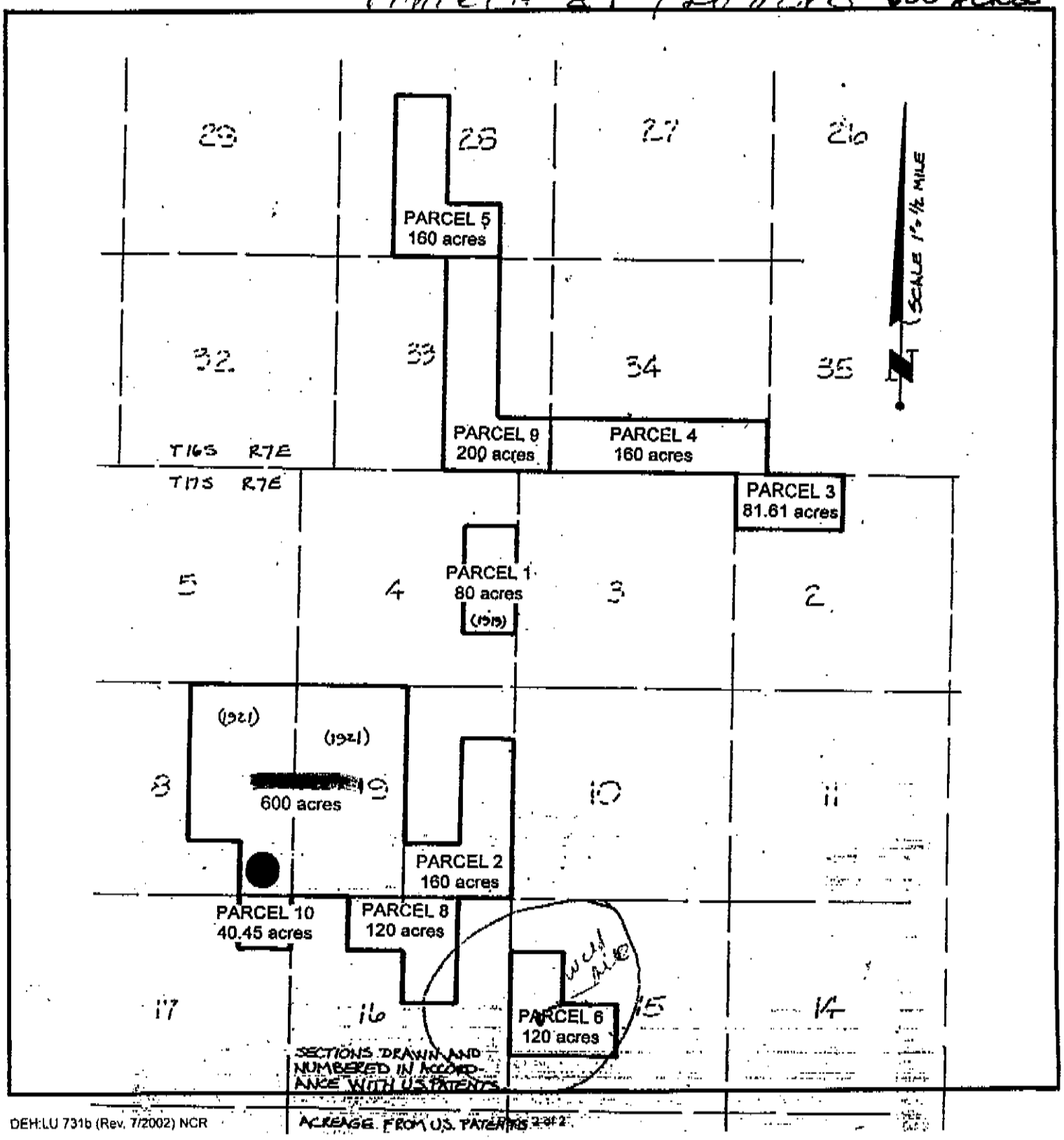
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWCL 16226
Assessor's Parcel Number: ~~611-110-07~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 67 ~~[illegible]~~ 600 ACRES



DEH:LU 731b (Rev. 7/2002) NCR

County Mail Station —A-21

FIRST CARBON COPY

ASSESSORS PARCEL NUMBER:

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT

(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ____
Local Permit No. or Date ____

State Well No. ____
Other Well No. ____

(1) OWNER: Name JOHN WELL NO 2
Address BOXER ACRES
City ____ Zip ____

(2) LOCATION OF WELL (See instructions):
County ____ Owner's Well Number ____
Well address if different from above ____
Township ____ Range ____ Section ____
Distance from cities, roads, railroads, fences, etc. ____

(12) WELL LOG: Total depth 260 ft. Depth of completed well 185 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-91 - SANDY, D.G.
91-130 - SOFT, ORANGE, WHITE, BROWN
130-133 - VERY SOFT (5 GPM)
133-185 - SOFT ORANGE, WHITE, BLACK
185-190 - LOOSE ROCKS (20 GPM)
190-260 - SOFT, HARD

DEPARTMENT USE ONLY
Completed Well Construction:
Date ____
Date Inspected ____
Comments ____
Water Sample Taken? ____
Sanitarian's Approval: ____
Jeffery

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in item (12))

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack: 3/8 ths
Yes ☒ No ☐ Size ____
Diameter of above 4"
Packed from 0 to 185 ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	91	6 5/8	188	0	185	3/32 ths

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 91' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ____ ft.
Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:
Depth of first water, if known 130' ft.
Standing level after well completion 35 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test ____ ft.
Discharge 15 gal/min after 1 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

Work Started ____ 19 Completed ____ 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED ____ (Well Driller)

NAME ____ (Person, Firm, or Corporation) (Type or Print)

ADDRESS ____

CITY ____ ZIP ____

LICENSE NO. ____ DATE THIS REPORT ____

DHS:EHP-732 (83) CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1
Owner's Well No. X 4
Date Work Began 9-25-04, Ended 9-27-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16226 Permit Date 9-16-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909442

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 91	sandy, dg
91 130	soft, orange, white & brown
130 133	very soft
133 185	soft, orange, white & black
185 190	loose rocks
190 260	soft & hard

TOTAL DEPTH OF BORING 260 (Feet)
TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER

Name Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon, Ca 92020
CITY STATE ZIP

WELL LOCATION

Address McCain Valley Rd
City Jacumba
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17 Range 7E Section 15
Lat ___ DEG. ___ MIN. ___ SEC. N Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 130 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-27-04
ESTIMATED YIELD * 15 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN — (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 91	11	x				steel	6 5/8	.188	
0 185	6½		x			pvc	4	sch 40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 91	x	x		
0 185			x	5/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP
Signed [signature] 3-6-05 360722
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

DWR 188 REV. 05-03
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

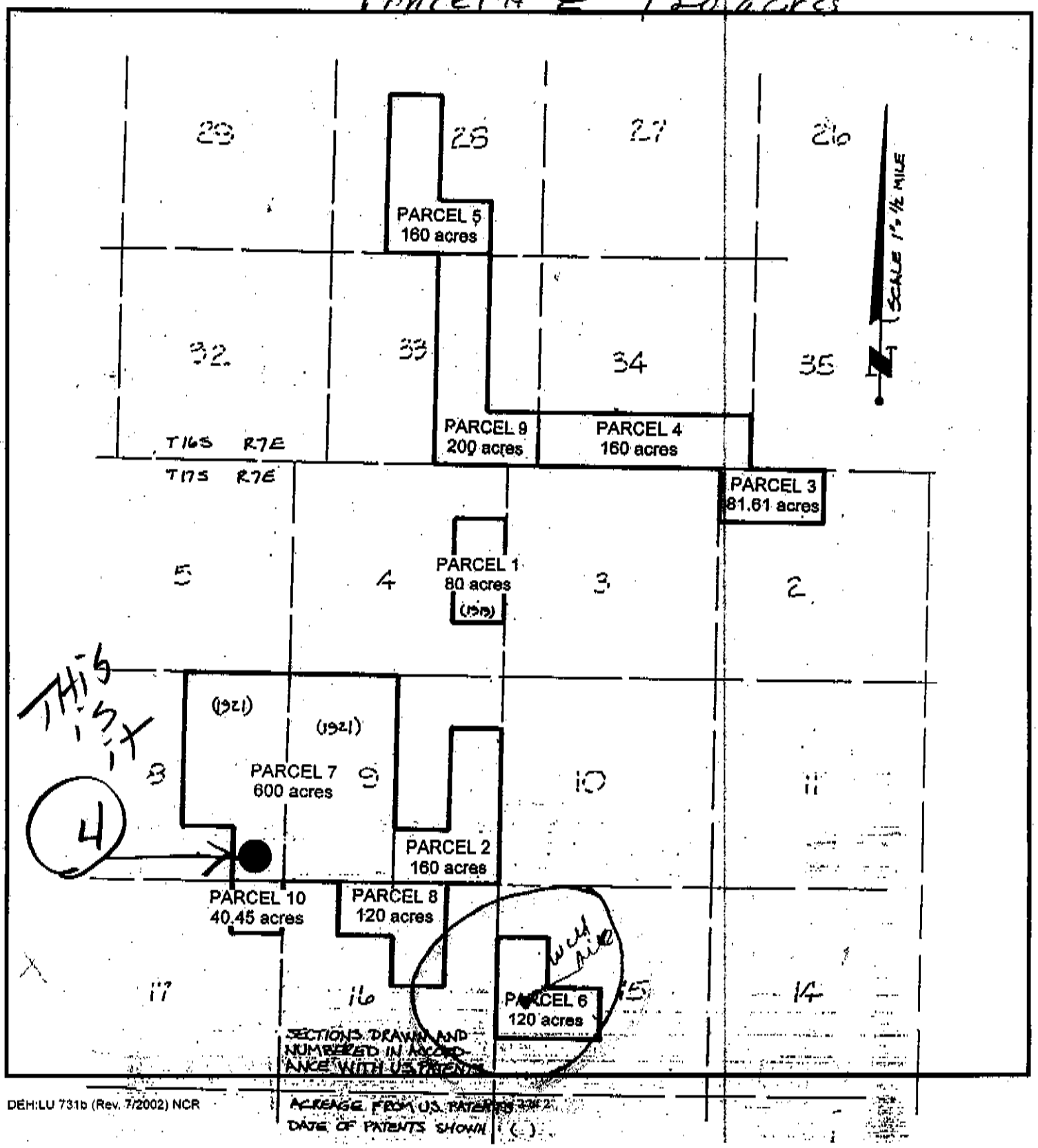
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16226
Assessor's Parcel Number: 611-110-04

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 6 120 acres



DEH:LU 731b (Rev. 7/2002) NCR

5

pump & power
to well

have never
used this well

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

H5

INVOICE

PERMIT TYPE & NUMBER: LWEL 16224 **INVOICE DATE:** 16 SEP 2004

PERMIT OWNER:
MANOS DRILLING & PUMP
16052 LAWSON VALLEY RD.

JAMUL CA 91935

CONTACT:

APPLICANT:
HAMANN ROBERT D FAMILY TRUST 04

APN: 611-030-01-00

SITE ADDRESS: 3041 MCCAIN VALLEY RD

LOCATION DESCRIPTION: 3041 MCCAIN VALLEY RD. JACUMBA 91935

PROJECT DESCRIPTION/SCOPE

Number of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

FEE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04	
			11:32	
			9773 773 429E01	
			CHECK	
			TOTAL AMOUNT DUE	$390.00

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel #1 80 Acres

DEH USE ONLY
PERMIT # WEL 16224
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 444 7424
   1000 Market Way (Mailing Address) — [illegible] (City) — 92021 (Zip)
2. Well Location - Assessors Parcel Number 611-030-08
   McLain Ln (Site Address) — [illegible] (City) — (Zip)
3. Well Contractor - Well Driller Jim Manos Company Name: [illegible]
   (Mailing Address) — (City) — (Zip)
   Phone#: 445-1926 C-57#: 361722 ☑ Cash Deposit ☐ Bond Posted
4. Use: ☐ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: [illegible]
7. Depth of Well: Proposed: [illegible] Existing: —
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: [illegible]	Depth: ft.	From: To:	From: To:
Diameter in.	Diameter in.	Type:	From: To:
Wall/Gauge: [illegible]	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: ft. Sealing Material: Bentonite/Cement
   Borehole diameter: in. Conductor diameter: in. Annular Thickness in.
10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [signature] Date: [illegible]

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: [signature] Date: 9/16/04

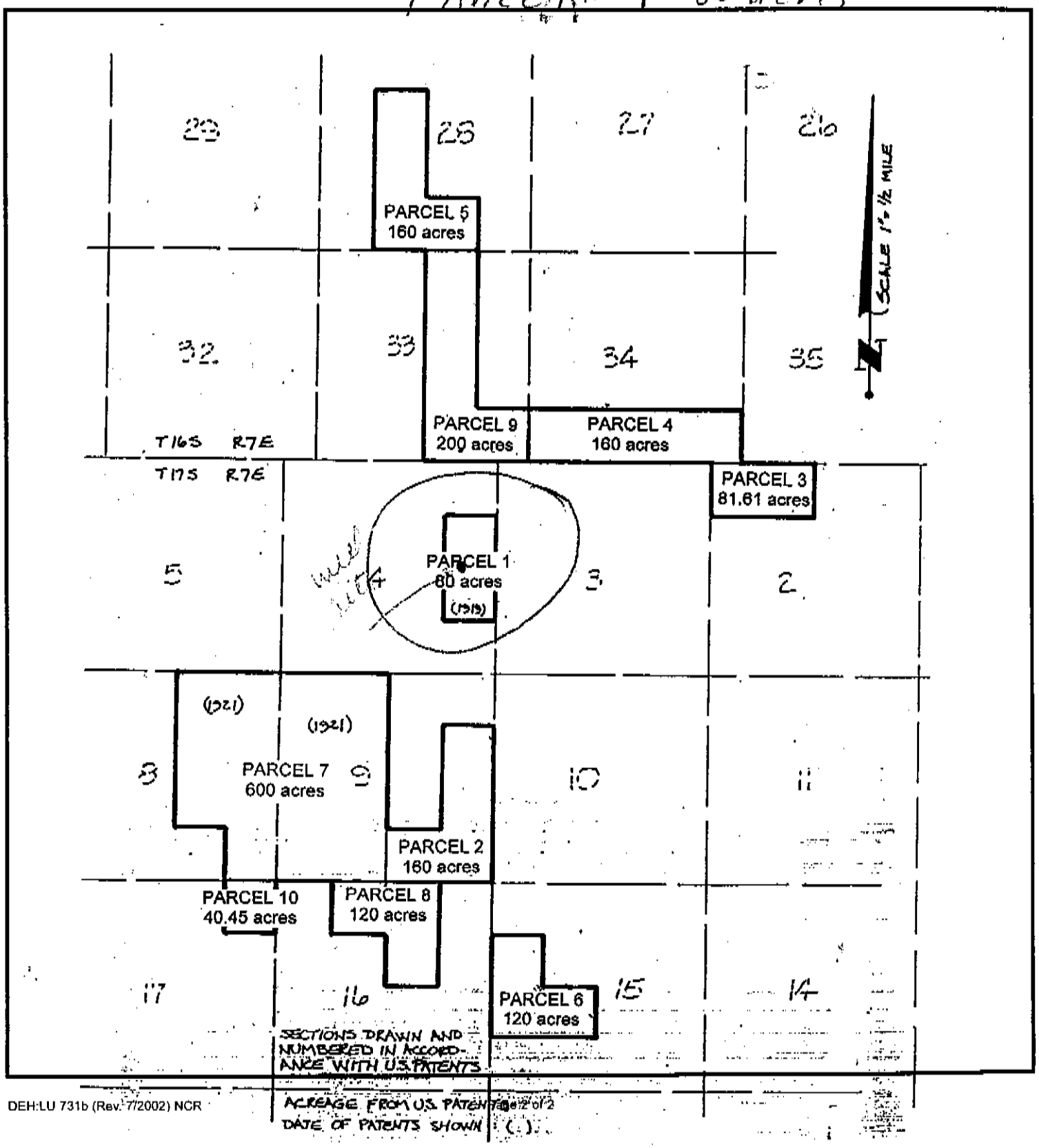
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWRL 16724
Assessor's Parcel Number: 611-030-08

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel #1 80 acres



County Mail Station —A-21

FIRST CARBON COPY

(3)

#5

ASSESSORS PARCEL NUMBER:

O.K. well

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

Notice of Intent No. _____
Local Permit No. or Date _____

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

State Well No. _____
Other Well No. _____

(1) OWNER: Name JOHN WELL #3
Address _____
City _____ Zip _____

(2) LOCATION OF WELL (See instructions):
County _____ Owner's Well Number _____
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

(12) WELL LOG: Total depth 800 ft. Depth of completed well 800 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0 - 14 TOPSOIL
14 - 50 - BLACK, WHITE ROCK
50-51 - (1 GPM)
51 - 110 - BLACK, WHITE ROCK
110-112 - SOFTER, ORANGE (1 GPM)
112 - 726 - BLACK, WHITE ROCK
726-727 - (5 GPM)
727 - 800 - BLACK, WHITE ROCK

DEPARTMENT USE ONLY
Completed Well Construction:
Date _____
Date Inspected _____
Comments _____
Water Sample Taken? _____
Sanitarian's Approval: _____

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

6/A

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack:
Yes ☐ No ☒ Size _____
Diameter of above _____
Packed from _____ to _____ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	92	7"	.188			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:
Depth of first water, if known 50' ft.
Standing level after well completion 45' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test _____ ft.
Discharge 7 gal/min after 1 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

Work Started _____ 19 Completed _____ 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED _____ (Well Driller)

NAME _____ (Person, firm, or Corporation) (Type or Print)

ADDRESS _____

CITY _____ ZIP _____

LICENSE NO. _____ DATE THIS REPORT _____

DHS:EHP-732 (8

CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1
Owner's Well No. 5
Date Work Began 9-21-04, Ended 9-25-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16224 Permit Date 9-16-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909441

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	1½	topsoil
1½	50	black & white rock
50	51	crack
51	110	black & white rock
110	112	softer, orange
112	726	black & white rock
726	727	crack
727	800	black & white rock

TOTAL DEPTH OF BORING 800 (Feet)
TOTAL DEPTH OF COMPLETED WELL 800 (Feet)

CONFIDENTIAL
NOT FOR PUBLIC RELEASE
WATER CODE SECTIONS 13752

WELL OWNER
Name Hamann Companies
Mailing Address 1000 Pioneer Way
City El Cajon, Ca 92020 State Zip

WELL LOCATION
Address 3041 McCain Valley Rd
City Jacumba
County San Diego
APN Book 611 Page 030 Parcel 01
Township 17 Range 7E Section 4
Lat ___ N (DEG. MIN. SEC.) Long ___ W (DEG. MIN. SEC.)

LOCATION SKETCH
NORTH
WEST EAST
See attached
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)
x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 50 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 45 (Ft.) & DATE MEASURED 9-25-04
ESTIMATED YIELD * 7 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN — (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	21	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	21	x	x		

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP
Signed [signature] 3-6-05 360722
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

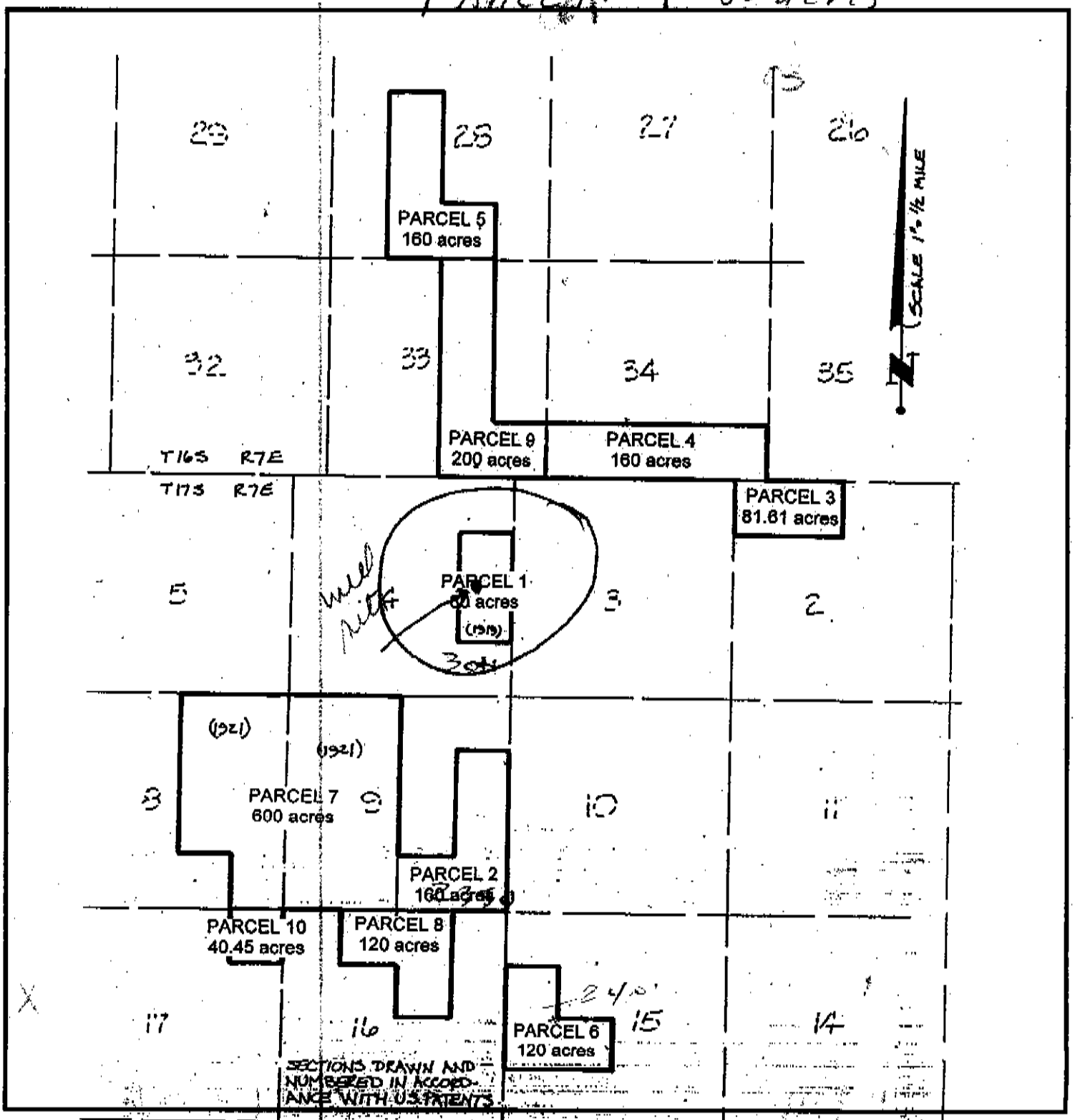
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16224
Assessor's Parcel Number: 611-030-08

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 1 80 acres



Fully operational

#6 No Logs
Available

original
well on
Ranch

6A NEW
Public
WELL

Fully operational

QUADRUPLICATE
For Local Requirements

FEB 09 2010

County of San Diego
Dept. of Environmental Health
Land & Water Quality Div.

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 1089956

Page 1 of 1
Owner's Well No. 1
Date Work Began 11-4-09, Ended 11-10-09
Local Permit Agency San Diego C.H.S.
Permit No. LWM620420 Permit Date 11-13-09

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	10	sandy-rocks
10	30	sandy-slightly firm
30	32	soft
32	70	sandy
70	85	harder
85	87	cracks
87	230	black & white rock, softer areas
230	233	softer, orange
233	330	black, white & orange
330	332	softer, orange
332	385	black & white rock, softer areas
385	395	sand
395	420	black & white rock

TOTAL DEPTH OF BORING 420 (Feet)
TOTAL DEPTH OF COMPLETED WELL 395 (Feet)

Completed Well Construction
Date 2/9/10
Date Inspected
Comments KIVA entered on this date.
Water Sample Taken?
Reviewed By

WELL OWNER

Name Harmony Grove Partners
Mailing Address 1900 Pioneer Way
CITY El Cajon, Ca 92026 STATE ZIP

WELL LOCATION

Address Mc Cain Valley Road
City Jacumba, Ca
County San Diego
APN Book 611 Page 990 Parcel 04
Township 17 Range 7 Section 17
Lat DEG. MIN. SEC. N Long DEG. MIN. SEC. W

LOCATION SKETCH

NORTH
WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ✓ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 30 (Ft.) & DATE MEASURED 11-10-09
ESTIMATED YIELD * 60 (GPM) & TEST TYPE airlift
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN – (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	56	12	x				steel		.188	
0	75		x				steel	6 5/8	.188	
0	385	6½		x			pvc	4	CL200	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	56	x	(cement was pumped)		
0	75		x		
0	385			x	5/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOR DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VALLEY ROAD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] 1-11-10 3607
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICE

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NOT FOR PUBLIC USE
CONFIDENTIAL
WATER CODE SEC. 13752

#7 unstable hole
not much
water
well destroyed

Fain Drilling & Pump Co. Inc.

12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Invoice

Date	Invoice #
2/15/2005	8049

Bad hole Abandoned

#7

Bill To
HAMANN COMPANIES 1000 PIONEER WAY EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
WELL DRILLING (TEST HOLE) APN 611 090 03			
PARCEL # 10 40.45 ACRES			
MOVE IN AND SET UP 1ST. TIME	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
BACKFILL TEST HOLE AND CEMENT TOP	1	400.00	400.00
MOVE BACK TO TEST HOLE AND SET UP 2ND TIME	1	500.00	500.00
DRILL OUT AND CLEAN OUT EXISTING 400 FT.	1	400.00	400.00
DRILLING FROM 400-850 FT. 6.5" DIA HOLE	450	14.00	6,300.00
BACKFILL AND DESTROY TEST HOLE	1	400.00	400.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$13,790.00
Payments/Credits	$0.00
Balance Due	$13,790.00

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. Test Well Par 10
Date Work Began 2/4/05, Ended 2/14/05
Local Permit Agency DEH
Permit No. 16457 Permit Date 2/7/05

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909548

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	6	Slope wash - sand and silt brown color
6	62	Weathered, decomposed rock
62		1st water - seepage
62	112	quartz diorite
112	114	Fracture - seepage of water
114	274	Quartz diorite, soft weathered
274		Fracture - water
275	654	Quartz diorite, soft weathered
654		Fracture - seepage of water
654	720	Quartz diorite
720		Seepage of water
720	850	Quartz diorite
		Backfill and destroy bore hole

TOTAL DEPTH OF BORING 850 (Feet)
TOTAL DEPTH OF COMPLETED WELL 0 (Feet)

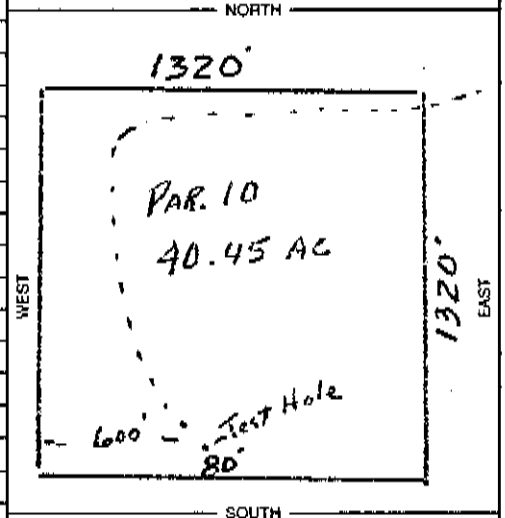
WELL OWNER

Name Hamann Companies
Mailing Address 1000 Pioneer Way
CITY El Cajon, Ca STATE 92020 ZIP

WELL LOCATION

Address Mc Cain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 090 Parcel 03
Township 17 S Range 7 E Section 17
Lat 32° 41' .735 N (DEG. MIN. SEC.) Long 116° 16' .613 W (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ✓
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 62 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 28 (Ft.) & DATE MEASURED 2/14/05
ESTIMATED YIELD * 10 (GPM) & TEST TYPE Airlift
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 500 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
NONE										

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	5			X	
5	25	X			
25	850			X	

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other Site Map

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Fain Drilling & Pump Co Inc
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
12029 Old Castle Rd. Valley Center, Ca 92082
ADDRESS CITY STATE ZIP
Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR
2-14-05 DATE SIGNED
328287 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

8

THIS WELL HAS
NO PUMP OR POWER
NEEDS TO BE
RELOCATED EAST
OUTSIDE OF
TRANSMISSION LINE
POWER EASEMENT

Fain Drilling & Pump Co. Inc.
12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Invoice

#8

Date	Invoice #
2/11/2005	8048

Bill To
THE HAMANN COMPANIES 1000 PIONEER WAY EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
DRILLING 970 FT DEEP WELL APN 611 110 01			
PARCEL 6 120 AC			
EQUIPMENT SET UP	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
DRILLING 400-800' 6.5" DIA HOLE	400	14.00	5,600.00
DRILLING 800 - 970' 6.5" DIA HOLE	170	16.00	2,720.00
REAMING 6" TO 10" DIA HOLE	226	12.00	2,712.00
FURNISH AND INSTALL 6" WELL CASING	228	13.00	2,964.00
INSTALL 50 FT. SURFACE SEAL	1	1,500.00	1,500.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$21,286.00
Payments/Credits	$0.00
Balance Due	$21,286.00

TRIPLICATE
Owner's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 0909549

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. Par. 6 -120
Date Work Began 2/1/05, Ended 2/9/05
Local Permit Agency DEH
Permit No. 16456 Permit Date 2/1/05

GEOLOGIC LOG

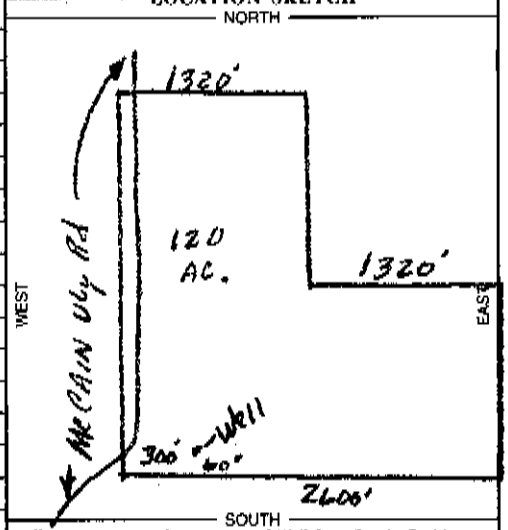
ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	12	Slope wash - sandy decomposed granite - brown color
12	212	Weathered Granitic Rock
212	226	Broken Rock
226	310	Weathered granitic rock mostly white quartz
310		Water 8 gpm
310	961	Granitic rock large crystals of white quartz
961		Water 40+ gpm
961	970	Fractured granitic rock large quartz crystals

TOTAL DEPTH OF BORING 970 (Feet)
TOTAL DEPTH OF COMPLETED WELL 970 (Feet)

WELL OWNER
Name The Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon Ca 92020
CITY STATE ZIP

WELL LOCATION
Address Rough Acres Ranch McCain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17S Range 7E Section 15
Lat 36 16 772 N (DEG. MIN. SEC.) Long 115 69 465 W (DEG. MIN. SEC.)

LOCATION SKETCH


Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED
ESTIMATED YIELD * 50 (GPM) & TEST TYPE airlift
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 800 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	226	10	X				Steel	6	.188	

ANNULAR MATERIAL

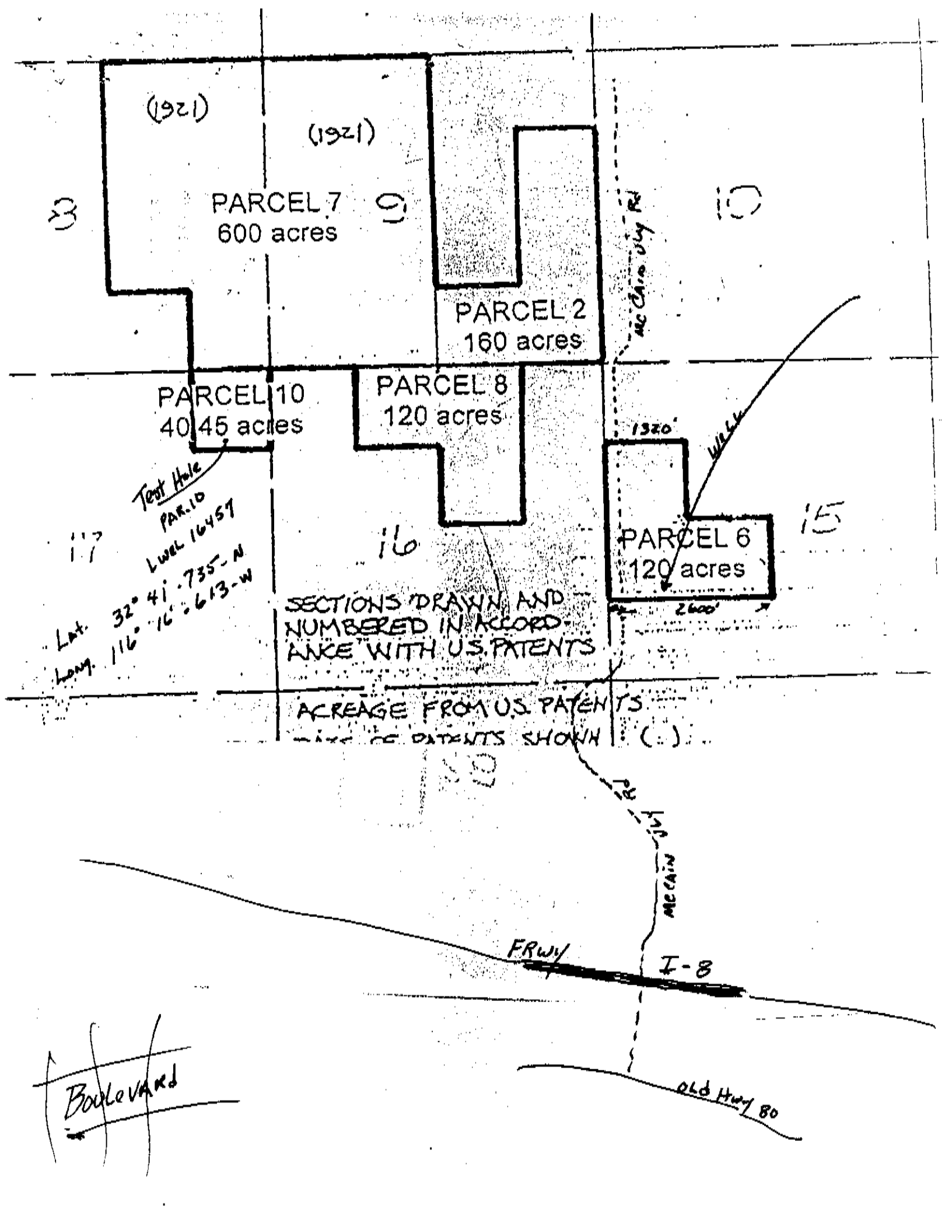
DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			
50	226			X	

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Fain Drilling & Pump Co. Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 12029 Old Castle Rd. Valley Center, Ca 92082 CITY STATE ZIP
Signed Joe R. Fain
C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 2/11/05
C-57 LICENSE NUMBER 328287

DWR 188 REV. 05-03
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM


(1921)
(1921)
PARCEL 7
600 acres
PARCEL 2
160 acres
PARCEL 10
40.45 acres
PARCEL 8
120 acres
PARCEL 6
120 acres
1320'
2600'
Test Hole
PAR. 10
LWEL 16457
Lat. 32° 41' .735" N
Long. 116° 16' .613" W
SECTIONS DRAWN AND NUMBERED IN ACCORDANCE WITH U.S. PATENTS
ACREAGE FROM U.S. PATENTS
McCain Valley Rd
McCain Valy Rd
FRWY
I-8
Old Hwy 80
Boulevard

9

Fully operational
old well
No info
Probably 5-10 GPM
& shallow

APPENDIX B

OBSERVATIONS AND ANALYSIS OF AQUIFER CHARACERISTICS

ROUGH ACRES RANCH

MCCAIN VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES
Geologists, Hydrogeologists and Engineers

Date: December 1, 2010
Project No.: 2010-0005

To: John Hower, CEG
Sarah Battelle, CHG

From: Mark Vincent, CHG

Regarding: **Observations and Analyses of Aquifer Characteristics**
Rough Acres Ranch, San Diego County, California

INTRODUCTION

This memo presents a summary of observations and analyses made following a stepped and a constant rate aquifer pumping and recovery test in wells located at Rough Acres Ranch located approximately in McCain Valley in eastern San Diego County, California. The tests were performed to determine whether sufficient volumes of water are available for the Tule Wind Farm construction projects. Analyses performed included calculation of transmissivity, hydraulic conductivity, and storativity for a pumping well and observation wells.

WELL AND AQUIFER CONDITIONS

A well labeled as Well #6a was used as the pumping well for this test. Another well labeled as Well #6 (also referred to as South Well) is located 36 feet away from the pumping well and was monitored and analyzed as an observation well. More distant observation wells were monitored including Well #9 (Horse Corral Well), Walker Residence Well, Well #4 (RV Well), Well #2, and Well #8 (Far Field Well) (Figure 1).

Records for drilling and construction of the wells used for these pumping tests are incomplete or nonexistent. A well identified on Department of Water Resources (DWR) records as being owned by Harmony Grove Partners (identified as Form No. 1089956) is believed to be the log for Well #6a. Logs for Well #4 (RV Well) and Well #8 (Far Field Well) were also obtained. No records are available for Well #6 (South Well), The Walker Residence Well, Well #9 (Horse Corral Well), or Well #2.

Although DWR records indicate the borehole for Well #6a was drilled to a total depth of 420 feet, the bottom of the well is recorded to be at a depth of 385 feet below ground surface. Records are incomplete but it was assumed that the well screen extends from a depth of 75 to 385 feet below ground surface. A cement sanitary seal is reported to extend from ground surface to a depth of 56 feet. Wells #6 and #6a used in this pumping test have existing electric submersible pumps installed in them. Based on the production rates achieved during the tests performed, the wells are likely to be outfitted with four-inch diameter electric submersible pumps. Based on the depth and pressure head on the

transducers installed in the wells for the test, it was assumed that both of the boreholes are 385 feet deep and are 6.5-inches in diameter. It was further assumed that the wells were constructed with 4-inch diameter well casing and that they are perforated or screened from a depth of 75 feet below ground surface. Details of well construction could not be verified in the field because of the presence of pumps, discharge pipes, electrical wires, and surface sanitary seals. Available well logs are included at the back of this document.

The area immediately around Well #6 and #6a is underlain by alluvium comprised of poorly sorted sand, gravel, and silt derived from the crystalline basement rock exposed on the adjacent canyon sidewalls. The crystalline basement rocks are classified as tonalite and yield groundwater from fractures. The well log reportedly recorded for Well #6a indicates that there is about 70 to 85 feet of alluvium overlying the tonalite. Groundwater was measured at a depth of 27.81 feet below the top of sanitary seal on Well #6a.

TEST METHODS

Observations of groundwater elevation were recorded in a pumping well and six observation wells in McCain Valley. Data was collected using pressure transducers connected to data loggers. Barometric pressure changes were recorded during the test and corrections were made to the pressure head data collected during the tests.

A stepped aquifer pumping test was performed using Well #6a to determine the optimum pumping rate for a longer duration test. The pressure transducers were deployed and began recording data on August 20, 2010 to perform the stepped pumping test. The stepped pumping test was performed at pumping rates of 28 gallons per minute (gpm), 38 gpm, 55 gpm and 60 gpm. A semi-logarithmic plot of elapsed time versus drawdown for the stepped pumping test is shown on Figure 2.

The constant rate pumping and recovery test was performed from August 24 through 27, 2010. The pump was powered-down on August 27, 2010 and allowed to recover for 10 hours when the pressure transducers were removed from the wells. A recovery test was performed by turning off the pumps and recording the increasing head levels over time.

DATA ANALYSIS

Changes in groundwater level data recorded during this test were corrected for barometric pressure changes and used to generate a file containing tabulated time and changes in pressure head. The data was used to generate time-drawdown graphs for the pumping and observation wells and imported into computer software used to calculate the transmissivity and storativity of the fractured tonalite.

The stepped pump test analysis consists of plotting the drawdown versus time for each pumping rate on a time versus drawdown plot with time plotted on a logarithmic scale. Forward projections of each segment representing a different pumping rate can be used to predict the likely drawdown for the pumping well during for the selected duration of the test. A pumping rate of 50 gpm was selected as the target pumping rate because it would allow for ample drawdown without the well running dry during the test.

The method of Schafer (1978) was employed to determine how much of the data set for Well #6a was impacted by casing storage effects. The method is a simplification of the method first developed by Papadopulos and Cooper (1967) but does not require prior knowledge of the transmissivity or well efficiency. The point at which casing storage effects are overcome was calculated to occur approximately 23 to 25 minutes into the test based on the assumptions about well construction practices, pumping rates, and drawdown. Very early pumping data was ignored in the analyses described below due to casing storage effects.

Time versus drawdown plots were prepared for the pumping and observation wells for the pumping and recovery portions of the test. The plots are shown with the time axis plotted on a logarithmic scale and drawdown on a linear scale.

Figure 3 shows the time-drawdown plot for Well #6a during pumping. The first 23 to 25 minutes of the test show the casing storage effects. Well #6a drawdown plots as a straight line on the time-drawdown chart representing constant aquifer properties during that portion of the drawdown cone development. A sudden change in the drawdown curve starts at approximately 11 or 12 minutes; which may reflect leakage from the alluvium above the fractured bedrock.

A residual drawdown plot for Well #6a is shown on Figure 4. The plot shows the change in drawdown versus the ratio of the time since the pump test started divided by the time since the recovery portion of the test started (t/t`). The residual drawdown at a t/t` ratio of 1 is shown to be about 0.33 feet (a less than significant change in storage noted in the pumping well over the course of the pumping and recovery portions of the aquifer stress test).

A time-drawdown plot of Well #6 (the observation well also referred to as South Well) located 36 feet away from the pumping well shows a decrease in drawdown from approximately 30 minutes to approximately 400 minutes which may result from leakage from the alluvium above the fractured bedrock (Figure 5). The Well #6 plot shows even less drawdown versus time after 400 minutes possibly reflecting the fractured bedrock aquifer.

The Well #6 recovery portion of the test is plotted as the residual drawdown versus t/t` shows a flat line on the semi-logarithmic plot (Figure 6) indicative of uniform aquifer conditions from a t/t` ratio of about 8 to 110 into the recovery test period. The residual drawdown value measured for a t/t' ratio of 1 is about -0.22 feet. It is not regarded to be significant compared to the County standard maximum change of 0.5 feet.

The Well #9 (Horse Corral Well) was monitored and the time-drawdown plot reflects that the well pump cycled on and off five times during the test (Figure 7). No analyses were performed for this well because the changes in drawdown versus time due to the pump activating are far greater than any drawdown likely to be induced by the pumping test at Well #6a.

Well #2 (Pond Well) and Well #9 (Far Field Well) were monitored for changes in head during the pumping test. Figure 8 and 9 show the time-drawdown plots for Wells #2 and #9. Both plots show similar small, cyclic, barometric changes in head but are not likely to have resulted from the pumping test. No analyses were performed using the data from these wells.

Water level drawdown data were evaluated using the computer software program AquiferTest version 3.5 (Waterloo Hydrogeologic, 2002). The program performs curve matching of the time drawdown data to calculate transmissivity, hydraulic conductivity, and storativity using different methods. The methods employed included Cooper-Jacob (1946), Moench (1993), Neuman (1975), and Theis (1935).

DISCUSSION

As shown on Table 1, the calculated hydraulic conductivity values for all of the analytical methods employed ranged from a low of 7.50E-04 feet/day for data collected from Well #6 (South Well) using the Theis method for the data collected from the end of the recovery test to a high of 7.50E+00 feet/day using the Cooper Jacob method with late time data for Well #6 (South Well). An average conductivity of 1.85 feet/day was calculated from all methods from both Well #6 and #6a. The Storativity values range from a low of 4.48E-06 for Well #6 late time data calculated using the Moench Fracture Flow method and a high of 7.87E-01 for a match to the late time data recorded in Well #6 using the Moench method with the vertical hydraulic conductivity set at one-tenth the horizontal hydraulic conductivity.

All of the analytical results show a higher transmissivity and hydraulic conductivity value for matches to the observation Well #6. The pumping well and observation well used for these analyses are located in a portion of McCain Valley which is entirely covered in up to 75 to 80 feet of alluvium (Figure 10). Based on the measured depth to groundwater in Well #6 and #6a, approximately 47 to 52 of saturated alluvium overlies the fractured bedrock at the test site (Figure 11). The saturated alluvium is likely to act like a reservoir recharging the fractures in the bedrock. The aerial extent of the fractured bedrock aquifer and the amount of storage in the fractures is likely controlled in part by the presence of the alluvial aquifer. Because the fractures in the bedrock appear to be of aerially limited extent, the actual volume of groundwater available may be limited with larger volumes of groundwater available within the canyon areas where fracturing may be most prevalent and alluvium is saturated.

CLOSURE

This summary of observations and analyses has been prepared in general accordance with accepted professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included in it. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

Geo-**L**ogic **A**ssociates

Mark W. Vincent, PG 5767, CEG 1873, CHg 865
Senior Geologist

Attachments: Table 1 - Aquifer Stress Test Results
Figure 1 - Well Location Plan
Figure 2 - Step Test Time Drawdown Plot
Figure 3 - North Well Time Drawdown Plot Pumping
Figure 4 - North Well Time Drawdown Plot Recovery
Figure 5 - South Well Time Drawdown Plot Pumping
Figure 6 - South Well Time Drawdown Plot Recovery
Figure 7 - Thing Valley Well Time Drawdown Pumping
Figure 8 - Thing Valley Well Time Drawdown Recovery
Figure 9 - Geologic Map
Appendix A - Analytical Results from Aquifer Test Program
Appendix B - Department of Water Resources Well Completion Reports

REFERENCES

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

Driscoll, D.G., 1986, Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

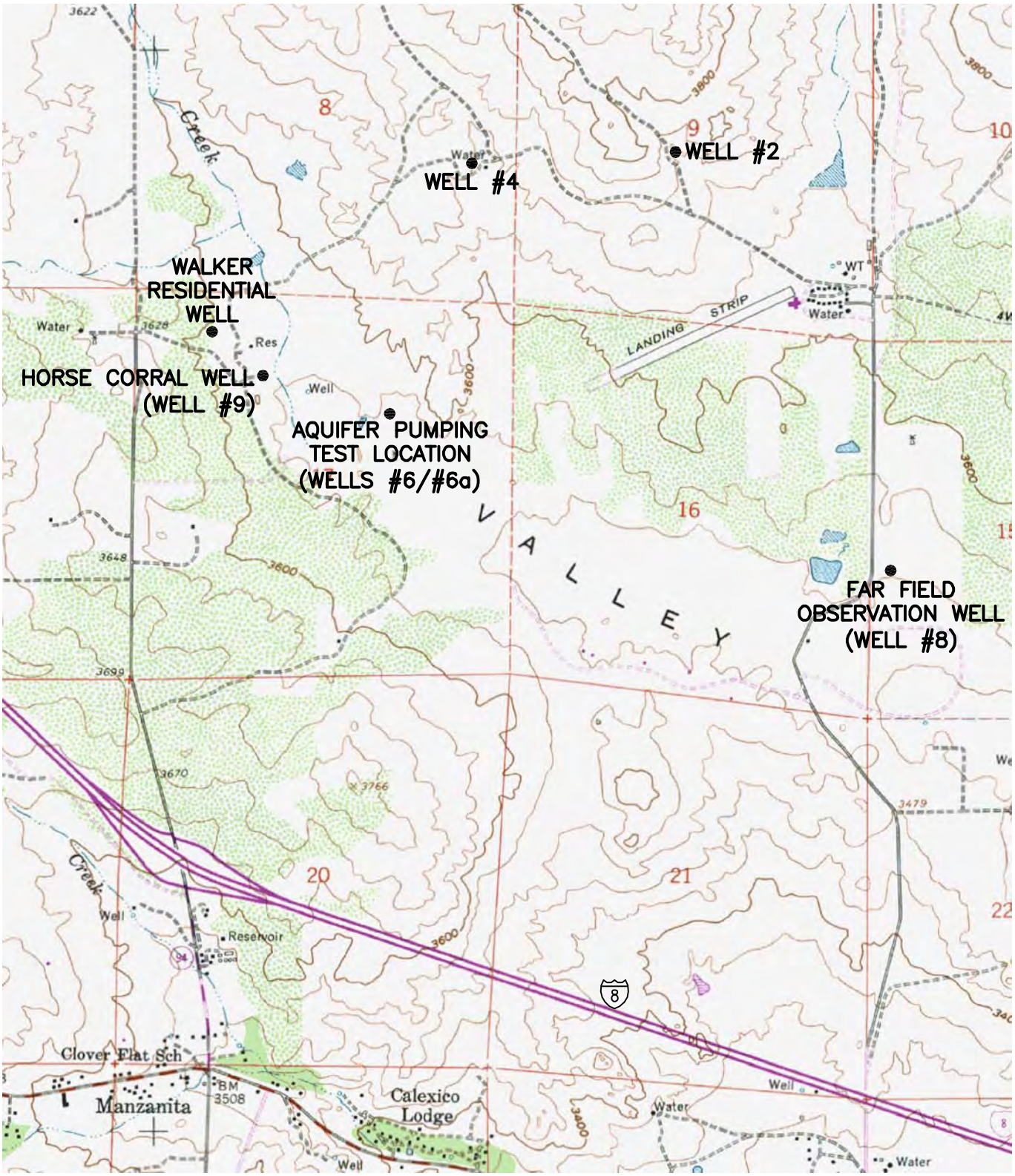
Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

Table 1

Aquifer Stress Test Results

Rough Acres Ranch - McCain Valley

Well Designation	Condition	Distance From Pumping Well (feet)	Groundwater Depth from Ground Surface (feet)	Assumed Aquifer Thickness (feet)	Average Pumping Rate (gpm)	Analytical Method	Transmissivity (feet^2/day)	Conductivity (feet/day)	Storativity	Comments
Well #6a	Pumping	1	28	500	50	Cooper-Jacob	6.30E+02	1.26E+00	NA	Match to late data.
Well #6a	Pumping	1	28	500	50	Moench Fracture Flow	1.12E+02	2.25E-01	2.70E-04	Match to late data.
Well #6a	Pumping	1	28	500	50	Moench	1.21E+02	2.43E-01	1.72E-01	Match to late data.
Well #6a	Pumping	1	28	500	50	Neuman	5.69E+01	1.14E-01	1.62E-02	Spec Yld. = 1.62E+02
Well #6a	Pumping	1	28	500	50	Theis	2.69E+01	5.39E-02	1.64E-01	Match to early data.
Well #6a	Pumping	1	28	500	50	Theis	1.51E+02	3.03E-01	3.19E-05	Match to late data.
Well #6a	Pumping	1	28	500	50	Walton	1.11E+02	2.21E-01	7.08E-04	Match to late data.
Well #6a	Recovery	1	28	500	0	Theis Recovery	2.17E-02	4.35E-05	NA	Match to early data.
Well #6a	Recovery	1	28	500	0	Theis Recovery	7.27E+00	1.45E-02	NA	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Cooper-Jacob	2.14E+03	4.28E+00	NA	Match to middle data.
South Well #6	Pumping	36	27.81	500	50	Cooper-Jacob	3.75E+03	7.50E+00	NA	Match to late data.
South Well #7	Pumping	36	27.81	500	50	Moench Fracture Flow	2.95E+03	5.91E+00	4.48E-06	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Moench	1.30E+03	2.60E+00	7.87E-01	Kv=1/10 Kh
South Well #6	Pumping	36	27.81	500	50	Neuman	9.67E+02	1.93E+00	NA	Match to all data.
South Well #6	Pumping	36	27.81	500	50	Theis	3.18E+03	6.36E+00	3.29E-06	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Walton	1.13E+03	2.26E+00	1.47E-03	Match to early data.
South Well #6	Recovery	36	27.81	500	0	Theis Recovery	3.75E-01	7.50E-04	NA	Match to early data.
South Well #6	Recovery	36	27.81	500	0	Theis Recovery	2.23E+00	4.47E-03	NA	Match to late data.
						Average Values	**9.24E+02**	**1.85E+00**	**1.14E-01**	



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

WELL LOCATION MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

Figure 2
Step Drawdown Test
Well #6a - Pumping Well
Rough Acres Ranch, McCain Valley

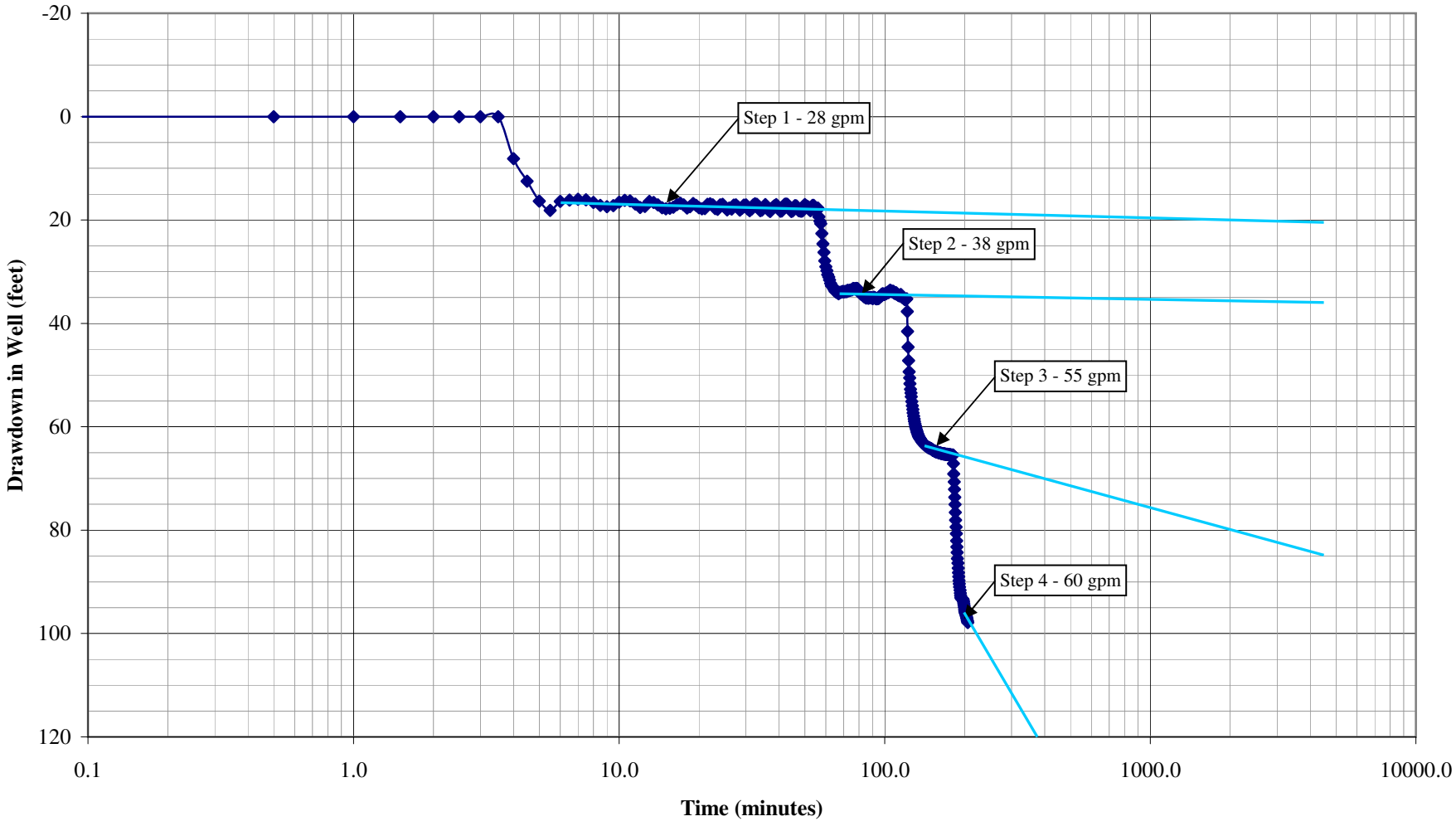


Figure 3
Drawdown in Pumping Well during 72-hour Pumping Test at 50 gpm
North Well at Rough Acres Ranch

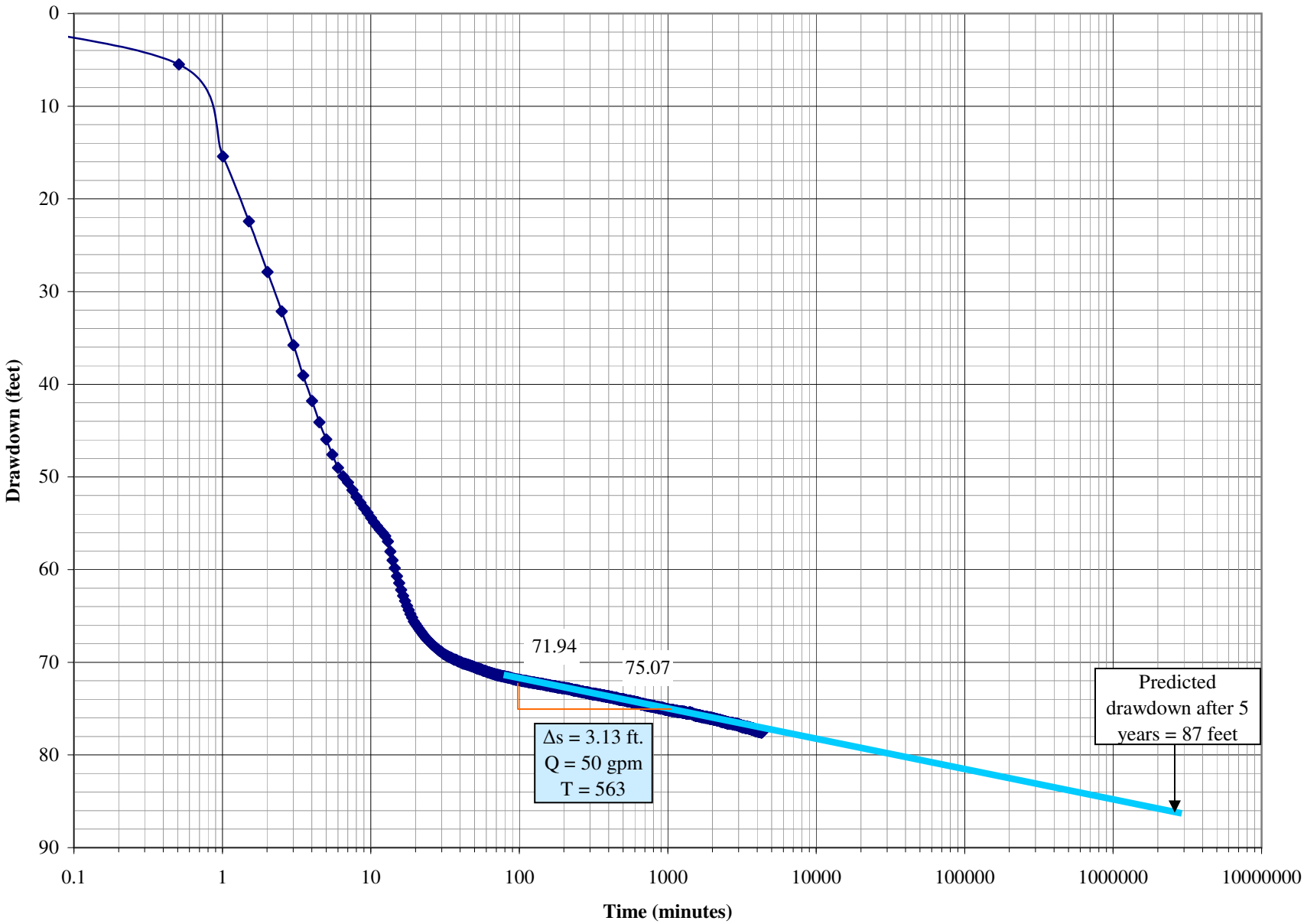


Figure 4
Residual Drawdown Plot
Pumping Well #6a

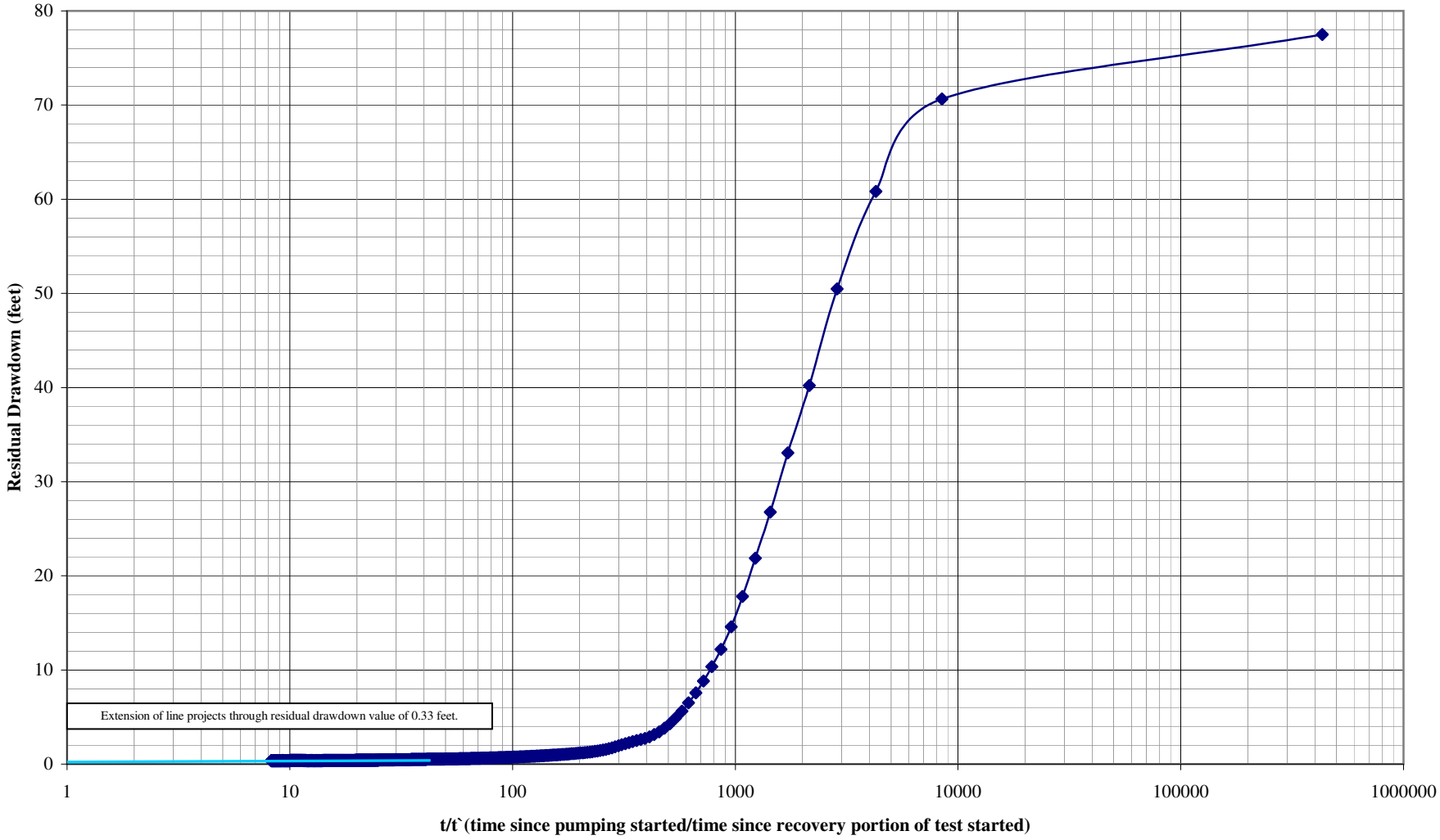


Figure 5
Well #6 - Observation Well
Time-Drawdown Plot
Rough Acres Ranch

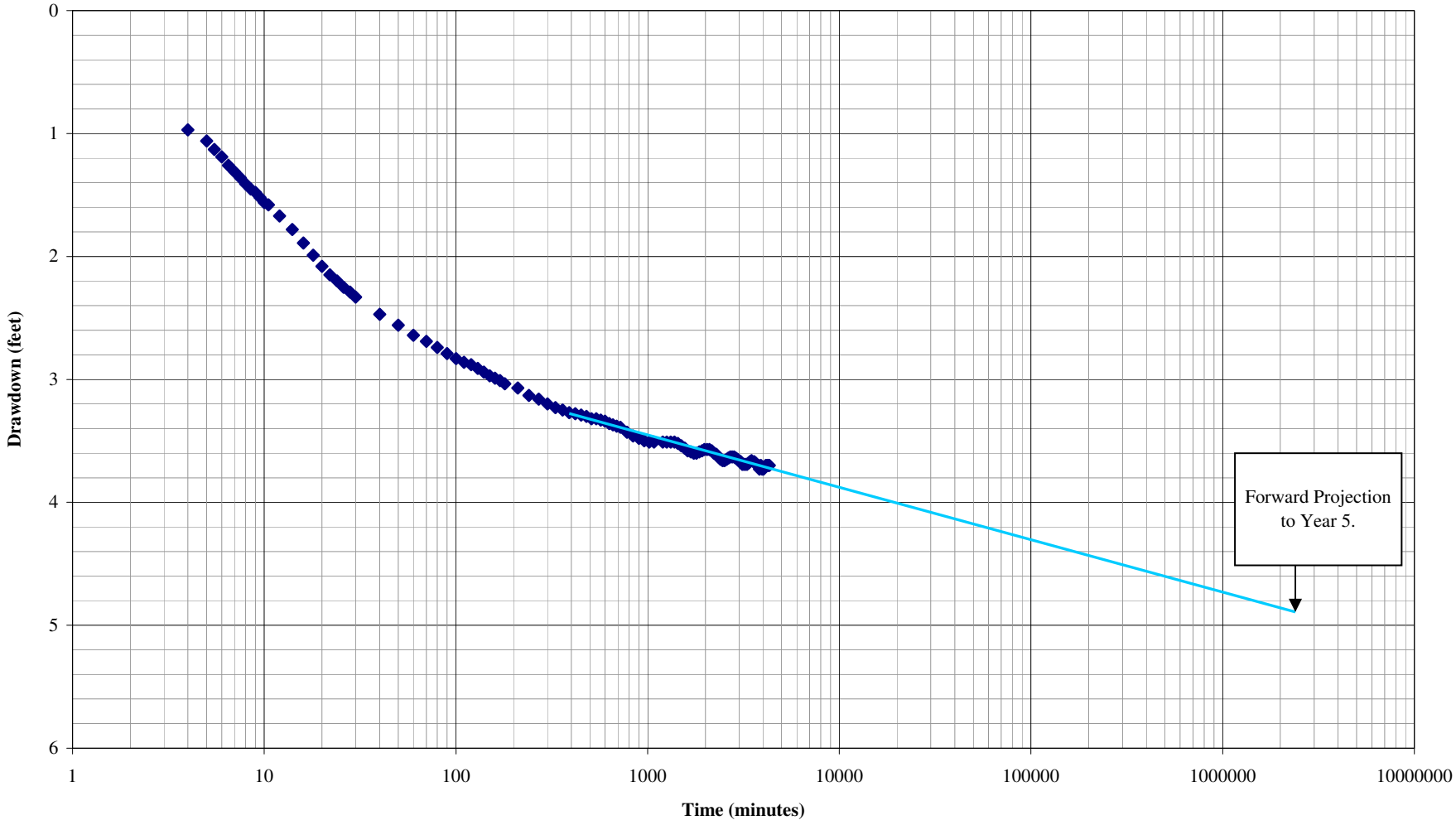


Figure 6
South Well - Observation Well
Residual Drawdown Plot
Rough Acres Ranch

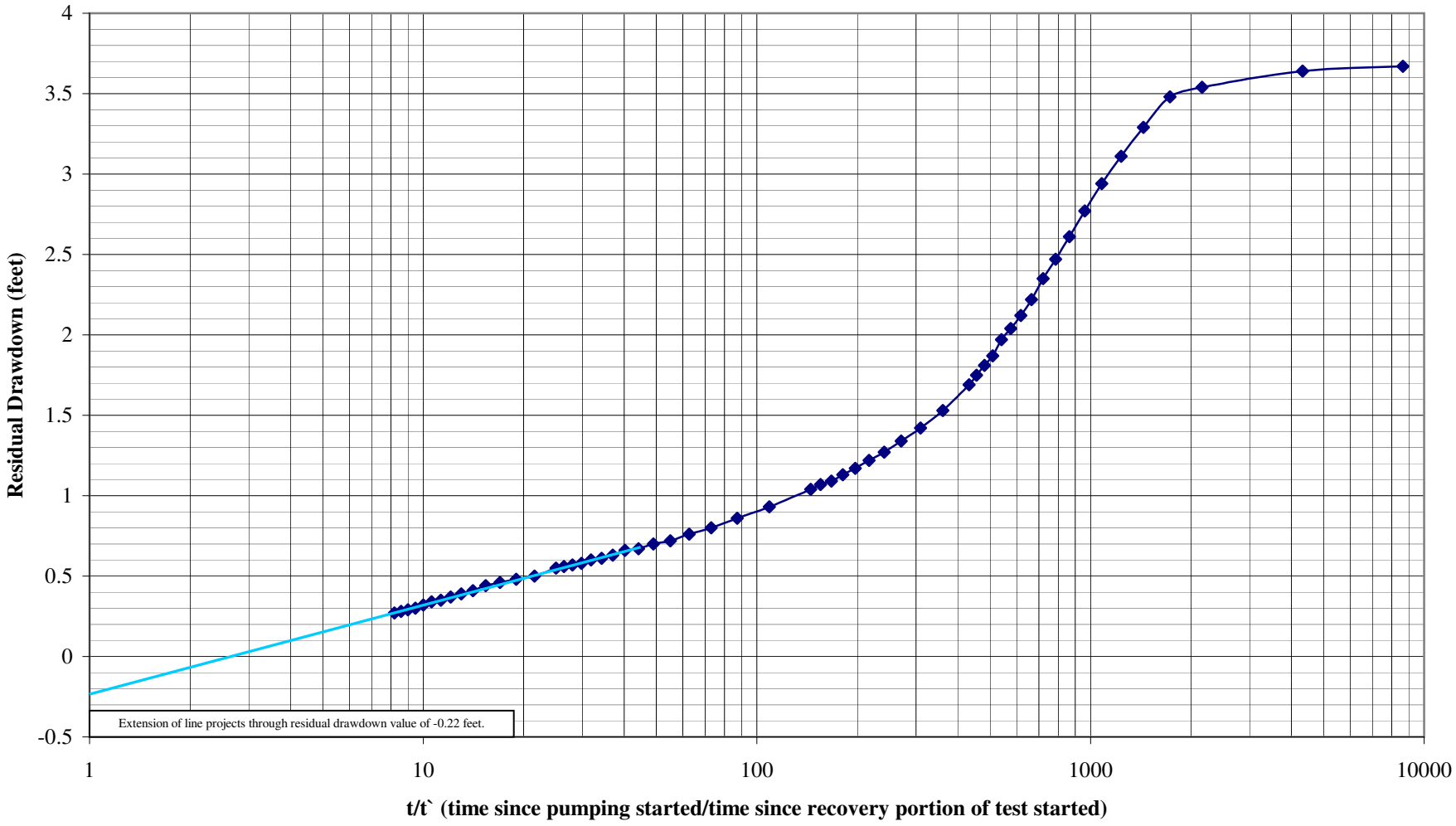


Figure 7
Horse Corral Well
(Observation Well)
Time-Drawdown Plot

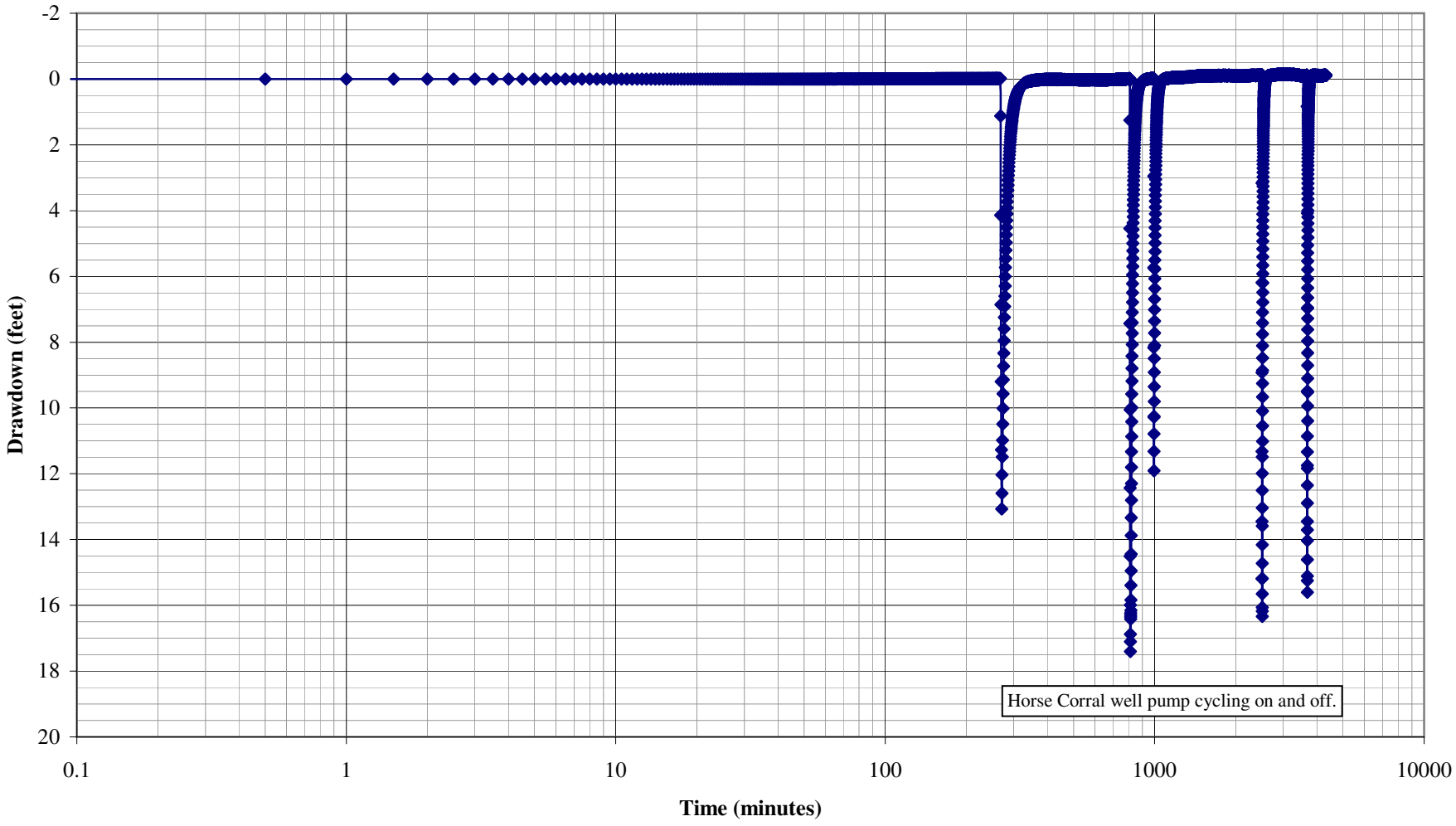


Figure 8
Well #2 - Observation Well
Distance-Drawdown Plot
Rough Acres Ranch

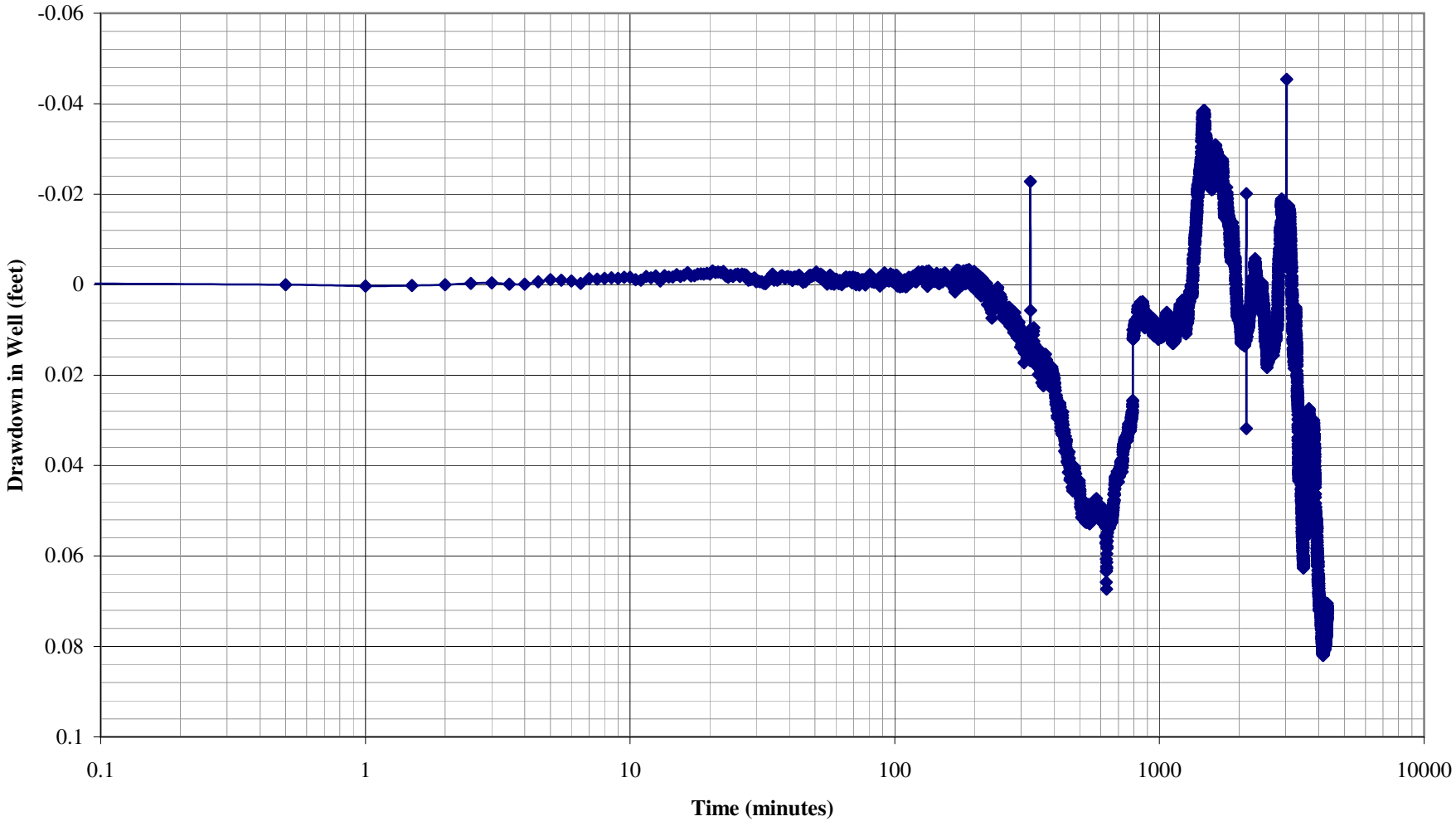
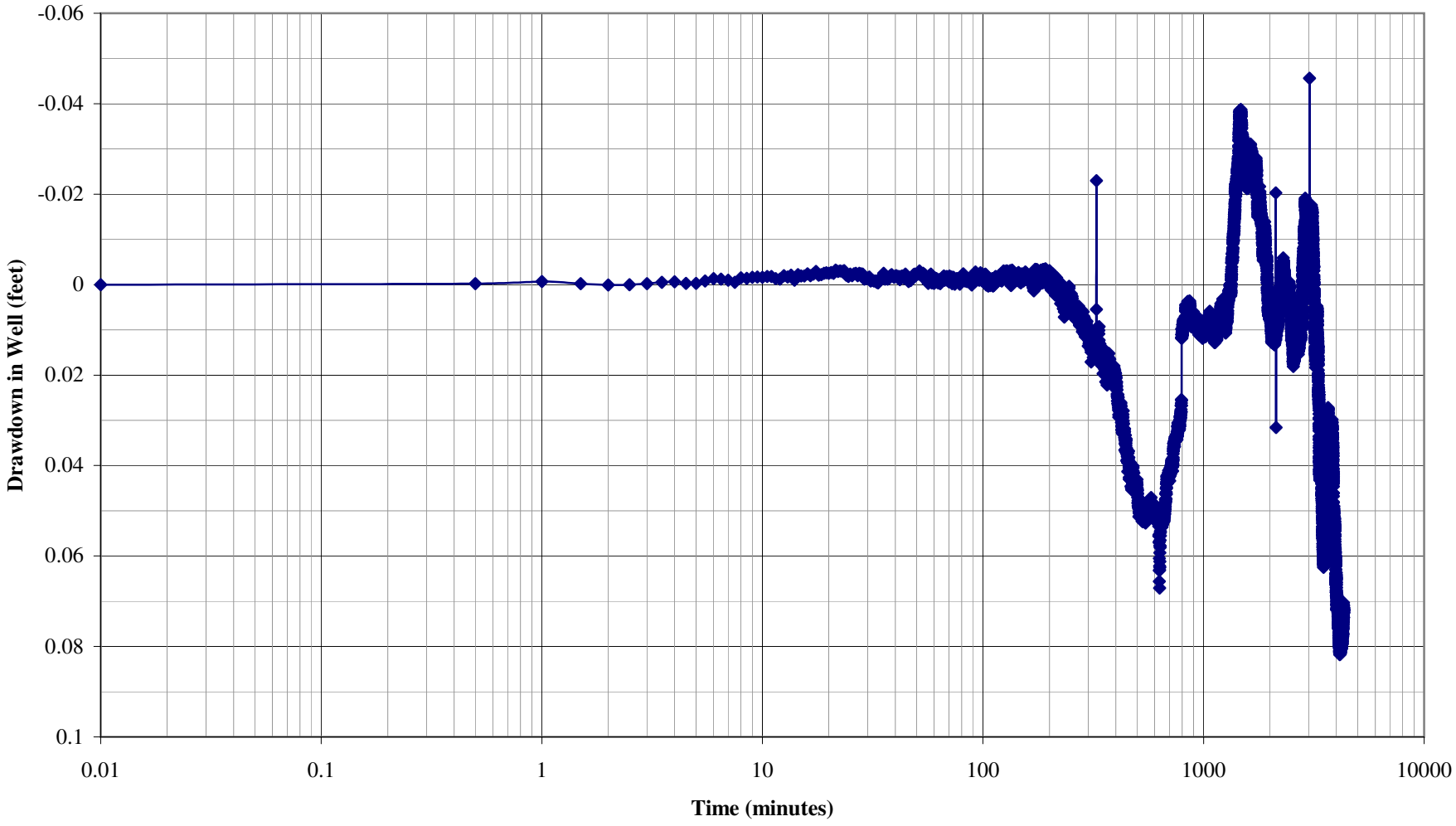
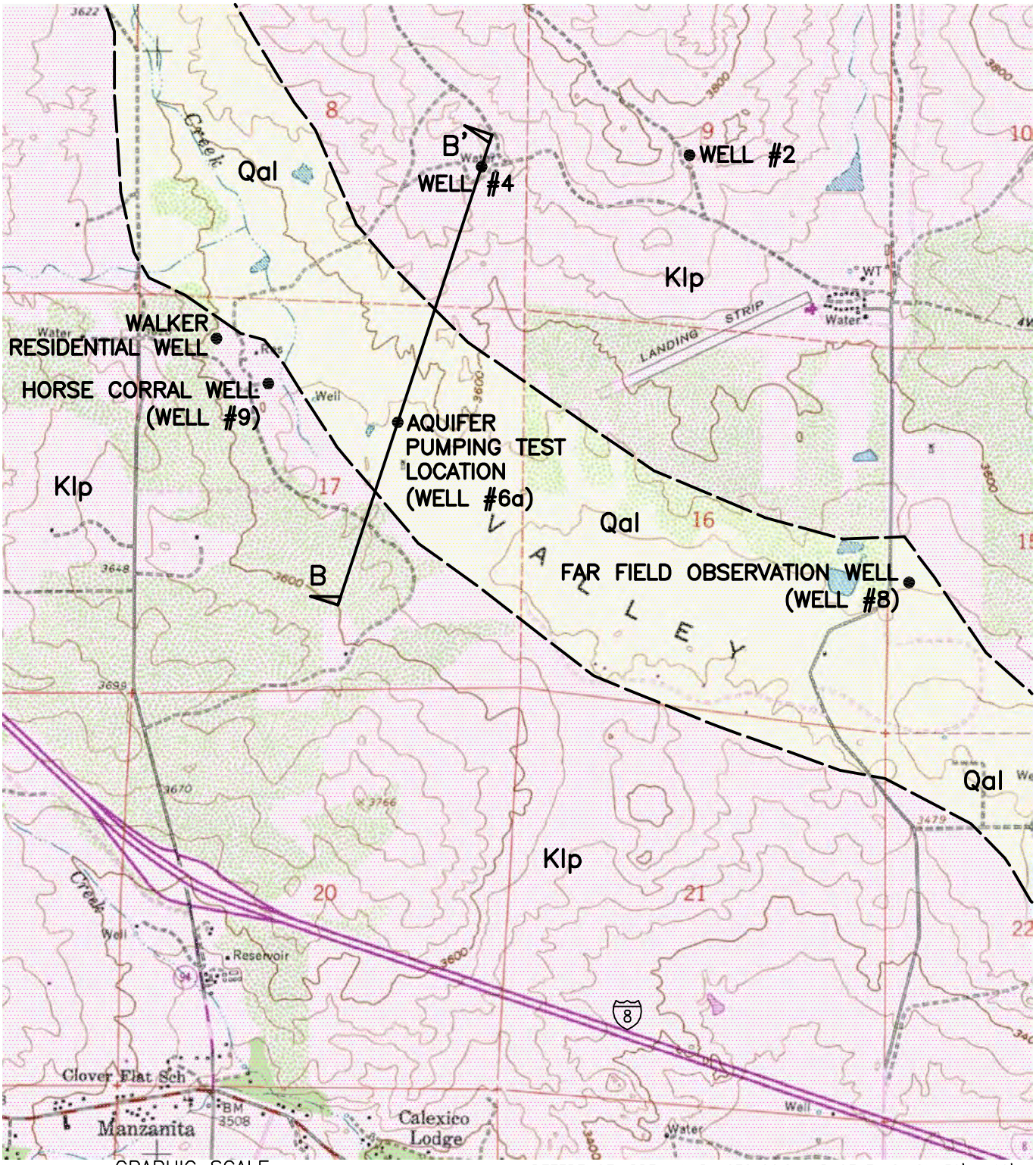


Figure 9
Well #8 Far Field - Observation Well
Time-Drawdown Plot
Rough Acres Ranch





GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

EXPLANATION:

Qal	ALLUVIUM
Klp	TONALITE OF LA POSTA (EARLY AND LATE CRETACEOUS)
— — —	APPROXIMATE GEOLOGIC CONTACT
B B'	CROSS-SECTION LOCATION

GEOLOGIC MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

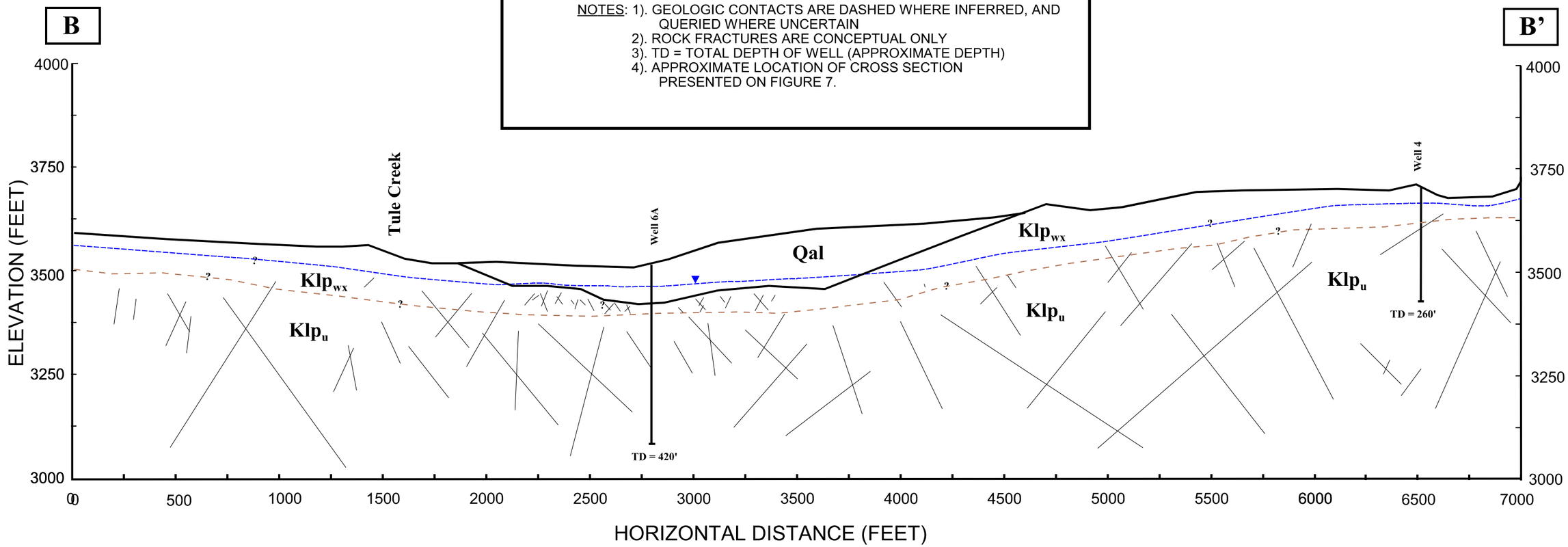
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

LEGEND

Qal	RECENT ALLUVIUM
Klp_{wx}	LA POSTA TONALITE, WEATHERED
Klb_u	LA POSTA TONALITE, UNWEATHERED
	APPROXIMATE GROUNDWATER TABLE
	ROCK FRACTURES (SCHEMATIC ONLY)

NOTES: 1). GEOLOGIC CONTACTS ARE DASHED WHERE INFERRED, AND QUERIED WHERE UNCERTAIN
2). ROCK FRACTURES ARE CONCEPTUAL ONLY
3). TD = TOTAL DEPTH OF WELL (APPROXIMATE DEPTH)
4). APPROXIMATE LOCATION OF CROSS SECTION PRESENTED ON FIGURE 7.



NORTH 18° EAST

HORIZONTAL SCALE: 1 INCH = 500 FEET
VERTICAL SCALE: 1 INCH = 250 FEET
2x VERTICAL EXAGGERATION
(11 X 17 INCH FORMAT ONLY)

References: USGS, 1975, 7.5' Live Oak Springs, CA Quadrangle.

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION

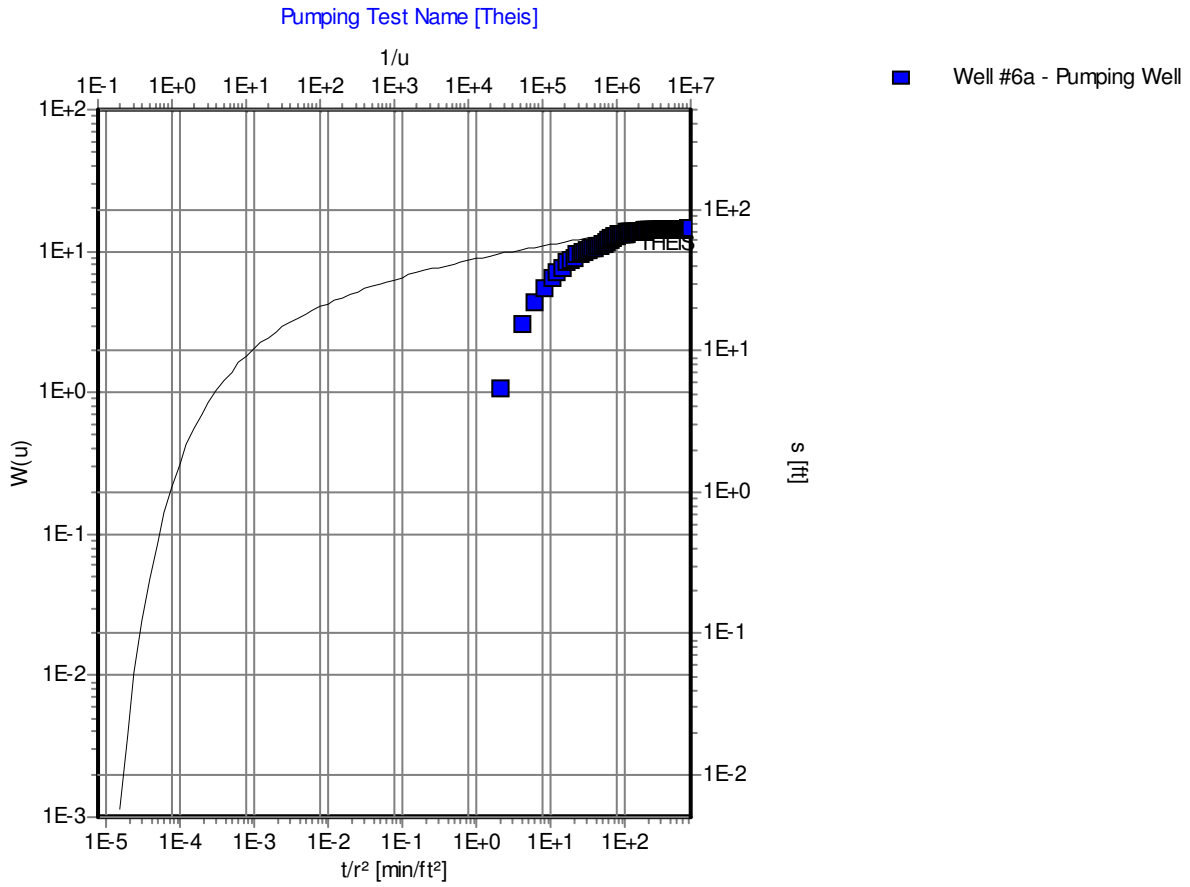
ROUGH ACRES STUDY AREA
SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	OCT 2010	2010-0005

Appendix A
Analytical Results from Aquifer Test Program

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

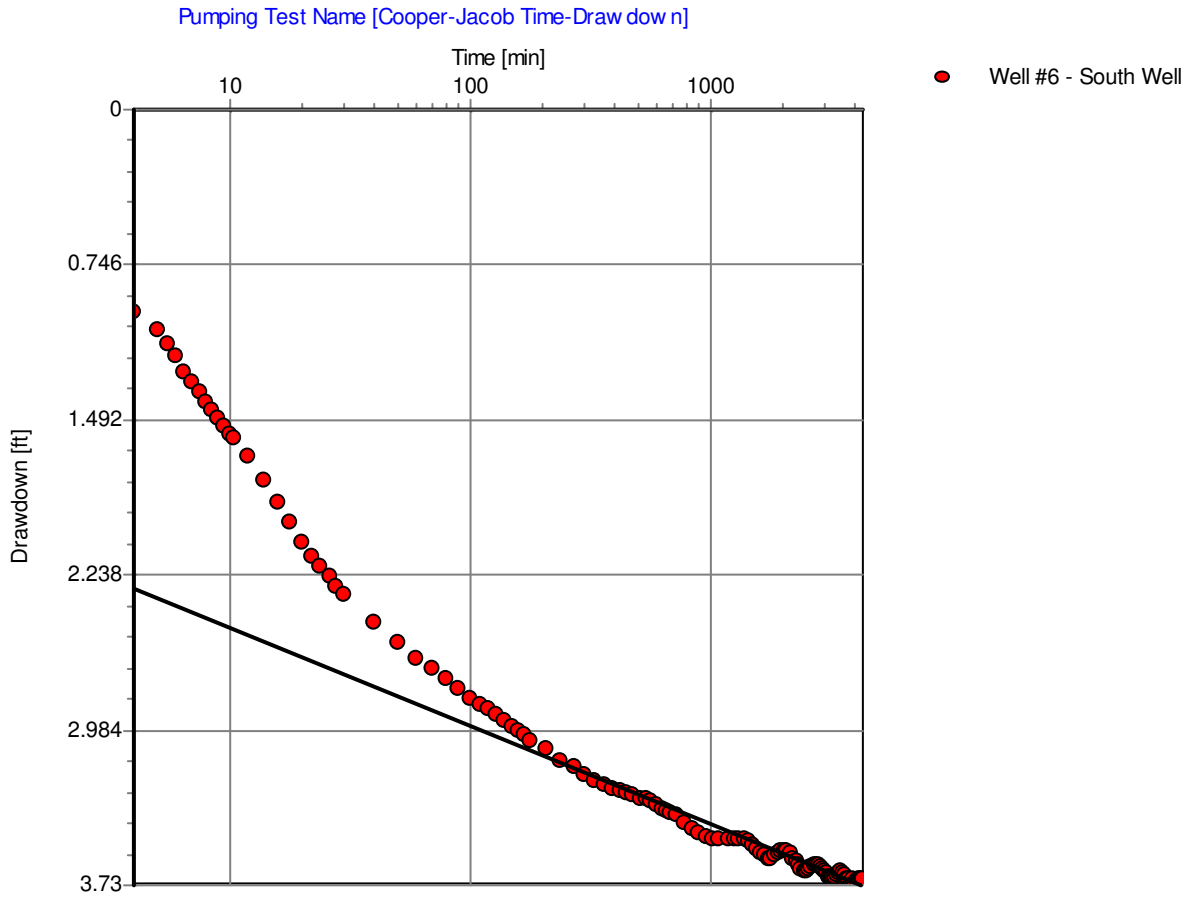
Analysis Results:	Transmissivity:	1.51E+2 [ft²/d]	Conductivity:	3.03E-1 [ft/d]
	Storativity:	3.19E-5		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to late time data. Pumping Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	3.75E+3 [ft²/d]	Conductivity:	7.50E+0 [ft/d]
	Storativity:	2.28E-7		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to latest time data. Observation Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

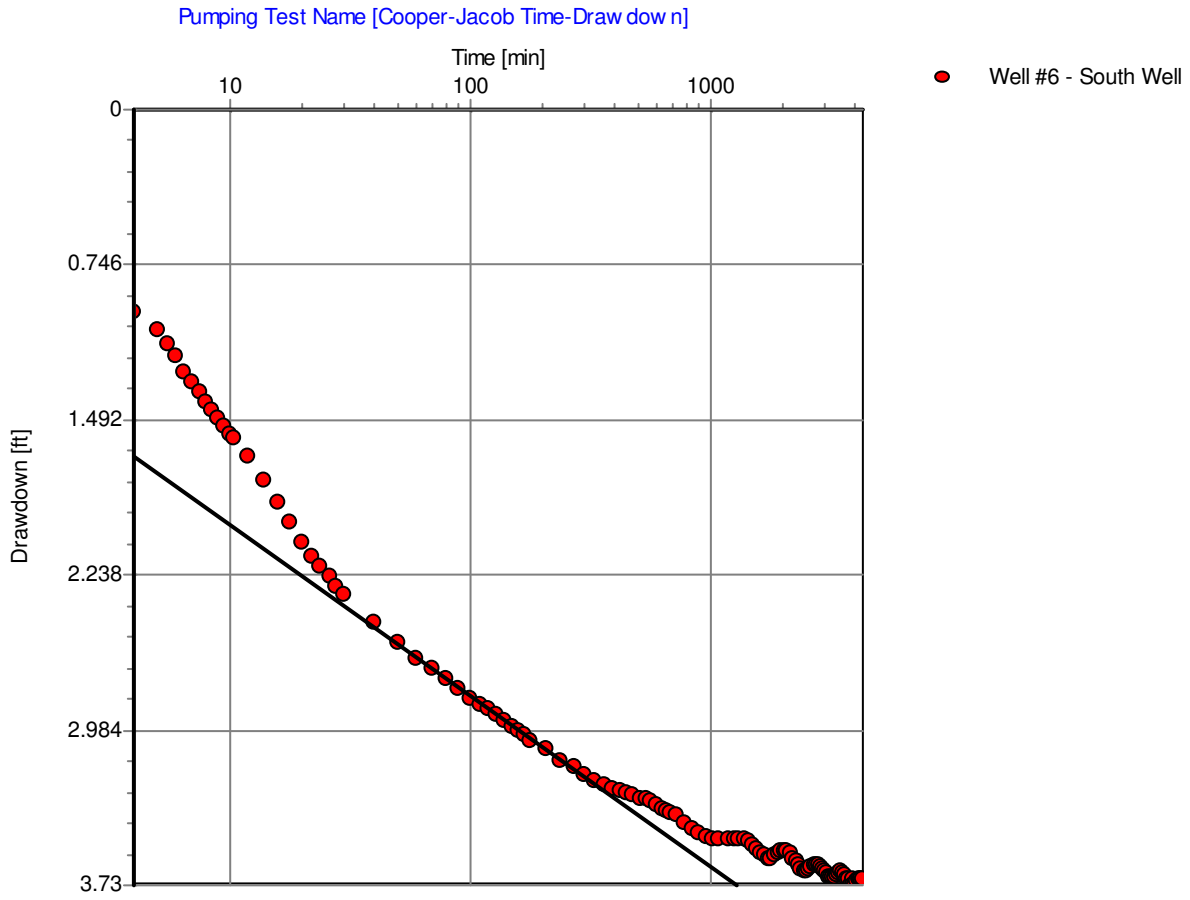
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:				
	Transmissivity:	2.14E+3 [ft²/d]	Conductivity:	4.28E+0 [ft/d]
	Storativity:	1.01E-4		

Test parameters:				
	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to middle time data. Observation Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

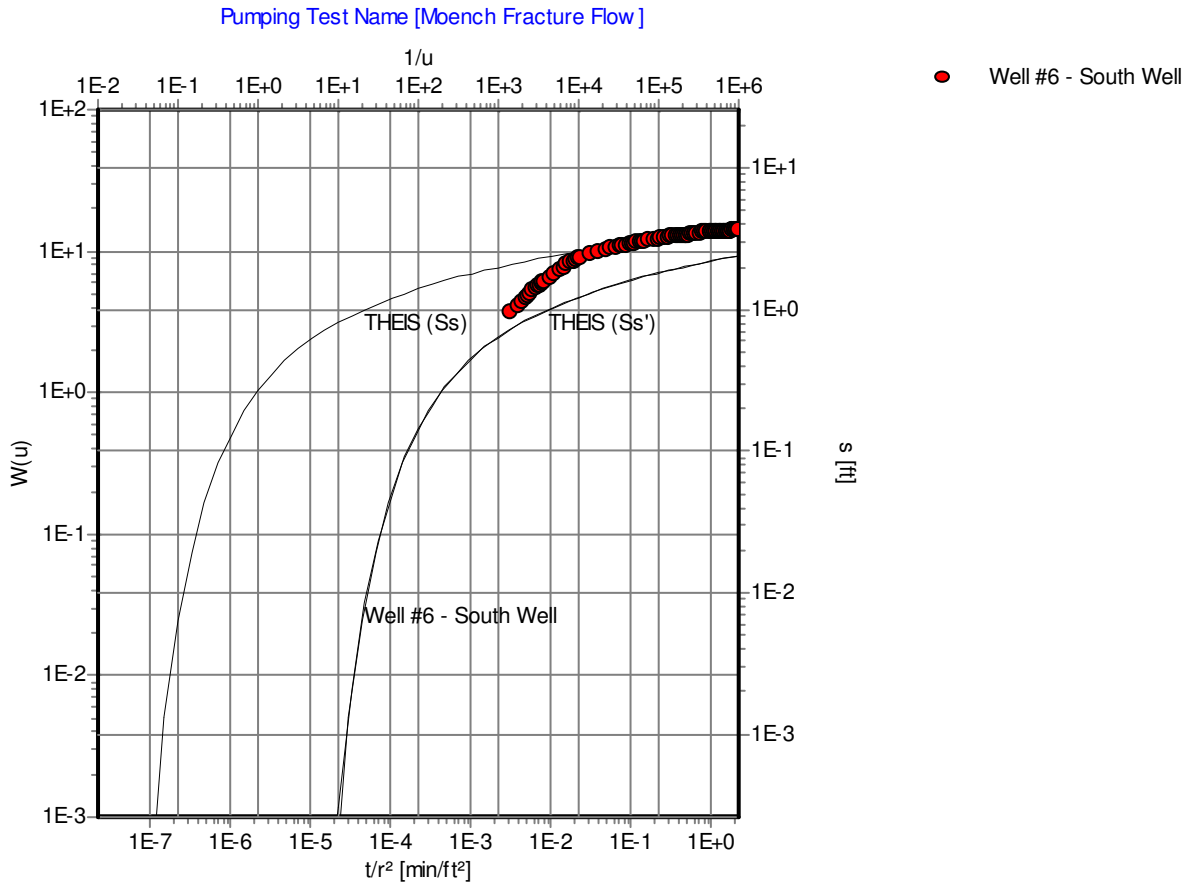
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench Fracture Flow**

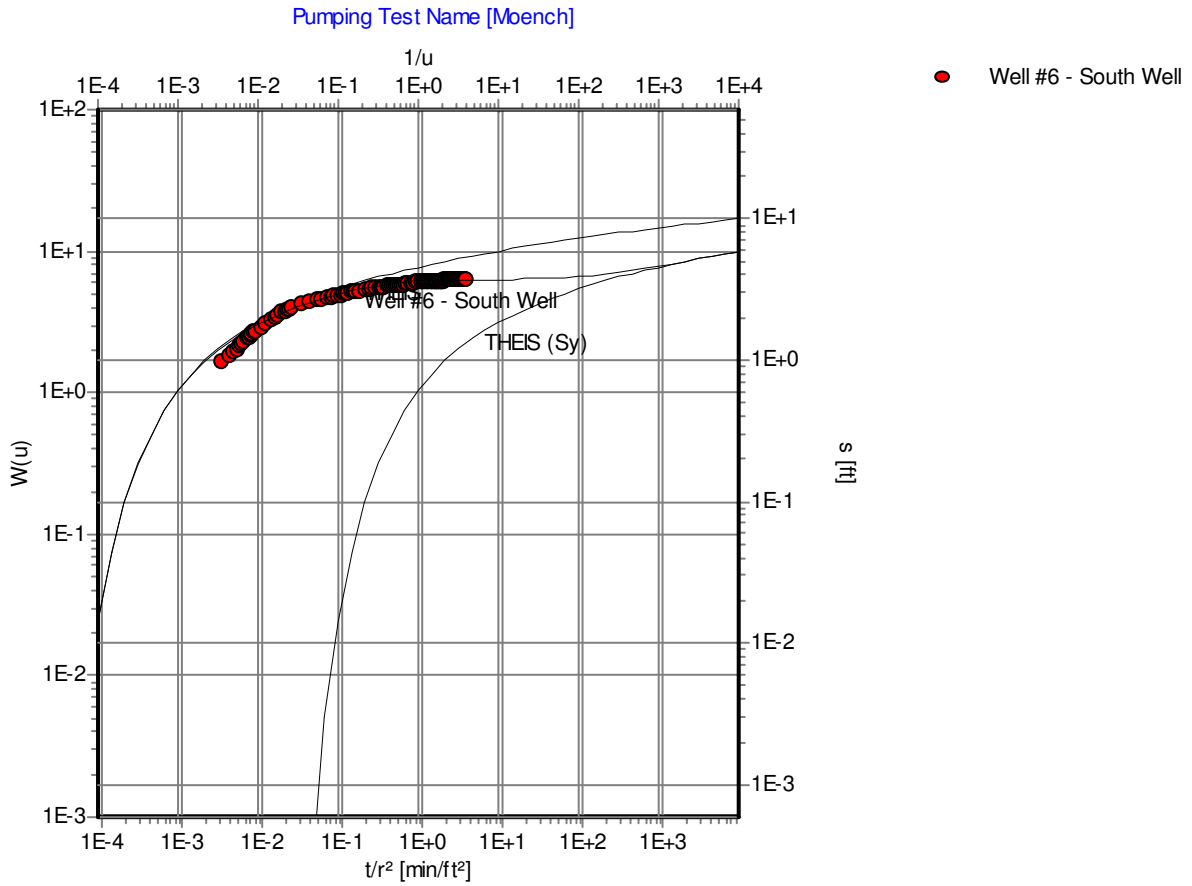
Analysis Results:	Transmissivity:	2.95E+3 [ft²/d]	Conductivity:	5.91E+0 [ft/d]
	Storativity:	4.48E-6		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	b:	357 [ft]
	Screen length:	310 [ft]	Kv/Kh:	0.1
	Boring radius:	0.271 [ft]	C:	0.231
	Discharge Rate:	50 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report**
	Project: Rough Acres
	Number:
	Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench**

Analysis Results:	Transmissivity:	1.30E+3 [ft²/d]	Conductivity:	2.60E+0 [ft/d]
	Storativity:	7.87E-1	Conductivity (vertical):	2.60E-1 [ft/d]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]	S/Sy:	0.001
	Boring radius:	0.271 [ft]	Kv/Kh:	0.1
	Discharge Rate:	50 [U.S. gal/min]	Gamma:	1E9
	b:	357 [ft]		

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

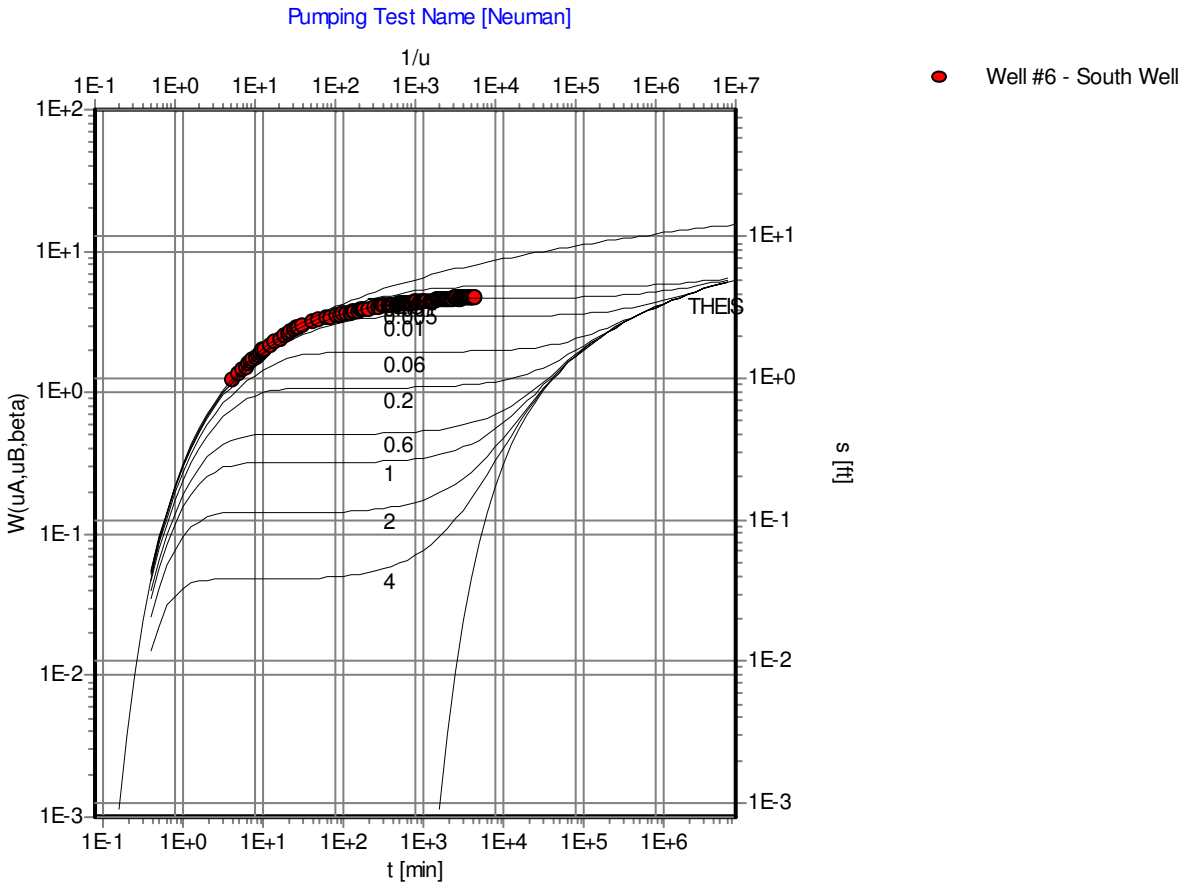
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	9.67E+2 [ft²/d]	Conductivity:	1.93E+0 [ft/d]

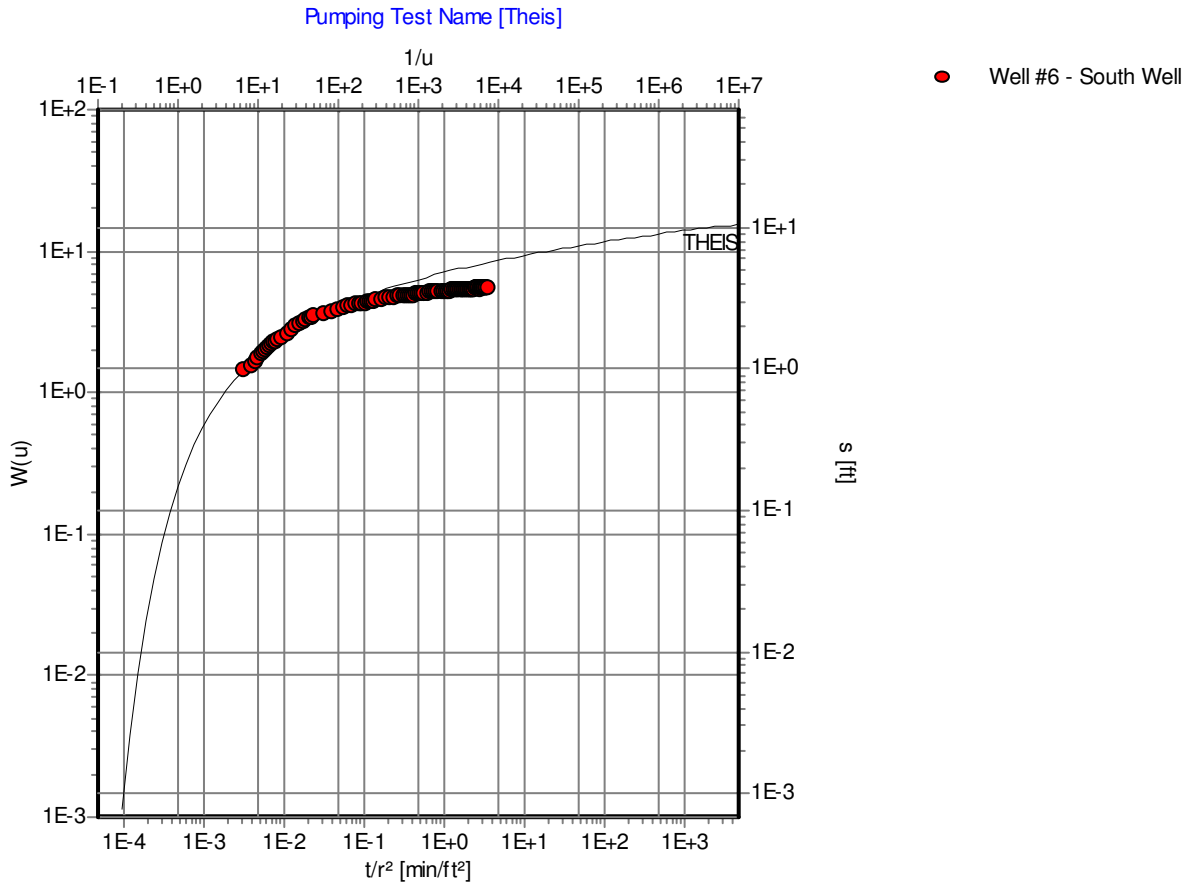
Test parameters:				
	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Beta:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: Match to entire data set.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

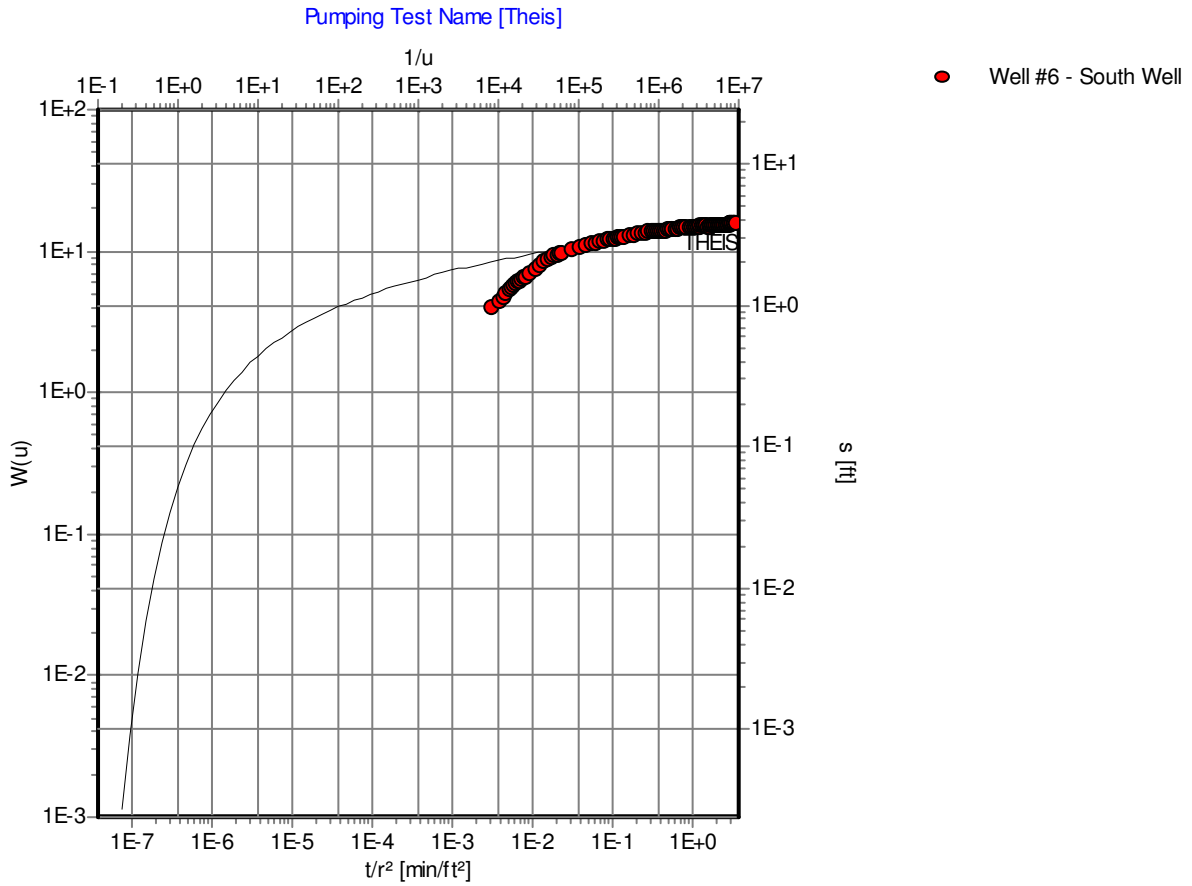
Analysis Results:	Transmissivity:	1.13E+3 [ft²/d]	Conductivity:	2.26E+0 [ft/d]
	Storativity:	1.47E-3		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to early time data. Observation Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

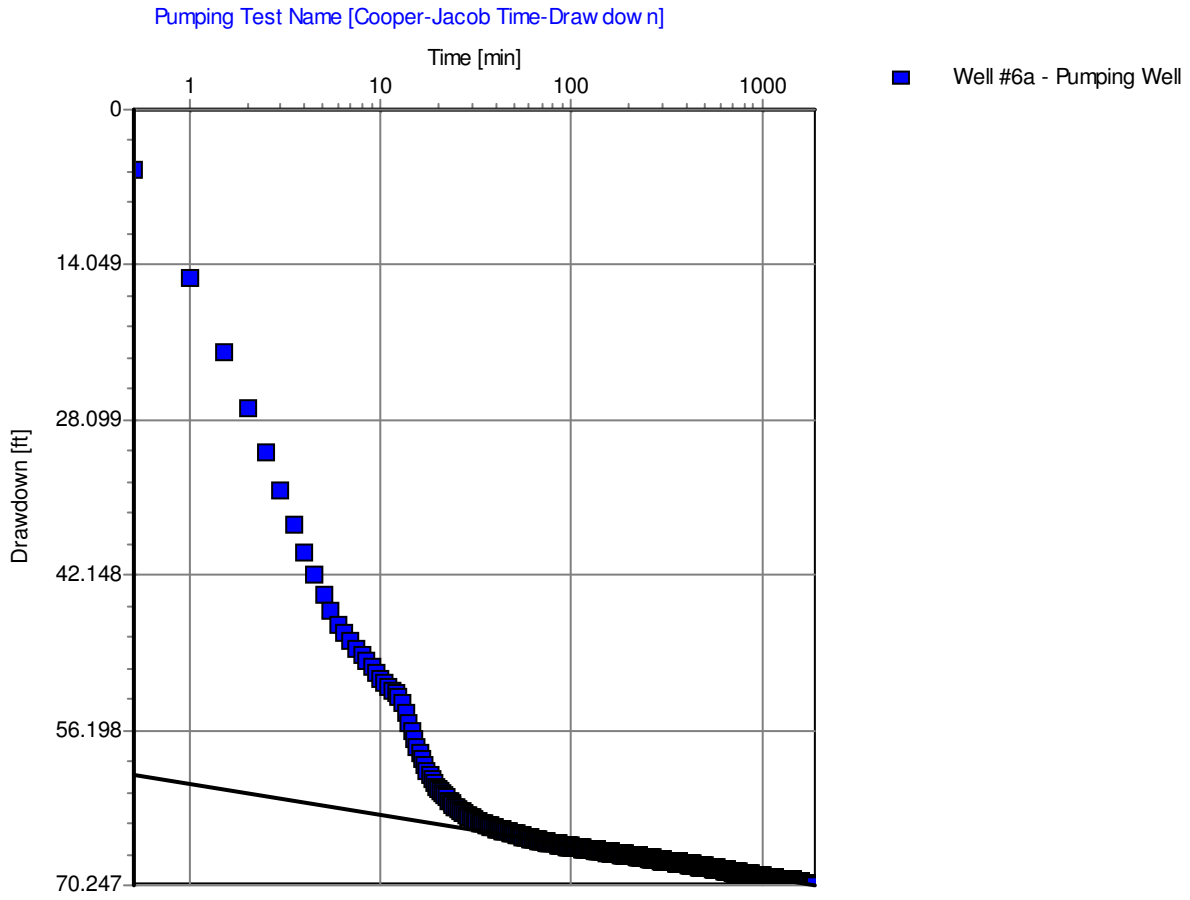
Analysis Results:	Transmissivity:	3.18E+3 [ft²/d]	Conductivity:	6.36E+0 [ft/d]
	Storativity:	3.29E-6		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	6.30E+2 [ft²/d]	Conductivity:	1.26E+0 [ft/d]

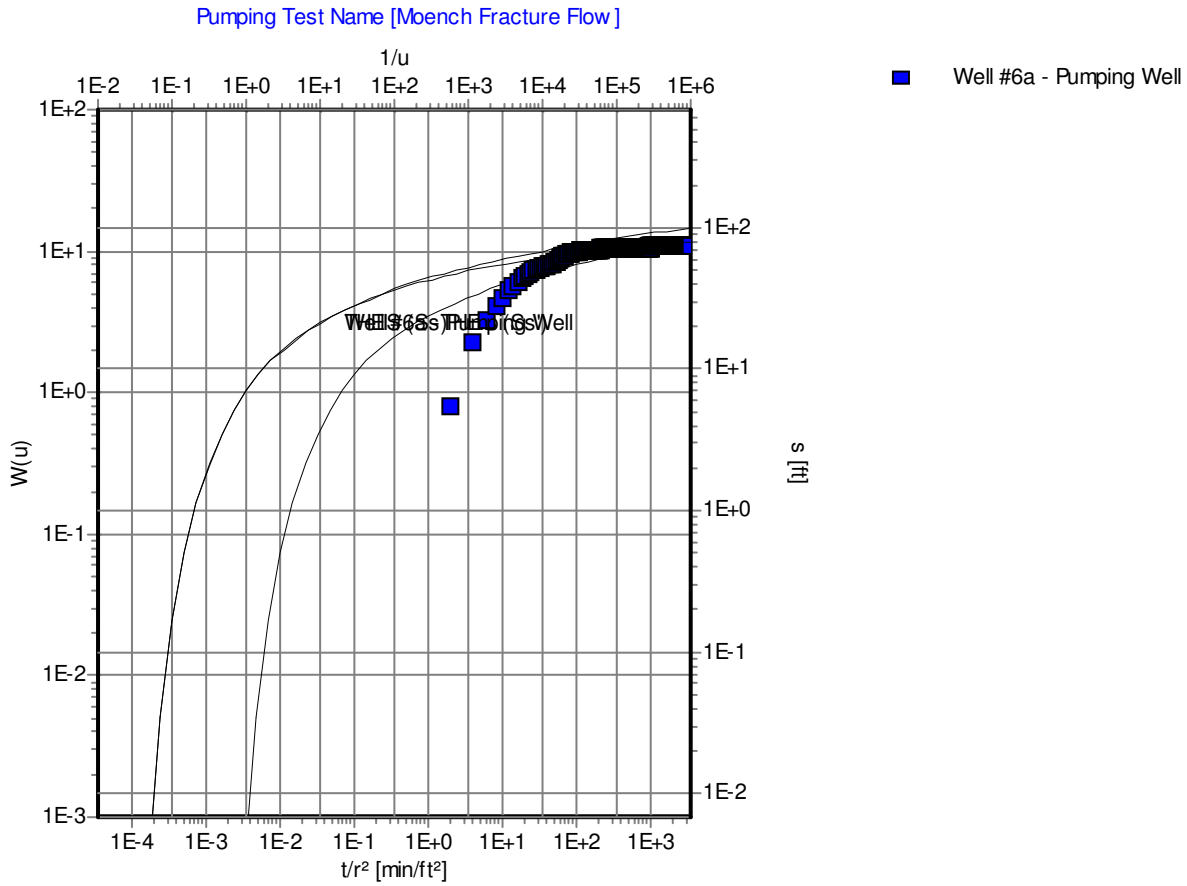
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc.	**Pumping Test Analysis Report**
460 Philip Street - Suite 101	Project: Rough Acres
Waterloo, Ontario, Canada	Number:
Phone: +1 519 746 1798	Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench Fracture Flow**

Analysis Results:				
	Transmissivity:	1.12E+2 [ft²/d]	Conductivity:	2.25E-1 [ft/d]
	Storativity:	2.70E-4		

Test parameters:				
	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	b:	357 [ft]
	Screen length:	310 [ft]	Kv/Kh:	1
	Boring radius:	0.271 [ft]	C:	0.231
	Discharge Rate:	50 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	20	K(block)/K(fracture):	0.1

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/17/2010

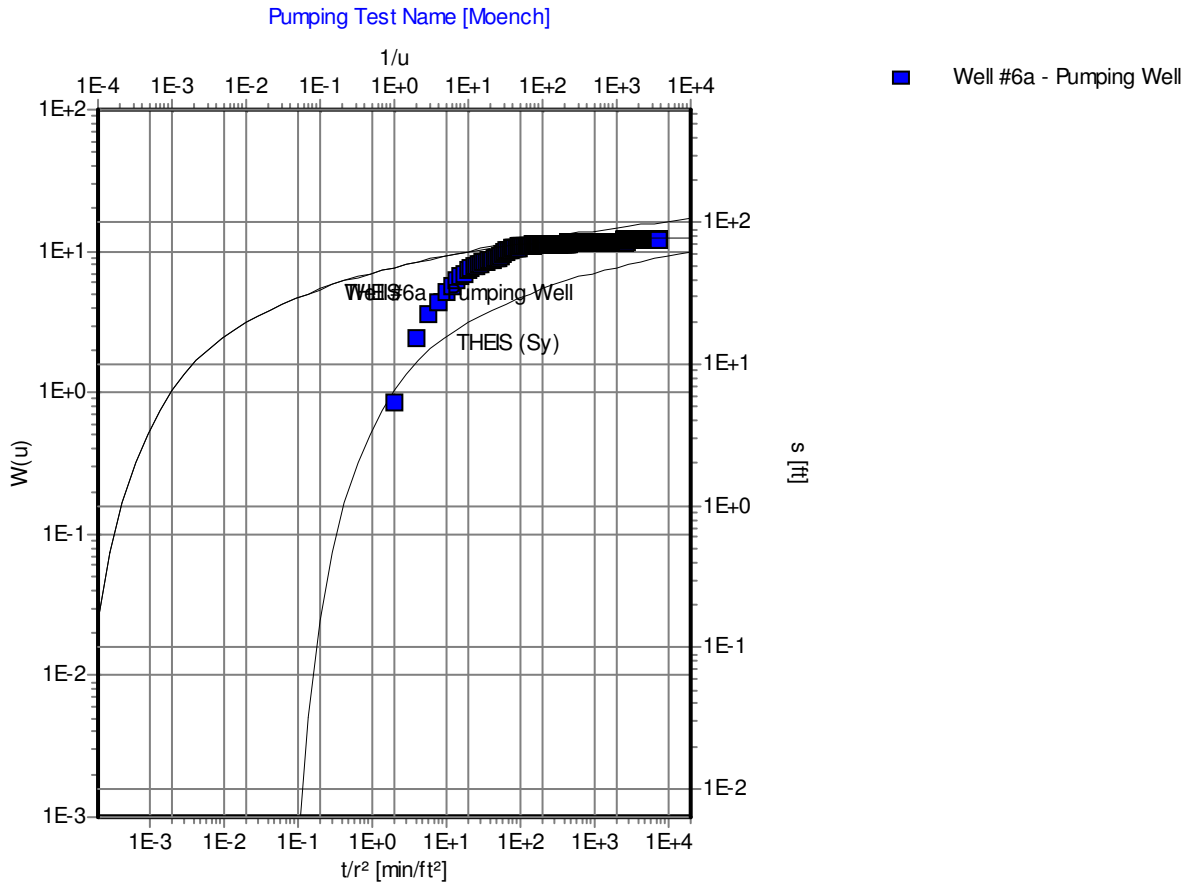
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench**

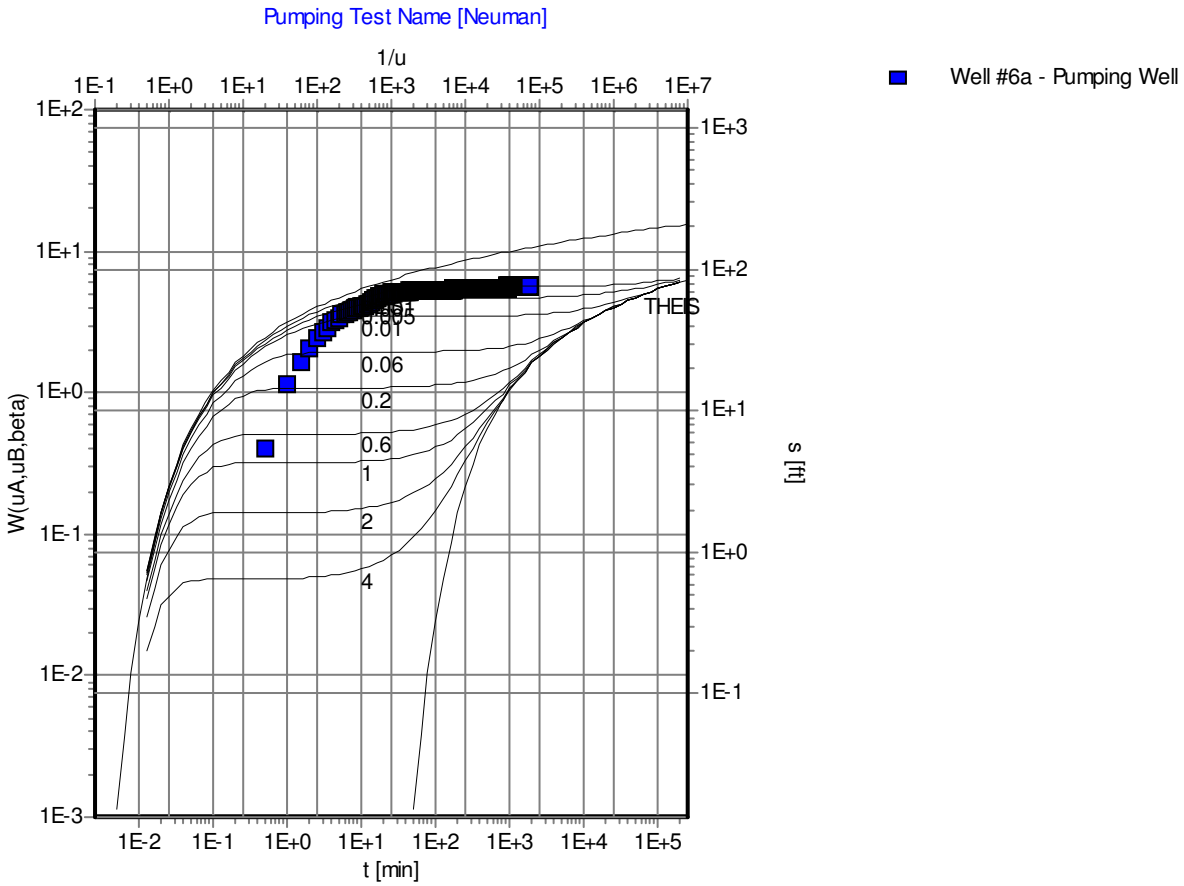
Analysis Results:	Transmissivity:	1.21E+2 [ft²/d]	Conductivity:	2.43E-1 [ft/d]
	Storativity:	1.72E-1	Conductivity (vertical):	2.43E-1 [ft/d]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]	S/Sy:	0.001
	Boring radius:	0.271 [ft]	Kv/Kh:	1
	Discharge Rate:	50 [U.S. gal/min]	Gamma:	1E9
	b:	357 [ft]		

Comments:

Evaluated by:

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Neuman**

Analysis Results:				
	Transmissivity:	5.69E+1 [ft²/d]	Conductivity:	1.14E-1 [ft/d]
	Storativity:	1.62E-2	Specific Yield:	1.62E+2

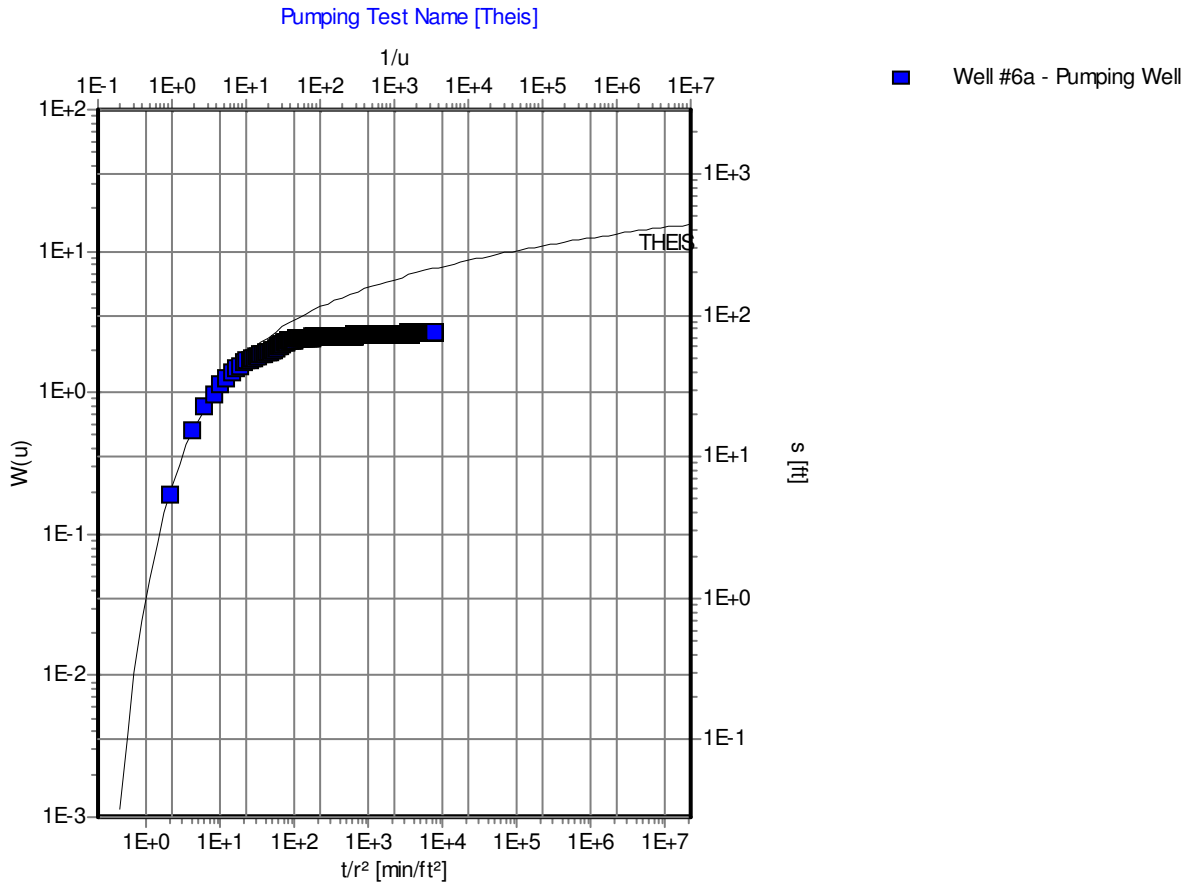
Test parameters:				
	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Beta:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: Match to late time drawdown data.

Evaluated by: MWV

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	2.69E+1 [ft²/d]	Conductivity:	5.39E-2 [ft/d]
	Storativity:	1.64E-1		

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to early time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

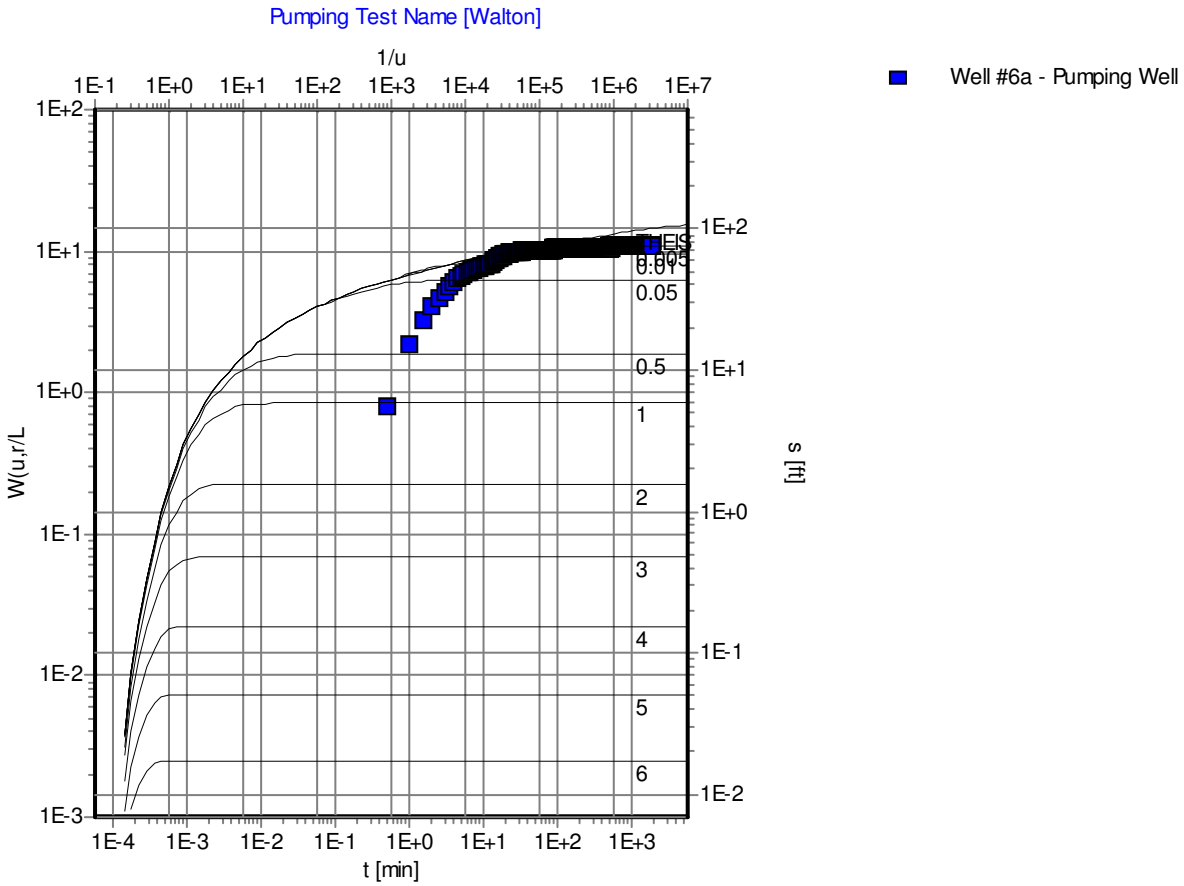
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Walton**

Analysis Results:	Transmissivity:	1.11E+2 [ft²/d]	Conductivity:	2.21E-1 [ft/d]
	Storativity:	7.08E-4	c:	1.30E+5 [min]

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	r/L:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments:

Evaluated by: MWV

Evaluation Date: 11/17/2010

Appendix B
Department of Water Resources Well Completion Reports

#4

Power at well

NO pump

Across road from
bathrooms in
West Canyon

water was discolored
& hence quit using

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#4

INVOICE

ERMIT TYPE & NUMBER: LWEL 16226 INVOICE DATE: 16 SEP 2004
ERMIT OWNER: CONTACT:
ADEM ROBERT S&MARY O TRUST B1
53 OCEAN ST

92008

611-060-03 APPLICANT:
PN: ~~611-110-01-00~~ 611-070-01 FADEM ROBERT S&MARY O TRUST B1
ITE ADDRESS: ~~2533~~ MCCAIN VALLEY RD
OCATION DESCRIPTION: ~~2533~~ MCCAIN VALLEY RD,

ROJECT DESCRIPTION/SCOPE
umber of Wells on Permit Application:1
escription of Work:new
ype of Use for Each Well:private

EE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:30 9773 773 429E01 CHECK	[illegible]
			TOTAL AMOUNT DUE	$390.00

2 7E
c.15

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel # ~~67~~ 600 ~~[illegible]~~

DEH USE ONLY
PERMIT # W LWCL162
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 440-7424
   1000 Pioneer Way (Mailing Address) [illegible] (City) 92020 (Zip)
2. Well Location - Assessors Parcel Number ~~611-110-01~~ 611-060-03 611-070-01
   [illegible] (Site Address) [illegible] (City) BOULEVARD 91905 (Zip)
3. Well Contractor - Well Driller Jim Manes Company Name: Jim Manes Drilling
   [illegible] (Mailing Address) [illegible] (City) [illegible] (Zip)
   Phone#: 445-1926 C-57#: [illegible] ☐ Cash Deposit ☐ Bond Posted
4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: Air Rotary
7. Depth of Well: Proposed: 300 Existing: [illegible]
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: 20	Depth: ft.	From: To:	From: To:
Diameter 7 in.	Diameter in.	Type:	From: To:
Wall/Gauge: [illegible]	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: [illegible] ft. Sealing Material: [illegible]
   Borehole diameter: in. Conductor diameter: in. Annular Thickness in.
10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [illegible] Date: [illegible]

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Danny O'Call Date: 4/16/04

DEH-LU-731a (Rev. 4/02) NCR

[illegible]

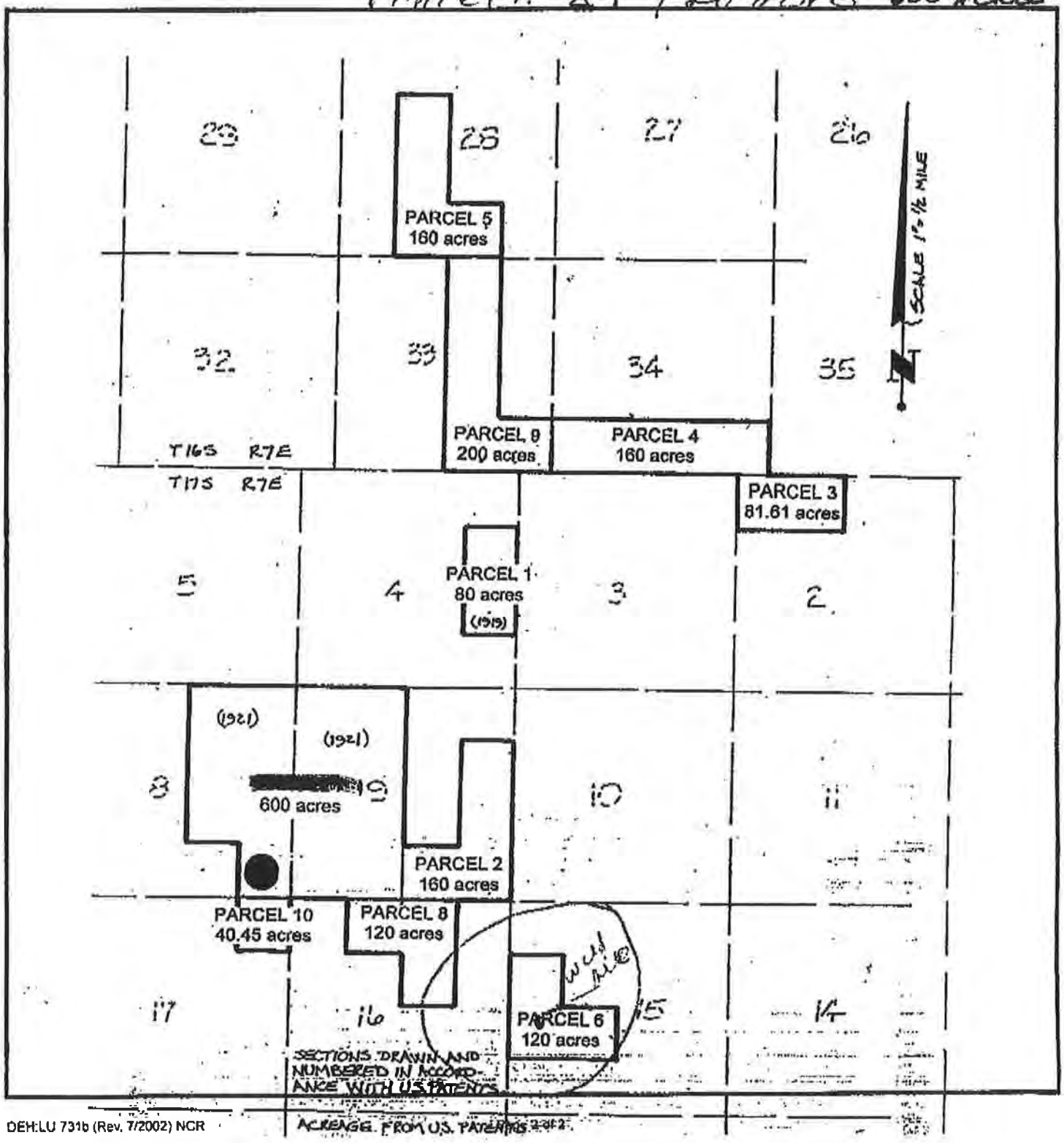
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWCL 16226
Assessor's Parcel Number: ~~611-170-07~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel 14 ~~[illegible]~~ 600 ACRES



County Mail Station – A-21

FIRST CARBON COPY

#2

ASSESSORS PARCEL NUMBER:

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name JOHN WELL NO. 2
Address ROUGH ACRES
City _____ Zip _____

(2) LOCATION OF WELL (See instructions):
County _____ Owner's Well Number _____
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

DEPARTMENT USE ONLY
Completed Well Construction:
Date _____
Date Inspected _____
Comments _____
Water Sample Taken? _____
Sanitarian's Approval: _____

JETTED #8

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack: 3/8ths
Yes ☒ No ☐ Size _____
Diameter of above 4"
Packed from 0 to 185 ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Well	From ft.	To ft.	Slot Size
0	91	6 5/8	185	0	185	3/32ths

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 91' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:
Depth of first water, if known 130' ft.
Standing level after well completion 35 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test — ft. At end of test — ft.
Discharge 15 gal/min after 1 hours Water temperature 60°C
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 260 ft. Depth of completed well 185 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-91 - SANDY, D.G.
91-130 - SOFT, ORANGE, WHITE & BROWN
130-133 - VERY SOFT (3 GPM)
133-185 - SOFT ORANGE, WHITE, BLACK
185-190 - LOOSE ROCKS (20 GPM)
190-260 - SOFT; HARD

Work Started _____ 19 Completed _____ 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature] (Well Driller)

NAME _____ (Person, firm, or Corporation) (Type or Print)

ADDRESS _____

CITY _____ ZIP _____

LICENSE NO. _____ DATE THIS REPORT _____

DHS:EHP-732 (83) CONFIDENTIAL – NOT FOR PUBLIC USE – WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 0909442

Page 1 of 1
Owner's Well No. X 4
Date Work Began 9-25-04, Ended 9-27-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16226 Permit Date 9-16-04

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 91	sandy, dg
91 130	soft, orange, white & brown
130 133	very soft
133 185	soft, orange, white & black
185 190	loose rocks
190 260	soft & hard

TOTAL DEPTH OF BORING 260 (Feet)
TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER
Name Hamann Companies
Mailing Address 1000 Pioneer Way
City El Cajon, Ca 92020 STATE ZIP

WELL LOCATION
Address McCain Valley Rd
City Jacumba
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17 Range 7E Section 15
Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH
NORTH
WEST EAST
Sandhills
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 130 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-27-04
ESTIMATED YIELD * 15 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN – (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 91	11	x				steel	5 5/8	.188	
0 185	6½		x			pvc	4	sch 40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 91	x	x		
0 185			x	5/16 pea gravel

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 16052 LAWSON VLY RD, JAMUL, CA 91935 CITY STATE ZIP
Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 3-6-05 C-57 LICENSE NUMBER 360722

CONFIDENTIAL
NOT FOR PUBLIC RELEASE
WATER CODE SECTIONS 13752

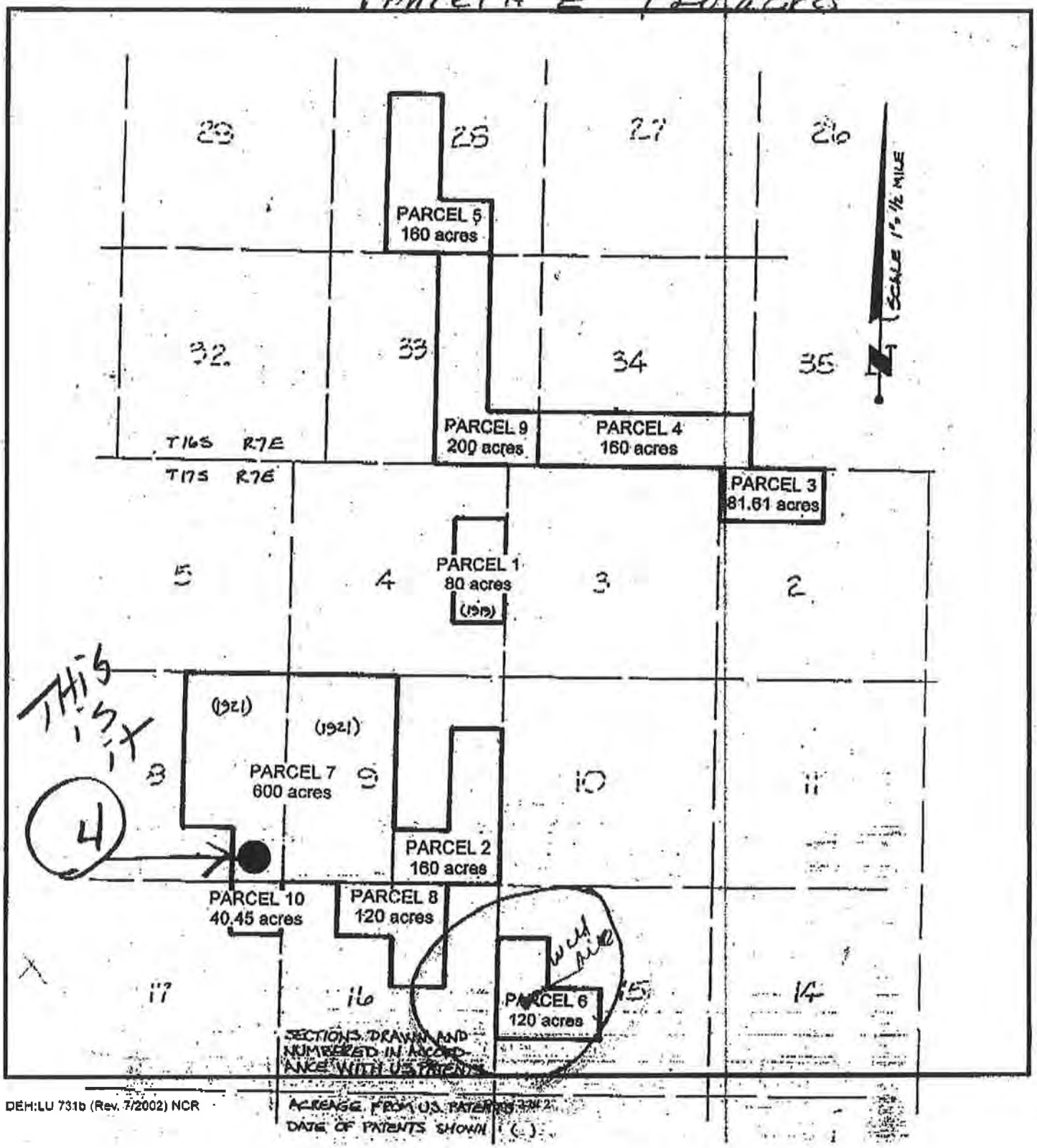
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16226
Assessor's Parcel Number: 611-110-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 6 120 acres



Fully operational

#6 No Logs
Available

original
well on
Ranch

6A NEW
Public
WELL

Fully operational

QUADRUPLICATE FEB 09 201[illegible]
For Local Requirements

County of San Diego
Dept. of Environmental Health
Land & Water Quality Div.

Page 1 of 1
Owner's Well No. 1
Date Work Began 11-4-09, Ended 11-10-09
Local Permit Agency San Diego C.U.S.
Permit No. 5WE620429 Permit Date 11-13-09

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 1089956

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 10	sandy-rocks
10 30	sandy-slightly firm
30 32	soft
32 70	sandy
70 85	harder
85 87	cracks
87 230	black & white rock, softer areas
230 233	softer, orange
233 330	black, white & orange
330 332	softer, orange
332 385	black & white rock, softer areas
385 395	sand
395 420	black & white rock

Completed Well Construction
Date 2/9/10
Date Inspected
Comments KIVA entered on this date.
Water Sample Taken? [signature]

TOTAL DEPTH OF BORING 420 (Feet)
TOTAL DEPTH OF COMPLETED WELL 395 (Feet)

WELL OWNER

Name Harmony Grove Partners
Mailing Address 1000 Pioneer Way
CITY El Cajon, Ca 92020 STATE ZIP

WELL LOCATION

Address McGarry Valley Road
City Jacumba, Ca
County San Diego
APN Book 511 Page 090 Parcel 04
Township 17 Range 7 Section 17
Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ✓ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 30 (Ft.) & DATE MEASURED 11-10-09
ESTIMATED YIELD * 60 (GPM) & TEST TYPE airlift
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN - (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 56	12	x				steel		.188	
0 75		x				steel	6 5/8	.188	
0 385	6½		x			pvc	4	CL200	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 56	x (cement was pumped)			
0 75		x		
0 385			x	5/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other [illegible]

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VALLEY ROAD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] 1/10/10 3607
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICE

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NOT FOR PUBLIC USE
CONFIDENTIAL
WATER CODE SEC. 13752

8

THIS WELL HAS
NO PUMP OR POWER
NEEDS TO BE
RELOCATED EAST
OUTSIDE OF
TRANSMISSION LINE
POWER EASEMENT

Fain Drilling & Pump Co. Inc.

12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Invoice

#8

Date	Invoice #
2/11/2005	8048

Bill To
THE HAMANN COMPANIES 1000 PIONEER WAY EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
DRILLING 970 FT DEEP WELL APN 611 110 01			
PARCEL 6 120 AC			
EQUIPMENT SET UP	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
DRILLING 400-800' 6.5" DIA HOLE	400	14.00	5,600.00
DRILLING 800 - 970' 6.5" DIA HOLE	170	16.00	2,720.00
REAMING 6" TO 10" DIA HOLE	226	12.00	2,712.00
FURNISH AND INSTALL 6" WELL CASING	228	13.00	2,964.00
INSTALL 50 FT. SURFACE SEAL	1	1,500.00	1,500.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$21,286.00
Payments/Credits	$0.00
Balance Due	$21,286.00

TRIPLICATE
Owner's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909549

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. Par. 6 -120
Date Work Began 2/1/05, Ended 2/9/05
Local Permit Agency DEH
Permit No. 16456 Permit Date 2/1/05

GEOLOGIC LOG

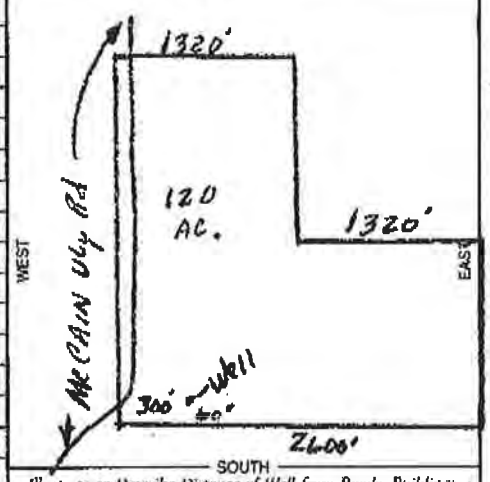
ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	12	Slope wash - sandy decomposed granite - brown color
12	212	Weathered Granitic Rock
212	226	Broken Rock
226	310	Weathered granitic rock mostly white quartz
310		Water 8 gpm
310	961	Granitic rock large crystals of white quartz
961		Water 40+ gpm
961	970	Fractured granitic rock large quartz crystals

TOTAL DEPTH OF BORING 970 (Feet)
TOTAL DEPTH OF COMPLETED WELL 970 (Feet)

WELL OWNER
Name The Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon Ca 92020
CITY STATE ZIP

WELL LOCATION
Address Rough Acres Ranch McCain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17S Range 7E Section 15
Lat 36 16 772 N (DEG. MIN. SEC.) Long 115 69 465 W (DEG. MIN. SEC.)

LOCATION SKETCH
NORTH


SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED
ESTIMATED YIELD * 50 (GPM) & TEST TYPE airlift
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 800 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	226	10	X				Steel	6	.188	

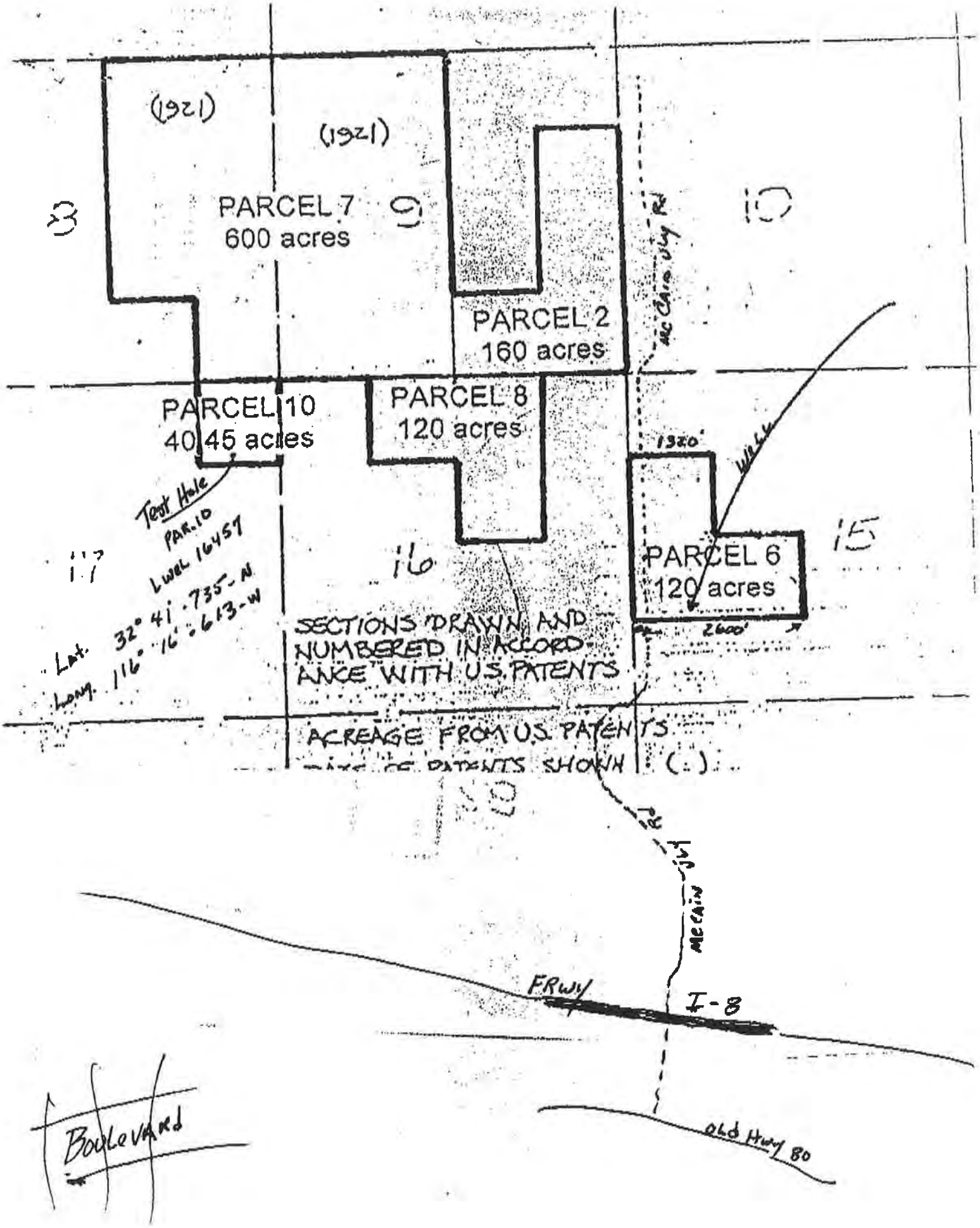
ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			
50	226			X	

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Fain Drilling & Pump Co. Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 12029 Old Castle Rd. Valley Center, Ca 92082 CITY STATE ZIP
Signed Joe R. Fain
C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 2/11/05
C-57 LICENSE NUMBER 328287

DWR 188 REV. 05-03
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM


(1921)
(1921)
8
PARCEL 7
600 acres
9
10
McCain Jly Rd
PARCEL 2
160 acres
PARCEL 10
40.45 acres
PARCEL 8
120 acres
1320'
Well
Test Hole
PAR. 10
LWEL 16457
Lat. 32° 41' .735-N
Long. 116° 16' .613-W
17
16
15
PARCEL 6
120 acres
2600'
SECTIONS DRAWN AND
NUMBERED IN ACCORD-
ANCE WITH U.S. PATENTS
ACREAGE FROM U.S. PATENTS
DATE OF PATENTS SHOWN ( )
McCain Jly Rd
FRWY
I-8
Old Hwy 80
Boulevard

9

Fully operational
old well
No info
Probably 5-10 GPM
& shallow

APPENDIX C

CUMULATIVE WATER QUANTITY IMPACTS ANALYSIS

ROUGH ACRES RANCH WATER PRODUCTION AREA

MCCAIN VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Table 1
Estimated Groundwater Demand - Rough Acres Ranch Water Production Area

Land Use Scenario	Land Use	Quantity	Water Demand per Unit (afy)	Total Demand (afy)
Existing Conditions	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Total Water Demand (Existing Conditions)			5.74
Existing Conditions Plus 9-Month Construction at 50 gpm	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Project 9-month Construction (50 gpm)	1	60	60
	Total Water Demand (Existing Conditions Plus 9-Month Construction at 50 gpm)			65.74
Existing Conditions Plus 9-Month Construction at 100 gpm	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Project 9-month Construction (50 gpm)	1	120	120
	Total Water Demand (Existing Conditions Plus 9-Month Construction at 100 gpm)			125.74

Note: afy - acre feet per year; gpm - gallons per minute

Table 2
Groundwater in Storage Calculation - Effects of Pumping at 50 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (50 gpm)

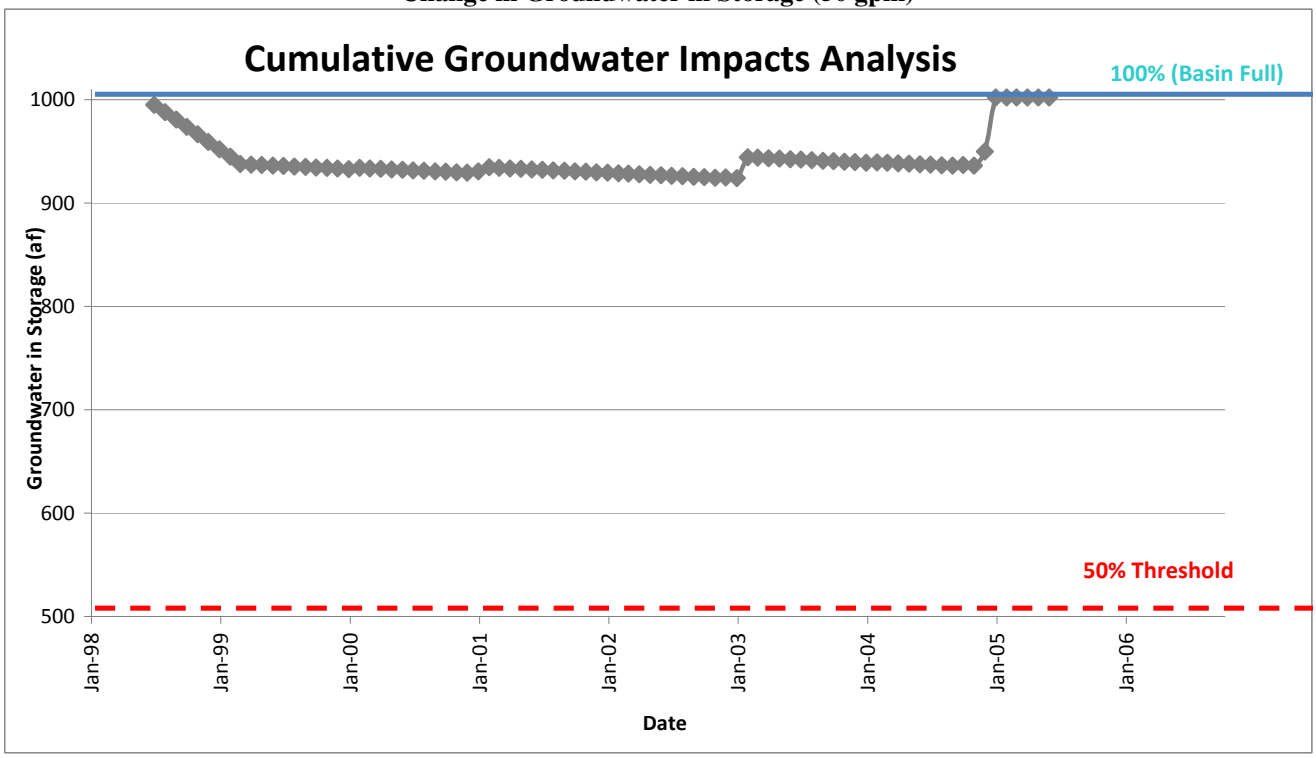


Table 3
Groundwater in Storage Calculation - Effects of Pumping at 100 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (100 gpm)

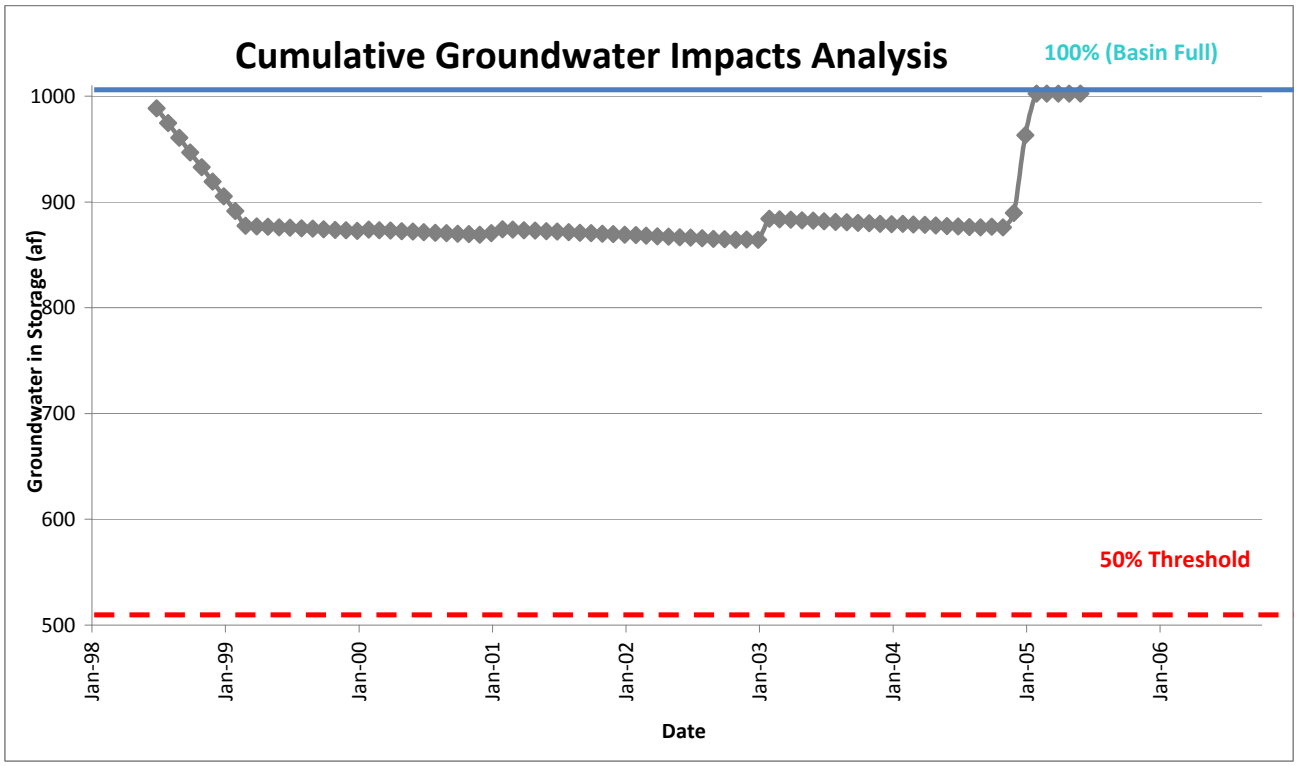
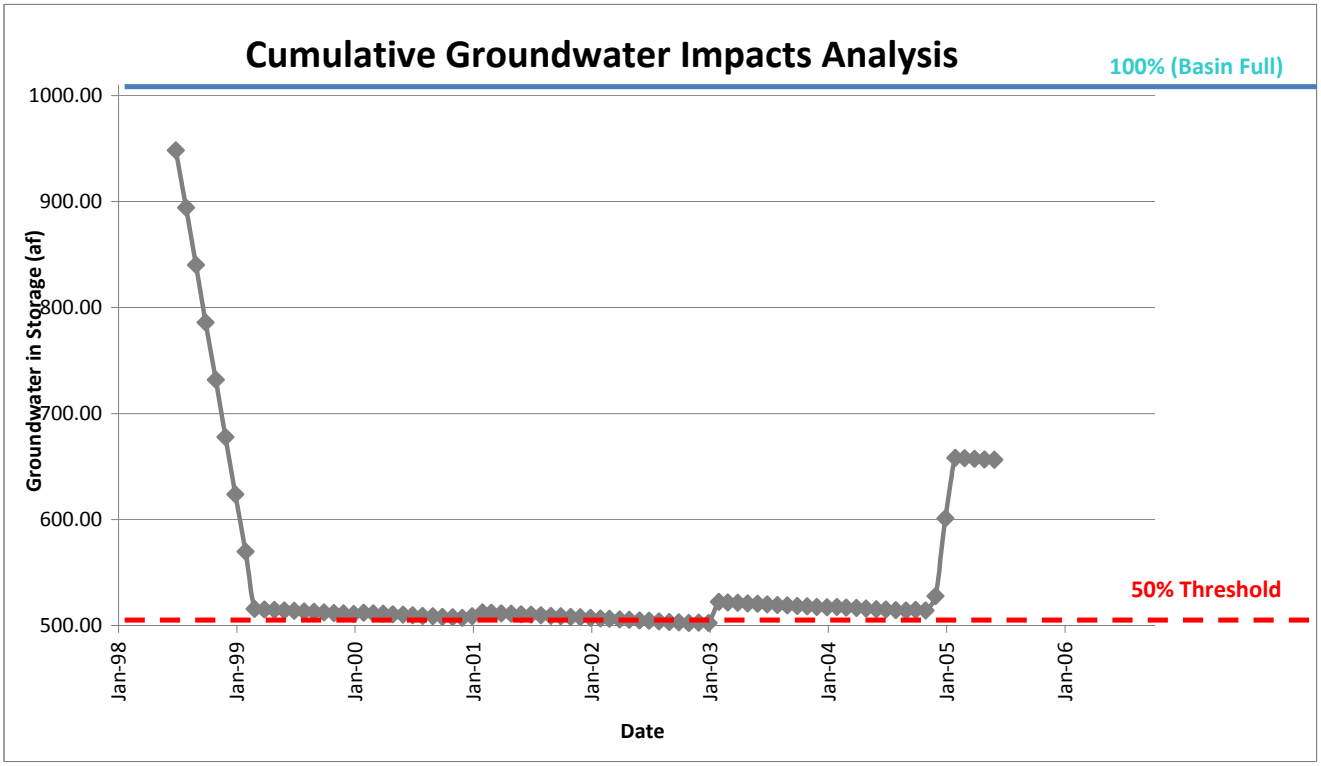


Table 4
Groundwater in Storage Calculation - Effects of Pumping at 400 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (400 gpm)



APPENDIX C

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Cumulative Project List

Appendix C

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Cumulative Project List

Project	Project Type	Project Location	Status
Wind Energy Projects			
ESJ WIND PROJECT I: Development of 400 MW of wind generation. Phase I (just north of the town of La Rumorosa) is proposed to generate approximately 100 MW of energy with 45 to 52 turbines. Point of interconnection proposed with the ECO Substation. Proposed to be online in July 2012 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico, In the Sierra Juárez mountains north of the town of La Rumorosa.	Final Interconnection Study completed. Draft Interconnection Agreement (IA) provided for review. (Queue No. 159a). The project would be built in multiple phases. Phase I is the Jacume phase and it expected to commence construction in 2011 and be completed in 2012.
ESJ WIND PROJECT II: Development of 300 MW of wind generation. Point of interconnection proposed with the ECO Substation. Proposed to be online in May 2013 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico. In the Sierra Juárez mountains.	In Transition Cluster. Interconnection Study is anticipated to be completed July 2010. The Interconnection Agreement is anticipated to be completed in December 2010. (Queue No. 183).
ESJ WIND PROJECT III: Development of 420 MW of wind generation. Point of interconnection proposed with the ECO Substation. Proposed to be online in February 2014 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico. In the Sierra Juárez mountains.	In Transition Cluster. Interconnection Study is anticipated to be completed July 2010. The Interconnection Agreement is anticipated to be completed in December 2010. (Queue 215).
Transmission and Other Renewable Projects			
SUNRISE POWERLINK: Development of a 150-mile transmission line from Imperial County to Sycamore Canyon near Poway.	Public Facilities and Utilities (Transmission)	Traverses southeastern San Diego County.	Permitting stage and under legal challenge. On May 14, 2010, SDG&E submitted to CPUC and BLM a final Project Modifications Report that defines changes made to the project along the entire route after publication of the Final EIR/EIS.
DEBENHAM ENERGY - CACA 0504855: Wind testing site. 2,169 acres.	Public Facilities and Utilities	West of the community of Boulevard, south of I-8.	Wind testing stage (Type II).
NATIONAL QUARRIES - CACA 050635: Wind testing site. 4,435 acres.	Public Facilities and Utilities (Wind)	Southeastern San Diego County, north of I-8, east of Sunrise Highway. Sawtooth Mountain.	Memorandum of Understanding/CRA signed. Application complete April 22, 2009 Wind testing stage (Type II) Testing.
OCOTILLO EXPRESS, LLC - CACA 051552. Development of 562 MW on 14,691 acres in two phases.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north and south of I-8	A Plan of Development (POD) prepared in September 2009. The project is currently in the wind testing stage (Type II) under CACA 047518 and CACA 050916 (MAP ID items 9 and 10)

Project	Project Type	Project Location	Status
GREENHUNTER, OCOTILLO EXPRESS, LLC - CACA 047518: Wind testing site. 6,280 acres.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Finding of No Significant Impact and decision record posted. Testing and monitoring ROW issued. ROW expires 2/3/2012. Wind testing stage (Type II).
OCOTILLO EXPRESS, LLC - CACA 050916: Wind testing site. 9,247 acres.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Wind testing stage (Type II).
RENEWERGY, LLC, CACA 048004: Wind testing site. 3,912 acres	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Meteorological Tower Environmental Assessment nearing completion. Pending Native American consultation. Cultural literature started. Wind testing stage (Type II).
IMPERIAL VALLEY SOLAR - SOLAR TWO, CACA 047740: Development of up to 750 MW of energy on 6,140 acres of Bureau of Land Management-administered public lands and on 360 acres of private lands.	Public Facilities and Utilities (Solar)	North of I-8 in southwestern Imperial County.	Application for Certification filed with California Energy Commission June 30, 2008. Application for Certification/POD determined adequate under minimal criteria. Notice of Intent published October 17, 2008. The Final EIS published July 2010.
Development Projects (Federal)			
GOLDEN ACORN CASINO AND TRAVEL CENTER: SCH No. 2007071097: 33-acre expansion consisting of 150-room hotel, 900-space parking garage, surface parking, RV park, casino expansion, bowling alley, arcade, offices, retail, restaurants/food service, wind turbines, and water and wastewater improvements in three phases.	Commercial	South of I-8 at Crestwood.	Draft off-reservation Environmental Evaluation complete. Public review ended August 2007.
CAMPO LANDFILL PROJECT: 493-acre landfill facility and a 657-acre buffer area surround landfill.	Public Facilities and Utilities	Southeast corner of Campo Reservation.	On May 27, 2010, the Campo General Council voted to rescind applicable lease agreements in order to terminate the Campo Sanitary Landfill Project. The vote occurred at a special General Council meeting resulting from a petition signed by the required number of tribal members. (Campo Kumeyaay Nation 2010).
LA POSTA CASINO: Existing casino consisting of a 20,000-square-foot casino facility on an approximately 20-acre portion of the La Posta Reservation.	Commercial	2 Crestwood Road, Boulevard, CA La Posta Reservation, just west of existing Kumeyaay Wind facility.	Final environmental document 2006. Started operation in 2007.
BOULEVARD BORDER PATROL STATION: 32-acre site proposed for an administrative and training/educational facility, operated 24 hours a day, 7 days a week. At least 250 personnel, over three shifts, would occupy the site throughout the week.	Public Facilities and Utilities	North of I-8, on the east side of Ribbonwood Road.	Final Environmental Assessment and Finding of No Significant Impact issued February 2010.

Project	Project Type	Project Location	Status
CAMPO (LA POSTA) BORDER PATROL STATION: 25-acre site that includes a heliport.	Public Facilities and Utilities	32355 Old Hwy 80, Pine Valley.	Station opened in 2008.
LA POSTA MOUNTAIN WARFARE TRAINING FACILITY: Construction of a special warfare operation and training facility on approximately 2,250 acres.	Public Facilities and Utilities	La Posta Road, south of I-8, Campo.	Final Environmental Assessment dated September 2007.
BORDER PATROL FENCE PROJECT: As of March 2009 the 18-foot-tall, 3-foot-deep fence has been completed in eastern San Diego County (Haseoton, pers. comm. 2010).	Public Facilities and Utilities	Along U.S.–Mexico border in eastern San Diego County.	Constructed in eastern San Diego County from July 2008 to March 2009.
WIND MEASUREMENT TOWERS: The Descanso Ranger District proposes to authorize temporary wind measurement towers. The towers would be approximately 160 feet high and testing would be 3 years or less in duration.	Wind Measurement Testing	Cleveland National Forest. Descanso Ranger District. San Diego County. North side of I-8, LEGAL - T 16 S, R 5 E, Sections 1, 2, and 13.	U.S. Forest Service issued a permit in February 2010 for 3 towers in the area of La Posta Valley and Fred Canyon Road.
CONSOLIDATION AND REISSUANCE OF SDG&E PERMITS: The Forest Service is proposing a "master permit" to consolidate and reissue approximately 75 permits presently issued to SDG&E.	Public Facilities and Utilities	Cleveland National Forest.	Expected decision by the Forest Service in March 2011.
Development Projects (County)			
KETCHUM RANCH: TM 5524; subdivide 1,250 acres into 2,125 residential units, retail commercial development, elementary school site, public park, recreational center, open space, and associated infrastructure and utilities.	Residential	South of I-8, north of Old Highway 80 and west of Carrizo Gorge Road.	Department of Planning and Land Use (DPLU) letter dated July 2007 requesting an EIR. Project placed on idle status in January 2010.
ELDER: TPM 20981; subdivide 109 acres into five single-family residential lots. The proposed project is a minor residential subdivision with the Boulevard Community Planning Area. The project proposes to divide 109.29 net acres into four parcels and a remainder measuring 11.2 acres, 11.2 acres, 11.3 acres, 11.6 acres, and 63.9 acres.	Residential	South of Old Highway 80 and west of McCain Valley Road.	First Draft EIR was submitted in February 2006. No activity since 2006. Project owner changed February 2010.
DAVIS-INMAN: TPM 21081; subdivide 96.23 acres into four residential lots.	Residential	32062 Highway 94.	Problem with project site access identified. Appeal due to fire code filed October 2009.
STAR RANCH: TM 5459; subdivide 2,160.1 acres into 460 single-family residential lots, commercial uses, equestrian facility, helipad, water treatment facility, and wastewater treatment facility.	Residential	South of Big Potrero and west of Buckman Springs Road.	Scoping letter sent to DPLU on August 27, 2008. Project is on idle status.

Project	Project Type	Project Location	Status
HARVEST GLEN: TM 5366; subdivide 286.68 acres into 40 single-family residential lots.	Residential	Buckman Springs Road and Lake Morena Drive.	DPLU extension approval letter dated January 2006. The project was placed on idle status on January, 10, 2010.
VAUGHN: TM 5417; 14-lot TM with a 15th non-buildable lot for the roads and water system. The proposed lots range from 5.00 to 6.85 net acres. The project site is 81.24 acres.	Residential	30069 Canvasback Drive, Campo, just west of Buckman Springs Road.	DPLU first iteration review letter dated October 17, 2006.
VOLLI: TPM 20889; subdivision to create four 8-acre parcels, and one 7.9 parcel for a single family residence	Residential	Old Highway 80 and La Posta Road, near Boulder Oaks.	Project determined to have inactive status as of November 2009.
McCLINTOCK: TPM: 20755; minor subdivision of 10.0 gross acres into two residential parcels of 4.15 acres and 4.56 acres net.	Residential	Basso Road in the Campo/Lake Morena Community.	Project was approved on June 19, 2003.
BARTLETT: TPM: 20754: subdivide 164 acres into four single-family residential lots.	Residential	1850 Lake Moreno Drive.	Project was approved on June 17, 2003.
TIBBOT TPM: 20686: subdivide 35 acres into four single-family residential lots.	Residential	20774 Bee Valley Road.	Notice of Determination filed with County Clerk on Oct 17 2006.
DART TPM: 20675: 33.46-acre subdivision into three lots. Two lots for single-family residential (SFR) and one for general commercial uses.	Residential	Ribbonwood Road and Roadrunner Lane.	Project approved January 4, 2007.
GRIZZLE: TPM: 20719: subdivision of one lot into four parcels with a remainder parcel for SFR development.	Residential	McCain Valley Road and I-8.	Notice of Determination filed with County Clerk on Jun 29 2006.
ARELLANO: TPM: 20756 subdivide a 17.27-acre parcel into three parcels.	Residential	Hauser Creek Road west of Lake Morena Drive.	County staff completed review on January 26, 2009.
PIJNENBURG: TPM: 20778: five-lot subdivision on a 76-acre site.	Residential	Barrett Smith Road, North of Interstate 94.	Approved on August 6, 2009.
HEALD: TPM 21014: four-lot subdivision (5 net acres each) with a remainder lot (15 net acres) on a 36-acre site.	Residential	Southern terminus of Sunfish Way.	Project is on idle status as of February 2, 2010.
CAMPO HILLS COMMERCIAL BUILDING: site plan to develop a commercial building consisting of four attached units and a parking area.	Commercial Building	Evening Primrose Trail and Sheridan Road.	Project approved August 16, 2007.
BUCKMAN SPRINGS BORROW RECLAMATION PLAN: Allow for the continued use of Buckman Springs Borrow Pit to complete road repairs countywide by the County of San Diego, Department of Public Works. Additionally, a Reclamation Plan (RP 05-001) is being processed to ensure that the project site is reclaimed pursuant to the Surface Mining and Reclamation Act of 1975 (as	Reclamation Plan	1588 Buckman Springs Road.	Project approved in January 2007.

Project	Project Type	Project Location	Status
amended) at the conclusion of each of the three phases of extraction on site. The Major Use Permit expired November 7, 2005, but the extension to the Major Use Permit was applied for prior to expiration of the original permit. The modification to the Major Use Permit would allow for continued extraction of materials for an additional 25 years, rather than 50 years. The project site is located on 19.31 acres.			
BORROW PIT MILLER CREEK: Major Use Permit and Reclamation Plan for the RCP - Circle F Ranch project. The project proposes the extraction of sand resources within approximately 58.2 acres along the Miller Creek alluvial valley. A 16.4-acre area at the north end of the project site would be used for the creation of wetlands. The general operations for processing material and access would consist of an additional 61.9 acres.	Reclamation Plan	East of La Posta Road and North of Highway 94.	Draft EIR currently in the process. Funds not available for EIR submittal. Inactive status January 2010.
NEXTEL CELL TOWER: 35-foot faux broadleaf tree with antennas and equipment shelter.	Cell Tower	North of Highway 94 on Harris Ranch Road.	Project approved October 16, 2006.
BUCKMAN SPRINGS CELL TOWER: Installation and operation of telecommunication facility disguised as a faux monopine tree 50 feet high with six panel antennas located at a height of 46 feet. The associated equipment cabinets would include one electric meter panel, one telephone interface, and would be housed within an equipment enclosure measuring 20 feet by 11.5 feet by 10 feet.	Cell Tower	4277 Buckman Springs Road.	Mitigated Negative Declaration completed February 2007.
VERIZON CELL TOWER: 35-foot-high mono-pine mounted with 12 panel antennas. Associated equipment would include an emergency generator and two air-conditioning units that would be surrounded by an 8-foot-high concrete block wall and equipment cabinets that would be placed within an equipment shelter.	Cell Tower	22201 Mariah Way.	Draft Initial Study Checklist completed November 4, 2009.
VISTA CELL TOWER: 39-foot-high faux cross arm utility poles to accommodate four wireless carriers. Each of the proposed faux utility poles would consist of three panel antennas mounted to the cross arm and two sets of three antennas flush mounted to the utility pole. The facility would contain a total 18 antennas when fully occupied by all wireless carriers. Associated equipment for AT&T, Sprint, and T-Mobile would consist of	Cell Tower	1524 Kimberly Way.	Scoping Letter submitted to project applicant on February 15, 2010 requesting additional information.

Project	Project Type	Project Location	Status
four outdoor equipment cabinets and one Global Positioning System (GPS) antennas for each carrier. Verizon's supporting equipment would consist of indoor equipment cabinets enclosed within a prefabricated equipment shelter, one GPS antenna, and one 30 kW emergency generator enclosed by a Concrete Masonry Unit (CMU) wall with a s solid metal gate. The proposed utility poles and supporting equipment would be surrounded by a 34-foot by 70-foot by 6-foot CMU enclosure.			
BARRETT WIRELESS: Nextel wireless facility in Potrero on occupied property. Antenna pole would be camouflaged as a monopine and access road to facility would need to be improved.	Cell Tower	Highway 94, west of Saxon Road and east of Emery Road.	Notice of Exemption sent to County Clerk on October 9, 2007.
HORIZON TOWER: 30-foot-tall faux monobroadleaf and associated equipment contained within a shelter 20 feet long by 11.5 feet wide. The lease area is 41.2 feet wide by 48 feet long and would be surrounded by a 6-foot-high fence.	Cell Tower	Cam Del Monte Road and Shasta Way.	Approved in March 2010.
WHITE STAR CELL TOWER: Replace one existing panel antenna with a new panel antenna and add four additional panel antennas on top of the existing 100-foot-tall lattice tower	Cell Tower	1680 Tierra del Sol at Shasta Way.	Approved in April 2008.
OUTDOOR WORLD TOWER: The project consists of a 30-foot-tall faux monobroadleaf and associated equipment contained within a shelter 20 feet long by 11 feet and 6 inches wide. The lease area is 41 feet and 2 inches wide by 48 feet long and would be surrounded by a 6-foot-high fence.	Radio Antenna	37113 Highway 94.	Approved in March 2010.
RADIO ANTENNA: 100-foot lattice FM radio broadcast antenna tower and associated transmitting equipment. The FM transmit antenna measures approximately 40 feet and is mounted vertically parallel to the top portion of the tower; it does not extend beyond the height of the tower. The equipment would be concealed within a 8-foot by 8-foot by 10-foot tall prefabricated equipment shelter located adjacent to the tower, to the north. The exterior finish of the equipment shelter is to be textured and painted (earth tone) to blend with the existing natural environment. Access would be provided through the existing 10-foot-wide dirt access road (within a 30-foot easement) off Lake Morena Drive.	Radio Antenna	2456 A Lake Morena Drive.	Approved in September 2009.

Project	Project Type	Project Location	Status
PACIFIC BELL CELL SITE: Construct a cell tower site.	Cell Tower	44441 Old Highway 80.	Approved in March 2001.
CALLE NADA CELL SITE: 50-foot faux cypress and related power and radio equipment for cell site.	Cell Tower	4737 Calle Nada.	Approved in August 2007.
VERIZON WIRELESS CELL SITE: Addition of one 2-foot diameter microwave antenna mounted inside of the existing faux water tank (permit P04-019), two GPS antennas mounted to the outside of the previously approved 11-foot 6-inch by 28-foot concrete, prefabricated equipment shelter, and the installation of a 30 kw emergency backup generator with a 52-gallon diesel fuel tank The generator would be located inside the previously approved concrete equipment shelter. The equipment shelter would need to be slightly modified to allow an extra door for access and two vents for ventilation.	Cell Tower	31906 Old Highway 80.	Approved in March 2009.
GASOLINE CURVE CELL TOWER: Project proposes a 30-foot faux broadleaf tree cellular antenna and 230-square foot equipment shelter	Cell Tower	Shockey Road and Campo Road.	Categorical Exemption approved in September 2007.
OZBIRN CINGULAR CELL TOWER: Construction of a wireless telecommunications facility of a 45-foot camouflage utility pole with three antennas.	Cell Tower	1524 Kimberly Way, Campo.	Approved in March 2005.
SDG&E MTN EMPIRE OPERATOR TRAINING FACILITY: Major Use Permit modification for the operation of an explosives storage facility.	Commercial	30763 Old Hwy 80.	Approved in March 2009
ADELAIDES ROMAN CATHOLIC CHURCH: Major Use Permit to allow a religious assembly use with an elementary school on an approximately 5.13-acre site to be constructed in three phases.	Church	Sheridan Road and Custer Road.	Approved in November 2007.
BUCKMAN SPRINGS ROAD BRIDGE: Construct a new 450-foot bridge over Cottonwood Creek.	Public Facilities and Utilities	Southwest of I-8, north of Morena Stokes Valley Road, Campo.	Estimated completion date Summer 2013.
RIBBONWOOD ROAD SIGHTLINE IMPROVEMENT: Approximately 270-foot improvement to sightline on a horizontal curve.	Public Facilities and Utilities	North of I-8 along Ribbonwood Road approximately 0.25 miles south of Opalocka Road, near Boulevard.	Estimated completion date Spring 2011.

Source: SDG&E East County Substation Project

This page intentionally left blank.

APPENDIX D

List of Fires Identified in Figure 14 Fire History Map

Appendix D
Fires Identified in Figure 14 Fire History Map

YEAR_	FIRE_NAME
1911	
1911	
1911	
1911	
1911	
1911	
1912	
1912	
1914	
1915	
1915	
1917	
1917	
1919	
1919	
1919	
1919	
1921	
1921	
1923	
1924	
1925	
1925	
1925	
1926	
1926	
1927	
1928	
1928	
1929	
1930	
1931	
1933	
1933	
1939	
1940	
1940	
1940	

YEAR_	FIRE_NAME
1940	
1941	
1941	
1941	
1942	
1942	
1942	
1943	
1943	
1944	
1944	
1944	
1945	
1945	
1947	
1947	
1947	
1948	
1948	
1949	
1949	
1950	CONEJOS
1950	BOULDER CREEK
1950	PUEBLO SIDING
1952	
1953	
1953	BRONCO FLATS
1953	HIPASS
1958	HAUSER #1
1958	
1958	
1958	HAUSER #2
1960	
1962	
1963	
1968	DONOVAN
1969	
1970	LAGUNA
1970	KITCHEN
1970	GUATAY

YEAR_	FIRE_NAME
1971	MORENA
1972	CUYAPAIPE
1972	
1973	BOULDER OAKS
1973	BUCKMAN
1974	OUTSIDE ORIGIN #2
1974	RIBBONWOOD
1976	HAMBEY #3
1978	HWY 25
1978	
1980	CANEBRAKE
1981	LIVE OAK
1982	TULE
1983	FLINN
1983	MCCAIN
1983	CARRIZO
1986	CAMERON
1987	CARRIZO
1988	BUCKMAN
1989	THING #2
1989	PINE VALLEY
1992	MANZANITA
1992	STAR
1993	JEWEL
1994	LA POSTA
1995	MCCAIN
1995	RIBBONWOOD
1995	CHURCH
1995	HAUSER
1996	WHITE
1996	HWY 94
1996	SPENCER
1997	BRONCO
1999	SHOCKEY
1999	COTTONWOOD
1999	RAILROAD
1999	CAMPO
2000	HAUSER
2000	BORDER #6
2000	BUCKMAN

YEAR_	FIRE_NAME
2002	TROY
2002	BOBCAT
2002	MANZANITA#2
2003	CEDAR
2004	BORDER #10
2005	RAILROAD
2005	RIBBONWOOD
2005	CHURCH
2006	HORSE
2006	PINE
2007	PINE
2007	HARRIS 2
2008	CARRIZO
2008	SHOCKEY

Source: CALFIRE GIS DATA

25 of October, 2010

James Pine
Fire Marshal
San Diego County Fire Authority
734 W. Beech Street, Suite 301
San Diego, CA 92101

Re: Disproving Alleged 35 Turbine Fires Per Year Statistic Cited in International Association of Electrical Inspectors News Magazine

Dear Mr. Pine,

Iberdrola Renewables is keenly aware that preventing back-country fires is an issue of vital importance in San Diego. We have made significant efforts to design the Tule Wind Project to minimize fire risk. For example, we have committed to install fire suppression systems in the wind turbine nacelles as an additional layer of fire prevention, although these systems are in early development and are not widely implemented in the wind power industry.

Throughout our project design efforts, we have appreciated a high level of engagement with the San Diego County Fire Authority and the San Diego Rural Fire Protection District. The assistance provided to us by Chief David Nissen, Mr. Ralph Steinhoff, and yourself have helped us to reduce the project's fire risk even further.

At a July 22, 2010, interagency fire meeting hosted by the County, Mr. Steinhoff cited an article published in the May-June 2010 edition of the International Association of Electrical Inspectors (IAEI) News magazine, which discussed wind turbine fires. See Exhibit A, IAEI News, Sergio Panetta, "Grounding of Wind Power Systems and Wind Power Generators", p. 16 (May-June 2010). The IAEI article claimed that "California reports 35 turbine generated fires per year due to short circuiting and lightning." *Id.* at p. 18. This figure appeared extremely high to us based on our experience, so we investigated.

We found that the article's claim has no basis in fact. No California agency we consulted specifically tracks turbine-related fires as a statistic, much less reports them at a rate of 35 fires per year. Instead, we found that the source of this "statistic" is an anti-wind power website maintained by the Keepers of the Blue Ridge. Not only did the Keepers website not provide attribution for the figure, but also the group removed the figure when

IBERDROLA RENEWABLES, Inc.
211 Chapalita Drive
Encinitas, California 92024
Telephone (760) 445-3081
www.iberdrolarenewables.us

challenged by the California State Fire Marshal's office. Further, through our independent research with the California State Fire Marshal's office and local fire agencies in counties with wind turbines, we have only been able to confirm four (4) turbine-related fires in California since January 1, 2008 (a rate of approximately 1.3 turbine fires per year, statewide).

I. THE IAEI ARTICLE CITES AN ANTI-WIND POWER WEBSITE THAT APPEARS TO HAVE FABRICATED THE 35 WIND TURBINE FIRE CLAIM

The IAEI article attributes the 35 wind turbine fire per year "statistic" to a website maintained by the Keepers of the Blue Ridge, a North Carolina-based anti-wind power advocacy group dedicated to stopping wind power projects in the Blue Ridge Mountains.[1] Exhibit A, p. 18, n.5. In its entirety, the Keepers of the Blue Ridge website alleged:

> California reports 35 turbine generated fires per year due to short circuiting and lightning. A single turbine may contain up to 200 gallons of oil; the transformer at the base of each turbine may contain another 500 gallons of oil. In rural areas even a spark can easily develop into a large fire before discovery is made and fire-fighting can begin.

Exhibit B, Keepers of the Blue Ridge website, p. 5 (September 1, 2010). The IAEI article took the quote verbatim from the Keepers of the Blue Ridge website. *Compare* Exhibit A, p. 18, *with* Exhibit B, p. 5.

We sought independent confirmation of the "statistic" from the California Office of the State Fire Marshal and the California Energy Commission. We learned that neither office specifically tracks wind turbine-related fires, and neither agency was responsible for or could confirm the 35 wind turbine claim from the Keepers website.

At the State Fire Marshal's Office, we worked with Kirsti Fong who serves as the Program Coordinator for the National Fire Incident Report System (NFIRS) and California All Incident Reporting System (CAIRS). The CAIRS database is housed in the Office of the State Fire Marshal / CalFire and is a centralized data repository of all fire incident reports from state and local agencies. Reports from the CAIRS system are fed into the NFIRS system, which is also maintained by Ms. Fong in California, but is under the jurisdiction of the Federal Emergency Management Agency (FEMA) and the Department of Homeland Security.

---

[1] The Keepers' mission statement explains: "Keepers of the Blue Ridge are dedicated to supporting the 1983 Mountain Ridge Protection Act and protecting the NC mountains for future generations. We are working together to stop commercial wind development on our protected ridges. We believe that commercial wind energy is an inefficient and expensive form of alternative energy that will adversely affect our local economy, our culture, our scenic view sheds, our wildlife and natural environment, and our quiet enjoyment. We believe installation of utility scale wind turbines will be a violation of the 1983 'Ridge Law'." *See* http://www.keepersoftheblueridge.com/ (last visited October 15, 2010).

Ms. Fong completed searches in the CAIRS database in an attempt to verify the statistic from the Keepers website, but found that there is no specific code in the CAIRS system for fires at wind power facilities, so the statistic could not have been generated by CAIRS. In addition, Ms. Fong spoke to her colleagues at the State Fire Marshal's Office to determine if this statistic had been generated by their office or if this information existed in the Department. Ms. Fong confirmed that the statistic was not created by their Department, and no one she consulted had heard of such a statistic.

Because the Keepers website itself gave no attribution for the statistic, Ms. Fong contacted the group through its website information link to determine its source. Although she received no response to her inquiry, the website was subsequently updated to remove the 35 wind turbine fire claim. Exhibit C, Keepers of the Blue Ridge website, p. 7 (October 15, 2010) (replacing the assertion that "California reports 35 turbine generated fires per year due to short circuiting and lightning", with the equally unsubstantiated assertion that "Turbine related fires are not uncommon").

We also contacted Sandra Fromm, Supervisor with the Public Interest Energy Research Division of the California Energy Commission (CEC). Ms. Fromm provides research to the CEC on renewable energy in California. Ms. Fromm was unable to find any data at the CEC that could corroborate the claim made by the Keepers website. In addition, Ms. Fromm noted in an e-mail communication that she had discussed the claim with other people within her department and, "although it may be possible for a wind turbine to catch fire from the oil in the gear box, no one has heard of fires occurring, let alone 35."

Based on a complete lack of any corroborating evidence, we conclude that the IAEI article erred when citing the unattributed and unsubstantiated claim on the Keepers of the Blue Ridge website. Not only was this "statistic" removed when questioned, but also neither the Program Coordinator of the State's fire incident database nor the Supervisor of the State's public interest energy research division could corroborate the information.

II. INDEPENDENT RESEARCH TO IDENTIFY WIND TURBINE RELATED FIRES IN CALIFORNIA

Parallel to our investigation on the Keepers website claim, we also undertook an independent investigation of available information to identify wind turbine related fires in California in the period between 2008 and 2010. Due to the fact that the CAIRS system does not specifically track fires attributed to wind power projects, much less fires associated with the wind turbines themselves, we cannot certify that we identified every wind turbine fire in California. We believe, however, that our research clearly demonstrates that the Keepers website's claim is wholly inaccurate, and have transparently described our methodology here so that it can be reviewed and interpreted by the County.

Working with Kirsti Fong of the Office of the State Fire Marshall, we identified codes in the CAIRS system for fires at or caused by electrical generating facilities [Code 610 – Energy Production Plan, Other; and Code 615 – Electric Generating Plant].

Focusing on these codes, we requested that Ms. Fong provide Iberdrola with a list of all fires related to electrical generating facilities from January 1, 2008 to the present. In response, Ms. Fong provided a spreadsheet describing ninety-five (95) fire incidents across

California, which occurred between January 1, 2008 and September 2, 2010, the date of her report. *See* Exhibit D, Office of the State Fire Marshal, "All Reported Fires by Property Use - Electric Generating Plant/Energy Production Plant" (September 2, 2010). The spreadsheet provides key information, including the fire department that responded to the incident, the City and County in which the incident occurred, the incident type, and the amount of property loss, among others.

After reviewing the spreadsheet, we broadly requested incident reports in jurisdictions with known wind power facilities.[2] After performing an internal confidentiality screening, Ms. Fong provided us with fifteen (15) incident reports. *See* Exhibit E, Office of the State Fire Marshal, Select Incident Reports from Alameda, Kern, and Riverside Counties.

Upon closer inspection, we determined that seven (7) incidents actually occurred at or near wind power facilities. We then contacted the fire departments that responded to each incident, provided them with the incident report number, and asked if they could provide additional information about the event. Specifically, we asked if a wind turbine was involved in the fire, whether it had been determined what caused the fire, what type of turbine was involved, and for any additional information they could provide.

The following is a brief summary of each of the wind energy facility incidents we identified (including one recent event that we uncovered during our conversation with the Riverside County Fire Department), arranged by oldest to most recent.

A. Four Confirmed Wind Turbine Fires, 2008 - 2010

- Incident Number 0002769 occurred on May 9, 2008, in Palm Springs (Riverside County) within the jurisdiction of the Palm Springs Municipal Fire Department. A public information official at the Palm Springs Fire Department stated that the fire occurred in a wind turbine nacelle and fully destroyed the nacelle. The incident report states that, "I contacted Rick Kolitz a supervisor with AES the operators of the windmill farm. He advised me that the probable cause of the fire was to an overheated generator." This clearly involved the nacelle with small ground fires started by falling debris.

- Incident Number 0822604 occurred on July 19, 2008, in the City of Tehachapi (Kern County) in the Kern County Fire Department jurisdiction. The Kern County Fire Department stated that the fire occurred in the wind turbine nacelle. The incident report states, "found wind turbine smoldering and dropping chunks of insulation to the ground. Crew extinguished 1 small spot fire on the ground."

---

[2] Data was requested on incidents in the following fire department ("FD") jurisdictions: Merced County FD, Alameda County FD, Kern County FD, Riverside County FD, Palm Springs FD, and Hemet FD. We did not request incident reports in situations where it was clear from the Exhibit D description that wind power facilities were not involved (for example, we did not request Alameda County Fire Department incidents where the "incident type" was "passenger vehicle fire").

- Incident 68515 occurred on August 4, 2008, in North Palm Springs (Riverside County) in the Riverside County Fire Department Jurisdiction. The report indicates that it occurred in the windmill transformer sub-station, at the base of the turbine. The incident report indicates that the fire did not involve the nacelle, did not cause any associated vegetation fire, and did not impact the wind turbine itself (the report notes, "the wind turbine was opened, and AES employees confirmed the electrical panels inside received no damage"). Although the fire did not involve the wind turbine itself, it occurred in associated equipment, and was therefore included as a wind turbine fire. Representatives from the Riverside County Fire Department were not able to elaborate on the event citing the confidentiality of the reports for liability reasons.

- In our discussions with the Riverside County Fire Department, they also informed us of an additional incident that occurred in Fall 2010, which appears to have occurred after Ms. Fong prepared the Exhibit D spreadsheet. The Riverside County Fire Department stated that a fire occurred in a wind turbine nacelle, however, no information about turbine type was available. The fire caused damage to 69 acres in the Whitewater Canyon area near Palm Springs.[3]

B. Two Incidents At Wind Power Facilities With Undeterminable Cause, 2008 - 2010

- Incident Number 0816142 occurred on August 28, 2008 in the City of Livermore (Alameda County) in the Alameda County Fire Department jurisdiction. The incident report notes that the fire was a "veg fire at the windmill farm," but states that the cause of the fire is "undetermined." No property damage was reported. Although the cause of the fire is undetermined, if the nacelle were involved, it is likely that property damage would have been reported.

- Incident Number 3544 occurred on August 25, 2010, in the City of Altamont (Alameda County). The type of incident was a grass fire. The incident report notes that "the general area of the fire origin was in the area of the windmills." The report goes on to note that the windmills were not operating and that a circuit had been tripped. The fire department official states, "I located both windmills and reexamined the area looking for evidence. Nothing was found in the area…Further examination of the specific origin area did not reveal any other source of ignition." The report states in the Factors Contributing to Ignition section that there was an "unspecified short-circuit arc." Therefore, it is undeterminable whether the windmill nacelle was the source of the fire, although the fact that there was only $300 worth of fire damage makes it unlikely that the fire occurred within the nacelle.

---

[3] We tried to independently confirm this incident with the State Fire Marshal's Office, but Ms. Fong was unable to locate any reported incidents in their database that matched this description. Nonetheless, we included the incident here in an excess of caution.

C. Two Incidents At Wind Power Facilities Not Attributable to Nacelle Fire, 2008 - 2010

- Incident Number 2094 occurred on May 19, 2009 in the City of Altamont (Alameda County), in the Alameda County Fire Department jurisdiction. The incident report indicates that the fire was a grass fire, "next to several windmills." However, the report notes that the equipment involved in the ignition of the fire was "electrical distribution." Therefore, we concluded that the wind turbine was not involved.

- Incident Number 0913160 occurred on July 29, 2009, in the City of Livermore (Alameda County) in the Altamont Pass. The report indicates that the type of incident was a grass fire and 0.5 acres were burned. The incident report states "the fire started due to employees re-energizing the windmills due to a power outage. A panel short circuited starting the fire." There was no property damage from the fire. This appears to be a fire caused by employee error, but it does not appear to be related to the wind turbine.

D. Summary of Independent Research

Based on the foregoing, our research shows that of the ninety-five (95) fire incidents at electrical generating facilities reported to the State of California between January 1, 2008 and September 2, 2010, including another incident that was reported to us during our research, only eight (8) incidents were related to or near wind power facilities. Of those eight (8) incidents, only four (4) incidents could be confirmed to involve the wind turbine, a rate of approximately 1.3 turbine fires per year, statewide, between 2008 and 2010.

Although we were unable to obtain information about the turbine type and age due to fire department confidentiality rules, it is highly likely that these four (4) turbine fires occurred in older models without the modern safeguards to be incorporated as standard equipment on the Tule Wind Project turbines. Furthermore, it is a virtual certainty that none of these turbines were equipped with fire suppression systems, based on the fact that such systems are in early development and are not widely implemented in the wind power industry.

III. CONCLUSION

Our research shows that the IAEI article erroneously relied on an unattributed, undocumented assertion that California reports thirty-five (35) wind turbine fires per year. Not only was this "statistic" removed from the Keepers of the Blue Ridge website when questioned by the State Fire Marshal's Office, but also neither the Program Coordinator of the State's fire incident database nor the Supervisor of the State's public interest energy research division could corroborate the information. It appears that the IAEI article is another victim of an Internet age when fact-checking follows, instead of preceding, publication.

Further, our analysis identified only four (4) confirmed wind turbine-related fire incidents in the period between January 1, 2008 and Fall 2010 (including one recent nacelle fire for which we did not receive an incident report) – a rate of approximately 1.3 turbine fires

per year. This number of wind turbine incidents in California is less than 4% of the number of incidents alleged in the IAEI article.[4] To place this number in context, the California Wind Energy Association calculates that there are approximately 11,000 wind turbines currently in operation in California. *See* http://www.calwea.org/bigPicture.html (last visited October 18, 2010) (based on the combined number of "Number of Turbines" in "Major Wind Development Areas", including the Altamont Pass (4,489), San Gorgonio Pass (2,675), Solano County (627), and Tehachapi (3,252)).

Although we were unable to obtain information about the turbine type and age due to fire department confidentiality rules, it is highly likely that the few turbine fires that did occur started in older models unequipped with the modern safeguards to be incorporated as standard equipment on the Tule Wind Project turbines. Moreover, it is a virtual certainty that none of those turbines were equipped with fire suppression systems like the Tule Wind Project turbines will be. Accordingly, we hope you agree that the Tule Wind Project's wind turbines will pose a less than significant risk of fire to the back-country in San Diego County.

Yours Sincerely,

K. Harley McDonald
Business Developer
Iberdrola Renewables

Enclosures

Cc: Edmund Clark, Iberdrola Renewables
Chief David Nissen, San Diego Rural Fire Protection District
Cynthia Eldred, Law Offices of Cynthia Eldred
Ralph Steinhoff, San Diego County Fire Authority
Patrick Brown, Department of Land Use and Planning, County of San Diego
Robin Church, RCC Biological Consulting
Jim Hunt, Hunt Research, Inc.
Christopher W. Garrett, Latham & Watkins LLP
Ryan R. Waterman, Latham & Watkins LLP

---

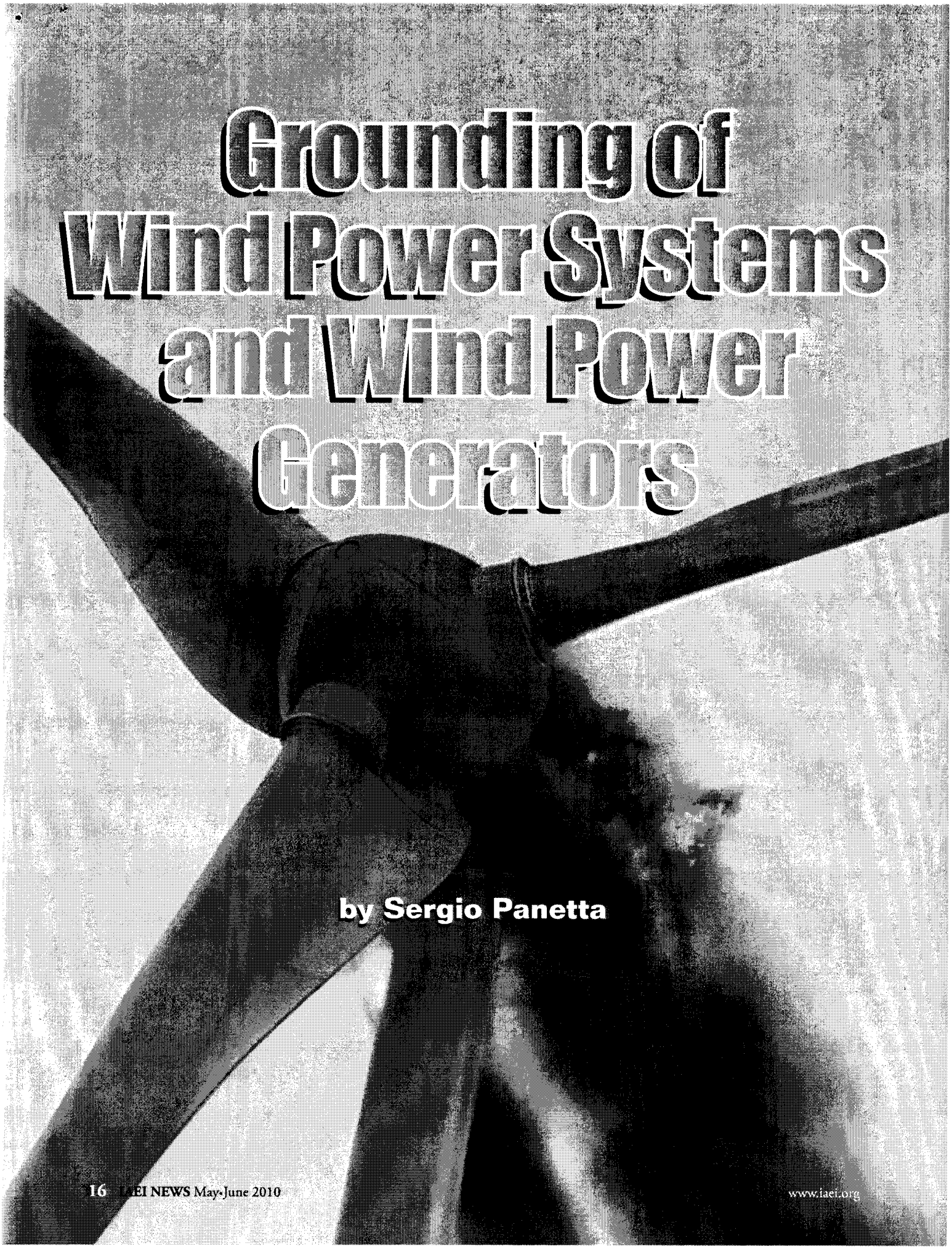
4 The IAEI article alleges that California reports 35 wind turbine fires per year. At that rate, California should have reported 105 turbine fires between 2008 to 2010. Instead, we found only four (4) confirmed turbine fires, less than 4% of that alleged in the article.

Exhibit A

IAEI News, by Sergio Panetta,

“Grounding of Wind Power Systems and Wind Power Generators” (May-June 2010).

Grounding of Wind Power Systems and Wind Power Generators



by Sergio Panetta

Power continuity is essential in wind power projects where a tripped overcurrent device due to ground fault can have serious economic or operational consequences. An arcing phase-to-ground fault can totally destroy the equipment. Consequential downtime adds to the economic loss. Four typical grounding methods for generators and power systems are examined for these factors and the article concludes that resistance grounding provides the best protection against arcing ground-fault damage in wind power projects with distribution systems and improves reliability and availability of the power systems.

Grounding of Generators

The generators can be ungrounded, high-resistance grounded, low-resistance grounded or solidly grounded. In solidly grounded generators, very high fault currents can flow in the event of a phase-to-ground fault with a possibility of extensive fault damage[4] and consequential loss of revenue. In addition, there is a possibility of high harmonic current flows when the generator and step-up transformers are solidly grounded. Applying low-resistance grounding reduces the potential damage due to phase-to-ground faults, but the generator must be tripped and isolated with a consequential loss of revenue. With high-resistance grounding, a phase-to-ground fault can be annunciated[4] and the generator kept running. An ungrounded generator can be used if the cable length to the step-up transformer is relatively small. With long cable lengths in multiple generator systems, the generator to transformer section becomes susceptible to transient overvoltages in case of intermittent phase-to-ground faults. This could lead to subsequent 2nd phase-to-ground failure elsewhere in the network leading to catastrophic damage.

Power Collection System

Wind power generators are usually Y-connected and ungrounded. Voltage is less than 1000 V.[1] The rated power output can be 50 kW for small units, and up to 2.5 MW for larger units. A molded-case circuit breaker with overcurrent and instantaneous protection is used. The generator is cable-connected to a Y-configured step-up transformer primary. The transformer primary neutral can be ungrounded, resistance grounded or solidly grounded.

The transformer secondary is usually connected in delta and can be 5, 15, or 36 kV for areas which follow ANSI specifications, and 3.3, 11, 20, or 33 kV for areas following IEC specifications.

This arrangement can be a single generator to transformer, as shown in figure 1 or multiple generators to a transformer, as shown in figure 2. Power is collected through many such transformers on a wind farm in the medium voltage (MV) distribution network, and exported to the utility network at the point of common coupling, as shown in figure 3.[2]

MV Circuits

Solidly grounded circuits lead to high-fault currents due to phase-to-ground faults and may cause extensive damage and high-step or touch voltages. Low-resistance grounding thus lowers the phase-to-ground fault current and allows time-current coordinated trips to isolate the faulty circuit. High-resistance grounding is not suggested, since the cable capacitance can be quite high due to the total length of the MV cable at the collection voltage. When the MV network is left ungrounded on the occurrence of a phase-to-ground fault, the voltage on the other two phases to ground rises to phase-to-phase value, but the operation of the wind farm remains uninterrupted.[3]

An ungrounded MV network is subjected to transient overvoltages on the two healthy phases in the case of

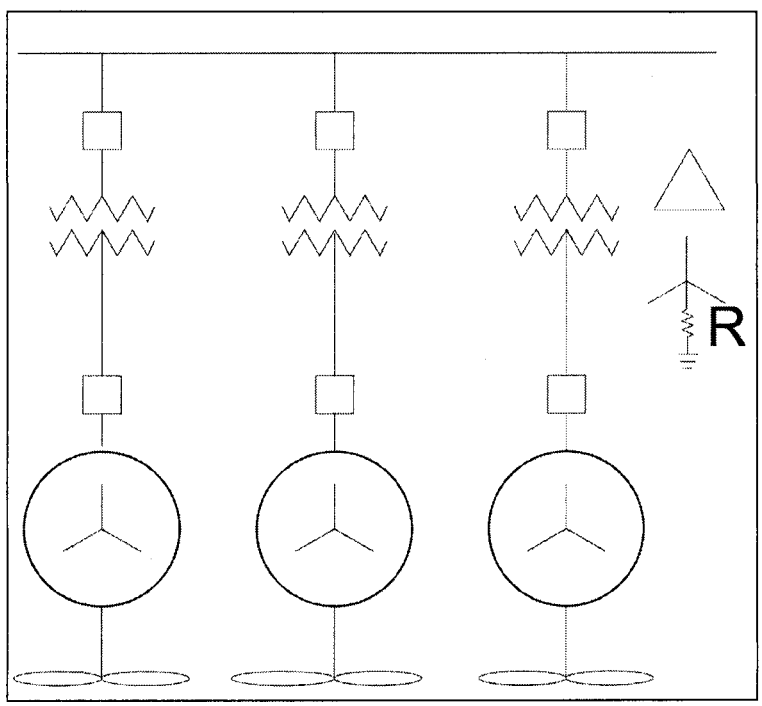


Figure 1. Single generator to transformer

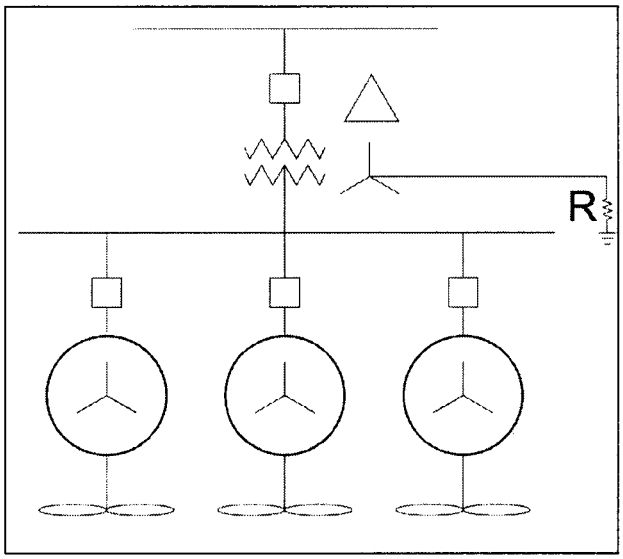


Figure 2. Multiple generators connected to transformer

intermittent or arcing type phase-to-ground faults, due to the capacitive charge build-up in the cables.

MV Electrical Distribution Networks

Wind farm collection networks are simple radial circuits with switching devices for isolation and switching.[1] Balanced 3-phase networks are suitable for connecting large wind generators. The secondary of the generator step-up transformer can be Y- or Delta-connected. In Y-connected transformers the neutral point is directly accessible and hence can be easily grounded. In Delta-connected transformers an accessible neutral point is created by using a grounding transformer as shown in figure 4. The usual practice is to ground the neutral point at one location only.

Electrical Protection

With high-resistance grounding of the generator step-up transformer, fast acting ground-fault relays can be applied in the generator circuit. Low-resistance grounding by neutral grounding resistors or artificial neutrals is suggested for the MV network. The fault currents in the MV collection networks can be small due to high source impedance and long lengths of cables. In some cases, fuses cannot be relied upon to quickly clear the fault; hence, ground-fault relays and circuit breakers are required. It is important to isolate the faulted section quickly. Correct discrimination is obtained by the application of ground-fault relays.

Additional Electrical Protection

California reports 35 turbine generated fires per year due to short circuiting and lightning. A single turbine may contain up to 200 gallons of oil; the transformer at the base of each turbine may contain another 500 gallons of oil. In rural areas even a spark can easily develop into a large fire before discovery is made and fire-fighting can begin.[5] These fires may be avoided and save millions of dollars in damage by placing arc flash mitigation relays in the switchgear in the nacelle. On the occurrence of an arc, the turbine can immediately switch off-line and reduce damage, protecting the personnel, equipment, and the environment.

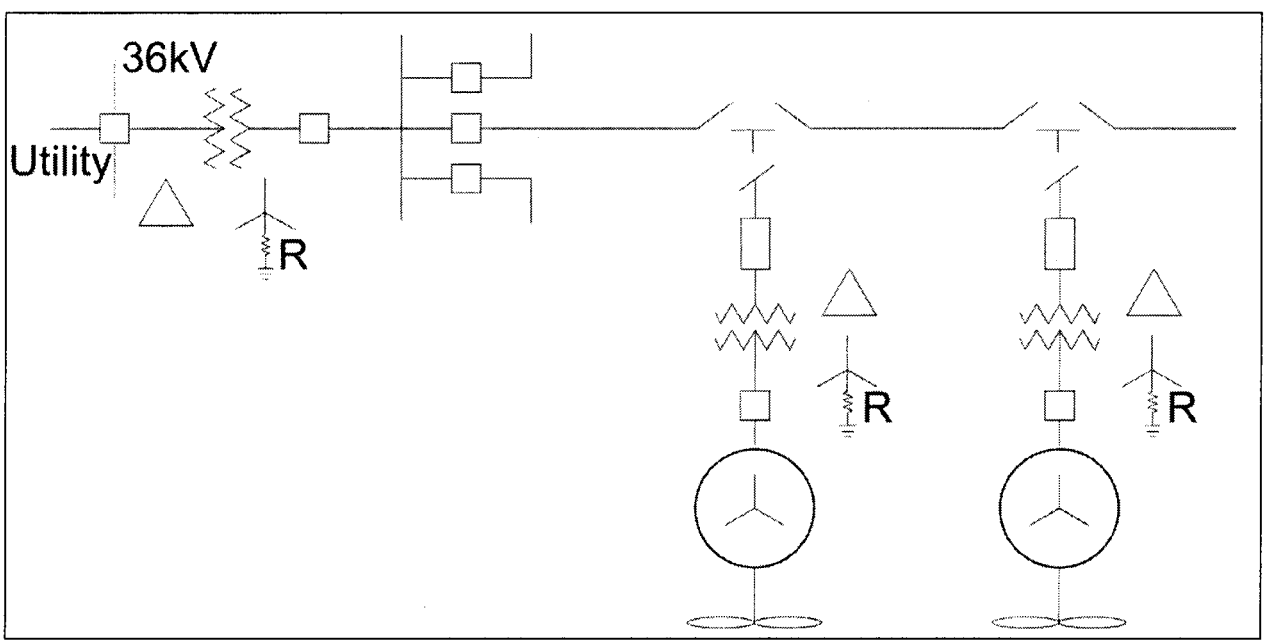


Figure 3. MV Collection Network

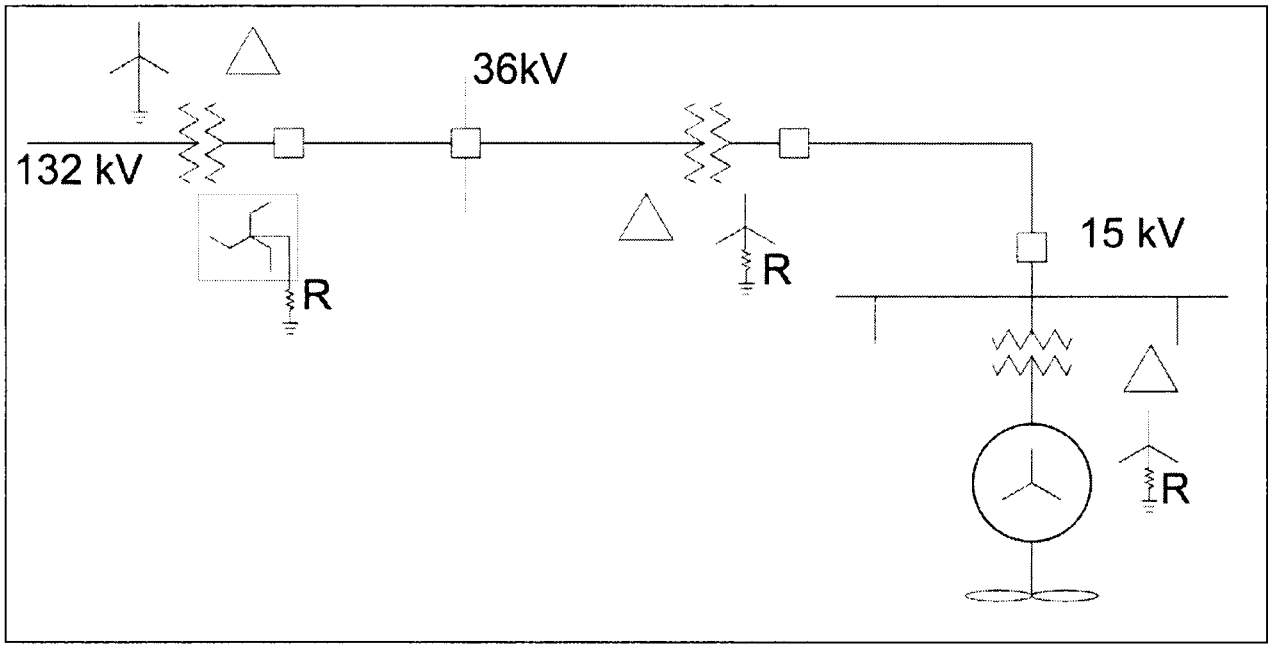


Figure 4. MV collection network with artificial neutral

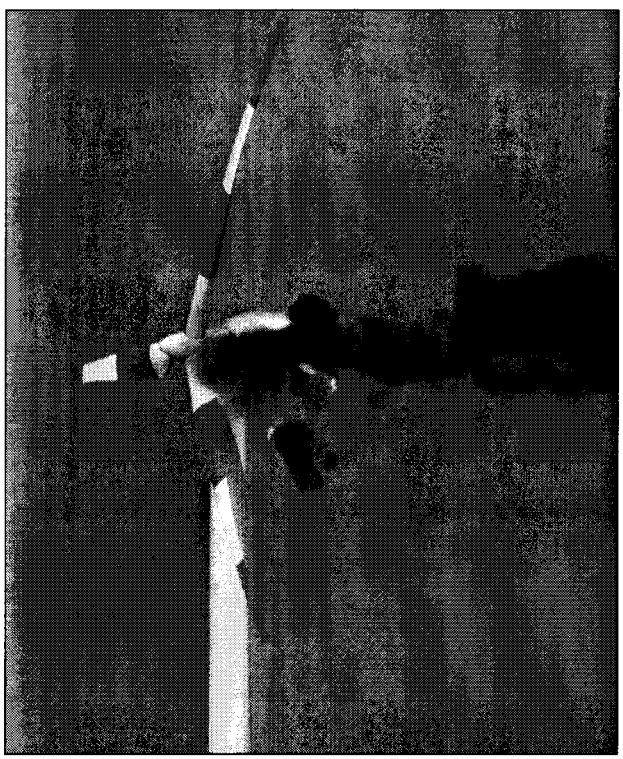


Figure 5. Turbine fire

Conclusion

Ungrounded delta systems have many operating disadvantages, including high transient overvoltages and difficulty in locating faults. Solidly grounded neutral systems limit the system potential to ground, and speed the detection and location of ground faults. However, the system must be shut down after the first ground fault and there is a potential for extensive arcing fault damage. Applying coordinated ground-fault protection is very difficult and almost impossible with multiple generators.

Low-resistance grounded neutral systems limit the magnitude of the ground-fault current so that serious damage does not occur. The system must still be shut down after the first ground fault. This level of resistance grounding is generally used on medium- and high-voltage systems, above 6.9 kV.

If the power system is changed to high-resistance grounding then the ground-fault current can be reduced to 10 A or less, which has significant impact on reducing the equipment damage. In addition, it ensures that the wind power system continues to operate and does not suffer trip-out of a faulted generator.

References

[1] Burton,T., and D. Sharpe, N. Jenkins, and E. Bossanyi, *Handbook of Wind Energy.* John Wiley and Sons.

[2] Rodrigues-Amenedo, J. L., S. Arnalte, and J. C. Burgos, "Automatic Generation Control of a Wind Farm with Variable Speed Wind Turbines." *IEEE Transactions On Energy Conversion,* Vol 17, No. 2, (June 2002).

[3] Mullan, A., G. Lightbody, and R. Yacamini. "Wind Turbine Fault Ride through Enhancement." *IEEE Transactions On Power Systems,* Vol. 20, No. 4, (November 2005).

[4] IEEE Standard 142-1991: *IEEE Recommended Practice for Grounding Industrial and Commercial Power Systems.*

[5] http://www.keepersoftheblueridge.com/gallery.html

[6] http://www.moorsydeactiongroup.org.uk/safety.html

Sergio Panetta is vice president of engineering with I-Gard Corporation in Mississauga, Ontario. He holds a master's degree in electri-

Exhibit B

Keepers of the Blue Ridge website (September 1, 2010).

Keepers of the Blue Ridge

"As an Engineer with experience in power generation, I confess to being skeptical about wind energy as an economical and dependable source of energy. Wind mills are extremely large, unreliable, and produce very little electricity. In most cases, the prime motivation for building wind farms is not environmental or energy benefits; rather it is tax breaks and incentives. The wind mills in Kansas are expected to supply less than 1% of the energy used in Kansas. This is not cost effective."

--2005 Press Release from Frank Miller, Republican Representative for the 12th District, Kansas.

For entire press release: www.stopillwind.org....

HELP PROTECT OUR RIDGE TOPS FROM DESTRUCTION BY THE WIND INDUSTRY

Wind Energy is a Failed Technology – evidence from around the world

- Germany (size of Montana) is the world's largest user of wind technology. Over the last 20 years, Germany has erected 18,000 wind turbines that have only been able to generate 6% of the country's total electricity supply.
- In Feb. 2005, the German Government's energy agency released a report that concluded that wind plants were an expensive and inefficient way of generating sustainable energy and also had serious environmental effects.
- This same report suggested reduction of greenhouse gases could be more effectively and cheaply reduced by simply installing filters on existing fossil-fuel plants.
- Denmark has 6000 wind turbines; in 2003 that country's greenhouse gas emissions increased 7.3% over 2002 levels.
- Despite being blanketed with wind turbines, Denmark has not been able to shut down one single conventional power plant.
- Development of onshore wind plants in Denmark has effectively stopped. The Government has cancelled plans for three offshore wind plants for 2008 and has scheduled the withdrawal of subsidies for existing sites.
- The California Energy Commission reported that the state's 14,000 turbines produced half of one percent of their electricity in 2002. Extrapolating this record to the U.S. as a whole, it would take over 100,000 wind turbines spread over 10 million acres of land (costing $150-300 billion) to produce 5% of the country's electricity.
- Kansas politician Frank Miller was quoted in a press release stating wind plants in Kansas were only expected to supply 1% of the energy used in the state.
- The Wind Industry is meeting much public resistance in Europe, especially in Germany and Denmark , the inefficiency has become apparent and people are angry at the cost of wasted resources. The industry is searching for a bigger market in the U.S. to replace lost sales in Europe .

Wind Energy – Inefficient and Unreliable

- Because of its inherent technical limitations and the fluctuating nature of its power source, no other type of industrial power generation has such poor performance.
- Wind Developers often dwell on wind turbines' *installed capacity* ; they provide facts and figures based on what the turbines can produce at 100% capacity.
- Because of the fluctuating nature of wind, the amount of energy produced by wind plants is expressed as an average annual output called *capacity factor*. Research proves that average annual capacity for wind plants is only 15-30% of their installed capacity.
- Due to the intermittency of wind power, all wind turbine plants must have stand-by generators that are powered by fossil fuels. These backup generators must idle 24 hrs a day (emitting considerable amounts of greenhouse gases for nothing) in order to be ready to generate electricity when the wind turbines aren't functioning – wind energy is not clean.
- In a 2003 study, the California Energy Commission studied 3 wind plants and estimated that they had an average capacity credit of 23.9%. The estimated capacity credit for wind energy in the state will be 5%.
- Evidence available from California , Texas , and Ontario suggests that many wind facilities sited on land will achieve capacity credits averaging only in the single digit range.
- A study in Germany proved that for more than half the days in 2004, the sum of wind plant output to the grid was lower than 11% of its capacity.
- In the U.K. 1,010 wind turbines produced 0.1% of their electricity in 2002.
- It would take over 2000 large wind turbines (with a generous capacity factor of 30%) spread over hundreds of miles to equal the power of one 1600 MW conventional power plant situated on a few acres.
- Wind turbines produce electricity only when the wind is blowing within the right speed range. They don't produce power until wind speed reaches 8 mph; reach rated capacity around 33 mph, and shut down at 55 mph because of possible damage to the blades. Their output is intermittent, volatile, and unpredictable.
- This unpredictability causes "grid instability". Electricity grids must be kept in balance (supply & demand, voltage, frequency) which is why wind power must have back up generators to ramp up and down to balance the unreliable output from wind turbines.
- Many Japanese utilities severely limit the amount of wind generated power they buy because of the grid instability they cause.
- For the same reason, in Dec. 2003, Ireland halted all new wind power connections to the national grid and have plans to end state supported subsidies.
- In 2005, Spanish utilities began refusing new wind power connections and in 2006 Spain ended all subsidies.
- In 2004, Australia reduced the amount of wind power that utilities are required to buy bringing wind projects to an almost stand still.
- Switzerland is also cutting subsidies as too expensive for the lack of significant benefit from wind power.
- It must also be noted that months of peak demand for electricity (summer months) coincide with months of low or no wind.

The Winners & The Losers – huge tax breaks for the Wind Industry while the taxpayers and electric customers pick up the tab.

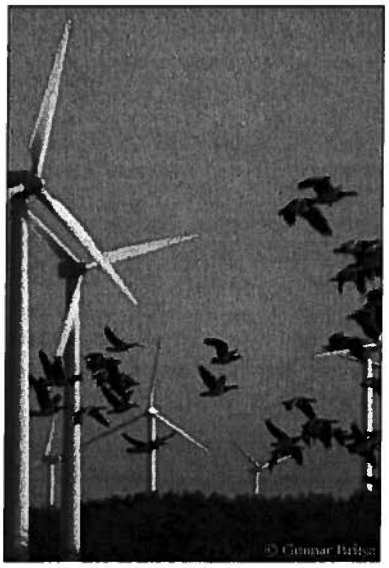
- On a per kilowatt basis, no other form of industrial energy has recently received higher public subsidy than wind.
- Wind plants are now being built primarily for tax avoidance purposes, not because of their environmental, energy, or economic benefits.
- The tax breaks and subsidies have more value to wind plant owners than the revenue from the sale of the small amount of electricity they produce.
- The big winners are the Wind Industry, the Wind Developer, and a few landowners who lease their land. Electric customers and taxpayers are the big losers.
- Many states have approved Renewable Portfolio standards (RPS) that force utility companies to purchase electricity from wind plants at extremely high prices – this cost is passed on to the consumer.
- Publicly funded tax schemes (production tax credits and double-declining depreciation) reimburse as much as 75% of the wind plant owner's capital cost for each of the $1.65 million wind turbines. You, the taxpayer, are practically paying for the wind plants and will also be paying higher prices for the expensive, small amount of electricity wind turbines produce.
- According to Citizens for Tax Justice, Florida Power and Light Group, (FLP) (largest owner of wind capacity in the U.S.) paid **NO** federal income taxes in 2002 and 2003 while reporting net income of more than $2 billion. Those were the years that FLP invested heavily in wind plants. They took more than $1.2 billion in depreciation in those years.
- The Wind Industry has powerful lobbyists in Washington , D.C. placing intense pressure on our politicians. In the not so distant future, if the Wind Industry and Wind Developers are successful, hundreds of thousands of massive turbines will dominate our landscapes while doing virtually nothing to solve the problems of fossil fuel dependency. Subsidies given to industrial wind technology diverts money that could be used in research for other more reliable forms of alternative energy.
- Despite the facts, its unclear if legislators, local government officials, and regulators will temper enthusiasm for wind energy, since so many have accepted the false claims and inaccurate information distributed by the wind industry and advocates. Also, they are well aware of wind industry lobbying power and campaign contributions.
- Wind Developers claim that they increase the local tax base. Research proves those gains are more than offset by the loss of open land, loss of tourism, the decrease in property values, and the taxes and fees consumers must pay to subsidize the industry.
- A survey of property assessors in the UK found that a nearby wind facility lowers property values by up to 15% per year for 2 years.
- In the discussion of property values, it must be remembered that in most places values increase steadily. So any slowing down of that normal rise because of wind power facilities is in fact a loss of value.
- The Wind Industry also claims to create many jobs - a typical wind plant requires one low paid maintenance worker.

Collateral Damage – wind energy is NO FRIEND to the environment

- Ordinary citizens are beginning to realize that wind plants are not environmentally benign. Instead, wind energy has high economic, environmental, ecological, scenic and property value costs.
- Wind plants cause considerable environmental damage to the surrounding countryside. Each wind turbine requires the clear-cutting of at least 4 - 6 acres and another 35 - 75 acres for infrastructure support, i.e. access roads, tensions lines, substations, pool-size irremovable concrete bases, etc.
- Often it is necessary to blast through bedrock, potentially disrupting water flow to existing wells downhill.

- Adverse impacts include erosion, destruction of wildlife habitat, interference with bird migration paths, massive bird kills, destruction of scenic vistas, noise, lowering of property values, distracting blade flicker and aircraft warning lights.

- We must take into consideration the greenhouse gases that are produced by the construction and installation of wind plants: the manufacture of steel, the concrete bases, asphalt for roads, the fuel burned by earth-moving equipment, production of tension lines, pylons, substations, and back-up generators – all for a technology that performs at 15 -30% capacity. It's clear that no real savings will be achieved in greenhouse gas emissions.
- At the Buffalo Mountain wind plant in Tennessee , each turbine foundation is 30 ft deep and contains approx. 3,500 cubic yards of concrete. Concrete production is one of the biggest sources of CO_2 emissions.
- It has been estimated that a wind plant must be in production for seven years to offset the carbon emissions created in the manufacture of just the concrete needed for their placement.
- A wind plant stands to be seen from at least 20 miles around, meaning it has the potential of degrading the scenery of 1,256 square miles. Western N.C. economies are dependent on the vacation home business and tourists that are attracted to the area for its scenic views, and natural undisturbed environment.



- Then there is the bird problem. The California Energy Commission reported that in 1989 the wind turbines in Altamont Pass killed 60 golden eagles and 300 redtail hawks, not to mention smaller birds.
- Norway researchers Winkleman and Karlsson counted 49 birds killed by a single turbine during one night of migration.
- The U.S Fish and Wildlife Services estimate that European wind power kills 37 birds per turbine per year. Extrapolating that figure to 50 turbines equals the potential for a small wind plant to kill almost 20,000 birds over a 10 year period.
- At least 2000 bats were killed on Backbone Mountain in West Virginia in just 2 months during their 2003 fall migration.
- A 2002 study in Spain estimated that 11,200 birds of prey, 350,000 bats, and 3,000,000 small birds are killed each year by wind turbines and their power lines.

Enter at Your Own Risk - Noise, Fire, and Health Hazards

- The Wind Industry typically plays down the noise problem but it is widely known that in the leases between land owners and developers there is a "noise easement" to protect the wind company from liability. Any complaints or lawsuits would be against the land owner.

- The noise problem is well documented – in Oct. 2005, Germany hosted the First International Conference on Wind Turbine Noise and discussed perspectives for noise control.
- The European Union published results of a 5 year investigation into wind power and found noise complaints to be valid, and that noise levels could not be predicted before developing a site.
- A Meyersdale, Pa resident, Bob Laravee, who lives 3000 ft. from a wind plant, documented noise levels over a 48 hr. period. The results showed an average reading of 75 decibels. According to the EPA, 45 decibels disturb sleep.
- It is difficult to predict noise levels in mountainous terrain. Only a "swishing" may be heard directly underneath a turbine, but farther away the resulting sound of several turbines together has been described to be as loud as a motorcycle or a jet engine.
- In March 2006, Dr Nina Pierpont testified before the N.Y. State Legislature Committee about "Wind Turbine Syndrome" which affects many people living in the vicinity of wind turbines, This syndrome includes chronic sleep problems, severe headaches, dizziness, concentration problems, inner ear problems, etc. People with a history of car sickness, migraines, and inner ear problems are more susceptible.
- Dr. Pierpont also reported that some people feel disturbing pulsations in their chests and ears even when they can't see or hear the wind turbines. Sensitivity to low frequency vibration is highly variable in people and poorly understood. The strobe effect of turbines can also provoke seizures in people with epilepsy.
- An interesting note – the Nazis used low-frequency noise as a form of torture.
- Wind turbines are subject to metal fatigue and the effects of ice and wind, parts and whole blades have torn off because of malfunction, flying as far as 8 kilometers and through the window of a home in one case. Whole towers have collapsed in Germany (as recently as 2002) and the U.S. (e.g. Oklahoma, May 2005).

- California reports 35 turbine generated fires per year due to short circuiting and lightning. A single turbine may contain up to 200 gallons of oil; the transformer at the base of each turbine may contain another 500 gallons of oil. In rural areas even a spark can easily develop into a large fire before discovery is made and fire fighting can begin.
- There are currently many lawsuits around the world due to wind plant noise, lowered property values, and negative health effects. Communities are angry at being forced to become live-in power plants.

Should we sacrifice a North Carolina Treasure for an expensive, inefficient, and insignificant contribution to an ill conceived attempt to solve a global problem?

Exhibit C

Keepers of the Blue Ridge website (October 15, 2010).

Keepers of the Blue Ridge

"As an Engineer with experience in power generation, I confess to being skeptical about wind energy as an economical and dependable source of energy. Wind mills are extremely large, unreliable, and produce very little electricity. In most cases, the prime motivation for building wind farms is not environmental or energy benefits; rather it is tax breaks and incentives. The wind mills in Kansas are expected to supply less than 1% of the energy used in Kansas. This is not cost effective."

--2005 Press Release from Frank Miller, Republican Representative for the 12th District, Kansas.

For entire press release: www.stopillwind.org....

HELP PROTECT OUR RIDGE TOPS FROM DESTRUCTION BY THE WIND INDUSTRY

Wind Energy is a Failed Technology - evidence from around the world

- Germany (size of Montana) is the world's largest user of wind technology. Over the last 20 years, Germany has erected 18,000 wind turbines that have only been able to generate 6% of the country's total electricity supply.
- In Feb. 2005, the German Government's energy agency released a report that concluded that wind plants were an expensive and inefficient way of generating sustainable energy and also had serious environmental effects.
- This same report suggested reduction of greenhouse gases could be more effectively and cheaply reduced by simply installing filters on existing fossil-fuel plants.
- Denmark has 6000 wind turbines; in 2003 that country's greenhouse gas emissions increased 7.3% over 2002 levels.
- Despite being blanketed with wind turbines, Denmark has not been able to shut down one single conventional power plant.
- Development of onshore wind plants in Denmark has effectively stopped. The Government has cancelled plans for three offshore wind plants for 2008 and has scheduled the withdrawal of subsidies for existing sites.
- The California Energy Commission reported that the state's 14,000 turbines produced half of one percent of their electricity in 2002. Extrapolating this record to the U.S. as a whole, it would take over 100,000 wind turbines spread over 10 million acres of land (costing $150-300 billion) to produce 5% of the country's electricity.

- Kansas politician Frank Miller was quoted in a press release stating wind plants in Kansas were only expected to supply 1% of the energy used in the state.
- The Wind Industry is meeting much public resistance in Europe, especially in Germany and Denmark , the inefficiency has become apparent and people are angry at the cost of wasted resources. The industry is searching for a bigger market in the U.S. to replace lost sales in Europe .

Wind Energy - Inefficient and Unreliable

- Because of its inherent technical limitations and the fluctuating nature of its power source, no other type of industrial power generation has such poor performance.
- Wind Developers often dwell on wind turbines' *installed capacity* ; they provide facts and figures based on what the turbines can produce at 100% capacity.
- Because of the fluctuating nature of wind, the amount of energy produced by wind plants is expressed as an average annual output called *capacity factor.* Research proves that average annual capacity for wind plants is only 15-30% of their installed capacity.
- Because wind is an intermittent power source, the energy output is highly variable and rarely correlates with demand; other sources of energy cannot be taken off line. Because of its intermittent, unreliable nature, wind energy is more difficult to manage and more costly - the cost is passed on to the consumer.
- The use of wind power will not shut down coal plants. With the extra burden of balancing the wind energy, other energy sources may even use more fuel (just as cars use more gas in stop and go traffic than in more steady highway driving).
- In a 2003 study, the California Energy Commission studied 3 wind plants and estimated that they had an average capacity credit of 23.9%. The estimated capacity credit for wind energy in the state will be 5%.
- Evidence available from California , Texas , and Ontario suggests that many wind facilities sited on land will achieve capacity credits averaging only in the single digit range.
- A study in Germany proved that for more than half the days in 2004, the sum of wind plant output to the grid was lower than 11% of its capacity.
- In the U.K. 1,010 wind turbines produced 0.1% of their electricity in 2002.
- It would take over 2000 large wind turbines (with a generous capacity factor of 30%) spread over hundreds of miles to equal the power of one 1600 MW conventional power plant situated on a few acres.
- Wind turbines produce electricity only when the wind is blowing within the right speed range. They don't produce power until wind speed reaches 8 mph; reach rated capacity around 33 mph, and shut down at 55 mph because of possible damage to the blades. Their output is intermittent, volatile, and unpredictable.
- This unpredictability causes "grid instability". Electricity grids must be kept in balance (supply & demand, voltage, frequency) which is why wind power must have back up generators to ramp up and down to balance the unreliable output from wind turbines.
- Many Japanese utilities severely limit the amount of wind generated power they buy because of the grid instability they cause.
- For the same reason, in Dec. 2003, Ireland halted all new wind power connections to the national grid and have plans to end state supported subsidies.

- In 2005, Spanish utilities began refusing new wind power connections and in 2006 Spain ended all subsidies.
- In 2004, Australia reduced the amount of wind power that utilities are required to buy bringing wind projects to an almost stand still.
- Switzerland is also cutting subsidies as too expensive for the lack of significant benefit from wind power.
- It must also be noted that months of peak demand for electricity (summer months) coincide with months of low or no wind.

The Winners & The Losers - huge tax breaks for the Wind Industry while the taxpayers and electric customers pick up the tab.

- On a per kilowatt basis, no other form of industrial energy has recently received higher public subsidy than wind.
- Wind plants are now being built primarily for tax avoidance purposes, not because of their environmental, energy, or economic benefits.
- The tax breaks and subsidies have more value to wind plant owners than the revenue from the sale of the small amount of electricity they produce.
- The big winners are the Wind Industry, the Wind Developer, and a few landowners who lease their land. Electric customers and taxpayers are the big losers.
- Many states have approved Renewable Portfolio standards (RPS) that force utility companies to purchase electricity from wind plants at extremely high prices - this cost is passed on to the consumer.
- Publicly funded tax schemes (production tax credits and double-declining depreciation) reimburse as much as 75% of the wind plant owner's capital cost for each of the $1.65 million wind turbines. You, the taxpayer, are practically paying for the wind plants and will also be paying higher prices for the expensive, small amount of electricity wind turbines produce.
- According to Citizens for Tax Justice, Florida Power and Light Group, (FLP) (largest owner of wind capacity in the U.S.) paid **NO** federal income taxes in 2002 and 2003 while reporting net income of more than $2 billion. Those were the years that FLP invested heavily in wind plants. They took more than $1.2 billion in depreciation in those years.
- The Wind Industry has powerful lobbyists in Washington , D.C. placing intense pressure on our politicians. In the not so distant future, if the Wind Industry and Wind Developers are successful, hundreds of thousands of massive turbines will dominate our landscapes while doing virtually nothing to solve the problems of fossil fuel dependency. Subsidies given to industrial wind technology diverts money that could be used in research for other more reliable forms of alternative energy.
- Despite the facts, its unclear if legislators, local government officials, and regulators will temper enthusiasm for wind energy, since so many have accepted the false claims and inaccurate information distributed by the wind

industry and advocates. Also, they are well aware of wind industry lobbying power and campaign contributions.

- Wind Developers claim that they increase the local tax base. Research proves those gains are more than offset by the loss of open land, loss of tourism, the decrease in property values, and the taxes and fees consumers must pay to subsidize the industry.
- A survey of property assessors in the UK found that a nearby wind facility lowers property values by up to 15% per year for 2 years.
- In the discussion of property values, it must be remembered that in most places values increase steadily. So any slowing down of that normal rise because of wind power facilities is in fact a loss of value.
- The wind industry claims to create many jobs - in reality very few permanent local jobs are created. Most of the jobs are temporary and are imported by the wind developer.

Collateral Damage - wind energy is NO FRIEND to the environment

- Ordinary citizens are beginning to realize that wind plants are not environmentally benign. Instead, wind energy has high economic, environmental, ecological, scenic and property value costs.
- Commercial wind projects cause considerable collateral damage. A single turbine requires clear cutting 3-5 acres to provide room for construction and to reduce wind turbulence during operation. Loss of interior forest habitat is even greater, 15-20 acres per turbine. Interior forest, defined as forest habitat that is more than 100 meters from a clearing, is essential for maintaining viable populations of many birds and wildlife.
- Often it is necessary to blast through bedrock, potentially disrupting water flow to existing wells downhill.
- Adverse impacts include erosion, destruction of wildlife habitat, interference with bird migration paths, massive bird kills, destruction of scenic vistas, noise, lowering of property values, distracting blade flicker and aircraft warning lights.
- A 2007 study from the American National Academies of Science expressed concerns about bird and bat kill, and also stated that wind projects will not significantly reduce emissions.

- We must take into consideration the greenhouse gases that are produced by the construction and installation of wind plants: the manufacture of steel, the concrete bases, asphalt for roads, the fuel burned by earth-moving equipment, production of tension lines, pylons, substations, and back-up generators - all for a technology that performs at 15 -30% capacity.

- A wind plant stands to be seen from at least 20 miles around, meaning it has the potential of degrading the scenery of 1,256 square miles. Western N.C. economies are dependent on the vacation home business and tourists that are attracted to the area for its scenic views, and natural undisturbed environment.

- Then there is the bird problem. The California Energy Commission reported that in 1989 the wind turbines in Altamont Pass killed 60 golden eagles and 300 redtail hawks, not to mention smaller birds.
- Norway researchers Winkleman and Karlsson counted 49 birds killed by a single turbine during one night of migration.
- The U.S Fish and Wildlife Services estimate that European wind power kills 37 birds per turbine per year. Extrapolating that figure to 50 turbines equals the potential for a small wind plant to kill almost 20,000 birds over a 10 year period.
- At least 2000 bats were killed on Backbone Mountain in West Virginia in just 2 months during their 2003 fall migration.
- A 2002 study in Spain estimated that 11,200 birds of prey, 350,000 bats, and 3,000,000 small birds are killed each year by wind turbines and their power lines.

Enter at Your Own Risk - Noise, Fire, and Health Hazards

- The Wind Industry typically plays down the noise problem but it is widely known that in the leases between land owners and developers there is a "noise easement" to protect the wind company from liability. Any complaints or lawsuits would be against the land owner.
- The noise problem is well documented - in Oct. 2005, Germany hosted the First International Conference on Wind Turbine Noise and discussed perspectives for noise control.
- The European Union published results of a 5 year investigation into wind power and found noise complaints to be valid, and that noise levels could not be predicted before developing a site.
- A Meyersdale, Pa resident, Bob Laravee, who lives 3000 ft. from a wind plant, documented noise levels over a 48 hr. period. The results showed an average reading of 75 decibels. According to the EPA, 45 decibels disturb sleep.
- It is difficult to predict noise levels in mountainous terrain. Only a "swishing" may be heard directly underneath a turbine, but farther away the resulting sound of several turbines together has been described to be as loud as a motorcycle or a jet engine.
- In March 2006, Dr Nina Pierpont testified before the N.Y. State Legislature Committee about "Wind Turbine Syndrome" which affects many people living in the vicinity of wind turbines, This syndrome includes chronic sleep problems, severe headaches, dizziness, concentration problems, inner ear problems, etc. People with a history of car sickness, migraines, and inner ear problems are more susceptible.
- Dr. Pierpont also reported that some people feel disturbing pulsations in their chests and ears even when they can't see or hear the wind turbines. Sensitivity to low frequency vibration is highly variable in people and poorly understood. The strobe effect of turbines can also provoke seizures in people with epilepsy.

- An interesting note - the Nazis used low-frequency noise as a form of torture.

- Wind turbines are subject to metal fatigue and the effects of ice and wind, parts and whole blades have torn off because of malfunction, flying as far as 8 kilometers and through the window of a home in one case. Whole towers have collapsed in Germany (as recently as 2002) and the U.S. (e.g. Oklahoma, May 2005).
- Turbine related fires are not uncommon. A single turbine may contain up to 200 gallons of oil; the transformer at the base of each turbine may contain another 500 gallons of oil. In rural areas even a spark can easily develop into a large fire before discovery is made and fire fighting can begin.

- There are currently many lawsuits around the world due to wind plant noise, lowered property values, and negative health effects. Communities are angry at being forced to become live-in power plants.

Should we sacrifice a North Carolina Treasure for an expensive, inefficient, and insignificant contribution to an ill conceived attempt to solve a global problem?

Exhibit D

"All Reported Fires by Property Use - Electric Generating Plant/Energy Production Plant"

California Office of the State Fire Marshal (September 2, 2010).

All Reported Fires by Property Use - Electric Generating Plant/Energy Production Plant

Reported to the California Office of the State Fire Marshal

as of 9/2/10

Incident Date	Fire Department Name	Incident Type	Property Use	Address	Street	City	Zip	Property Loss	Contents Loss	Fire Service Injuries	Fire Service Deaths	Civilian Injuries	Civilian Deaths
02/17/2008	LOS ANGELES COUNTY FD	Fire in portable building, fixed location	Energy production plant, other	1150	SEPULVEDA	CARSON	0	$60,000	$500,000	0	0	0	0
02/20/2008	ALAMEDA COUNTY FD	Passenger vehicle fire	Electric generating plant		DYER RD	LIVERMORE	94550	$20,000	$0	0	0	0	0
02/24/2008	HOLTVILLE FD	Building fires	Electric generating plant	3300	Evan Hewes	Imperial (County)	92250	$0	$5,000	0	0	0	0
03/09/2008	MERCED CFD	Fire, other	Electric generating plant	13072	G	SNELLING	95369	$1,000	$1,000,000	0	0	0	0
04/18/2008	FRESNO COUNTY FPD	Fire, other	Energy production plant, other	2360	ORANGE	FRESNO	93727	$10	$0	0	0	0	0
04/22/2008	COTTONWOOD F P D	Special outside fire, other	Electric generating plant	20811	Industry Rd.	Cottonwood	96022	$0	$0	0	0	0	0
04/22/2008	ANDERSON FPD	Special outside fire, other	Electric generating plant	20811	Industry	Anderson	96007	$0	$0	0	0	0	0
05/03/2008	COTTONWOOD F P D	Special outside fire, other	Electric generating plant	20811	Industry	Cottonwood	96022	$0	$0	0	0	0	0
05/07/2008	KERN CFD	Cultivated vegetation, crop fire, other	Energy production plant, other	31500	POND	KERN COUNTY	93250	$1	$1	0	0	0	0
05/08/2008	COTTONWOOD F P D	Special outside fire, other	Electric generating plant					$0	$0	0	0	0	0
05/09/2008	PALM SPRINGS FD	Special outside fire, other	Energy production plant, other		INDIAN CANYON	Palm Springs	92262	$750,000	$0	0	0	0	0
05/16/2008	OROVILLE FD	Special outside fire, other	Electric generating plant	3155	SOUTH 5TH	Oroville	95966	$0	$0	0	0	0	0
05/17/2008	AUBURN VFD	Grass fire	Energy production plant, other	100	Hidden Creek	Auburn	95603	$0	$0	0	0	0	0
05/24/2008	STOCKTON FD	Fuel burner/boiler malfunction, fire confined	Electric generating plant	2526	WASHINGTON	STOCKTON	95203	$0	$0	0	0	0	0
05/28/2008	LOS ANGELES COUNTY FD	Fires in structures other than in a building	Energy production plant, other	8835	SOMERSET	PARAMOUNT	0	$0	$0	0	0	0	0
05/31/2008	COTTONWOOD F P D	Special outside fire, other	Electric generating plant	20811	Industry	Cottonwood	96022	$0	$0	0	0	0	0
05/31/2008	ANDERSON FPD	Outside storage fire	Energy production plant, other	20811	Industry	Anderson	96007	$0	$0	0	0	0	0
06/07/2008	OROVILLE FD	Cultivated grain or crop fire	Energy production plant, other	3050	SOUTH 5TH	Oroville	95965	$10,000	$0	0	0	0	0
06/10/2008	ANDERSON FPD	Outside storage fire	Energy production plant, other		Wheelabrator	Anderson	96007	$0	$0	0	0	0	0
06/13/2008	SUTTER CREEK FPD	Natural vegetation fire, other	Electric generating plant	49	Highway	Jackson	95642	$0	$0	0	0	0	0
06/22/2008	COTTONWOOD F P D	Outside rubbish, trash or waste fire	Electric generating plant	20811	Industry	Cottonwood	96022	$0	$0	0	0	0	0
06/23/2008	SAN DIEGO FIRE & RESCUE	Building fires	Electric generating plant	9060	Friars	SAN DIEGO	92108	$1,000	$0	0	0	0	0
06/23/2008	CDF-SAN BERNARDINO	Brush, or brush and grass mixture fire	Electric generating plant	6655	Escondido	Hesperia	92345	$0	$0	0	0	0	0
06/23/2008	SAN BERNANDINO COUNTY FD	Natural vegetation fire, other	Energy production plant, other	6655	ESCONDIDO	HES	92345	$0	$0	0	0	0	0
07/03/2008	CDF-TUOLUMNE	Grass fire	Energy production plant, other		Hwy 108	JAMESTOWN	95370	$0	$0	0	0	0	0
07/17/2008	KERN CFD	Building fires	Electric generating plant		LERA	KERN COUNTY	93501	$3,000	$1,000	0	0	0	0
07/18/2008	CDF-CONTRA COSTA	Grass fire	Energy production plant, other		Vasco	LOS_VAQUEROS_RESER	94551	$0	$0	0	0	0	0
07/19/2008	KERN CFD	Outside equipment fire	Energy production plant, other	19358	JAMISON	TEHACHAPI	93561	$200,000	$0	0	0	0	0
07/29/2008	SONORA FD	Building fires	Electric generating plant	14560	Tuolumne	Sonora	95370	$0	$0	0	0	0	0
07/29/2008	SANTA MONICA FD	Outside equipment fire	Energy production plant, other	1721	22ND ST	SANTA MONICA	90404	$10,000	$0	0	0	0	0
08/04/2008	RIVERSIDE CFD	Special outside fire, other	Electric generating plant		Garnet	North Palm Springs	92258	$12,000	$0	0	0	0	0
08/04/2008	RIVERSIDE CFD	Special outside fire, other	Electric generating plant		Garnet	North Palm Springs	92258	$12,000	$0	0	0	0	0
08/04/2008	KERN CFD	Outside equipment fire	Electric generating plant	26255	33	KERN COUNTY	93224	$750,000	$0	0	0	0	0
08/15/2008	ALAMEDA COUNTY FD	Passenger vehicle fire	Electric generating plant	11700	FLYNN	LIVERMORE	94550	$4,000	$0	0	0	0	0
08/18/2008	CDF-SHASTA	Building fires	Electric generating plant	16349	Shasta Dam	SHASTALKCTY	96089	$0	$0	0	0	0	0
08/20/2008	TORRANCE FD	Special outside fire, other	Energy production plant, other	3700	190th	TORRANCE	90504	$0	$0	0	0	0	0
08/26/2008	CDF-TUOLUMNE	Fire, other	Energy production plant, other	8755	Enterprise Dr.	TUOLUMNE_COUNTY	95309	$0	$0	0	0	0	0
08/27/2008	CDF-ALAMEDA	Grass fire	Energy production plant, other	3200	2800 DYER	ALTAMONT	94551	$0	$0	0	0	0	0
08/28/2008	ALAMEDA COUNTY FD	Grass fire	Electric generating plant		MOUNTAIN HOUSE RD	LIVERMORE	94550	$0	$0	0	0	0	0
08/29/2008	TORRANCE FD	Mobile property (vehicle) fire, other	Energy production plant, other	3700	190th	TORRANCE	90504	$1,000	$0	0	0	0	0
09/02/2008	STOCKTON FD	Building fires	Energy production plant, other	2526	WASHINGTON	STOCKTON	95203	$10,000	$0	1	0	0	0
09/22/2008	PALO ALTO FD	Trash or rubbish fire, contained	Energy production plant, other	2575	SAND HILL	Stanford	94305	$0	$0	0	0	0	0
09/22/2008	DIXON FD	Grass fire	Electric generating plant	5221	QUINN	VACAVILLE	95688	$0	$0	0	0	0	0
09/24/2008	TORRANCE FD	Outside equipment fire	Energy production plant, other	3700	190TH	TORRANCE	90504	$0	$0	0	0	0	0
10/04/2008	KERN CFD	Mobile property (vehicle) fire, other	Electric generating plant	31500	POND	KERN COUNTY	93250	$500	$0	0	0	0	0
10/08/2008	CHULA VISTA FD	Outside equipment fire	Electric generating plant	990	Bay	CHULA VISTA	91911	$0	$0	0	0	0	0
10/13/2008	SAN FRANCISCO FD	Fires in structures other than in a building	Electric generating plant	25	JUDAH	SF	94143	$2,000	$2,000	0	0	0	0
10/13/2008	VENTURA COUNTY FD	Brush, or brush and grass mixture fire	Energy production plant, other	0	South Mountain	Santa Paula	93060	$0	$0	0	0	0	0
10/28/2008	ORANGE COUNTY FIRE AUTHORITY	Outside equipment fire	Electric generating plant		EDWARDS ST/GARDEN GROVE BL	WESTMINSTER	0	$10,000	$0	0	0	0	0
10/29/2008	TORRANCE FD	Special outside fire, other	Energy production plant, other	3700	190TH	TORRANCE	90504	$0	$0	0	0	0	0
11/25/2008	SANTA BARBARA CFD	Outside equipment fire	Electric generating plant	1833	FLETCHER	SANTA YNEZ	93460	$0	$0	0	0	0	0
12/04/2008	TORRANCE FD	Outside equipment fire	Energy production plant, other	3700	190TH	TORRANCE	90504	$0	$0	0	0	0	0
12/22/2008	KIRKWOOD VFD	Fire, other	Electric generating plant		Power House Road	Kirkwood	95646	$0	$0	0	0	0	0
12/27/2008	TUOLUMNE CFD	Fire in motor home, camper, recreational vehicle	Energy production plant, other		J59	TUOLUMNE_COUNTY	95321	$100	$0	0	0	0	0
01/11/2009	MENIFEE FIRE DEPARTMENT	Special outside fire, other	Electric generating plant	26226	ANTELOPE	ROMO	92585	$0	$0	0	0	0	0
01/18/2009	SANTA MARIA FD	Building fires	Electric generating plant	1400	CHURCH	SANTA MARIA	93454	$0	$100,000	0	0	0	0
01/23/2009	HEMET FD	Outside equipment fire	Electric generating plant		GILBERT	HEMET	92543	$100,000	$0	0	0	0	0
02/06/2009	LONG BEACH FD	Outside rubbish, trash or waste fire	Energy production plant, other	6801	2ND	LONG BEACH	90803	$0	$0	0	0	0	0
02/10/2009	QUINCY FPD	Off-road vehicle or heavy equipment fire	Energy production plant, other		LEE	Quincy	95971	$0	$0	0	0	0	0
02/11/2009	KIRKWOOD VFD	Fire, other	Electric generating plant	1	Power House Rd	Kirkwood	89410	$0	$0	0	0	0	0
02/15/2009	DINUBA FD	Off-road vehicle or heavy equipment fire	Energy production plant, other		ROAD 72	Dinuba	93618	$100,000	$0	0	0	0	0
03/09/2009	SAN LUIS OBISPO CFD	Fire, other	Electric generating plant		Diablo Rd	SLO_CO	93504	$0	$0	0	0	0	0
04/21/2009	COTTONWOOD F P D	Rail vehicle fire	Energy production plant, other		Panorama Point Rd.	Cottonwood	96022	$0	$0	0	0	0	0
04/23/2009	PALO ALTO FD	Dumpster or other outside trash receptacle fire	Electric generating plant	2575	SAND HILL	STANFORD	94305	$0	$0	0	0	0	0
04/24/2009	SAN BERNANDINO COUNTY FD	Outside equipment fire	Electric generating plant	16800	Aster	ADELANTO	92301	$0	$0	0	0	0	0
05/17/2009	PLACER CO FD	Building fires	Energy production plant, other	3195	ATHENS	PCF_PAIGE1	95648	$0	$30,000	0	0	0	0
05/19/2009	CDF-ALAMEDA	Grass fire	Energy production plant, other	3014	Patterson	ALTAMONT	95377	$0	$0	0	0	0	0
05/29/2009	EAST DIABLO FPD	Grass fire	Electric generating plant	3551	Wilbur	Antioch	ANT	$0	$0	0	0	0	0
06/03/2009	LONG BEACH FD	Building fires	Energy production plant, other	6801	2ND	LONG BEACH	90803	$0	$0	0	0	0	0
06/15/2009	CDF-LAKE	Brush, or brush and grass mixture fire	Electric generating plant	10350	SOCRATES MINE	COBB	95426	$0	$0	0	0	0	0
06/23/2009	CDF-MONTEREY	Grass fire	Energy production plant, other	66344	SARGEANT CANYON	SAN_ARDO	93426	$5,000	$0	0	0	0	0
07/14/2009	LONG BEACH FD	Building fires	Electric generating plant	690	STUDEBAKER	LONG BEACH	90803	$500,000	$0	0	0	0	0
07/16/2009	SAN BERNANDINO COUNTY FD	Natural vegetation fire, other	Electric generating plant		GOFFS	ESSEX	92332	$0	$0	0	0	0	0
07/23/2009	TORRANCE FD	Special outside fire, other	Energy production plant, other	3700	190TH	TORRANCE	90504	$0	$0	0	0	0	0
07/26/2009	ALAMEDA COUNTY FD	Grass fire	Electric generating plant	10619	ALTAMONT PASS	LIVERMORE	94550	$0	$0	0	0	0	0

All Reported Fires by Property Use - Electric Generating Plant/Energy Production Plant

Reported to the California Office of the State Fire Marshal

as of 9/2/10

Incident Date	Fire Department Name	Incident Type	Property Use	Address	Street	City	Zip	Property Loss	Contents Loss	Fire Service Injuries	Fire Service Deaths	Civilian Injuries	Civilian Deaths
08/03/2009	TORRANCE FD	Outside equipment fire	Energy production plant, other	3700	190TH	TORRANCE	90504	$0	$0	0	0	0	0
08/17/2009	SAN DIEGO FIRE & RESCUE	Building fires	Energy production plant, other	2200	Pacific Hy	SAN DIEGO	92101	$10,000	$50,000	0	0	0	0
09/10/2009	SAN LUIS OBISPO CFD	Building fires	Energy production plant, other		Diablo Power Plant	SLO_CO	93405	$0	$0	0	0	0	0
09/12/2009	EAST DIABLO FPD	Grass fire	Electric generating plant	5280	Bruns	None - NAME?	OOC	$0	$0	0	0	0	0
09/28/2009	CDF-ALAMEDA	Grass fire	Energy production plant, other		Altamont	ALTAMONT	94550	$400	$400	0	0	0	0
10/28/2009	CDF-RIVERSIDE	Outside equipment fire	Electric generating plant	11001	WHITEWATER CANYON	WHIT	92282	$0	$30	0	0	0	0
11/05/2009	CHESTER FPD	Building fires	Electric generating plant	500	Main	Chester	96020	$0	$0	0	0	0	0
11/11/2009	FRESNO COUNTY FPD	Outside equipment fire	Electric generating plant	39550	BUTTE	HURON	93234	$15,000	$30,000	0	0	0	0
12/02/2009	KERN CFD	Outside rubbish, trash or waste fire	Electric generating plant		WILSON	KERN COUNTY	93307	$1	$1	0	0	0	0
01/16/2010	MERCED CFD	Fire, other	Energy production plant, other	30	SANDY MUSH	EL_NIDO	95317	$60,000	$60,000	0	0	0	0
02/03/2010	SANTA BARBARA CFD	Outside equipment fire	Energy production plant, other	12100	Calle Real	GOLETA	93117	$0	$0	0	0	0	0
03/08/2010	REDLANDS FD	Outside equipment fire	Electric generating plant	2492	San Bernardino	REDLANDS	92408	$15,000	$0	0	0	0	0
03/29/2010	COTTONWOOD F P D	Fire in portable building, fixed location	Energy production plant, other	20811	Industry	Cottonwood	96022	$0	$0	0	0	0	0
04/05/2010	LOS ANGELES CITY FD	Fuel burner/boiler malfunction, fire confined	Electric generating plant	12700	VISTA DEL MAR	LOS ANGELES	90045	$0	$0	0	0	0	0
04/12/2010	FRESNO COUNTY FPD	Fire, other	Electric generating plant	18015	Friant	FRIANT	93626	$30,000	$0	0	0	0	0
04/24/2010	BLUE LAKE VFD	Fire, other	Energy production plant, other	200	Taylor	Blue Lake	95525	$0	$0	0	0	0	0
05/15/2010	SHASTA CFD	Fire, other	Electric generating plant	41402	HWY 299	CASSEL	96018	$1,000,000	$0	0	0	0	0
06/16/2010	KIRKWOOD VFD	Fire, other	Electric generating plant	1	Powerhouse	Kirkwood1	95646	$0	$0	0	0	0	0
07/29/2010	CDF-ALAMEDA	Grass fire	Electric generating plant	12598	Flynn	Livermore	94550	$0	$0	0	0	0	0
08/23/2010	CDF-SAN JOAQUIN	Grass fire	Electric generating plant	14680	Patterson Pass	Tracy	95377	$4,500	$0	0	0	0	0
08/25/2010	CDF-ALAMEDA	Grass fire	Energy production plant, other	11700	Flynn	ALTAMONT	94550	$300	$0	0	0	0	0

The data contained in this report provided by the California Office of the State Fire Marshal (OSFM) is from the California All Incident Reporting System (CAIRS) database. Property and contents loss figures, if included, are estimates only. These emergency incident statistics, including injury and death counts, are based only upon information submitted to the OSFM by participating California fire departments. Please note that apparent variations in incident counts and associated losses shown in this report may be solely due to fluctuation in the amount of data submitted to the OSFM. Incoming data is validated according to logical data rules, however, individual data elements are not always verified for accuracy.

Exhibit E

Select Incident Reports from Alameda, Kern, and Riverside Counties, 2008 – 2010

California Office of the State Fire Marshal (September 2, 2010)

Exhibit E.1: Four Confirmed Turbine Fires, 2008 – 2010 (only three incident reports attached)

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002769	0

NFIRS - 1 Basic

B Location

Address Type: 2 - Intersection

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: North INDIAN CANYON Drive

Apt./Suite/Room | City | State | Zip Code: Palm Springs CA 92262

Census Tract: 570201

Cross street or directions, as applicable: INTERSTATE 10

C Incident Type

Incident Type: 160 - Special outside fi

D Aid Given or Received

Their FDID | Their State | Their Incident Number

Type Aid Given or Recieved: N - None

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	05/09/2008			05:54:58		
Arrival	05/09/2008			06:01:51		
Controlled						
Last Unit Cleared	05/09/2008			07:05:39		

E2 Shifts & Alarms (Local Option)

Shift or platoon: B | Alarms: 0 | District: 443

E3 Special Studies (Local Option)

Special Study ID# | Special Study Value

F Actions Taken

10 - Fire, other

Actions Taken

G1 Resources

[Y] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	1	3
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 750000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $

Contents $

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

I Mixed Use Property

J Property Use: 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002769	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin

Y — Not Residential

B2 0 — Number of buildings involved

B3 0 — Acres burned (outside fires)

C On-Site Materials or Products

On-site materials: 712 - Electronic: parts, supplies, equipment

On-site materials use: N - None

D Ignition

D1 60 - Equipment or service ar — Area of fire origin

D2 10 - Heat from powered equip — Heat source

D3 UU - Undetermined — Item first ignited

D4 — Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

3 - Failure of equipment or heat — Cause of ignition

E2 Factors Contributing To Ignition

20 - Mechanical failure, malfunction, other

Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

Equipment power source

F3 Equipment Portability

Equipment portability

G Fire Suppression Factors

Fire suppression factors

H1 Mobile Property Involved

Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002769	0

NFIRS Remarks

Remarks

Windmill fire. ME443 responded to windmill fire. Upon our arrival we found one windmill with the generator housing fully involved in fire at the top of the windmill approximately 200 feet high. Half of the housing was had already burned away and was dropping debris throughout the desert causing spot fires. I made contact with a windmill employee and he advised housing was already lost. I asked him if the unit was energized and what was the possibility of the blade dropping off was. He advised me that the unit still may be energized and their was a very good chance the blade may fall off. Due to these conditions it was determined that it was not safe to try any type of direct attack on the fire. We had sustained wind of 50 MPH with gust of 63 MPH which was assisting in extinguishing the windmill fire. We repositioned up wind and attacked the spot fires with hand tools; Eng Duenas was assigned as a safety officer/lookout due to the debris falling. We were able to safely extinguish the spot fires and observed the windmill fire until we no longer could see any active fire.. We did not observe any more debris falling or any other spot fires. I contacted a Rick Kolitz a supervisor with AES the operators of the windmill farm. He advised me that the probable cause of the fire was to an overheated generator and the cost of the windmill is $750,000.00. Kolitz told me that they were going to have their personnel monitored the windmill and would call back if they needed further assistance. We cleared the scene, no further assistance requested at this time. ---------- On 05/09/2008 at 05:54:58 dispatched To N INDIAN CANYON DR & INTERSTATE 10 /Palm Springs, CA 92262. The location is a Energy production plant, Other. The incident was determined to be a(n) Special outside fire, Other. 06:01:51 arrived on scene. The following actions were performed on scene: Fire control or extinguishment, other Units responding were: Unit E-443 responded. 07:05:39 all units back in service.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
00392	Richard Barrena	CP		05/10/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
00392	Richard Barrena	CP		05/10/2008

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002769	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)	Dates and Times (Month Day Year Hours/Mins)	Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken
1 ID: E-443 Type: 11	Dispatch: 05/09/2008 05:56 Arrival: 05/09/2008 06:01 Clear: 05/09/2008 07:05	X	3	1 - Suppress	
2 ID: Type:	Dispatch: Arrival: Clear:				
3 ID: Type:	Dispatch: Arrival: Clear:				
4 ID: Type:	Dispatch: Arrival: Clear:				
5 ID: Type:	Dispatch: Arrival: Clear:				
6 ID: Type:	Dispatch: Arrival: Clear:				
7 ID: Type:	Dispatch: Arrival: Clear:				
8 ID: Type:	Dispatch: Arrival: Clear:				
9 ID: Type:	Dispatch: Arrival: Clear:				
10 ID: Type:	Dispatch: Arrival: Clear:				
11 ID: Type:	Dispatch: Arrival: Clear:				
12 ID: Type:	Dispatch: Arrival: Clear:				
13 ID: Type:	Dispatch: Arrival: Clear:				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	33065	CA	05/09/2008	443	0002769	0	

B Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1 ID E-443 Type 11	Dispatch 05/09/2008 05:56:19 Arrival 05/09/2008 06:01:51 Clear 05/09/2008 07:05:39	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
00392	Barrena, Richard	CP	X				
10925	Gunkel, Nathan	EPM	X				
15654	Kelsheimer, Jeff	PR	X				

2 ID / Type	Dispatch / Arrival / Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3 ID / Type	Dispatch / Arrival / Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	07/19/2008	K12	0822604	0

NFIRS - 1 Basic

B Location

Address Type: 6 - Directions

Number/Milepost: 19358 | Prefix: | Street or Highway: JAMISON | Street Type: Road | Suffix:

Apt./Suite/Room: | City: TEHACHAPI | State: CA | Zip Code: 93561

Census Tract:

Cross street or directions, as applicable: 3 MILES SOUTH OF HWY 58 KEY 18

C Incident Type

162 - Outside equipment

Incident Type

D Aid Given or Received

Their FDID: | Their State: | Their Incident Number:

Type Aid Given or Recieved: N - None

E1 Dates & Times (Midnight is 0000)

	Month Day Year	Hour Min Seconds
Alarm	07/19/2008	12:23:11
Arrival	07/19/2008	12:43:49
Controlled		
Last Unit Cleared	07/19/2008	14:02:42

E2 Shifts & Alarms Local Option

Shift or platoon: A | Alarms: 1 | District: 184

E3 Special Studies Local Option

Special Study ID#: | Special Study Value:

F Actions Taken

11 - Extinguish

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	7	10
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 200000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 200000

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector: U - Unknown

H3 Hazardous Materials Release:

I Mixed Use Property:

J Property Use: 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: [redacted] | MI: | Last Name: [redacted] | Suffix:

Number: [redacted] | Prefix: | Street or Highway: [redacted] | Street Type: [redacted] | Suffix:

Post Office Box: | Apt./Suite/Room: | City: [redacted]

State: [redacted] | Zip Code: [redacted] | Business name (if applicable): | Area Code: | Phone Number:

K2 Owner

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	07/19/2008	K12	0822604	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin

Y — Not Residential

B2 Number of buildings involved

B3 Acres burned (outside fires)

C On-Site Materials or Products

NNN - None

On-site materials

On-site materials use

D Ignition

D1 83 - Engine area, running ge
Area of fire origin

D2 12 - Radiated, conducted hea
Heat source

D3 UU - Undetermined
Item first ignited

D4 Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

2 - Unintentional
Cause of ignition

E2 Factors Contributing To Ignition

UU - Undetermined

Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

200 - Electrical distribution, p
Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

10 - Electrical, other
Equipment power source

F3 Equipment Portability

2 - Stationary
Equipment portability

G Fire Suppression Factors

Fire suppression factors

H1 Mobile Property Involved

Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	07/19/2008	K12	0822604	0

NFIRS Remarks

Remarks

TITLE:CAD Narrative [CRLF]08048274 E Type: ST STRUCTURE Fire
Sub Type:
Disp:[CRLF]COMMENTS:[CRLF]~KEYMAP: ERROR PROCESSING ADDRESSWINDMILLS ON FIREWIND MILL AT THE TOP OF THE MTN ON FIRE NOT INTO THE GRASS PER THE RPANOTHER RP, CHIEF BILL BENDER ....AT THE GE WIND FARM....BENDER SAID IT WAS OFF TEH WILLOW SPRINGS RD"LL(35:05:31.0596,-118:17:45.6435)" AT: 07/19/08 12:28:58PER KB1 CXL E14 AND RESP E18E12 UNABLE TO SEE ANTHING YET.APPEARED TO BE BEHIND GE WIND FARM NO SMK SEENHOLD ALL INCOMING IN PLACE.11 TO HOLD AT 202 AND 58.PER SECURITY, TURBINE IS ON FIRE....BEING LED INATTEMPTING TO GAINACCESS...LITE SMK SHOWING.GO PAST GUARD SHACK, FOLLOW ROAD UPE12ON SCENE..LAUNCH 408 FOR BUCKET DROP.TURBINE MOTOR FIRE, WINDS ARE OUT OF SE 10-15MPHCPT408 COPIED10 MIN ETA.408 OFF KEEN P+1 1HR43MIN FUELHEADING 080 10 MIN ETA.408 OPS NORM1324.H408 ENRT BASE PILOT+1, 1/25 FUEL, ETA 10 MINS, HDG 307MESSAGE LEFT ON PIO CELL[CRLF][CRLF]TITLE:CO 12 [CRLF]CREW FOUND WIND TURBINE SMOLDERING AND DROPPING CHUNCKS OF INSULATION TO THE GROUND. CREW EXTINGUISHED 1 SMALL SPOT FIRE ON THE GROUND. H408 DISPATCHED TO MAKE 3 DROPS ON TURBINE. FIRE OUT. ADVISED SECURITY TO CHECK ON THE TOWER PERIODICLY. POWER CUT BY WORKER

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
K0614	Kevin Ostrinski	4590	1	07/19/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
K0614	Kevin Ostrinski	4590	1	07/19/2008

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	07/19/2008	K12	0822604	0

NFIRS - 11
Arson

B Agency Referred To

Street Address:
Their Case Number: 0
Agency Name:
City:
Their ORI:
Agency Phone Number:
State:
Zip Code:
Their Federal Identifier (FID):
Their FDID:

C Case Status

Case Status:

D Availability of Material First Ignited

Availability of Material First Ignited:

E Suspected Motivation Factors

Suspected Motivation Factors:

F Apparent Group Involvement

Apparent Group Involvement:

G1 Entry Method

Entry Method:

H Incendiary Devices

CONTAINER

Container:

IGNITION/DELAY DEVICE

Ignition/Delay Device:

G2 Extent of Fire Involvement on Arrival

Extent of Fire Involvement:

FUEL

Fuel:

I Other Investigative Information

Other Investigative information:

J Property Ownership

Property Owenership:

K Initial Observations

Initial Observations:

L Laboratory Used

Laboratory Used:

M1 Subject Number

Subject Number: 1

M3 Gender

Gender:

M6 Family Type

Family Type:

M8 Disposition of Person Under 18

Disposition of Person Under 18:

M2 Age or Date of Birth

Age (in years):

OR

Month Day Year:

M4 Race

Race:

M5 Ethnicity

Ethnicity:

M7 Motivation/Risk Factors

Motivation/Risk Factors:

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	07/19/2008	K12	0822604	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)	Dates and Times (Month Day Year Hours/Mins)	Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken
1 ID: E18 Type: 11	Dispatch: 07/19/2008 12:31 Arrival: Clear: 07/19/2008 13:23	X	2	1 - Suppress	93
2 ID: E11 Type: 11	Dispatch: 07/19/2008 12:27 Arrival: Clear: 07/19/2008 13:37	X	3	1 - Suppress	
3 ID: KB1 Type: 92	Dispatch: 07/19/2008 12:27 Arrival: 07/19/2008 12:43 Clear: 07/19/2008 14:02	X	1	1 - Suppress	
4 ID: P12 Type: 16	Dispatch: 07/19/2008 12:30 Arrival: 07/19/2008 12:45 Clear: 07/19/2008 14:02	X	1	1 - Suppress	160
5 ID: E12 Type: 11	Dispatch: 07/19/2008 12:27 Arrival: 07/19/2008 12:54 Clear: 07/19/2008 14:02	X	2	1 - Suppress	160
6 ID: P11 Type: 16	Dispatch: 07/19/2008 12:31 Arrival: 07/19/2008 13:08 Clear: 07/19/2008 13:37	X	0	1 - Suppress	
7 ID: P18 Type: 16	Dispatch: 07/19/2008 12:33 Arrival: 07/19/2008 13:23 Clear: 07/19/2008 13:37	X	1	1 - Suppress	93
8 ID: Type:	Dispatch: Arrival: Clear:				
9 ID: Type:	Dispatch: Arrival: Clear:				
10 ID: Type:	Dispatch: Arrival: Clear:				
11 ID: Type:	Dispatch: Arrival: Clear:				
12 ID: Type:	Dispatch: Arrival: Clear:				
13 ID: Type:	Dispatch: Arrival: Clear:				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	07/19/2008	K12	0822604	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E18 Type 11	Dispatch 07/19/2008 12:31:43 Arrival Clear 07/19/2008 13:23:30	X	2 #	1 - Suppressi	93

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0199	Maestas, Ramon	4590	X				
K0807	Whitley, Parris	4595	X				

2	ID E11 Type 11	Dispatch 07/19/2008 12:27:42 Arrival Clear 07/19/2008 13:37:46	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0477	Lewter, Charles	4595	X				
K0148	Pearson, Donald	4589 C	X				
K0736	Estrada, Fredrick	4639	X				

3	ID KB1 Type 92	Dispatch 07/19/2008 12:27:41 Arrival 07/19/2008 12:43:49 Clear 07/19/2008 14:02:42	Sent X	1 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0215	Lechtreck, Robert	4580	X				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	07/19/2008	K12	0822604	0	

B Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)			Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1 ID P12	Dispatch	07/19/2008	12:30:05	Sent			160
Type 16	Arrival	07/19/2008	12:45:49	X	1 #	1 - Suppressi	
	Clear	07/19/2008	14:02:40				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0899	Yost, Christopher	4639	X				

2 ID E12	Dispatch	07/19/2008	12:27:41	Sent			160
Type 11	Arrival	07/19/2008	12:54:21	X	2 #	1 - Suppressi	
	Clear	07/19/2008	14:02:35				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0614	Ostrinski, Kevin	4590	X				
K0768	Kingsbury, Tyson	4595	X				

3 ID P11	Dispatch	07/19/2008	12:31:17	Sent			
Type 16	Arrival	07/19/2008	13:08:53	X	0 #	1 - Suppressi	
	Clear	07/19/2008	13:37:46				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	07/19/2008	K12	0822604	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID P18 Type 16	Dispatch 07/19/2008 12:33 Arrival 07/19/2008 13:23:07 Clear 07/19/2008 13:37:52	X	1 #	1 - Suppressi	93

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0982	Erwin, John	4639	X				

2	ID	Type	Dispatch / Arrival / Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID	Type	Dispatch / Arrival / Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	0

NFIRS - 1 Basic

B Location

Address Type: 6 - Directions

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: Garnet Avenue

Apt./Suite/Room | City: North Palm Springs | State: CA | Zip Code: 92258

Census Tract:

Cross street or directions, as applicable: Off Garnet Ave, directly south

C Incident Type

Incident Type: 160 - Special outside fi

D Aid Given or Received

Their FDID | Their State | Their Incident Number:

Type Aid Given or Recieved: 1 - Mutual aid received

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/04/2008			16:39		
Arrival	08/04/2008			16:53		
Controlled						
Last Unit Cleared	08/04/2008			20:01		

E2 Shifts & Alarms (Local Option)

Shift or platoon: | Alarms: | District: 10

E3 Special Studies (Local Option)

Special Study ID#: | Special Study Value:

F Actions Taken

11 - Extinguish
41 - Identify, analyze hazardous materials
44 - Hazardous materials leak control & containment

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	7
EMS	0	0
Other	3	6

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 12000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 812000

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector:

H3 Hazardous Materials Release: 0 - Special hazmat actions required

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs.: Mr. | First Name: Gregory | MI: J | Last Name: Thill | Suffix:

Number | Prefix | Street or Highway: 1360 Geronimo | Street Type: Trail | Suffix:

Post Office Box: | Apt./Suite/Room: | City: Yucca Valley

State: CA | Zip Code: 92284 | Business name (if applicable): AES | Area Code: 760 | Phone Number: 4134273

K2 Owner

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number | Prefix | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	0

NFIRS - 1 Basic

B Location

Address Type: 6 - Directions

Number/Milepost | Prefix | Street or Highway: Garnet | Street Type: Avenue | Suffix:

Apt./Suite/Room: | City: North Palm Springs | State: CA | Zip Code: 92258

Census Tract:

Cross street or directions, as applicable: Off Garnet Ave, directly south

C Incident Type

Incident Type: 160 - Special outside fi

D Aid Given or Received

Their FDID: | Their State: | Their Incident Number:

Type Aid Given or Recieved: 1 - Mutual aid received

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/04/2008			16:39		
Arrival	08/04/2008			16:53		
Controlled						
Last Unit Cleared	08/04/2008			20:01		

E2 Shifts & Alarms Local Option

Shift or platoon: | Alarms: | District: 10

E3 Special Studies Local Option

Special Study ID#: | Special Study Value:

F Actions Taken

11 - Extinguish
41 - Identify, analyze hazardous materials
44 - Hazardous materials leak control & containment

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	7
EMS	0	0
Other	3	6

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 12000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 812000

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector:

H3 Hazardous Materials Release: 0 - Special hazmat actions required

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs.: [redacted] First Name: [redacted] MI: [redacted] Last Name: Suffix:

Number: [redacted] Prefix: Street or Highway: [redacted] Street Type: [redacted] Suffix:

Post Office Box: Apt./Suite/Room: City: [redacted]

State: [redacted] Zip Code: [redacted] Business name (if applicable): [redacted] Area Code: [redacted] Phone Number:

K2 Owner

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	0

B Property Details

B1: 0 — Estimated number of residential living units in building of origin
Y — Not Residential

B2: Number of buildings involved

B3: 0 — Acres burned (outside fires)

C On-Site Materials or Products

On-site materials: NNN - None

On-site materials use: N - None

D Ignition

D1: 63 - Switchgear area, transf — Area of fire origin

D2: 13 - Arcing — Heat source

D3: 81 - Electrical wire, cable — Item first ignited

D4: Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

3 - Failure of equipment or heat — Cause of ignition

E2 Factors Contributing To Ignition

36 - Arc, spark from operating equipment — Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

200 - Electrical distribution, p — Equipment Involved

Brand

Model

01J286107 — Serial #

Year

F2 Equipment Power

54 - Wind — Equipment power source

F3 Equipment Portability

2 - Stationary — Equipment portability

G Fire Suppression Factors

325 - Flammable/combustible liquid hazard — Fire suppression factors

H1 Mobile Property Involved

N - None — Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	0

NFIRS Remarks

Remarks

Fin Type = FOIResponded to reported windmill fire. On scene, observed windmill transformer sub-station on fire. Was advised by company reps that power was secured, but unit held approx 500 gals of mineral oil. Requested Haz-Mat response. Mineral oil leak ed into container built around transformer unit, with minimal (less than 5 gal)oil leak outside of container due to small explosion at ignition. Approx less than 20 gal leak.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
100509	William Bryant	FC	36-OT	08/04/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
100509	William Bryant	FC	36-OT	08/04/2008

NFIRS - 7
HazMat

A						
33090	CA	08/04/2008 (MM DD YYYY)	RRU	68515	0	1
FDID	State	Incident Date	Station	Incident Number	Exposure	Haz No

B HazMat ID

UN Number | DOT Hazard Classification | CAS Registration Number

Chemical name

C1 Container Type

Container Type

C2 Estimated Container Capacity

Capacity: by volume or weight

C3 Units: Capacity

Units: Capacity

D1 Estimated Amount Released

Amount released: by volume or weight

D2 Units: Released

Units: Released

E1 Physical State When Released

Physical state when released

E2 Released Into

Released into

F1 Released From:

2 - Outside S
Released from:

0 Story of release

F2 Population Density

3 - Rural - Scatt
Population density

G1 Area Affected

1 - Square Unit of measure

100
Area affected

G2 Area Evacuated

1 - Square Unit of measure

Area evacuated

G3 People Evacuated

G4 Estimated Number of Buildings Evacuated

H HazMat Actions Taken

31 - Refer to proper authority
HazMat actions taken

I If fire or explosion is involved with a release, which occurred first?

1 - Ignition
Release/fire sequence

J Cause of Release

3 - Container or cont
Cause of release

K Factors Contributing to Release

UU - Undetermined
Factors contributing to release

L Factors Affecting Mitigation

NN - None
Factors affecting mitigation

M Equipment Involved In Release

221 - Transformer, distributid
Equipment involved in release

Brand

Model

Serial Number 01J286107

Year

N Mobile Property Involved in Release

Mobile property type

Mobile property make

Model | Year

License Plate Number | State

DOT Number/ ICC Number

O HazMat Disposition

7 - Released to private a
HazMat disposition

P HazMat Civilian Casualties

Deaths | Injuries

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	1

NFIRS - 1 Basic

B Location

Address Type: 6 - Directions

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: Garnet Avenue

Apt./Suite/Room | City | State | Zip Code: North Palm Springs | CA | 92258

Census Tract:

Cross street or directions, as applicable: Directly south of I-10 / Hwy 6

C Incident Type

Incident Type: 160 - Special outside fi

D Aid Given or Received

Their FDID | Their State | Their Incident Number:

Type Aid Given or Recieved: 1 - Mutual aid received

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/04/2008			16:39		
Arrival	08/04/2008			16:53		
Controlled						
Last Unit Cleared	08/04/2008			20:01		

E2 Shifts & Alarms Local Option

Shift or platoon | Alarms | District: 10

E3 Special Studies Local Option

Special Study ID# | Special Study Value

F Actions Taken

10 - Fire, other

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	7
EMS	0	0
Other	3	6

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 12000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 81200

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

I Mixed Use Property

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

[redacted] Mr., Ms., Mrs. | [redacted] First Name | [redacted] MI | Last Name | Suffix

[redacted] Number | Prefix | [redacted] Street or Highway | [redacted] Street Type | Suffix

Post Office Box | Apt./Suite/Room | [redacted] City

[redacted] State | [redacted] Zip Code | [redacted] Business name (if applicable) | [redacted] Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	1

NFIRS - 1 Basic

B Location

Address Type: 6 - Directions

Number/Milepost | Prefix | Street or Highway: Garnet | Street Type: Avenue | Suffix:

Apt./Suite/Room: | City: North Palm Springs | State: CA | Zip Code: 92258

Census Tract:

Cross street or directions, as applicable: Directly south of I-10 / Hwy 6

C Incident Type

Incident Type: 160 - Special outside fi

D Aid Given or Received

Their FDID: | Their State: | Their Incident Number:

Type Aid Given or Recieved: 1 - Mutual aid received

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/04/2008			16:39		
Arrival	08/04/2008			16:53		
Controlled						
Last Unit Cleared	08/04/2008			20:01		

E2 Shifts & Alarms Local Option

Shift or platoon: | Alarms: | District: 10

E3 Special Studies Local Option

Special Study ID#: | Special Study Value:

F Actions Taken

10 - Fire, other

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	7
EMS	0	0
Other	3	6

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 12000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 81200

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector:

H3 Hazardous Materials Release:

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs.: Mr. | First Name: Gregory | MI: J | Last Name: Thill | Suffix:

Number: 1360 | Prefix: | Street or Highway: Geronimo | Street Type: Trail | Suffix:

Post Office Box: | Apt./Suite/Room: | City: Yucca Valley

State: CA | Zip Code: 92284 | Business name (if applicable): AES | Area Code: 760 | Phone Number: 4134273

K2 Owner

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	1

B Property Details

B1: 0 — Estimated number of residential living units in building of origin
Y — Not Residential

B2: Number of buildings involved

B3: 0 — Acres burned (outside fires)

C On-Site Materials or Products

On-site materials: NNN - None

On-site materials use: N - None

D Ignition

D1: 63 - Switchgear area, transf — Area of fire origin

D2: 13 - Arcing — Heat source

D3: 81 - Electrical wire, cable — Item first ignited

D4: Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

0 - Cause, other (conversion and — Cause of ignition

E2 Factors Contributing To Ignition

71 - Exposure fire — Factors contributing to ignition

E3 Human Factors Contributing To Ignition

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

200 - Electrical distribution, p — Equipment Involved

Brand

Model

01J286107 — Serial #

Year

F2 Equipment Power

54 - Wind — Equipment power source

F3 Equipment Portability

2 - Stationary — Equipment portability

G Fire Suppression Factors

325 - Flammable/combustible liquid hazard — Fire suppression factors

H1 Mobile Property Involved

N - None — Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33090	CA	08/04/2008	RRU	68515	1

NFIRS Remarks

Remarks

Exposure was wind turbine, approx. 5' from electrical transformer substation on ground. Damage to wind turbine was limited to charring on the exterior, on the side facing the substation, approx. 20' high. The wind turbine was opened, and AES employees con firmed the electrical panels inside received no damage.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
100509	William Bryant	FC	36-OT	08/04/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
100509	William Bryant	FC	36-OT	08/04/2008

Exhibit E.2: Two Incidents At Wind Power Facilities With Undeterminable Cause, 2008 – 2010

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	08/28/2008	20	0816142	0

NFIRS - 1 Basic

B Location

Address Type: 2 - Intersection

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: MOUNTAIN HOUSE RD

Apt./Suite/Room | City: LIVERMORE | State: CA | Zip Code: 94550

Census Tract

Cross street or directions, as applicable: GRANT LINE RD

C Incident Type

143 - Grass fire

Incident Type

D Aid Given or Received

Their FDID | Their State | Their Incident Number

Type Aid Given or Recieved: 1 - Mutual aid received

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/28/2008			02:18:24		
Arrival	08/28/2008			02:36:38		
Controlled	08/28/2008			02:52		
Last Unit Cleared	08/28/2008			03:52:17		

E2 Shifts & Alarms Local Option

Shift or platoon: A | Alarms: 1 | District:

E3 Special Studies Local Option

Special Study ID# | Special Study Value

F Actions Taken

11 - Extinguish

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	5	8
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 0

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 0

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector: U - Unknown

H3 Hazardous Materials Release:

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	08/28/2008	20	0816142	0

B Alternate Location Specification

Latitude

Longitude

OR

Township

Range

Section

Subsection

Meridian

C Area Type

1 - Rural, including farms >5

Area type

D1 Wildland Fire Cause

U - Undetermined

Wildland fire cause

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition

D3 Factors Contributing To Ignition

Factors contributing to ignition

D4 Fire Suppression Factors

Fire suppression factors

E Heat Source

F Mobile Property Type

G Equipment Involved in Ignition

H Weather Information

NFDRS Weather Station ID

Wind Direction

Weather Type

Wind speed MPH

Air Temperature F°

Relative Humidity %

Fuel Moisture %

Fire Danger Rating

I1 Number of Buildings Ignited

Number of buildings that were ignited in Wildland fire

I2 Number of Buildings Threatened

Number of buildings that were threatened by Wildland fire but were not involved

I3 Total Acres Burned

1.0

I4 Primary Crops Burned

Crops Burned

J Property Management

Ownership

	% Total Acres Burned
Undetermined	100 %
Tax paying	0 %
Non tax paying	0 %
City, town, village, local	0 %
County or parish	0 %
State or province	0 %
Federal (Federal Agency Code)	0 %
Foreign	0 %
Military	0 %
Other	0 %

K NFDRS Fuel Model at Origin

Fuel Model

L1 Person Responsible For Fire

Person Responsible for Fire

L2 Gender of Person Involved

Gender of person involved

L3 Age or Date of Birth

Age in Years: 0.0

OR

Date of Birth (Month Day Year)

L4 Activity of Person

Activity of Person Involved

M Right of Way

0 Feet

Horizontal distance from right of way

931 - Open land, field

Type of right of way

N Fire Behavior

Elevation Feet

Relative position on slope

Aspect

Flame Length Feet

Rate of spread Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	08/28/2008	20	0816142	0

NFIRS Remarks

Remarks

TITLE:CAD Narrative [CRLF]20080057312 E Type: WVF WORKING VEGETATION FIRE
Sub Type:
Disp:[CRLF]COMMENTS:[CRLF]GRASS FIRE150 YARDS OFF OF THE ROADWAYNEAR THE WINDMILLSON MOUNTAIN HOUSE RD APPROX 1/4 FRM GRANTLINESEES FLAMESRIGHT HAND SIDERP HEADING FRM LIVERMORE TWRDS TRACYLP ADVISED ON DELAY1/2 MI FRM HIS HOUSECENTRAL PKW/MASCOT3488- WORKING FIRE08/28/08 02:36:10 REQUEST CDF FOR SET ACF WVF.08/28/08 02:36:14 REQUEST LAW FOR SET ACF WVF.08/28/08 02:36:14 NOTIFY LAW FOR SET ACF WVF.1810- 21810- ONS W/CAL FIRE, APPRX 2 ACRES, SLOW RATE, WITH MODERATE WINDCHIEF BRADLEY ADVISEDCHIEF GILBERT ADVSCHIEF ROCHA RECV'D PG1810- FIRE CONTAINED, XCEL 1590, 1561[CRLF][CRLF]TITLE:1881 [CRLF]At 0218 hours on Thursday August 28, 2008 we were dispatched to a grass fire. Five units were assigned to this incident. Eight personnel responded. We arrived on scene at 0236 hours and cleared at 0352 hours. The incident occurred at On MOUNTAIN HOUSE RD at GRANT LINE RD, LIVERMORE. The local station is 20. The general description of this property is electric generating plant. The area is described as rural. The primary task(s) performed at the scene by responding personnel was extinguishment. Mutual aid was received on this incident.[CRLF][CRLF]The cause of ignition was undetermined.[CRLF][CRLF]Alarm number 0816142 has been assigned to this incident.[CRLF][CRLF]Veg fire at the windmill farm. Cause undetermined. Released by IC VanWormer.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
383	GARY LINNEY	BC	1	09/01/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
381	GORDON DAKIN	C	1	09/01/2008

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	08/28/2008	20	0816142	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)	Dates and Times (Month Day Year Hours/Mins)	Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken
1 ID 1810 Type 92	Dispatch 08/28/2008 02:18 Arrival 08/28/2008 02:36 Clear 08/28/2008 03:13	X	1	1 - Suppress	70
2 ID 1881 Type 16	Dispatch 08/28/2008 02:18 Arrival 08/28/2008 02:36 Clear 08/28/2008 03:47	X	2	1 - Suppress	11
3 ID 3468 Type 11	Dispatch 08/28/2008 02:18 Arrival 08/28/2008 02:37 Clear 08/28/2008 03:52	X	1	1 - Suppress	11
4 ID 3488 Type 16	Dispatch 08/28/2008 02:18 Arrival 08/28/2008 02:37 Clear 08/28/2008 03:52	X	2	1 - Suppress	11
5 ID 1861 Type 11	Dispatch 08/28/2008 02:18 Arrival 08/28/2008 02:37 Clear 08/28/2008 03:47	X	2	1 - Suppress	11
6 ID Type	Dispatch Arrival Clear				
7 ID Type	Dispatch Arrival Clear				
8 ID Type	Dispatch Arrival Clear				
9 ID Type	Dispatch Arrival Clear				
10 ID Type	Dispatch Arrival Clear				
11 ID Type	Dispatch Arrival Clear				
12 ID Type	Dispatch Arrival Clear				
13 ID Type	Dispatch Arrival Clear				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	01008	CA	08/28/2008	20	0816142	0	

B Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1 ID 1810 Type 92	Dispatch 08/28/2008 02:18:25 Arrival 08/28/2008 02:36:38 Clear 08/28/2008 03:13:41	X	1 #	1 - Suppressi	70

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
383	LINNEY, GARY	BC	X				

2 ID 1881 Type 16	Dispatch 08/28/2008 02:18:25 Arrival 08/28/2008 02:36:58 Clear 08/28/2008 03:47:58	X	2 #	1 - Suppressi	11		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
381	DAKIN, GORDON	C	X	11			
411	HAMILTON, MICHAEL	FF	X	11			

3 ID 3468 Type 11	Dispatch 08/28/2008 02:18:24 Arrival 08/28/2008 02:37:02 Clear 08/28/2008 03:52:16	X	1 #	1 - Suppressi	11		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
095	WRIGHT, ERIC	E	X	11			

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	01008	CA	08/28/2008	20	0816142	0	

B Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1 ID 3488 Type 16	Dispatch 08/28/2008 02:18:25 Arrival 08/28/2008 02:37:05 Clear 08/28/2008 03:52:09	X	2 #	1 - Suppressi	11

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
090	EVANS, PAUL	C	X	11			
093	KNIGHT, STEPHEN	FF	X	11			

2 ID 1861 Type 11	Dispatch 08/28/2008 02:18:25 Arrival 08/28/2008 02:37:11 Clear 08/28/2008 03:47:55	Sent X	2 #	1 - Suppressi	11

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
402	DWYER, EDWARD	E	X	11			
413	PEREZ, JUAN	FF	X	11			

3 ID Type	Dispatch Arrival Clear	Sent	#	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/25/2010	SCU	3544	0

NFIRS - 1 Basic

B Location

Address Type: 5 - Adjacent to

Number/Milepost: 11700 | Prefix: South | Street or Highway: Flynn | Street Type: Road | Suffix:

Apt./Suite/Room: | City: ALTAMONT | State: CA | Zip Code: 94550

Census Tract:

Cross street or directions, as applicable: 12599 BLK S FLYNN RD, 4WD ROAD

C Incident Type

Incident Type: 143 - Grass fire

D Aid Given or Received

Their FDID: | Their State: | Their Incident Number:

Type Aid Given or Recieved: 2 - Automatic aid received

E1 Dates & Times (Midnight is 0000)

	Month Day Year	Hour Min Seconds
Alarm	08/25/2010	18:57
Arrival	08/25/2010	19:09
Controlled	08/25/2010	19:47
Last Unit Cleared	08/25/2010	21:19

E2 Shifts & Alarms (Local Option)

Shift or platoon: | Alarms: | District: 161

E3 Special Studies (Local Option)

Special Study ID#: | Special Study Value:

F Actions Taken

14 - Contain fire (wildland)
16 - Control fire (wildland)
86 - Investigate

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	9	23
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 300

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 300

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector:

H3 Hazardous Materials Release: N - None

I Mixed Use Property:

J Property Use: 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. [redacted] First Name | MI [redacted] Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | [redacted] Business name (if applicable) | [redacted] Area Code Phone Number

K2 Owner

Mr., Ms., Mrs. First Name | MI Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/25/2010	SCU	3544	0

B Alternate Location Specification

Latitude:
Longitude:

OR

Township:
Range:

Section:
Subsection:
Meridian:

C Area Type

Area type: 1 - Rural, including farms >5

D1 Wildland Fire Cause

Wildland fire cause: 2 - Equipment

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition: N - None

D3 Factors Contributing To Ignition

Factors contributing to ignition: 34 - Unspecified short-circuit arc

D4 Fire Suppression Factors

Fire suppression factors: NNN - None

E Heat Source

13 - Arcing

F Mobile Property Type

NN - None

G Equipment Involved in Ignition

000 - Other equipment invo

H Weather Information

NFDRS Weather Station ID:
Wind Direction: 7 - West

Weather Type: 10 - Clear, less than 1/10 cloud

Wind speed MPH: 20
Air Temperature: 86 F°
Relative Humidity: 32 %

Fuel Moisture: %
Fire Danger Rating: 3 - High fire danger

I1 Number of Buildings Ignited

Number of buildings that were ignited in Wildland fire:

I2 Number of Buildings Threatened

Number of buildings that were threatened by Wildland fire but were not involved:

I3 Total Acres Burned

3.0

I4 Primary Crops Burned

Crops Burned: annual grass

J Property Management

Ownership: 1 - Tax paying

	% Total Acres Burned
Undetermined	%
Tax paying	100 %
Non tax paying	%
City, town, village, local	%
County or parish	%
State or province	%
Federal (Federal Agency Code)	%
Foreign	%
Military	%
Other	%

K NFDRS Fuel Model at Origin

Fuel Model: 01 - A: Annual Grasses.

L1 Person Responsible For Fire

Person Responsible for Fire: 2 - Unknown person caused

L2 Gender of Person Involved

Gender of person involved:

L3 Age or Date of Birth

Age in Years:

OR

Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved:

M Right of Way

Horizontal distance from right of way: Feet

Type of right of way:

N Fire Behavior

Elevation: 1237 Feet

Relative position on slope: 4 - Ridge Top

Aspect: 8 - North

Flame Length: 3 Feet

Rate of spread: 20 Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/25/2010	SCU	3544	0

NFIRS Remarks

Remarks

Fin Type = FWLOn Wednesday, August 25, 2010 I was assigned as the Company Officer on Engine 1695 at the Castle Rock CAL FIRE Station, Station 26. At 1857 hours, the Emergency Command Center (ECC) for Cal Fire in Morgan Hill received a 911-telephone repo
rt of a vegetation fire on the south side of Highway 580 near Flynn Road. The ECC initiated a high vegetation response and I was dispatched on Engine 1695. Upon my arrival, I observed a vegetation fire, approximately 2 acres in size off Flynn Road, nort
heast of Gate 4 at a slow rate of spread. I immediately began fire suppression efforts with a mobile attack on the right flank of the fire. At approximately 1931 hours, the fire was contained to 3 acres. I then began the origin and cause investigation
of the fire. Burn indicators and fire origin had been destroyed by ALCO Engine 420 during suppression efforts. The general area of the fire origin was in the area of the windmills. I noticed that 2 of the windmills were not in operation. I then contac
ted the Flynn Incident Commander, (B1612) Battalion Chief Dave McLean and asked him to contact a representative from the windmill farm. At 2030 hours, Chief McLean spoke to (O1) Angie Dean of Greenridge. She said that a circuit had been tripped on windm
ill #'s 3002 and 965. I located both windmills and reexamined the area looking for evidence. Nothing was found in the area. I then photographed both windmill identification numbers (P1 and P2). Further examination of the specific origin area did not
reveal any other sources of ignition.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
	Charles Carroll	FAE		08/25/2010

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
	Charles Carroll			08/25/2010

Exhibit E.3: Two Incidents At Wind Power Facilities Not Attributable to Turbine Fire, 2008 – 2010

NFIRS - 1 Basic

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	05/19/2009	SCU	2094	0

B Location

Address Type: 5 - Adjacent to

Number/Milepost: 3014 Prefix: Street or Highway: Patterson Street Type: Pass Suffix:

Apt./Suite/Room: City: ALTAMONT State: CA Zip Code: 95377

Census Tract:

Cross street or directions, as applicable:

C Incident Type

143 - Grass fire

Incident Type

D Aid Given or Received

Their FDID: Their State: Their Incident Number:

2 - Automatic aid received

Type Aid Given or Recieved

E1 Dates & Times

Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	05/19/2009			19:39		
Arrival	05/19/2009			19:59		
Controlled	05/19/2009			20:15		
Last Unit Cleared	05/19/2009			20:47		

E2 Shifts & Alarms

Local Option

Shift or platoon: Alarms: District: 161

E3 Special Studies

Local Option

Special Study ID#: Special Study Value:

F Actions Taken

11 - Extinguish

Actions Taken

G1 Resources

IN Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	6
EMS	0	0
Other	3	3

IN Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 0

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 0

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

U - Unknown

H3 Hazardous Materials Release

I Mixed Use Property

J Property Use

610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

K2 Owner

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	05/19/2009	SCU	2094	0

B Alternate Location Specification

Latitude:
Longitude:
OR
Township:
Range:
Section:
Subsection:
Meridian:

C Area Type

Area type: 1 - Rural, including farms >5

D1 Wildland Fire Cause

Wildland fire cause: 0 - Other cause

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition: N - None

D3 Factors Contributing To Ignition

Factors contributing to ignition: 36 - Arc, spark from operating equipment

D4 Fire Suppression Factors

Fire suppression factors: 000 - Fire supression factor, other

E Heat Source

10 - Heat from powered equ

F Mobile Property Type

NN - None

G Equipment Involved in Ignition

200 - Electrical distribut

H Weather Information

NFDRS Weather Station ID:
Wind Direction: 3 - East
Weather Type: 10 - Clear, less than 1/10 cloud
Wind speed MPH: 35
Air Temperature: 63 F°
Relative Humidity: 20 %
Fuel Moisture: %
Fire Danger Rating: 3 - High fire danger

I1 Number of Buildings Ignited

0
Number of buildings that were ignited in Wildland fire

I2 Number of Buildings Threatened

0
Number of buildings that were threatened by Wildland fire but were not involved

I3 Total Acres Burned

1.0

I4 Primary Crops Burned

Crops Burned

J Property Management

Ownership: 1 - Tax paying

	% Total Acres Burned
Undetermined	%
Tax paying	100 %
Non tax paying	%
City, town, village, local	%
County or parish	%
State or province	%
Federal (Federal Agency Code)	%
Foreign	%
Military	%
Other	%

K NFDRS Fuel Model at Origin

Fuel Model: 01 - A: Annual Grasses.

L1 Person Responsible For Fire

Person Responsible for Fire: 3 - Fire not caused by pe

L2 Gender of Person Involved

Gender of person involved:

L3 Age or Date of Birth

Age in Years:
OR
Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved:

M Right of Way

Horizontal distance from right of way: 99 Feet
Type of right of way: 983 - Pipeline, power line

N Fire Behavior

Elevation: 750 Feet
Relative position on slope: 3 - Upper Slope
Aspect:
Flame Length: 2 Feet
Rate of spread: 2 Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	05/19/2009	SCU	2094	0

NFIRS Remarks

Remarks

Fin Type = FWL Engine 1664 responded to a reported vegetation fire off of Patterson Pass road. The fire was held be roads and disk line at about an acer of grass, no damage, the fire was next several windmills.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
1617	Craig Collins	FAE	Sunol	05/19/2009

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
1617	Craig Collins	FAE	Sunol	05/19/2009

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	07/26/2009	20	0913160	0

NFIRS - 1 Basic

B Location

Address Type	Number/Milepost	Prefix	Street or Highway	Street Type	Suffix
1 - Street addres	10619		ALTAMONT PASS	Road	

Apt./Suite/Room	City	State	Zip Code
	LIVERMORE	CA	94550

Census Tract

Cross street or directions, as applicable

C Incident Type

143 - Grass fire

Incident Type

D Aid Given or Received

Their FDID | Their State | Their Incident Number

N - None

Type Aid Given or Recieved

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	07/26/2009			16:20:30		
Arrival	07/26/2009			16:22:30		
Controlled	07/26/2009			16:25		
Last Unit Cleared	07/26/2009			16:57:51		

E2 Shifts & Alarms Local Option

Shift or platoon	Alarms	District
B	1	

E3 Special Studies Local Option

Special Study ID# | Special Study Value

F Actions Taken

13 - Establish fire lines (wildfire)

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	3	4
EMS	4	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 0

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 0

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector: U - Unknown

H3 Hazardous Materials Release:

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	07/26/2009	20	0913160	0

B Alternate Location Specification

Latitude:
Longitude:

OR

Township:
Range:

Section:
Subsection:
Meridian:

C Area Type

Area type: 4 - Urban -wildland interface

D1 Wildland Fire Cause

Wildland fire cause: 2 - Equipment

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition:

D3 Factors Contributing To Ignition

Factors contributing to ignition:

D4 Fire Suppression Factors

Fire suppression factors:

E Heat Source

F Mobile Property Type

G Equipment Involved in Ignition

H Weather Information

NFDRS Weather Station ID:
Wind Direction:
Weather Type:
Wind speed MPH:
Air Temperature: F°
Relative Humidity: %
Fuel Moisture: %
Fire Danger Rating:

I1 Number of Buildings Ignited

Number of buildings that were ignited in Wildland fire:

I2 Number of Buildings Threatened

Number of buildings that were threatened by Wildland fire but were not involved:

I3 Total Acres Burned

0.5

I4 Primary Crops Burned

Crops Burned:

J Property Management

Ownership:

	% Total Acres Burned
Undetermined	100 %
Tax paying	0 %
Non tax paying	0 %
City, town, village, local	0 %
County or parish	0 %
State or province	0 %
Federal (Federal Agency Code:)	0 %
Foreign	0 %
Military	0 %
Other	0 %

K NFDRS Fuel Model at Origin

Fuel Model:

L1 Person Responsible For Fire

Person Responsible for Fire:

L2 Gender of Person Involved

Gender of person involved:

L3 Age or Date of Birth

Age in Years: 0.0

OR

Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved:

M Right of Way

0 Feet
Horizontal distance from right of way

NNN - None
Type of right of way

N Fire Behavior

Elevation: Feet

Relative position on slope:

Aspect:

Flame Length: Feet

Rate of spread: Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	07/26/2009	20	0913160	0

NFIRS Remarks

Remarks

TITLE:CAD Narrative [CRLF]20090047389 E Type: VEG VEGETATION RESPONSE
Sub Type:
Disp:[CRLF]COMMENTS:[CRLF]MAY BE UNDER CONTROL PER RP STILL ON THE PHONEON THE RIDGE FROM HIS ADDRESSCONTAINED 10 FEET DIAMETERGRASS - CONTAINED NOWCALLING LIFE COMADV PFDPFD ADVD GREENVILLE GATEON DELAY W/ LPPER B 3 ONS BEING WAVED DOWNE 410 JUST PAST OLD ALTMONT GARAGE ON THE RIGHTE 410 ADV ON A GRAVEL ROAD RP IS LEADING THE CREW INBAD RADIO IN THE AREA CANT HEAR CREWSPOSS MARKING THE GATEPER B 3 ONS 30 BY 30 FT CONTAINED XCLE BAL STA 8 STA 20 TO HANDLECALLING CDFLIFE COM ADV TO XCELFIRE IS OUT BO3 IS AOSPER B 3 FIRE OUT MOP UP COMCPLET[CRLF][CRLF]TITLE:E420 [CRLF]At 1620 hours on Sunday July 26, 2009 we were dispatched to a grass fire. Seven units were assigned to this incident. Four personnel responded. We arrived on scene at 1622 hours and cleared at 1657 hours. The incident occurred at 10619 ALTAMONT PASS Rd, LIVERMORE. The local station is 20. The general description of this property is electric generating plant. The location is described as urban/wildland interface area. The primary task(s) performed at the scene by responding personnel was the establishment of fire lines. No mutual/automatic aid was given or received.[CRLF][CRLF]The cause of ignition was from equipment.[CRLF][CRLF]Alarm number 0913160 has been assigned to this incident.[CRLF]TITLE:Jones [CRLF]Sta. 20 & 8 units arrived on scene and were escorted by windmill employees to the site. Approx. 1/4 acre of grass had been burned. But due to the fire backing into the wind and the fact that the fore was contained on all sides, the fire had burned itself out by FD arrival. Sta. 8 & 20 units remained on scene to overhaul the area. All other units were canceled. The fire started due to employees re-energizing the windmills due to a power outage. A panel shorted starting the fire.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
388	GARY JONES	C	1	07/26/2009

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
388	GARY JONES	C	1	07/26/2009

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01008	CA	07/26/2009	20	0913160	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)		Dates and Times (Month Day Year Hours/Mins)	Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken	
1	ID E18	Dispatch 07/26/2009 16:25	X	3		93	
	Type 11	Arrival			1 - Suppress		
		Clear 07/26/2009 16:36					
2	ID E418	Dispatch 07/26/2009 16:20	X	0		93	
	Type 16	Arrival 07/26/2009 16:22			1 - Suppress		
		Clear 07/26/2009 16:36					
3	ID E420	Dispatch 07/26/2009 16:27	X	0		13	
	Type 16	Arrival 07/26/2009 16:33			2 - EMS		
		Clear 07/26/2009 16:57					
4	ID E308	Dispatch 07/26/2009 16:20	X	0		13	
	Type 11	Arrival 07/26/2009 16:35			2 - EMS		
		Clear 07/26/2009 16:57					
5	ID E408	Dispatch 07/26/2009 16:20	X	0		13	
	Type 16	Arrival 07/26/2009 16:35			2 - EMS		
		Clear 07/26/2009 16:57					
6	ID E320	Dispatch 07/26/2009 16:20	X	0		13	
	Type 11	Arrival 07/26/2009 16:37			2 - EMS		
		Clear 07/26/2009 16:57					
7	ID B03	Dispatch 07/26/2009 16:20	X	1		81	
	Type 92	Arrival 07/26/2009 16:37			1 - Suppress		
		Clear 07/26/2009 16:57					
8	ID	Dispatch					
	Type	Arrival					
		Clear					
9	ID	Dispatch					
	Type	Arrival					
		Clear					
10	ID	Dispatch					
	Type	Arrival					
		Clear					
11	ID	Dispatch					
	Type	Arrival					
		Clear					
12	ID	Dispatch					
	Type	Arrival					
		Clear					
13	ID	Dispatch					
	Type	Arrival					
		Clear					

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	01008	CA	07/26/2009	20	0913160	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E18 Type 11	Dispatch 07/26/2009 16:25:34 Arrival Clear 07/26/2009 16:36:46	X	3 #	1 - Suppressi	93

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
199	SCHORD III, ROBERT	E	X				
228	SILVA, JEFF	C	X				
377	UNRUH, JEFFREY	FF	X				

2	ID E418 Type 16	Dispatch 07/26/2009 16:20:31 Arrival 07/26/2009 16:22:30 Clear 07/26/2009 16:36:58	X	0 #	1 - Suppressi	93

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID E420 Type 16	Dispatch 07/26/2009 16:27:05 Arrival 07/26/2009 16:33:57 Clear 07/26/2009 16:57:51	X	0 #	2 - EMS	13

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	01008	CA	07/26/2009	20	0913160	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E308 Type 11	Dispatch 07/26/2009 16:20:30 Arrival 07/26/2009 16:35:04 Clear 07/26/2009 16:57:51	Sent X	0 #	2 - EMS	13

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

2	ID E408 Type 16	Dispatch 07/26/2009 16:20:30 Arrival 07/26/2009 16:35:08 Clear 07/26/2009 16:57:51	Sent X	0 #	2 - EMS	13

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID E320 Type 11	Dispatch 07/26/2009 16:20:31 Arrival 07/26/2009 16:37:10 Clear 07/26/2009 16:57:51	Sent X	0 #	2 - EMS	13

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	01008	CA	07/26/2009	20	0913160	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID B03 Type 92	Dispatch 07/26/2009 16:20:31 Arrival 07/26/2009 16:37:13 Clear 07/26/2009 16:57:51	Sent X	1 #	1 - Suppressi	81

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
379	WATKINS, JAMES	BC	X				

2	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

Exhibit E.4: Incidents Wholly Unrelated to Wind Power Facilities

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002773	0

NFIRS - 1 Basic

B Location

Address Type: 2 - Intersection

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: North INDIAN CANYON Drive

Apt./Suite/Room | City | State | Zip Code: Palm Springs CA 92262

Census Tract: 570201

Cross street or directions, as applicable: INTERSTATE 10

C Incident Type

Incident Type: 622 - No incident found

D Aid Given or Received

Their FDID | Their State | Their Incident Number

Type Aid Given or Recieved: 2 - Automatic aid received

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	05/09/2008			17:29:12		
Arrival	05/09/2008			17:40		
Controlled	05/09/2008			17:40		
Last Unit Cleared	05/09/2008			17:47		

E2 Shifts & Alarms (Local Option)

Shift or platoon	Alarms	District
A	0	443

E3 Special Studies (Local Option)

Special Study ID# | Special Study Value

F Actions Taken

86 - Investigate

Actions Taken

G1 Resources

[Y] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	4	9
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 0

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $

Contents $

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

I Mixed Use Property

J Property Use: 961 - Highway or divided highway

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002773	0

B Alternate Location Specification

Latitude: 0.0
Longitude: 0.0

OR

Township:
Range:
Section:
Subsection:
Meridian:

C Area Type

Area type: 3 - Rural/urban or suburban

D1 Wildland Fire Cause

Wildland fire cause: U - Undetermined

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition:

D3 Factors Contributing To Ignition

Factors contributing to ignition:

D4 Fire Suppression Factors

Fire suppression factors: NNN - None

E Heat Source

UU - Undetermined

F Mobile Property Type

G Equipment Involved in Ignition

H Weather Information

NFDRS Weather Station ID:
Wind Direction:
Weather Type:
Wind speed MPH:
Air Temperature: F°
Relative Humidity: %
Fuel Moisture: %
Fire Danger Rating:

I1 Number of Buildings Ignited

0

Number of buildings that were ignited in Wildland fire

I2 Number of Buildings Threatened

0

Number of buildings that were threatened by Wildland fire but were not involved

I3 Total Acres Burned

0.1

I4 Primary Crops Burned

Crops Burned

J Property Management

Ownership:

	% Total Acres Burned
Undetermined	0 %
Tax paying	0 %
Non tax paying	0 %
City, town, village, local	0 %
County or parish	0 %
State or province	0 %
Federal (Federal Agency Code:)	0 %
Foreign	0 %
Military	0 %
Other	0 %

K NFDRS Fuel Model at Origin

Fuel Model:

L1 Person Responsible For Fire

Person Responsible for Fire:

L2 Gender of Person Involved

Gender of person involved:

L3 Age or Date of Birth

Age in Years:

OR

Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved:

M Right of Way

Horizontal distance from right of way: Feet

Type of right of way:

N Fire Behavior

Elevation: 0 Feet

Relative position on slope:

Aspect:

Flame Length: 0 Feet

Rate of spread: 0 Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002773	0

NFIRS Remarks

Remarks

E443 RESPONDED TO REPORT OF BRUSH FIRE... UTL CANCELLED BY E36 ---------- On 05/09/2008 at 17:29:12 dispatched To N INDIAN CANYON DR & INTERSTATE 10 /Palm Springs, CA 92262. The location is a Highway or divided highway. The incident was determined to be a(n) No Incident found on arrival at dispatch address. 17:40:00 arrived on scene. The following actions were performed on scene: Investigate FD personnel responded to the area of Indian Ave and I10. RE stated fire was on the WB I10 on ramp. E36 arrived on-scene and was UTL an incident. A second report by a caller put the fire in the same general area. E443 assisted /attempted to locate but found nothing. All units were cancelled and returned. Units responding were: Unit BC4420 responded. Unit E-443 responded. Unit MS-441 responded. Unit T-441 responded. Automatic aid CDF Riverside 17:47:00 all units back in service.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
09034	Michael Wills	CP		05/10/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
09034	Michael Wills	CP		05/10/2008

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33065	CA	05/09/2008	443	0002773	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)		Dates and Times (Month Day Year Hours/Mins)		Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken
1	ID BC442	Dispatch	05/09/2008 17:29	X	1		
		Arrival					
	Type 92	Clear	05/09/2008 17:39			1 - Suppress	
2	ID MS-44	Dispatch	05/09/2008 17:29	X	2		
		Arrival					
	Type 76	Clear	05/09/2008 17:39			1 - Suppress	
3	ID T-441	Dispatch	05/09/2008 17:29	X	3		
		Arrival					
	Type 13	Clear	05/09/2008 17:39			1 - Suppress	
4	ID E-443	Dispatch	05/09/2008 17:29	X	3		
		Arrival	05/09/2008 17:40				
	Type 11	Clear	05/09/2008 17:47			1 - Suppress	
5	ID	Dispatch					
		Arrival					
	Type	Clear					
6	ID	Dispatch					
		Arrival					
	Type	Clear					
7	ID	Dispatch					
		Arrival					
	Type	Clear					
8	ID	Dispatch					
		Arrival					
	Type	Clear					
9	ID	Dispatch					
		Arrival					
	Type	Clear					
10	ID	Dispatch					
		Arrival					
	Type	Clear					
11	ID	Dispatch					
		Arrival					
	Type	Clear					
12	ID	Dispatch					
		Arrival					
	Type	Clear					
13	ID	Dispatch					
		Arrival					
	Type	Clear					

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	33065	CA	05/09/2008	443	0002773	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID BC442 Type 92	Dispatch 05/09/2008 17:29:12 Arrival Clear 05/09/2008 17:39:13	X	1 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
08700	Wang, Sang Pao	BC	X				

2	ID MS-44 Type 76	Dispatch 05/09/2008 17:29:12 Arrival Clear 05/09/2008 17:39:13	X	2 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
15520	Brown, Dustin	FFP	X				
15697	Josephson, Ashley	PR	X				

3	ID T-441 Type 13	Dispatch 05/09/2008 17:29:12 Arrival Clear 05/09/2008 17:39:13	X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
15390	Blaseck, Chad	ENG	X				
10372	Ferguson, Rande	CP	X				
15100	Line, Michael	ENG	X				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	33065	CA	05/09/2008	443	0002773	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E-443 Type 11	Dispatch 05/09/2008 17:29:12 Arrival 05/09/2008 17:40 Clear 05/09/2008 17:47	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
10925	Gunkel, Nathan	EPM	X				
15699	Kaimer, Jeff	PR	X				
09034	Wills, Michael	CP	X				

2	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

NFIRS - 1 Basic

B Location

Address Type: 2 - Intersection

Number/Milepost | Prefix | Street or Highway | Street Type | Suffix: North GILBERT Street

Apt./Suite/Room | City: HEMET | State: CA | Zip Code: 92543

Census Tract:

Cross street or directions, as applicable: FLORIDA

C Incident Type

Incident Type: 162 - Outside equipment

D Aid Given or Received

Their FDID | Their State | Their Incident Number:

Type Aid Given or Recieved: 2 - Automatic aid received

E1 Dates & Times (Midnight is 0000)

	Month Day Year	Hour Min Seconds
Alarm	01/23/2009	20:16:58
Arrival	01/23/2009	20:20:32
Controlled		
Last Unit Cleared	01/23/2009	23:56:06

E2 Shifts & Alarms (Local Option)

Shift or platoon: A | Alarms: | District: 526

E3 Special Studies (Local Option)

Special Study ID#: | Special Study Value:

F Actions Taken

81 - Incident command
41 - Identify, analyze hazardous materials
401 - Code Not Found

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	2	4
EMS	0	0
Other	1	3

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 100000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 100000

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector: U - Unknown

H3 Hazardous Materials Release: 0 - Special hazmat actions required

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name: [redacted] | MI | Last Name: [redacted] | Suffix

Number | Prefix | Street or Highway: [redacted] | Street Type: [redacted] | Suffix

Post Office Box | Apt./Suite/Room | City: [redacted]

State: [redacted] | Zip Code: [redacted] | Business name (if applicable) | Area Code: [redacted] | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

NFIRS - 1S
Supplemental

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: Bradly | MI: | Last Name: Payne | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: 9513230258 | Phone Number:

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

K1 Person/Entity Involved

Mr., Ms., Mrs.: | First Name: | MI: | Last Name: | Suffix:

Number: | Prefix: | Street or Highway: | Street Type: | Suffix:

Post Office Box: | Apt./Suite/Room: | City:

State: | Zip Code: | Business name (if applicable): | Area Code: | Phone Number:

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin

Y — Not Residential

B2 Number of buildings involved

B3 Acres burned (outside fires)

C On-Site Materials or Products

NNN - None

On-site materials

On-site materials use

D Ignition

D1 20 - Function area, other
Area of fire origin

D2 13 - Arcing
Heat source

D3 60 - Liquids, piping, filter
Item first ignited

D4 20 - Flammable or combustibl
Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

2 - Unintentional
Cause of ignition

E2 Factors Contributing To Ignition

34 - Unspecified short-circuit arc

Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

221 - Transformer, distribution
Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

11 - Electrical line vo
Equipment power source

F3 Equipment Portability

2 - Stationary
Equipment portability

G Fire Suppression Factors

Fire suppression factors

H1 Mobile Property Involved

Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

NFIRS Remarks

Remarks

TITLE:CAD Narrative [CRLF]V562/LIGHTS NOW FLASHING AT FL/STATE.,NUMEROUS RPTS OF SOME SORT OF EXPLOSION IN AREA.,SOME RP'S ADV'ING FLORIDA/GILRERT,MENLO/PALM,I/E1 DIVERTING TO SANDERSON/FLORIDA,I/B1 AT SENE TRANSFORMER OR SOME SUBSTATION EXPLOSION,CONTINUE THE ALARM ASSIGNMENT,FLOR[CRLF][CRLF]TITLE:E4 [CRLF]Upon arrival of the Florida Incident, E4 personell found a constant flow of transformer oil and rain water, draining down the gutter of the eastbound lane of Florida Ave and the northbound gutter of Gilbert. Both streets were closed by PD. E4 immediatly notified the BC and requested HM4, County HM and County Health. The source was determined to be from a 230 gallon transformer that had blown from a SCE sub station. Immediate efforts were made to dam and dike the flow, which had gone several city blocks and had made it to Florida and Palm. After the arrival of SCE and tests by County HM, it was determined that the oil was not the PCB based oil. SCE cooridinated the clean up of the oil from the streets and the ground contamination around the sub station property. On call city yard provided lane eastbound lane closure for the Double Barrel Cleanup Company.[CRLF]TITLE:E2 [CRLF]E2 brought the HAZMAT truck/trailer to the scene and the was released.[CRLF]TITLE:E3 [CRLF]E#3 personnel provided retention dikes for contaminated runoff from transformer fire. Afterward we were released to respond to an medical emergency.[CRLF]TITLE:Battalion One [CRLF]While enroute to a reported structure fire, a very large explosion was seen near the intersection of Florida Ave and Gilbert. When B1 arrived at seen it was determined that the fire was due to a ruptured, 350 gallon transformer which had exploded. Traffic was closed on Florida, at State all the way west to Palm. Gilbert was closed at Acacia as well as at Florida. County Haz Mat was requested along with County Environmental Health. The concern was that the oil from the transformer could have been toxic. At the close of the incident the oil released was determined to be minimally toxic and SOCAL Edison utilized their private clean up crews to mitigate the remaining hazards. A small fire was extinguished about one half hour after the explosion, due to inability to isolate the power. Environmental Health remained on scene after all fire units cleared. City crews were called out to cone off Florida Ave while the clean up crews worked.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
3794	John Muhr	BC	1	01/27/2009

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
3794	John Muhr	BC	1	01/27/2009

NFIRS - 7
HazMat

A						
33040	CA	01/23/2009 (MM DD YYYY)	1	0900762	0	1
FDID	State	Incident Date	Station	Incident Number	Exposure	Haz No

B HazMat ID

UN Number | DOT Hazard Classification | CAS Registration Number

Chemical name

C1 Container Type

Container Type

C2 Estimated Container Capacity

Capacity: by volume or weight

C3 Units: Capacity

Units: Capacity

D1 Estimated Amount Released

Amount released: by volume or weight

D2 Units: Released

Units: Released

E1 Physical State When Released

Physical state when released

E2 Released Into

Released into

F1 Released From:

Released from:

Story of release

F2 Population Density

Population density

G1 Area Affected

1 - Square — Unit of measure

500 — Area affected

G2 Area Evacuated

Unit of measure

Area evacuated

G3 People Evacuated

G4 Estimated Number of Buildings Evacuated

H HazMat Actions Taken

HazMat actions taken

I If fire or explosion is involved with a release, which occurred first?

Release/fire sequence

J Cause of Release

2 - Unintentional rel

Cause of release

K Factors Contributing to Release

55 - Other electrical failure

Factors contributing to release

L Factors Affecting Mitigation

Factors affecting mitigation

M Equipment Involved In Release

221 - Transformer, distributid

Equipment involved in release

Brand

Model

Serial Number

Year

N Mobile Property Involved in Release

Mobile property type

Mobile property make

Model | Year

License Plate Number | State

DOT Number/ ICC Number

O HazMat Disposition

7 - Released to private a

HazMat disposition

P HazMat Civilian Casualties

Deaths | Injuries

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

NFIRS - 11
Arson

B Agency Referred To

Street Address:
Their Case Number: 0
Agency Name:
City:
Their ORI:
Agency Phone Number:
State:
Zip Code:
Their Federal Identifier (FID):
Their FDID:

C Case Status

Case Status: 2 - Investigation closed

D Availability of Material First Ignited

Availability of Material First Ignited:

E Suspected Motivation Factors

Suspected Motivation Factors:

F Apparent Group Involvement

Apparent Group Involvement:

G1 Entry Method

Entry Method:

H Incendiary Devices

CONTAINER

Container:

IGNITION/DELAY DEVICE

Ignition/Delay Device:

G2 Extent of Fire Involvement on Arrival

Extent of Fire Involvement:

FUEL

Fuel:

I Other Investigative Information

Other Investigative information:

J Property Ownership

Property Owenership:

K Initial Observations

Initial Observations:

L Laboratory Used

Laboratory Used:

M1 Subject Number

Subject Number: 1

M3 Gender

Gender:

M6 Family Type

Family Type:

M8 Disposition of Person Under 18

Disposition of Person Under 18:

M2 Age or Date of Birth

Age (in years):

OR

Month Day Year:

M4 Race

Race:

M5 Ethnicity

Ethnicity:

M7 Motivation/Risk Factors

Motivation/Risk Factors:

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
33040	CA	01/23/2009	1	0900762	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)		Dates and Times (Month Day Year Hours/Mins)	Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken	
1	ID: E4 Type: 11	Dispatch: 01/23/2009 20:19 Arrival: 01/23/2009 20:20 Clear: 01/23/2009 23:56	X	3	1 - Suppress		
2	ID: B1 Type: 92	Dispatch: 01/23/2009 20:17 Arrival: 01/23/2009 20:20 Clear: 01/23/2009 23:43	X	1	1 - Suppress	81	
3	ID: E2 Type: 11	Dispatch: 01/23/2009 20:44 Arrival: 01/23/2009 20:53 Clear: 01/23/2009 21:30	X	3	0 - Other		
4	ID: Type:	Dispatch: Arrival: Clear:					
5	ID: Type:	Dispatch: Arrival: Clear:					
6	ID: Type:	Dispatch: Arrival: Clear:					
7	ID: Type:	Dispatch: Arrival: Clear:					
8	ID: Type:	Dispatch: Arrival: Clear:					
9	ID: Type:	Dispatch: Arrival: Clear:					
10	ID: Type:	Dispatch: Arrival: Clear:					
11	ID: Type:	Dispatch: Arrival: Clear:					
12	ID: Type:	Dispatch: Arrival: Clear:					
13	ID: Type:	Dispatch: Arrival: Clear:					

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	33040	CA	01/23/2009	1	0900762	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E4 Type 11	Dispatch 01/23/2009 20:19:03 Arrival 01/23/2009 20:20:32 Clear 01/23/2009 23:56:06	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
8141	Swain, David	ENG	X				
10171	Sampson, Ryan	FF	X				
8379	Parkin, David	ENG	X				

2	ID B1 Type 92	Dispatch 01/23/2009 20:17:05 Arrival 01/23/2009 20:20:42 Clear 01/23/2009 23:43:10	Sent X	1 #	1 - Suppressi	81

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
3794	Muhr, John	BC	X				

3	ID E2 Type 11	Dispatch 01/23/2009 20:44:02 Arrival 01/23/2009 20:53:03 Clear 01/23/2009 21:30:26	Sent X	3 #	0 - Other	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
8388	Lindberg, David	ENG	X				
10214	Durbin, Scott	FF	X				
6637	Barnes, William	CAPT	X				

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
24035	CA	01/16/2010	MMU	725	0

NFIRS - 1 Basic

B Location

Address Type: 1 - Street addres

Number/Milepost: 00000030 Prefix: West Street or Highway: SANDY MUSH Street Type: Road Suffix:

Apt./Suite/Room: City: EL NIDO State: CA Zip Code: 95317

Census Tract:

Cross street or directions, as applicable: 7000 BLK HWY 59 S, 8000 BLK FR

C Incident Type

Incident Type: 100 - Fire, other

D Aid Given or Received

Their FDID: Their State: Their Incident Number:

Type Aid Given or Recieved: N - None

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	01	16	2010	04	36	
Arrival	01	16	2010	04	49	
Controlled	01	16	2010	06	36	
Last Unit Cleared	01	16	2010	06	48	

E2 Shifts & Alarms Local Option

Shift or platoon: A Alarms: District: 18

E3 Special Studies Local Option

Special Study ID#: Special Study Value:

F Actions Taken

74 - Provide apparatus

Actions Taken

G1 Resources

IN Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	5	5
EMS	0	0
Other	0	3

IN Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 60000

Contents $ 60000

PRE-INCIDENT VALUE: Optional

Property $

Contents $

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

I Mixed Use Property

J Property Use 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

K2 Owner

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
24035	CA	01/16/2010	MMU	725	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin

Y — Not Residential

B2 Number of buildings involved

B3 0 — Acres burned (outside fires)

C On-Site Materials or Products

On-site materials: 962 - Recyclable materials

On-site materials use: 2 - Processing or manufacturing

D Ignition

D1 30 - Technical processing ar — Area of fire origin

D2 UU - Undetermined — Heat source

D3 UU - Undetermined — Item first ignited

D4 Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

3 - Failure of equipment or heat — Cause of ignition

E2 Factors Contributing To Ignition

NN - None — Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

NNN - None — Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

Equipment power source

F3 Equipment Portability

Equipment portability

G Fire Suppression Factors

NNN - None — Fire suppression factors

H1 Mobile Property Involved

N - None — Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
24035	CA	01/16/2010	MMU	725	0

NFIRS Remarks

Remarks

Fin Type = FSC

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
2865	DANNY RHOAN	FAE	STA 83	01/16/2010

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
2865	DANNY RHOAN	FAE	STA 83	01/16/2010

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	08/04/2008	K23	0824374	0

NFIRS - 1 Basic

B Location

Address Type	Number/Milepost	Prefix	Street or Highway	Street Type	Suffix
1 - Street addres	26255		33	Highway	

Apt./Suite/Room	City	State	Zip Code
	KERN COUNTY	CA	93224

Census Tract

Cross street or directions, as applicable

C Incident Type

162 - Outside equipment

Incident Type

D Aid Given or Received

Their FDID | Their State | Their Incident Number

N - None

Type Aid Given or Recieved

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	08/04/2008			13:02:01		
Arrival	08/04/2008			13:14:02		
Controlled						
Last Unit Cleared	08/04/2008			17:44:32		

E2 Shifts & Alarms Local Option

Shift or platoon	Alarms	District
C	1	

E3 Special Studies Local Option

Special Study ID# | Special Study Value

F Actions Taken

112 - Code Not Found

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	4	13
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property	$ 750000
Contents	$ 0

PRE-INCIDENT VALUE: Optional

Property	$ 750000
Contents	$ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector: U - Unknown

H3 Hazardous Materials Release:

I Mixed Use Property:

J Property Use: 615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	08/04/2008	K23	0824374	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin
Y — Not Residential

B2 — Number of buildings involved

B3 — Acres burned (outside fires)

C On-Site Materials or Products

NNN - None
On-site materials

On-site materials use

D Ignition

D1 63 - Switchgear area, transf
Area of fire origin

D2 10 - Heat from powered equip
Heat source

D3 60 - Liquids, piping, filter
Item first ignited

D4 20 - Flammable or combustibl
Type of material first ignited

Confined to object of origin

E1 Cause of Ignition

3 - Failure of equipment or heat
Cause of ignition

E2 Factors Contributing To Ignition

UU - Undetermined
Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

200 - Electrical distribution, p
Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

52 - Steam
Equipment power source

F3 Equipment Portability

2 - Stationary
Equipment portability

G Fire Suppression Factors

400 - Delays, other
Fire suppression factors

H1 Mobile Property Involved

N - None
Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	08/04/2008	K23	0824374	0

NFIRS Remarks

Remarks

TITLE:CO21 [CRLF]STAGED AND RELEASED[CRLF]TITLE:CAD Narrative [CRLF]08052074 E Type: UNK UNKNOWN Type Fire Sub Type:
Disp:[CRLF]COMMENTS:[CRLF]~KEYMAP: 137911 HANGUP/ REPORTED FIRE TO KCSOUNK TYPE OF FIRELINE BUSY TO BUSINESSACCESS OFF SHALE RDNOTHING SHOWING ALOMOST AT SCNDUST DEVIL POSSIBLYSEVERAL DUST DEVILDUPLICATE EVENT:LOCATION = 26255 33 HWY KC, CROSS STREET 1 = SHALE RD RANDALLRD,CROSS STREET 2 = RANDALL RD, CALLER NAME = SUNRISE POWER CO, CALLER PHNUMBER = (661) 768-4852, CALL SOURCE = ANI/ALIEND OF DUPLICATE EVENT DATACO23 WITH RP NOWFIRE IN SWITCH YARD.....12857 SUNRISE POWER RDCO23 TRANSFORMER ON FIREKEEP EVERTHING COMINGKB2 HAVE OTHERS STAGE AT ENTRANCERP IS GETTING POWER SHUT OFFFIRE IS STAYING WITH ONE TRANSFORMER.TRK STAGED @ 1319E/P21 STAGED @ 1319..IC TO CO24 LINES ARE STILL ENBERGIZED IT WILL BE A WHILE WATCH FOR TRAFFIC ANDSUCH.IC RELEASE 21 EQUIPMENT.ICREP FROM LA PALOMA 97 - WORKING ON SHUTTING DOWN FIREFACILITY DIRECTOR 97KB2 - ALL EQUIP COMPLETE[CRLF][CRLF]TITLE:Co23 [CRLF]Received a report of an unknown type fire. On arrival, Co 23 met with the facility manager of the Sunrise Power Company who pointed out that a fire was in the remaining tower of what was a "Position Transfer Switch" located in the switching yard. The insulator had exploded leaving the Dielectric Oil inside burning. Approximately 85 gallons of the burning oil was contained to the tower in a 4' x 4' holding container. Fire personnel stood by while a plan was formulated and the area locked and tagged out for safe entry for everyone. The facility staff attempted to extinguish the fire by use of dry chemical extinguishers. After several attempts were made, the fire remained burning. Fire personnel utilized a 3% foam to extinguish the fire and then cooled the sides of the container with water.[CRLF][CRLF]Note: The actual address of the incident is 12857 Sunrise Power Road. ECC advised that the CAD system did not have that address in it and the reporting location remained the location on the report.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
K0391	James Glaser	4579 C	1	08/07/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
K0989	Roy Heimiller	4590	1	08/07/2008

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
15010	CA	08/04/2008	K23	0824374	0

NFIRS - 9
Apparatus or Resources

B Apparatus or Resource (Use codes listed below)		Dates and Times (Month Day Year Hours/Mins)		Sent (X)	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken
1	ID E22	Dispatch	08/04/2008 13:03	X	2		
		Arrival					
	Type 11	Clear	08/04/2008 13:05			1 - Suppress	
2	ID E23	Dispatch	08/04/2008 13:03	X	2		
		Arrival	08/04/2008 13:14				
	Type 11	Clear	08/04/2008 17:44			1 - Suppress	
3	ID KB2	Dispatch	08/04/2008 13:03	X	1		
		Arrival	08/04/2008 13:17				
	Type 92	Clear	08/04/2008 17:44			1 - Suppress	
4	ID E24	Dispatch	08/04/2008 13:04	X	2		
		Arrival	08/04/2008 13:17				
	Type 11	Clear	08/04/2008 17:44			1 - Suppress	
5	ID TK21	Dispatch	08/04/2008 13:03	X	3		
		Arrival	08/04/2008 13:18				
	Type 12	Clear	08/04/2008 13:42			1 - Suppress	
6	ID E21	Dispatch	08/04/2008 13:03	X	3		
		Arrival	08/04/2008 13:19				
	Type 11	Clear	08/04/2008 13:42			1 - Suppress	
7	ID P21	Dispatch	08/04/2008 13:07	X	0		
		Arrival	08/04/2008 13:19				
	Type 16	Clear	08/04/2008 13:42			1 - Suppress	
8	ID	Dispatch					
		Arrival					
	Type	Clear					
9	ID	Dispatch					
		Arrival					
	Type	Clear					
10	ID	Dispatch					
		Arrival					
	Type	Clear					
11	ID	Dispatch					
		Arrival					
	Type	Clear					
12	ID	Dispatch					
		Arrival					
	Type	Clear					
13	ID	Dispatch					
		Arrival					
	Type	Clear					

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	08/04/2008	K23	0824374	0	

B Apparatus or Resource		Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E22	Dispatch 08/04/2008 13:03:03	Sent X	2 #	1 - Suppressi	
	Type 11	Arrival				
		Clear 08/04/2008 13:05:01				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0565	Vradenburg, Robert	4594 C	X				
K0854	Murillo, Richard	4639	X				

2	ID E23	Dispatch 08/04/2008 13:03:03	Sent X	2 #	1 - Suppressi	
	Type 11	Arrival 08/04/2008 13:14:02				
		Clear 08/04/2008 17:44:32				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0884	Moore, Ryan	4595	X				
K0989	Heimiller, Roy	4590	X				

3	ID KB2	Dispatch 08/04/2008 13:03:03	Sent X	1 #	1 - Suppressi	
	Type 92	Arrival 08/04/2008 13:17:01				
		Clear 08/04/2008 17:44:29				

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0391	Glaser, James	4579 C	X				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	08/04/2008	K23	0824374	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID E24 Type 11	Dispatch 08/04/2008 13:04:54 Arrival 08/04/2008 13:17:04 Clear 08/04/2008 17:44:30	Sent X	2 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0457	Fogerlund, Ray	4595	X				
K0972	Whisnand, Seth	4639	X				

2	ID TK21 Type 12	Dispatch 08/04/2008 13:03:04 Arrival 08/04/2008 13:18:53 Clear 08/04/2008 13:42:32	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0573	Printup, Donald	4590	X				
K0811	Calhoun, James	4594 C	X				
K0833	Allegranza, Dustin	4639	X				

3	ID E21 Type 11	Dispatch 08/04/2008 13:03:03 Arrival 08/04/2008 13:19:22 Clear 08/04/2008 13:42:31	Sent X	3 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken
K0437	Finocchiaro, Guy	4589 C	X				
K0190	Whitley, Theodore	4594 C	X				
K1006	Tisinger, Ryan	4639	X				

A	FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure	NFIRS - 10 Personnel
	15010	CA	08/04/2008	K23	0824374	0	

B	Apparatus or Resource	Dates and Times (Month Day Year Hours/Mins)	Sent [X]	Number of People	Use (Check ONE box for each apparatus to indicate its main use at the incident.)	Actions Taken (List up to 4 actions for each apparatus and each personnel.)
1	ID P21 Type 16	Dispatch 08/04/2008 13:07:29 Arrival 08/04/2008 13:19:22 Clear 08/04/2008 13:42:32	Sent X	0 #	1 - Suppressi	

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

2	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

3	ID Type	Dispatch Arrival Clear	Sent	#		

Personnel ID	Name	Rank or Grade	Attend [X]	Action Taken	Action Taken	Action Taken	Action Taken

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	09/28/2009	SCU	4092	0

NFIRS - 1 Basic

B Location

Address Type: 2 - Intersection

Number/Milepost | Prefix | Street or Highway: Altamont | Street Type: Road | Suffix:

Apt./Suite/Room: | City: ALTAMONT | State: CA | Zip Code: 94550

Census Tract:

Cross street or directions, as applicable: Grant Line Rd.

C Incident Type

Incident Type: 143 - Grass fire

D Aid Given or Received

Their FDID: | Their State: | Their Incident Number:

Type Aid Given or Recieved: 2 - Automatic aid received

E1 Dates & Times (Midnight is 0000)

	Month	Day	Year	Hour	Min	Seconds
Alarm	09	28	2009	21	32	
Arrival	09	28	2009	21	50	
Controlled	09	29	2009	01	49	
Last Unit Cleared	09	29	2009	01	49	

E2 Shifts & Alarms (Local Option)

Shift or platoon: | Alarms: | District: 161

E3 Special Studies (Local Option)

Special Study ID#: | Special Study Value:

F Actions Taken

14 - Contain fire (wildland)

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	10	27
EMS	0	0
Other	0	0

[N] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 400

Contents $ 400

PRE-INCIDENT VALUE: Optional

Property $

Contents $

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector:

H3 Hazardous Materials Release: N - None

I Mixed Use Property: 65 - Farm use

J Property Use: 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	09/28/2009	SCU	4092	0

B Alternate Location Specification

Latitude:
Longitude:

OR

Township:
Range:

Section:
Subsection:
Meridian:

C Area Type

Area type: 4 - Urban -wildland interface

D1 Wildland Fire Cause

Wildland fire cause: 2 - Equipment

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition: N - None

D3 Factors Contributing To Ignition

Factors contributing to ignition: 25 - Worn out

D4 Fire Suppression Factors

Fire suppression factors: 732 - Wind, including hurricanes or tornadoes

E Heat Source

97 - Multiple heat sources

F Mobile Property Type

G Equipment Involved in Ignition

H Weather Information

NFDRS Weather Station ID:
Wind Direction: 7 - West

Weather Type: 11 - Scattered clouds, 1/10 to 5/

Wind speed MPH: 20
Air Temperature: 65 F°
Relative Humidity: 51 %

Fuel Moisture: %
Fire Danger Rating: 3 - High fire danger

I1 Number of Buildings Ignited

0

Number of buildings that were ignited in Wildland fire

I2 Number of Buildings Threatened

3

Number of buildings that were threatened by Wildland fire but were not involved

I3 Total Acres Burned

4.0

I4 Primary Crops Burned

Crops Burned

J Property Management

Ownership:

	% Total Acres Burned
Undetermined	%
Tax paying	%
Non tax paying	%
City, town, village, local	%
County or parish	%
State or province	%
Federal (Federal Agency Code)	%
Foreign	%
Military	%
Other	%

K NFDRS Fuel Model at Origin

Fuel Model:

L1 Person Responsible For Fire

Person Responsible for Fire:

L2 Gender of Person Involved

Gender of person involved:

L3 Age or Date of Birth

Age in Years:

OR

Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved:

M Right of Way

Horizontal distance from right of way: Feet

Type of right of way:

N Fire Behavior

Elevation: 344 Feet

Relative position on slope: 1 - Lower Slope

Aspect: 2 - East

Flame Length: 2 Feet

Rate of spread: Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	09/28/2009	SCU	4092	0

NFIRS Remarks

Remarks

Fin Type = FWL

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
	Deanna Hall	Fire Capta		09/28/2009

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
	Deanna Hall	Fire Capta		09/28/2009

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/27/2008	SCU	4203	0

NFIRS - 1 Basic

B Location

Address Type: 4 - Rear of

Number/Milepost: 00003200 Prefix: Street or Highway: 2800 DYER Street Type: Road Suffix:

Apt./Suite/Room: GATE #7 City: ALTAMONT State: CA Zip Code: 94551

Census Tract:

Cross street or directions, as applicable: 4WD ROAD, 4WD ROAD

C Incident Type

143 - Grass fire

Incident Type

D Aid Given or Received

Their FDID: Their State: Their Incident Number:

2 - Automatic aid received

Type Aid Given or Recieved

E1 Dates & Times Midnight is 0000

	Month	Day	Year	Hour	Min	Seconds
Alarm	08	27	2008	18	18	
Arrival	08	27	2008	18	37	
Controlled	08	27	2008	18	58	
Last Unit Cleared	08	27	2008	19	19	

E2 Shifts & Alarms Local Option

Shift or platoon: Alarms: District: 161

E3 Special Studies Local Option

Special Study ID#: Special Study Value:

F Actions Taken

11 - Extinguish

Actions Taken

G1 Resources

IN Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	3	12
EMS	0	0
Other	0	0

IN Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 0

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $ 0

Contents $ 0

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

I Mixed Use Property 65 - Farm use

J Property Use 610 - Energy production plant, other

K1 Person/Entity Involved

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

K2 Owner

Mr., Ms., Mrs. First Name MI Last Name Suffix

Number Prefix Street or Highway Street Type Suffix

Post Office Box Apt./Suite/Room City

State Zip Code Business name (if applicable) Area Code Phone Number

NFIRS - 8 Wildland Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/27/2008	SCU	4203	0

B Alternate Location Specification

Latitude:
Longitude:

OR

Township:
Range:

Section:
Subsection:
Meridian:

C Area Type

Area type: 1 - Rural, including farms >5

D1 Wildland Fire Cause

Wildland fire cause: 2 - Equipment

D2 Human Factors Contributing To Ignition

Human factors contributing to ignition: N - None

D3 Factors Contributing To Ignition

Factors contributing to ignition: 20 - Mechanical failure, malfunction, other

D4 Fire Suppression Factors

Fire suppression factors: 711 - Drought or low fuel moisture

E Heat Source

UU - Undetermined

F Mobile Property Type

G Equipment Involved in Ignition

224 - Generator

H Weather Information

NFDRS Weather Station ID:
Wind Direction: 6 - Southwest

Weather Type: 10 - Clear, less than 1/10 cloud

Wind speed MPH: 15
Air Temperature: 92 F°
Relative Humidity: 21 %

Fuel Moisture: %
Fire Danger Rating: 5 - Extreme fire danger

I1 Number of Buildings Ignited

0

Number of buildings that were ignited in Wildland fire

I2 Number of Buildings Threatened

0

Number of buildings that were threatened by Wildland fire but were not involved

I3 Total Acres Burned

0.1

I4 Primary Crops Burned

Crops Burned

J Property Management

Ownership: 1 - Tax paying

	% Total Acres Burned
Undetermined	%
Tax paying	100 %
Non tax paying	%
City, town, village, local	%
County or parish	%
State or province	%
Federal (Federal Agency Code)	%
Foreign	%
Military	%
Other	%

K NFDRS Fuel Model at Origin

Fuel Model: 01 - A: Annual Grasses.

L1 Person Responsible For Fire

Person Responsible for Fire

L2 Gender of Person Involved

Gender of person involved

L3 Age or Date of Birth

Age in Years:

OR

Date of Birth: Month Day Year

L4 Activity of Person

Activity of Person Involved

M Right of Way

Horizontal distance from right of way: Feet

Type of right of way

N Fire Behavior

Elevation: 925 Feet

Relative position on slope: 4 - Ridge Top

Aspect: 2 - East

Flame Length: 1 Feet

Rate of spread: 1 Chains per Hour

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
01555	CA	08/27/2008	SCU	4203	0

NFIRS Remarks

Remarks

Fin Type = FWL E-1664 WAS DISPATCHED TO A VEGETATION FIRE OFF DYER RD. PRIOR TO ARE ARRIVAL TWO ALCO UNITS HAD EXTINGUSHED THE LARGE SPOT THAT WAS HELD BY A DISK LINE.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
1617	CRAIG COLLINS	FAE	SUNOL	08/27/2008

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
1617	CRAIG COLLINS	FAE	SUNOL	08/27/2008

NFIRS - 1 Basic

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
45086	CA	05/15/2010	SHU	3188	0

B Location

Address Type	Number/Milepost	Prefix	Street or Highway	Street Type	Suffix
1 - Street addres	41402		HWY 299	Highway	East

Apt./Suite/Room	City	State	Zip Code
	CASSEL	CA	96018

Census Tract

Cross street or directions, as applicable

C Incident Type

100 - Fire, other

Incident Type

D Aid Given or Received

Their FDID | Their State | Their Incident Number

2 - Automatic aid received

Type Aid Given or Recieved

E1 Dates & Times

Midnight is 0000

	Month Day Year	Hour Min Seconds
Alarm	05/15/2010	00:37
Arrival	05/15/2010	00:51
Controlled		
Last Unit Cleared	05/15/2010	02:14

E2 Shifts & Alarms

Local Option

Shift or platoon	Alarms	District
		1

E3 Special Studies

Local Option

Special Study ID# | Special Study Value

F Actions Taken

00 - Action taken, other

Actions Taken

G1 Resources

[N] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	5	10
EMS	0	0
Other	2	2

[Y] Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

Property $ 1000000

Contents $ 0

PRE-INCIDENT VALUE: Optional

Property $

Contents $

H1 Casualties

	Deaths	Injuries
Fire Service	0	0
Civilian	0	0

H2 Detector

H3 Hazardous Materials Release

N - None

I Mixed Use Property

J Property Use

615 - Electric generating plant

K1 Person/Entity Involved

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Business name (if applicable) | Area Code | Phone Number

K2 Owner

Mr., Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code | Pacific Gas & Eletric | Area Code | Phone Number

Business name (if applicable)

NFIRS - 2
Fire

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
45086	CA	05/15/2010	SHU	3188	0

B Property Details

B1 0 — Estimated number of residential living units in building of origin

Y — Not Residential

B2 — Number of buildings involved

B3 0 — Acres burned (outside fires)

C On-Site Materials or Products

On-site materials: NNN - None

On-site materials use: N - None

D Ignition

D1 63 - Switchgear area, transf — Area of fire origin

D2 00 - Heat source: other — Heat source

D3 UU - Undetermined — Item first ignited

D4 — Type of material first ignited

1 - Fire Spread was — Confined to object of origin

E1 Cause of Ignition

3 - Failure of equipment or heat — Cause of ignition

E2 Factors Contributing To Ignition

NN - None — Factors contributing to ignition

E3 Human Factors Contributing To Ignition

N - None

Estimated age of person involved

Gender of person involved

F1 Equipment Involved In Ignition

221 - Transformer, distribution — Equipment Involved

Brand

Model

Serial #

Year

F2 Equipment Power

11 - Electrical line vo — Equipment power source

F3 Equipment Portability

2 - Stationary — Equipment portability

G Fire Suppression Factors

NNN - None — Fire suppression factors

H1 Mobile Property Involved

N - None — Mobile property involved

H2 Mobile Property Type & Make

Mobile property type

Mobile property make

Mobile property model

Year

License plate number

State

VIN number

Local Use

A

FDID	State	Incident Date (MM DD YYYY)	Station	Incident Number	Exposure
45086	CA	05/15/2010	SHU	3188	0

NFIRS Remarks

Remarks

Fin Type = FSC Transformer caught on fire at PG&E Transfer station, Pit One Powerhouse. Transformer destroyed at 1 million dollar damage. Person making report did not respond to fire.

M Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month Day Year
	Training 1	Volunteer	Fall River	05/15/2010

Member making report ID	Signature	Position or rank	Assignment	Month Day Year
	Roy Billings	Captain	Station 22	05/15/2010

Hunt Research Corporation
Founded 1979
JAMES W. HUNT, President

March 3, 2011

Dr. Fisher (CPUC) and Mr. Thomsen (BLM)
c/o Dudek
605 Third Street
Encinitas, California 92024

Re: Comments regarding the ECO Substation, Tule Wind, and ESJ Gen-Tie Project Draft EIR/EIS, Section D.15, Fire and Fuels Management

Dear Dr. Fisher (CPUC) and Mr. Thomsen (BLM):

Thank you for the opportunity to provide the following comments on the Draft Environmental Impact Report/Environmental Impact Statement for the East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects (Draft EIR/EIS).

Following are my comments, observations, and suggestions regarding certain information in Section D.15, Fire and Fuels Management of the Draft EIR/EIS. The comments are provided with the objective of offering possible revisions to help the Draft EIR/EIS to present an objective, real-world review of the net fire risks associated with the Tule Wind project, after considering the extensive project design features incorporated into the project's planning and design, proposed mitigations and the recent improvements in public fire protection. Please respond to these comments as part of the Final EIR/EIS. My comments are limited to the Tule Wind Farm.

I. INTRODUCTION AND STATEMENT OF QUALIFICATIONS

My name is James W. Hunt, and I am the principal of Hunt Research Corporation. I have 48 years of experience in fire protection as a firefighter and Battalion Chief/Incident Commander with major fire departments, an adjunct faculty member/ instructor in various subjects including firefighting, fire service management, emergency management, and Incident Command System (ICS) for the FEMA National Fire Academy and State Fire Academy, the University of California, Santa Barbara, and California State University, Long Beach. I have also served as a Fire Department Training officer and have 32 years experience as a fire protection consultant. My resume is attached to this letter.

POST OFFICE BOX 291 • SOLVANG, CALIFORNIA 93464 • PHONE: (805) 688-4625 • 1-800-737-2826 • FAX: (805) 688-0275
E MAIL: jhunt2@gte.net WEBSITE: www.huntresearch.com

Iberdrola Renewables (IRI) requested that I review the Draft EIR/EIS, Section D.15, Fires and Fuels Management, insofar as it relates to the Tule Wind Farm, and provide any comments as a third-party reviewer.

II. THE DRAFT EIR/EIS OVERSTATES REGIONAL ASSETS AT RISK

Section D.15.1.2, Project-Specific Environmental Setting/Affected Environment, includes a discussion on page D.15-24 of Regional Assets at Risk. This section discusses a potential wildland fire spreading to all communities and structures to the west of the project, in east and southeast San Diego County. It also states that over 2,000 structures could be at risk. (See also page D.15-49).

The most intensive area for downwind spotting from a fire is about ½ to 1 mile downwind of the fire. The general vicinity of the project is characterized as a very rural setting and, based on my observations, is composed primarily of ranches on large rural-use properties.

Therefore, when making decisions as the Incident Commander on such a fire (a Fire Service chief officer), fire units would be assigned to the main fire and to patrol downwind in the area of potential spotting; primarily within one half (½) to one (1) mile downwind. Spotting is common at wind driven fires in similar vegetation.

Wildland Fire Risk

Property owners, including homeowners, are responsible to maintain their properties' fire safety and to provide 100 feet of fuel modification, whether or not this project is built. Fire Departments can, and do conduct regular fire safety inspections of private properties and conduct public education programs for property owners. The 2,000 structures at risk that is noted in the Draft EIR/EIS appears high to me because it does not take into account the recent improvements in firefighting capacity and capabilities within San Diego County.

Any wildland fire or any other type of fire, regardless of where it starts, can obviously continue to burn if not controlled. This is true in any county and for any property or development. Any development, including residential developments, presents ignition sources, which can start a fire. The purpose of fire protection planning is to minimize ignition sources and define mitigation that addresses fire ignition potential and ways to control and respond to a fire if it occurs. The fire does not burn in a vacuum devoid of any fuel modification or attack by fire forces. The vast number of wildand fires are controlled by initial attack forces.

Wildland Fire Response

In San Diego County, CALFIRE states that it contains 90 to 95% of all wildland fires to 10 acres or less. (Hunt Research Corporation, personal communication with Chief Nick Schuler, CALFIRE, January 10, 2011). This is their stated goal for initial attack in State Responsibility Areas (SRAs) and would apply to the Tule Wind project. The Draft

EIR/EIS states that 95% of all wildfire ignitions are controlled during initial attack. (D.15-49). This impressive data mirrors the statewide CALFIRE data and the experience of the San Diego Rural Fire Protection District (SDRFPD). A 95% success rate is almost a perfect record! The NFPA standard on emergency response uses a quality factor of 90% when recommending response standards as it recognizes that a 100% standard is not practical.

National data demonstrates that the San Diego County and California record of fire containment compares to national containment rates. The National Institute of Science and Technology (NIST) provided the following national data:

- From 1995 to 2005, 97% to 99% of wildland fires were suppressed on initial attack. Initial attack fires are considered to be less than 10 acres.
- About 3% of fires escape and become larger fires. This information was provided by NIST from an article titled, "*Federal Forest Fire Policy in the United States*" (published in Ecological Applications, 2005) by Scott Stephens and Lawrence Ruth, University of California, Berkeley. The article also stated that the size of the majority of these fires was <0.1 ha (hectare) which equals 0.24 acres.

The National Fire Protection Association (NFPA) study, "Brush, Grass and Forest Fires," August 2010, states the following:

- 77% of wildland fires contained to 1 acre or less.
- Only 4% were more than 10 acres
- Most were intentionally set (arson)
- 4% were caused by electrical power/utility lines
- 4% caused by lightning.
- Local Fire Department responses to wildland fires for pipelines, power lines and other utility Rights of Way (ROWs) equals 1% of the fires.
- Electrical failure/malfunction caused 6% of wildland fires.
- Transformers are involved in ignition of 1% of wildland fires

This data indicates most wildland fires are less than 1 acre, and the number of ignitions involving electrical equipment is insignificant. In my experience, most fires are intentionally set. Most wildland fires are arson caused or other man made causes, such as tractors striking a rock on a farm, off road vehicles, roadside fires caused by vehicles, such as on I-8, careless smoking or campfires, etc. For example, there have been no fires in the route of the Southwest power link project along the border since at least 1976 (35 years). (Hunt Research Corporation, personal communication with Chief Nissen who obtained information from retired CALFIRE Division Chief Scully, January 2011).

It is recommended that the text of the Draft EIR/EIS be revised to include some of the information and perspective provided above to present a more real world picture of the conditions and response that would be provided by the fire agencies so the layperson

reviewing the Draft EIR/EIS is not lead to believe that every wildland fire is a catastrophic event or that wind farms cause or have been statistically linked to causing large wildland fires. No one disputes that a fire could occur onsite, or spread through the site. This is why extensive fire protection features have been proposed for the turbines and equipment so that such turbines and equipment do not increase the existing fire risk beyond what the responding fire agencies are capable of handle during the initial attack. In general, a fire is more likely to occur during construction of a project such as the Tule Wind project or other land use development, than during operation, it will be important to have an approved Construction Safety Plan.

It is also respectfully requested that the Draft EIR/EIS please give credit where credit is due, regarding the efforts of the Fire Service including additional fire apparatus, staffing, improved Fire and Building Codes, stringent requirements on new development, fire suppression systems, modern training programs, qualified fire fighters, the Incident Command System, firefighting aircraft, emergency communications and built in fire detection, protection, and suppression systems proposed by the Tule Wind project. It seems like despite the comprehensive improvements in Fire Protection in San Diego County, no credit is given to the fire agencies and other first responders towards mitigation of the fire risk. That is like saying despite all safety improvements in automobiles, they are no safer than the Ford Model T of 1915, or saying that despite the modern redundant safety systems on modern aircraft, they are no safer than the Wright Brothers Bi Plane of 1903. The 1970 Laguna Fire burned in the area, 41 years ago. The way Section D. 15 Fire and Fuels Management is written, the layperson who is not a firefighter is lead to believe that every wildland fire in an area where there was a large wildland fire in the past, will become a catastrophic fire. That is just not the case. There have been substantial improvements in the County fire service delivery system and response capabilities since 1970.

Wildland Fire Response and Equipment Improvements

Some examples of recent improvements in San Diego County include:

- Recent creation of the SDCFA with the objective of improving staffing and apparatus for small fire agencies and CSA's in the County
- The recent improvements, which should significantly improve fire response and mitigation, but are not given credit in the EIR, include:
    - Stipend Firefighters:The SDCFA is funding Stipend Firefighters at the following fire stations:
        - Boulevard
        - SDRFD stations:
            - Jacumba
            - Lake Morena
            - Harbison
            - Deerhorn
            - Dehesa

    - Jamul
    - Otay
    - Descanso
  - Palomar
  - Shelter Valley
  - Mt. Laguna
  - Campo
  - De Luz
  - Intermountain
  - Warner Springs stations 52 and 53
  - San Pasqual
  - Pine Valley
  - Ranchita
  - Ramona stations 80, 81, and 82
  - Sunshine Summit
  - Ocotillo Wells

Stipend firefighters are paid to be on duty on a regular schedule. This results in 3 to 4 firefighters on duty at a schedule A station and 2 at a non-schedule A station. The term Schedule A refers to the amount of paid staffing on duty every day. This is a tremendous improvement in fire service response capability since historical fires and must be given credit when determining any net risk of a project:

SDCFA Equipment - Recent purchases of fire apparatus since 2010:

- 11 water tankers
- 13 Type II engines,
- 3 Type 1 engines
- One (1) Type 11 engine (including new engines at Boulevard, Jacumba, Campo, and Lake Moreno.
- 2 rescue vehicles.

SDCFA has existing orders for the following vehicles:

- 6 additional water tenders, including for Jacumba and Lake Morena.
- One (1) additional type I fire engine and one (1) additional Type VI engine.

In addition, the SDRFPD will have a new aerial ladder truck in service this summer.

This additional fire apparatus is extremely impressive, effective, and important, and significantly improves response to the general project area addressed by the Draft EIR/EIS as all of these apparatus are available for response to a fire in the general project area. This greatly exceeds the resources available during historical fires in the County.

Such improvements in staffing and fire apparatus must be given credit and factored in when determining net risk of the Tule Wind and other projects analyzed in the Draft EIR/EIS. This substantial level of staffing and apparatus is funded at great expense for

the very purpose of mitigating fire risks in the County. The SDRFPD and the County Fire Authority as well as CALFIRE must be given credit for their efforts in this regard!

To supplement the existing fire and apparatus provided by SDRFPD, SDCFA, and CALFIRE as you may be aware, the SDRFPD Board of Directors approved a Fire and Emergency Protection Services Agreement with the Tule Wind Project on November 2, 2010. The agreement between Tule Wind, LLC and SDRFPD requires annual payments from Tule Wind, LLC to SDRFPD to support fire and emergency services in the vicinity of the project area. Additionally, I am aware that Tule Wind, LLC is currently discussing the terms and conditions of a fire services agreement with SDCFA. Approval of this fire services agreement would provide some level of additional fire staffing and/or apparatus that would be utilized within the vicinity of the Tule Wind project and other projects analyzed in the Draft EIR/EIS.

The current fire forces which would respond to a wildland fire at this site should be able to confine the fires to 10 acres, which is consistent with the goals of the SDRFPD and CALFIRE.

III. THE DRAFT EIR/EIS OVERSTATES WIND TURBINE-RELATED FIRE RISK

Despite the application of wind turbine nacelle fire suppression, and other wind turbine fire avoidance features, the Draft EIR/EIS concludes that the wind turbine facility will be pose a significant fire risk that cannot be mitigated below a level of significance.

Mitigation Measure FF-5 requires the installation of automated fire suppression systems in the wind turbine nacelles. In November 2010, prior to the publication of the Draft EIR/EIS, Tule Wind, LLC voluntarily committed to installing automated fire suppression systems in the wind turbine nacelles. (RC Biological Consulting, Inc., Fire Protection Plan for the Tule Wind Project, at 49 (November 2010).

The likelihood of a fire starting in a wind turbine appears to be remote. According to a study by Iberdrola Renewables, Inc., only four (4) wind turbine fires occurred in California between 2008 and 2010, an average rate of approximately 1.3 fires in turbines per year. (Letter from Harley McDonald, Iberdrola Renewables, Inc. to James Pine, San Diego County Fire Authority, (October 25, 2010)). Considering that there are 11,000 operating wind turbines in California, the annual risk of a wind turbine fire is approximately 0.01%. The study notes that these fires undoubtedly occurred in turbines without automatic fire suppression systems. Although industrial fire suppression systems are common, it is a technology just recently being applied to wind turbines.

In my experience, fire suppression systems are highly effective at preventing an ignition from escaping the room of origin in a structure. A recent National Fire Protection Association (NFPA) study; *"U.S Experience with Sprinklers and other Automatic Fire Extinguishing Systems"*; John R Hall Jr, September 2010, indicates that Fire Sprinkler systems have a 96% effectiveness rate in controlling and extinguishing fires. It showed

that flames were contained to the room of origin in 95% of all fires compared to 73% when no automatic fire suppression is present. The wind turbines will have approved automatic fire suppression systems (such as a clean agent or equivelant) in the nacelle of each wind turbine.

In discussions with Fire Chief Nissen, SDRFPD, he has determined that these systems will be considered to be equivalent to wet pipe fire sprinkler systems, subject to all appropriate UL listings, and also State Fire Marshal approvals for the alarm system components of the system. It should be noted that the fire suppression systems proposed for the wind turbines will actually be superior to a wet pipe system commonly used in other industrial settings, as a Fire Pump (which can fail) will not be required and the system is not dependent upon electrical power sources. A gaseous system will also not be affected by any obstructions as a wet pipe sprinkler flow can be, and there would be no costly water damage, or shock hazard due to application of water.

A statistical analysis was done regarding the potential of a fire starting in a wind turbine, to cause a fire that exceeds 10 acres in size. This analysis was based on three principal factors:
(1) recent NFPA sprinkler fire suppression data that shows that sprinkler systems prevent fires from escaping the "room" of origin (here, the wind turbine nacelle) 95% of the time; and that the Fire Agency considers the alternative systems equivalent to fire sprinklers for this application;
(2) less than 0.01% of wind turbines cause a fire in any given year; and
(3) for any wildland fire started, only 3% spread beyond 10 acres in size after initial attack. The probability of an unsuppressed nacelle fire escaping initial clearance and initial attack is 0.000028% per year. Put another way, the probably of an uncontained nacelle fire is less than 1 every 3.5 million years The probability of an unsuppressed nacelle fire escaping the nacelle and the clearance and initial attack for the Tule Wind project as a whole is 0.0036% per year. That is 99.9964% effective, or a likelihood of less than 1 uncontained turbine caused wildfire every 27,000 years (This information is from the letter from Dr. Rich Thompson, Ph.D., California Polytechnic State University, San Luis Obispo, to Patrick O'Neill, HDR Engineering, Inc. February 14, 2011. This is an insignificant probability in my opinion based upon the proposed mitigations and Dr. Thompson's analysis Based on the extensive project design features and the required, and fire agency accepted, mitigation measures identified in the February 28, 2011 FPP. I can say for your consideration that, in my opinion as a fire protection consultant, that the net offsite wildland fire risk can now be considered insignificant.

IV. THE DRAFT EIR/EIS OVERSTATES ELECTRICAL LINE RISK TO FIREFIGHTERS

The Draft EIR/EIS states firefighters may face challenging and unusual conditions due to the special training and equipment required to respond to emergencies involving live wires. (D.15-61).

In my professional opinion, the Draft EIR/EIS overstates this risk.

Basic firefighter training includes dealing with electricity, including downed power lines. They are not unusual and are typically not very challenging incidents. I can speak from actual experience as a firefighter responding to power line down calls. The risk of electrical shock to firefighters is greater in a structure fire such as a home or building, while firefighters are in the building or on a ladder on a building, as it may not be known if the electricity has been shut off. The electrical lines at the wind farm would be de energized much quicker than downed power lines in a residential tract, etc., and will probably be shut off automatically prior to arrival of the first fire company. The wind farm transmission line will be de energized at SDG&E's direction, which can occur upon request from the Fire Incident Commander on site.

Electrical Emergency Training

The IFSTA training manuals, as used by the State and local fire departments, include information on handling electrical emergencies. Firefighters are also trained in handling electrical emergencies in wildland fires, during certified Wildland Firefighting classes. In addition, fire department training programs include training on handling of downed electrical wires. The fire department training officer and the Officer of the fire company (engine or truck company) are required to provide ongoing training on electrical hazards and emergencies. Fire Companies pre plan occupancies, such as the wind farm, on an ongoing basis so they are familiar with the properties, occupancy and the risks. They also meet with the on site operational staff of a facility such as the proposed Tule Wind project to discuss the potential hazards and emergency procedures. In fact, IRI will offer to provide on site training for firefighters on an ongoing basis. Firefighters are also trained in the use of electrical wire handling tools and electrical safety gloves.

The Draft EIR/EIS discusses 10 firefighter fatalities due to electrical structure contact during wildland fires. This information should be quantified as to what the contact was and what type of lines were involved. This information should be included in the Final EIR/EIS or deleted if the source is not accurate. The Draft EIR/EIS mentions that firefighters should maintain a 500 foot safety buffer around electrical structures, and states that the decision may be made to let a fire burn through the area before attacking with ground and aerial firefighting resources. It is questionable that this decision to do nothing on the site would actually be made. The International Fire Service Training Association (IFSTA) Fire Department Training manual *"Fundamentals of Wildland Firefighting"* 3rd edition, states on page 304 that firefighters should stay a distance away from downed power lines a distance equal to one span between power poles (the reason this distance is typically the longest distance that a wire could fall, and then they typically only fall at one end) until they are sure the power is off.

With respect to the Tule Wind project, improved access roads will enable ground-based firefighters to reach places that were previously inaccessible by vehicle and will enable quicker ingress and egress to the project area to fight fires, and four (4) additional water tanks to be installed in SDRFPD-approved locations throughout the project area will improve both ground-based and aerial firefighting effectiveness. As discussed above and below, firefighters are trained to operate and fight fires around electrical transmission lines. Moreover, Development Agreements entered into with SDRFPD and SDCFA will

provide funding for equipment, staffing, and training that will improve firefighting effectiveness. Finally, proposed mitigation measure FPP-11 provides for de-energizing the Tule Wind Project in coordination with the fire agency liaison and SDG&E if necessary. Taken together, the Tule Wind Project features will improve ground-based firefighting effectiveness, not diminish firefighting effectiveness.

Paid and volunteer Firefighters responding to a fire at the Tule Wind project or other project analyzed in the Draft EIR/EIS will be trained by CALFIRE. This includes CALFIRE firefighters, SDRFPD, and Boulevard Fire Department Firefighters. All Firefighters receive electrical and power line hazard training at the level of Firefighter 1 (entry level). Further training is received at the CALFIRE State Fire Academy at Ione, California.

The training requirements include the following, which all address response to electrical hazards, downed power lines, etc.:

1. State Fire Fighter 1 Academy
2. State Volunteer Fire Fighter Academy (SB 1207 mandates that volunteers receive the same training as full time Firefighters). Volunteers must go through an 80-hour training course of which Electrical hazards are a part.
3. CALFIRE Fire Protection Training Procedures (4300) Training Manuals.
4. State Fire Training Firefigther 1 and 11 training program.
5. Wildland firefighting certification classes S-130 and S-190
6. Training classes conducted by the power company (SDG&E). Boulevard FD states that there are about 4 of these per year.

As a former Training Chief for a major Fire Department, and having conducted a major mandated training study, it is my opinion that Firefighters in California are among the best-trained firefighters in the world.

The required fuel modification in the transmission line corridor should result in a relatively small fire in the power line right of way under wires. It should also eliminate any phase to ground shorts. Fire which is away from any downed lines (until they are verified as shut down) can be fought as long as water is not applied to the high voltage lines, and it does not need to be anyway. The number one strategic priority in firefighting, after rescue, is to protect exposures. This is what would be done rather than any direct attack on a power line, which might be arcing until shut down. There will be a Safety Officer position activated at the emergency as part of the Incident Command System (ICS).

The Firefighter approach to an incident involving downed power lines would be similar to the following, based on my experience as a Fire Department Incident Commander:

Let's take for example an incident where a high voltage electrical line has fallen and is on the ground. The power line has ignited vegetation. The power line has coiled back into the shape it was in when on a coil before installation. CALFIRE HAS a very strict safety policy for dispatch and response procedures when there is a known or suspected power line down. Once the power is off, the fire is simply a Class A combustible fire.

1. When the first fire engine company arrives, the fire officer on board will size up the situation, take command as the initial incident commander, and will order his/her crew and incoming crews to stay back as there may be live wires. It will be obvious where the wire is. He or she will contact the on site SDG&E incident liaison, who will communicate with Tule Wind, LLC to determine if the power is off, or needs to be turned off.

2. The CALFIRE "three stripes policy" will be implemented; flag the area off with flagging, stay a distance of at least a 25-foot radius back and wait for confirmation that power is off. Subsequent arriving units will stage away from the electrical line right-of-way (ROW). There is no need to approach the ROW or the power lines. Firefighters do not rush in to a fire involving electricity. There is no hurry to handle the situation. The fire may be contained around the ROW without applying water to the area where the wires are. The fire in the ROW in the proximity of the wire can be allowed to burn out. The ROW will have fuel modification to mitigate the wildland fire threat. The ICS will be activated and a Safety Officer Position will be established by the Incident Commander. The Safety Officer is responsible to observe all operations for safety, stop unsafe operations, and to develop an Incident Safety plan.

3. Any need to move a downed wire is done by use of proper Electrical handling poles and tools operated by trained persons wearing electrical gloves and not standing in any water. Firefighters will be guided by trained Tule Wind, LLC personnel.

    a. Speaking from actual firefighting experience, a downed electrical line incident is much easier to handle than a fire in a structure such as a house, garage or industrial building where the firefighter does not know what is in the structure.

With respect to aerial firefighting effectiveness, the Tule Wind Project's 138kV transmission line has been designed to parallel the Sunrise Powerlink route. The Tule Wind 138kV transmission line will be approximately 75' high, while the Sunrise Powerlink will be approximately 130' to 160' in height. Accordingly, the Tule 138kV line will not add any significant vertical obstructions that will not already be part of the built environment. Furthermore, for those few places where the Tule Wind 138kV transmission line does not parallel the Sunrise Powerlink, its 75' height will not impede aircraft maneuverability, or significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground, otherwise known as the

"150 foot drop zone." The 138kV transmission towers are proposed to be 75 feet in height, less than half the height of the "150 foot drop" zone.

With respect to the 128 wind turbines proposed for the Tule Wind Project, the turbines are located approximately one-quarter mile apart, which would allow helicopters to navigate around the towers. Pursuant to FAA regulations, all turbines will be equipped with safety lighting and low-reflectivity neutral white paint. These safety features will enable firefighting aircraft to operate safely around the turbines. Furthermore, due to the rugged nature of the terrain and existing Campo Wind Project turbines, aerial firefighting professionals already will be focused on aerial impediments. Chief Nissen (SDRFPD) spoke with Ray Chaney (CALFIRE Battalion Chief, Special Operations Battalion) who stated that the determination to perform aerial operations would be made on a case-by-case basis and would not be prohibited just by the presence of the Tule Wind Project (Robin Church personal conversation with Chief Nissen).

The modern, highly trained, well-equipped firefighter and fire agency needs to be given credit in the Draft EIR/EIS for their ability to evaluate the risks and intelligently and properly handle a fire at the property. This is what they are trained and paid to do. Public fire protection in San Diego County has vastly improved since 1970 and since the wildland fire of 2007. A fire at the Tule Wind project facility should be a fairly routine fire to handle, rather than a catastrophic event.

Since 1970, emergency fire service communications have improved ten-fold in the County according to long time local CALFIRE Division Chief Pete Scully. The ICS was created and is now used on all emergencies. Training programs have improved, and fire equipment and apparatus have vastly improved. This includes newer fire apparatus, which is much faster and safer than older fire apparatus. Staffing, fire station locations, and apparatus in San Diego County have been increased in recent years, as noted above. OSHA mandated training has resulted in more comprehensive training programs for Firefighters. The statewide fire mutual aid program and response configurations have been significantly improved and expanded since 1970. Today, resources are available state wide simply by making the request. This includes the Strike team concept and the ability to activate specially trained ICS incident management teams. Aircraft capabilities have also improved due to new technologies. Firefighting tactics have improved significantly.

It is respectfully requested that the Draft EIR/EIS be revised to more accurately and objectively characterize the net risk based upon the probabilities and mitigations discussed in this letter. The Draft EIR/EIS analysis needs to take into consideration the well trained and equipped fire service agencies and the project design features and mitigation measures (e.g., fire suppression in turbines nacelles) proposed by the Tule Wind project. Based on the extensive project design features and the fire agency required and accepted mitigation measures identified in the February 28, 2011 FPP, I can say for your consideration that the potential for project-related transmission lines to significantly reduce the effectiveness of ground-based firefighting or aerial firefighting can now be considered less than significant in my opinion as a fire protection consultant and former firefighter.

V. CONCLUSION

The preceding comments reflect my opinions, experience and research and are submitted with the objective of providing information regarding wildland fire protection and firefighting to help the Draft EIR/EIS preparers and reviewers to better understand, evaluate/analyze the potential fire risks at the Tule Wind project based on the extensive project design feature (built in fire protection, fuel modification) proposed mitigation (turbine nacelle fire suppression) and the current improved fire agencies and associated staffing and apparatus. Please do not hesitate to contact me with any questions.

Respectfully submitted,

James W. Hunt
Hunt Research Corporation

Resume

James W. Hunt
P. O. Box 291
Solvang, California
93464
(805) 688-4625/800-737-2826
Fax (805) 688-0275
Jhunt2@gte.net
March 2011

EXPERTISE:

Fire Protection Planning, Fire Code compliance, and Risk Analysis for residential, institutional, commercial, industrial and petrochemical and energy related developments. Wildland Urban Interface Fire Protection Planning, Vegetation Management plans, Hazardous Materials Management, Standards Development, Plan Review, Emergency Planning and Risk Management. Risk Management Plans, Business Plans, Hazardous Materials Management Plans, scenario based corrective actions, Fire Station location studies, Fire Department Strategic Plans, Fire safety elements of EIR's and General Plans.

FIRE SERVICE EXPERIENCE:

48 years extensive Fire Service related experience in Southern California. 16 years Fire fighting experience. Served in all Fire Service ranks including Battalion Chief with the City of Huntington Beach.

Responded to and commanded numerous structural, petroleum, hazardous materials, EMS and wildland emergencies, as a Captain and Chief Officer.

Served as Fire Department Training Officer and Assistant Fire Marshal. Established and enforced new development conditions for numerous petroleum and hazardous materials facilities. Designed and enforced Fire codes and standards in petroleum and hazardous materials facilities. Have served as an instructor in the field of emergency management, ICS, firefighting, fire protection and fire prevention, since 1967.

CONSULTANT EXPERIENCE:

President of Hunt Research Corporation since 1979. Specializing in Risk Management, Fire Protection Planning, Fire Vegetation Management Plans, Fire Code compliance, Emergency Planning and Hazardous Materials Management. Serve as consultant to governmental agencies and industry. Extensive experience

conducting Fire Department studies, Preparing Strategic Plans, and conducting Fire Station location studies.

Fire Protection Projects Involving Commercial, Industrial, Residential and Institutional Facilities:

Extensive experience in Hazard Analysis, Risk Assessment, Fire Code compliance, and Fire Protection planning for oil and gas facilities, refineries, pipelines, airports, water treatment facilities, chemical plants, power plants, energy related projects, hazardous materials users, Storage facilities, plating plants, LNG facilities, Hydrogen gas plants, solar plant, wind farm, and other industrial/commercial facilities, retirement communities, shopping centers, institutions, residential developments in wildland/urban interface areas. Review of detailed Fire protection system and equipment plans and specifications. Project consultant for all stages of development including Environmental Impact Reports, Specific Plans, planning and plan review. Produce Fire Protection plans, Vegetation Management plans, Business Plans, Hazardous Materials Management Plans, and Risk Management Plans. Develop Public Safety elements for General Plans. Conduct Fire Station Location Studies. Conduct vegetation and Structural Risk Assessments of Communities. Have extensive background in planning and specifying Fire protection equipment systems and procedures for protection of complex fire risks, P&ID review and review of various documents for compliance with codes and standards, and the review of process safety and Fire prevention procedures.

Project Involvement:

Have been involved in projects for the following companies as a consultant for the company or the local governmental agencies. Some of those projects include the following:

Commercial, Industrial, Residential:

Camino Real Marketplace Shopping Center
Chevron Texaco Hydrogen Fuel Processor Test Facilities
Western LNG Facility: Southern California Gas Company
Union Pacific Railroad LNG Facility (Los Angeles)
Burlington Northern Santa Fe Railroad Tank Farm (Los Angeles)
Sempra Energy company
Blythe Solar plant
Iberdrola Wind Farm
County of Santa Barbara
Los Angeles County Fire Department
Hyatt Hotels
Red Lion Hotels
Sheraton Hotels
Hampton Hotels
Santa Barbara Resort and Spa
Santa Barbara Botanic Garden

Heritage House assisted living facility
Maravilla Retirement Community
Spectrum Chemical Company
Valley Plating Works
Reno International Airport
Pacific Offshore Pipeline Company
Coastal Oil & Gas
Conoco Oil
Exxon USA
General Motors Corporation
Mobil Oil Company
Chevron USA
Texaco
All American Pipeline Company
Phillips Petroleum
Shell Chemical Company
Husky Oil
Atlantic Richfield Company (ARCO)
ARCO L.A. Refmery Hydrogen Plant
Unocal
Mariposa Pipeline
Pacific Pipeline
Stocker Resources Inc. Gas Plant
Hallidor Petroleum
Colton Bishops Storehouse
Tidelands Oil Production Company
Delco Electronics (Hughes Aircraft)
Los Angeles Department of Water & Power
Gruber Engineering
Wilco Products
City of Santa Cruz Golf Course
AMV AC Chemical Company
Shell Equilon Chemical Company
Molino Energy Company
Benton Oil & Gas Company
Air Products & Chemical, Inc.
Standard Pacific properties
Spring Pacific Properties
Signature Properties
Bluegreen West
Providence Landing Project
Reliant Energy Power Plant; Casagrande Arizona
Duke Energy Power Plant; Morro Bay
Otay Mesa (Cal Pine) Power Plant; San Diego
AES Power Plant; Huntington Beach
Blythe Power Plant

Vernon Power Plant
Orange Grove Power Plant; Fallbrook
Lagasse Brothers Janitorial Supply
Reinhold Plastics
Los Angeles Chemical Co, South Gate
Royal Paper Co., Santa Fe Springs
Flint Group Ink Company; Santa Fe
Springs.
Sonoma County Hazardous Waste facility
J.B Dental Supply; Carson Cal and Coppell Texas
Roland Corp; Commerce Cal
Burlington Northern Santa Fe Modular Trailer storage facility; Commerce Cal
Burlington Northern Santa Fe Rail /truck loading facility; Los Angeles
Imation Corp, Camarillo
Kemiron Pacific, Fontana Cal
Vulcan asphalt plant; East Otay
Emultech asphalt tank farm; West Sacramento
CCA prison; East Otay
Texaco Global Energy
Miller Brewing Company
MSE Environmental; Camarillo Calif.
General Plating Co, Commerce Calif
LDS church project; Fallbrook Calif
Pinamonte Development; Fallbrook Calif
Shea Homes
Covington Development
Centex Homes
Cypress Land Co
Zurn Products
Galaxy Botanicals Co, Oxnard
Yosemite Plaza Shopping Center; Groveland Cal
Barona Reservation; San Diego County
Viejas Reservation; San Diego County

Numerous additional clients for residential, industrial and commercial Fire Protection and Vegetation Management Plans in the Urban Wildland Interface areas (over 150 completed).

Emergency Planning Projects:

Experience includes Risk Assessment, writing and reviewing emergency response plans, spill response plans, emergency checklists, design of Incident Command Systems, Standardized Emergency Management Systems (SEMS), Emergency operations center design, exercise design, conducting major exercises. Have designed or reviewed emergency plans for major nuclear facilities, petroleum installations, government agencies, high rise and hotels. Have designed model emergency response plans for government and industry. Have taught Incident Command System and emergency management courses throughout the country, since 1975. Introduced the Incident Command System to the Federal Emergency Management Agency (FEMA) National Fire Academy in 1980. Co-inventor of the nationally used "Incident Command System" vests, and mobile command post hardware.

Project Involvement:

Have been involved in projects for the following companies as a consultant to industry or government (refer to next page)

City of Ventura
County of Ventura Public Health
Los Angeles County Jail
City of Huntington Beach
County of Santa Barbara
City of San Luis Obispo
Livermore Nuclear Laboratories (DOE) (held a secret clearance)
Chevron USA
Exxon USA
Texaco
Shell Oil Company
All American Pipeline Company
Unocal Corporation
Pacific Offshore Pipeline Company
ARCO Oil & Gas
Hallidor Petroleum
Diablo Canyon Nuclear Plant
City of Dallas, Texas
Red Lion Hotels
Cuesta College
Santa Maria School District
Molino Energy Company
Santa Barbara Club Resort & Spa
Casa Grande Arizona Fire Department
Karl Stortz Imaging
City of Azusa

EDUCATION & CERTIFICATION

Associate in Arts Degree	Police Science	1963
Associate in Arts Degree	Fire Science	1966
Lifetime Instructors Credential;	State of California	1976
Bachelor of Science Degree	Fire Science	1985
National Fire Academy	Graduate	1989
Hazardous Materials Management Specialist	Certificate	1990
Professional Fire Safe Inspector	California	1999
California State Fire Academy	Graduate	1996

COMMITTEE MEMBERSHIP

- Fire Prevention Officers Association: Flammable Liquids & Gases, & Wildland-Urban Interface Fire code committees;
- U.S. Task Force on Sheltering-in-Place During Hazardous Materials Emergencies; EPA/FEMA

* Santa Barbara Fire Safe Council
* Western Fire Chiefs Association Wildland-Urban Interface Planning Task Force;
* Community Awareness & Emergency Response (CAER), Santa Barbara County.
* National Fire Protection Association Wildland Fire Management Section.

PUBLICATIONS

- 18 articles in National Fire Protection publications regarding hazardous materials and other fire protection issues;
  Book: *Development Strategies in the Wildland-Urban Interface* (WFCA 1991);
- Four nationwide training courses for the National Fire Academy;
- Multi-Agency Oil Spill Response utilizing the Incident Command System "Occupational Health & Safety Magazine" June 1993.
- Book: *"The I Zone: California's Mitigation Strategies"* (State Fire Marshal; 1996)
  Paper: *"Scenario Based Fire Protection Planning for New Development"* presented to the California Fire Prevention Officers Institute (Jan 2002)

ADJUNCT FACULTY INSTRUCTOR AND CURRICULUM DEVELOPMENT EXPERIENCE:

- FEMA (Dept of Homeland Security) National Fire Academy
- California State Fire Academy
- California State Fire Service Training
- UCSB
- Long Beach State University
- Santa Barbara City College
- Hancock College
- Bakersfield College
- Idaho State Fire Service Training

RC BIOLOGICAL CONSULTING, Inc.
PO Box 1568, Lemon Grove, CA 91946-1568
phone: (619) 463-1072 fax: (619) 463-0859
email: info@rcbio.com

Patrick Brown
Via email

January 10, 2011

RE: Summary of Rationale for Significance Determinations within the Fire Protection Plan for the Tule Wind Project; MUP 3300-09-019, ER No. 3910-1000001

Dear Mr. Brown,

Per your request, this letter summarizes the rationale for the significance determinations reached in the Fire Protection Plan (FPP) for the Tule Wind Project. A revised version was approved by the San Diego Rural Fire Protection District (SDRFPD) on November 3, 2010. The primary change of significance in the revised version approved by the SDRFPD is the commitment by Iberdola to have automatic fire suppression systems within the turbine nacelle.

California Environmental Quality Act (CEQA) Baseline - The project is proposed in an area that is mapped as a high fire hazard area, moderate to steep terrain, average high wind speeds and vegetation cover that ranges from sparse to having a high fuel load. This is the baseline condition of the project area, against which the project's impacts are measured. The project itself is not responsible for mitigating the baseline conditions pursuant to CEQA.

CEQA/County Thresholds of Significance - The following questions come from the County's Significance Guidelines for Fire Protection Plans. The responses summarize the rationale in the SDRFPD-approved FPP, which concluded that applied project design features (PDFs) and mitigation measures (MMs) have reduced all potentially significant impacts to a level less than significant.

Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project introduces the possibility of a wildland fire ignition from various components/phases of the project, including construction activities, collection and transmission lines, wind turbines, and operations and maintenance activities. Numerous PDFs and MMs have been proposed to minimize the potential for an ignition, including automatic fire suppression systems in the wind turbine nacelle(s), various design features such as arc flash relays, fuel management around project features (i.e., 100' clearance around turbines with fire-safe vegetation and annual fuel management), five (5) 10,000 gallon water storage tanks installed throughout the project area that can be utilized for regional fire suppression support, training of both construction and operational personnel, provide training to Firefighters on an ongoing basis as to the facility and electrical hazards and handling of such emergencies on site, both new and improved access roads through an area that currently does not have improved access, and funding for both the SDCFA and the SDRFPD. Not only has the project minimized the risk of a potential ignition resulting from the project, but it will also improve access and response time and provide water for wildland firefighting within the large expanse of BLM lands that do not currently have access or water but contain the baseline conditions that make the area a high fire hazard area.

For the project to result in a SIGNIFICANT risk, an ignition from the project would have to occur during severe fire weather (high winds, high temperatures, low humidity) and not be contained during the initial attack. Initial attack means the first attack on the fire. The number of resources sent on the first dispatch to a wildfire depends upon the location of the fire, the fuels in the area (vegetation, timber, homes, etc) and current weather conditions. Most fires are caught within the first burn period (the first two hours). Therefore, the vast majority of the fires CAL FIRE responds to are considered initial attack fires (http://www.fire.ca.gov/communications/downloads/fact_sheets/FireTerminology.pdf). The CALFIRE San Diego Unit states that Statewide, CALFIRE can hold 90-95% of all wildland fires in its response jurisdiction (SRA) to 10 acres or less which they consider contained within the initial attack (pers.comm Jim Hunt and Chief Nick Schuler.

The project is providing fire suppression (wind turbine nacelle and in the operations & maintenance facility), improved area access, water to support regional fire suppression, and funding that will increase the probability of containment. The low potential for an ignition from the project to occur during severe fire weather and not being contained by one of the PDFs and/or MMs, or doing the initial attack, results in a less than significant risk when measured against the baseline conditions. This conclusion is based on the implementation of the design features and mitigation measures proposed within the FPP.

Would the project result in inadequate emergency access?

The project will significantly improve access within the large expanse of BLM lands that currently have no vehicle access. The project is proposing new roads and improving existing roads, including the implementation of fuel management adjacent to the roads. Additionally, in order to ensure firefighter safety, the transmission line and above-ground collector lines shall be de-energized prior to and during fire suppression activities within 1 mile of the project corridor to maintain firefighter safety, and re-energizing shall require notification and approval of all the responsible fire agencies. This mitigation measure ensures firefighter safety, and is in addition to the training fire personnel already receive in how to work safely in the presence of downed electrical lines. Based on these factors, when compared against the baseline conditions in the project area, the proposed project will not adversely affect emergency access in the project area. For the reasons identified above, the project actually improves emergency access in the project area.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, or other performance objectives for fire protection?

The County of San Diego has not identified a need for new or physically altered governmental facilities in order to maintain acceptable service ratios, response times or other performance service ratios, or performance objectives as a result of the project. The project will enter into a Fire and Emergency Protection Services Agreement with the SDCFA, and has already entered into such an agreement with the SDRFPD. The purpose of these agreements are to provide private funding to the SDCFA and SDRFPD to assist with implementation of fire and emergency services in the project area. Furthermore, the project meets County response times to all project features within the County's jurisdiction. The project will not result in a substantial adverse physical impact which could cause significant environmental impacts.

Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The project has identified sufficient groundwater supplies to meet the peak construction and operational demand. Water for the O&M building will be provided by a well and a storage tank within the O&M site. No new or expanded entitlements are needed.

Section 4.0 of the County Guidelines for Determining Significance states that an affirmative response to any of the following three guidelines will generally be considered a significant impact related to wildland fire.

1. **The project cannot demonstrate compliance with all applicable fire codes.**
2. **A comprehensive fire protection plan has been accepted and the project is inconsistent with its recommendations.**
3. **The project does not meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer feasible alternatives that achieve comparable emergency response objectives.**

The project does not result in an affirmative answer to any of the three guidelines. The project is in compliance with all applicable fire codes (Question #1), and meets the emergency response objectives of the Public Facilities Element of the County General Plan (Question #3). Although the County has not yet accepted the Fire Protection Plan (Question #2), at this time, based on meetings and discussion with the County Department of Planning and Land Use (DPLU) and SDCFA, it appears the County is in agreement with the proposed PDFs and MMs in the report based on the October 25, 2010 comment letter from the County and our meeting on December 22, 2010. At this time, the County has not identified or requested any additional PDFs, MMs, or project redesign to address wildland fire risk. Accordingly, the project will be consistent with the Fire Protection Plan's recommendations.

I look forward to discussing the project at your earliest convenience, and am generally available to meet with you and SDCFA personnel, except the week of January 17-21 when I will be in the field. If you have any questions please do not hesitate to call.

Sincerely,

Robin Church

Robin Church
Principal

Richard P. Thompson, PhD, RPF
Natural Resources Management Department
California Polytechnic State University
San Luis Obispo, CA 93407

March 2, 2011

Mr. Patrick O'Neill
HDR, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123

Re: Comments regarding the ECO Substation, Tule Wind, and ESJ Gen-Tie Project Draft EIR/EIS, Section D.15, Fire and Fuels Management

Dear Mr. O'Neill:

Thank you for the opportunity to provide the following comments on the Draft Environmental Impact Report/Environmental Impact Statement for the East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects (Draft EIR/EIS).

I. INTRODUCTION AND STATEMENT OF QUALIFICATIONS

My name is Richard Thompson, Ph.D., and I am a Professor of Natural Resources Management at the California Polytechnic State University, San Luis Obispo, where I also serve as the Director of the Urban Forest Ecosystems Institute. My resume is attached to this letter.

I am submitting the following analysis at the request of HDR Engineering, Inc., which is the prime consultant employed by Tule Wind, LLC for the Tule Wind Project.

The following analysis is relevant to the evaluation of fire risk associated with the Tule Wind Project's wind turbines, as discussed in Section D.15, Fire and Fuels Management, of the Draft EIR/EIS.

II. CALCULATING THE RISK OF WILDFIRE FOR FIRE SUPPRESSION-EQUIPPED WIND TURBINES

Question: What is the annual probability of a fire occurring in a turbine nacelle, escaping suppression and containment systems in the nacelle, and escaping initial firefighting attack efforts?

Assumptions:
1. A wind energy facility in eastern San Diego County performs in a similar fashion as the average of such facilities statewide.
2. All probabilities are based on averages reported by the National Fire Protection Association (NFPA) and the National Institute of Safety and Technology (NIST), and Iberdrola Renewables, Inc.
3. Only mechanical failure and lightning strikes are the causes of turbine fires. A fire in one turbine does not increase the probability of an ignition in adjacent turbines.
4. All the various risk factors have been identified and quantified, except arson or sabotage.
5. Fire service response time is sufficient for such a facility.

Analysis:
Note that the analysis below is based on a number of assumptions based on the information provided to me, which appears after my own review to be the best data available at this time. No conclusions can be made with statistical certainty. This assumes no interaction between the variables used in this analysis, and presents simple probability estimates based on means with no variances. The following analysis makes predictive observations that are offered for consideration to the fire agencies and decision-makers evaluating the Tule Wind Project in eastern San Diego County, California.

1. Probability of a fire starting in the nacelle.
   Between 2008-2010, there was an average of 1.3 fires per year in a population of approximately 11,000 operating turbines in California (Iberdrola Renewables, Inc. 2010). Based on information available, this rate would include fires started from both lighting strikes and/or mechanical failure. This statistic averages a wide range of turbine ages and facility designs.

   a. The probability of lightning-caused fires should be a relatively constant risk over many years.
   b. The probability of fire starts from mechanical failure should be an accumulating risk. This should be estimated using a Poisson probability function, e.g., it should be similar to failure analysis of a light bulb. To estimate a Poisson probability requires data from the manufacturer, assuming that such failure experiments were conducted.

      Lacking the information, I'm assuming a constant risk of mechanical failure annually. Such an assumption is reasonable since the wind turbine manufacturer recommends a maintenance cycle to ensure wind turbine reliability, thereby diminishing the cumulative nature of mechanical failure risk, and is based upon an overall average of wind turbine performance across the State over multiple years. The result is a much higher probability estimate than by using the Poisson pdf. Assuming that the incident rate during 2008-2010 period studied above is reflective of the probability of a fire over any given period, then the probability of a fire occurring in the future is:

      prob{fire starting in a nacelle} = 1.3/11000 = .000118 or **0.0118% per year**

2. Probability of the nacelle fire suppression system failing

   National Fire Protection Association (Hall 2010) studied the effectiveness of water-based sprinkler systems and concluded that they are highly effective. Their effectiveness depends upon being functional (turned-on) and their capacity to contain the fire within the housing of ignition. There appears to be no scientific evidence on the effectiveness of alternative suppression systems such as the gas-pressurized ("clean" system) in this project.

   NFPA estimates show that water-based sprinkler systems operate 91% of the time. However, 64% of the 9% failures resulted from the sprinkler system being turned-off, for whatever reason. Therefore, operational water-based sprinkler systems appear to be at least 96% reliable to operate (1.0 - (0.36 x .09) = 1.0 – 0.0324 = 0.9676).[1]

   The same fire study also reports that 96% of the time sprinklers were effective in confining the fire to the housing of origin (Hall 2010). The fire suppression system in the turbine nacelles will

[1] To account for the small percentage of systems that were turned off, but might not have operated even if they were on, I have rounded down to 96%.

not be a water-based sprinkler system. However, Fire Chief David Nissen of the San Diego Rural Fire Protection District considers the "approved alternative automatic fire suppression system" equivalent to water-based systems (Hunt 2011). Given the fact that the turbine fire suppression systems are tailored to the nacelle and are not vulnerable to any operator error, along with expert opinion, it seems reasonable to conclude that they should be more effective than sprinkler systems. Therefore, it seems reasonable to conclude that the project's suppression systems are at least as effective as water-based systems that contain 96% of fires to the room (housing) and operate 96% of the time.

So, there is a 96% probability that a fire suppression system will operate and, of those instances, there is a 96% probability that the suppression system will confine the fire to the housing. The result is that there is 92% probability that a fire igniting in the housing will not escape the housing. The probability of failure in confining a fire to the housing is calculated as follows.

prob{fire suppression system failure & escaping the housing} = 1.0 –(0.96 x 0.96) = .0784 or about **8% per year**

3. Probability of an unsuppressed turbine fire

At this point in the sequence of probabilities, there is 0.0118% likelihood of a fire starting in a turbine and an 8% probability it will not be confined to the nacelle housing, giving the probability of an unsurpressed nacelle fire as:

prob{fire starting and escaping the nacelle} = .000118 x .08 = .0000094 or **0.00094% per year.**

4. Probability of an unsuppressed nacelle fire escaping containment from the vegetation-cleared turbine footprint and exceeding 10 acres in size.

Each turbine site has vegetation modification within a 200 foot radius from the base of the turbine. NIST data indicates that 3% of wildland fires escaped initial attack (Stephens and Ruth 2005), which is defined as a fire exceeding 10 acres in size. Therefore,

prob {nacelle fire starting and completely escaping the clearance and initial attack} = .000118 x .08 x .03 = .00000028 or **0.000028% per year**.

That is an effectiveness rate of 99.999972%, or put another way, **the probability of an uncontained nacelle fire is less than 1 every 3.5 million** years (28/100,000,000 = 1/x).

5. Probability of the Tule Wind Project facility having a fire start and escape both the nacelle and initial attack

Given the linear pattern of the facility, no complementary fire protection is created among the turbines. As such, the facility's risk for wildfire is the conjoint probability of a fire occurring at any 1 or more of the 128 turbines. Therefore, the final probability estimate is

prob {nacelle fire starting and completely escaping the clearance and initial attack in 1 or more of the 128 turbines in the Tule Wind Project facility} = 1 – [(1-(.000118 x .0784 x .03)^{128}] = .000036 or **0.0036% per year.**

That's 99.9964% effective, or a likelihood of less than 1 uncontained turbine-caused wildfire every 27,000 years (36/1,000,000 = 1/x).

Conclusions:
The final probability of a fire occurring and escaping containment of 0.0033% should remain fairly stable over the life of the project, since the original estimate of nacelle fires (1.3 fires/11,000 turbines) was based on a wide range of facility ages and designs.

These are simple probability estimates based on means with no variances. No statistical inference statement can be made, such as I am 99.9% confident that there's a 1% chance of a fire escaping the wind energy facility in the next 30 years. Such a statement requires annual data on the number of incidents for many years to calculate a mean and sampling error.

III. CLOSING

The preceding comments are submitted with the objective of providing information regarding wind turbine-related fire risk to help the Draft EIR/EIS preparers and reviewers to better understand and quantify the potential net fire risks associated with the Tule Wind Project. Please do not hesitate to contact me with any questions.

Respectfully submitted,

Richard P. Thompson, PhD, RPF
Enclosure

References

Hall, John. U.S. Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment. National Fire Protection Association, Fire Analysis and Research Division. September 2010.

Hunt James W. personal communication with Fire Chief David Nissen. Hunt Research Corp., February 2011.

McDonald Harley, K. Disproving Alleged 35 Turbine Fires Per Year Statistic Cited in International Association of Electrical Inspectors News Magazine, memo to James Pine, San Diego County Fire Marshall, Iberdrola Renewables, 25 October, 2010.

RC Biological Consulting, Inc. Fire Protection Plan for the Tule Wind Project, prepared for HDR Engineering, Inc., Environmental Review Number 3910-1000001, Nov. 3, 2010.

Stephens, Scott L. and Lawrence W. Ruth. 2005. Federal Forest Fire Policy in the U.S. Ecological Applications.

Curriculum Vitae
Richard P. Thompson, PhD, RPF
2011

Natural Resources Management Department
College of Agriculture, Food and Environmental Sciences
California Polytechnic State University
San Luis Obispo

Earned Degrees

Ph.D. Natural Resources/Environmental Economics, Texas A&M University, 1990
M.S. Forest Economics, Oklahoma State University, 1978
B.S. Forest Management, Oklahoma State University, 1974

Credentials

- Registered Professional Forester, California, License No. 2455
- Registered Professional Forester, Oklahoma, License No. 118
- Professional Rural Appraiser, American Society of Farm Managers & Rural Appraisers, 1986

Honors, Awards and Certificates

- Acting Head (standing), Natural Resources Management Dept., CAFES, Fall 2006 - present
- Sunkist Sustained Excellence Faculty Award, College of Agriculture, Food and Environmental Science, 2006.
- Elected Director of the Urban Forest Ecosystems Institute, College of Agriculture, California Polytechnic State University in January 1998.
- Tenured and Promoted to Full Professor, Cal Poly, San Luis Obispo, June 1995.
- USDA Certificate of Appreciation for "Superior Contribution to the Development of the Food and Agricultural Education Information System", signed Secretary of Agriculture, 1989
- Certificate of Appreciation for teaching, College of Agriculture, Cal Poly, Feb., 1991, 1992, 1994
- Xi Sigma Pi, National Honorary Society of Forestry
- Gamma Sigma Delta, Honorary Society of Agriculture

Thesis and Dissertation

Thompson, R. P. Demand for Higher Education in the Agricultural and Natural Resource Sciences. Ph.D. Dissertation. Texas A&M University, Aug., 1990, College Station, TX.

Thompson, R. P. Forest Management Characteristics, Attitudes, and Objectives of Private Non-industrial Landowners in Eastern Oklahoma. M.S. Thesis. Oklahoma State University, July 1978, Stillwater, OK.

Professional Affiliations

- Association of Environmental Professionals, member since 2006
- American Agricultural Economics Association, member since 1993
- Society of American Foresters, member since 1972
- Forest Products Society, 1987 - 1990
- American Society of Farm Managers and Rural Appraisers, member 1987 - 1991
- American Forests, member 1998- 2004
- California Urban Forest Council, member since 1998

- California Licensed Foresters Association, member 1993-1994
- Western Forest Economics Workshop Group, member since 2004
- Southern Forest Economics Workshop Group, member since 1978

Areas of Expertise

- Natural Resource/Environmental Economics & Finance
- Statistical Analysis & Econometrics
- Non-market Valuation Theory and Methodology
- Environmental Damage Valuation
- Rural Land Appraisal - certified Professional rural appraiser, American Society of Farm Managers and Rural Appraisers, 1986

Professional Education and Training

- Appraisal Theory and Practice Courses, American Society of Farm Managers and Rural Appraisers (ASFMRA)
- Production Management Training, Weyerhaeuser Co., 1981
- Chemical Applicator Training, Weyerhaeuser Co., 1980
- Human Resources Management Training, Weyerhaeuser Co., 1980.

Professional Experience

Program Coordinator, FNR and ENVM Degree Programs, 2007 to present

Director, Urban Forest Ecosystems Institute, CAFES
Polytechnic State University, 1997 to present

Professor, Natural Resources Management Department, CAFES, California
Polytechnic State University, September, Assoc. Prof. 1990 to 1995, Prof. 1995 to present

Research Associate, Department of Forest Science, Texas A&M University,
October 1986 to August 1990.

Consultant , Duck Creek Associates, Stillwater, Oklahoma, February 1983 to October 1986.
As Co-Director and Corporate Secretary, I was responsible for numerous projects for clientele such as the U.S. Department of Justice, U.S. Internal Revenue Service, U.S. Forest Service, U.S. Department of Indian Affairs, and numerous large and small firms and individuals. Major projects included (1) economic analysis of the old-growth redwood resource relating to the expansion of the Redwood National Park, (2) industrial timberland appraisals throughout the South for tax purposes, (3) timber inventories of the Cibola and Mark Twain National Forests, and (4) rural land and environmental damage appraisals. See Part I, Section I - "Consultant Reports".

Instructor and Research Associate, Department of Forestry, Oklahoma State University,
February 1982 to February 1983.

Plans and Operations Forester, Oklahoma-Arkansas Region, Weyerhaeuser Company,
Wright City, Oklahoma, July 1979 to February 1982.

Research Associate, USFS/OSU Cooperative Research Project, Department of Forestry,
Oklahoma State University, September 1978 to July 1979.

Intern, USDA Forest Service, Forest Resource and Economics Research Staff (FRER),
Washington Office, June 1978 to September 1978.

Peer-Reviewed Publications and Papers

Thompson, R. P. “State of the California Urban Forest – Status and Trends 1998 to 2003.” Urban Forest Ecosystem Institute, Technical Report No. 13, July 2006.

Thompson, R. P. and C.A. Dicus. THP Costs, in Proceedings of Western Forest Economists Convention, May 2-4, 2005, Welches, OR.

Thompson, R. P. and C.A. Dicus. The Impact of California's changing Environmental Regulations on Timber Harvest Planning Costs, California Institute for the Study of Specialty Crops, Cal Poly, San Luis Obispo, March 2005.

Thompson, R.P., J.E. Noel, and S.P. Cross. Oak Woodland Economics: A Contingent Valuation of Conversion Alternatives. Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape, Oct. 22-25, 2001, p. 501-510.

Thompson, R.P., J.E. Noel, R. Hanna, and D.D. Piirto. 1999. "Hedonic Valuation of Forest Aesthetics on Small Urban-Interface Properties" *J. of Arboriculture*, 25(5): 225- 234.8.

Thompson, R.P. and J. Ahern. "State of the California Urban Forest – Status and Trends since 1998." Urban Forest Ecosystem Institute, Technical Report No. 9, March 2000.

Shelly, J. R. and R. P. Thompson. Woody Waste to Value-Added Product in California. National Conference on Wood Waste Utilization, The National Arbor Day Foundation, Nebraska City, NB. May 4-5, 2000.

Dietterick, B.C., R.Strohman, R.P. Thompson. Threading GIS throughout a Forestry and Natural Resources Curriculum. *Proceedings for ESRI International User Conference*, San Diego, July 26-30.

Pillsbury, N.P. R. P. Thompson and J. Reimer, "Tree Volume Equations for Fifteen Urban Species in California." Urban Forest Ecosystems Institute, Tech. Report No. 7. California Polytechnic State University, San Luis Obispo, 45 pp., June 1998.

Pillsbury N.P, R.P. Thompson, W.R. Mark, 1998. "Design and Implementation of an Ecosystem Management Based Curriculum: a Case Study." presented to the Academic Program Section Summer Conference, Board of Agriculture, Commission on Food, Environment, and Renewable Resources, San Luis Obispo, CA, June 27-29, 1998.

Piirto D.D., R.P. Thompson, and K.L. Piper, 1997. "Implementing Uneven-Aged Redwood Management At Cal Poly's School Forest." presented to the International Union of Forest Research Organizations (IUFRO), September 1997.

Thompson, R. P. "Summary of the Economics, Policy and Planning Technical Session." *Proceedings of the Fourth Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*, March 19-22, 1996, California Polytechnic State University, San Luis Obispo.

Kruger, B. S. and R. P. Thompson. "The Effect of Sociological Factors, Attitudes, and Beliefs on Private Oak Woodland Management." *Proceedings of the Fourth Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*, March 19-22, 1996, California Polytechnic State University, San Luis Obispo.

Noel, J. and R. P. Thompson. "California Oak Woodlands Management: Uncertainties and Modeling." *Proceedings of the Fourth Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*, March 19-22, 1996, California Polytechnic State University, San Luis Obispo.

Hanna, R. J., R. P. Thompson, D. D. Piirto and J. Noel. "Economic Contribution of Stand Characteristics to Property Value." *Proceedings of the Fourth Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*, March 19-22, 1996, California Polytechnic State University, San Luis Obispo.

Piirto, D. D. and R. P. Thompson. "Practical Implications of Implementing Uneven-aged Coast Redwood Management at Cal Poly's School Forest." *Proceedings of the 1996 Redwood Symposium*, Arcata, CA, March 1996.

Pillsbury, N.P. and R. P. Thompson, “Tree Volume Equations for Fifteen Urban Species in California.” Urban Forest Ecosystems Institute, Interim Report. California Polytechnic State University, San Luis Obispo, 45 pp., 1995.

Thompson, R. P. “Benefit-Cost Analysis Methods in Sustainable Urban Forestry” paper presented to the “One California Forest” Workshop, April 1995, San Jose, CA.

Thompson, R. P. “Benefit-Cost Analysis in Urban Forestry Sustainability” paper presented to the “One California Forest” Workshop, March 1995, Anaheim, CA.

Thompson, R. P., N. H. Pillsbury, R. Hanna. "The Elements of Sustainability in Urban Forestry." Urban Forest Ecosystems Institute for the California Department of Forestry and Fire Protection, Technical Report No. 1, 56 pp., July 1994.

Thompson, R. P., O. Capps Jr., and J. G. Massey. 1994. "Demand for an Agricultural Education." *American Journal of Agricultural Economics*, 76(2): 303-312.

Thompson, R. P. 1993. "Compensated Takings and Negotiated Solutions." feature article *J. of Forestry*, 91(4): 14-18.

Thompson, R. P. "Forestry Education in California: Is it Needed Anymore?" paper presented to the NorCal SAF Society Symposium on Forestry Education, June 1993, Quincy, CA.

Piirto, D. D. and R. P. Thompson. 1992 Integrated Resource Management at Swanton Pacific Ranch--A Beginning. Presented at the USDA Forest Service Silvicultural Workshop held on June 3, 1992 in Sacramento, California.

Massey, J. G., R. P. Thompson, R. P., and C. N. deHoop. 1989. "The Utility of Knowledge Based Systems to the Forest Products Industry." *Forest Products Journal*, 39(11/12): 37-40.

Thompson, R. P. and J. G. Massey. 1989. "Trends in Baccalaureate Graduates." *NACTA Journal*, 33(1): 3-6.

Massey, J. G. and R. P. Thompson. "The Value of Expert Systems in the Forest Industry: the Hype and the Reality." *Proceedings of the 1989 Southern Forest Economics Workshop*, March 1989, San Antonio, Texas.

Thompson, R. P. "FAEIS ON-LINE: An Interactive Version." Invited Paper/Demonstration at the National Association of State Universities and Land Grant Colleges Convention. November, 1988, Washington, D.C.

Olson, K. W., R. L. Moomaw, and R. P. Thompson. 1988. "Redwood National Park Expansion: Impact on Old-Growth Redwood Stumpage Prices." *Land Economics*, 64(3): 269-275.

Olson, K. W., R. L. Moomaw, and R. P. Thompson. "Redwood National Park Expansion: Did Anticipation Enhance Stumpage Prices?" *Proceedings of the 1987 Western Economic Association Conference*, July 1987, Vancouver, British Columbia.

Thompson, R. P. "Income Taxes and Timber." Paper presented to the Oklahoma Chapter of the Society of American Foresters, April 1986, McAlester, Oklahoma.

Jones, J. G. and R. P. Thompson. "Characteristics, Attitudes and Objectives of Nonindustrial Private Forest Owners in Eastern Oklahoma." Oklahoma State University Agricultural Experiment Station, Research Report P-816, August 1981.

Thompson, R. P. and J. G. Jones. 1981. "Classifying Nonindustrial Private Forestland by Tract Size." *J. of Forestry*, 79(5): 288-291.

Consultant Reports

Thompson, R.P. and M.D. Shelton. “Information Gathering Phase” for Sustainable Agriculture and Forestry on the East-West Ranch, Cambria for the Coastal Resources Institute, January, 1998.

Thompson, R.P. An Environmental Study on the Culture and Stocking of Trout in California, Coastal Resources Institute, April 1996, 101 p.

Latham, R. P. and R. P. Thompson. "The Impact of the Expansion of the Redwood National Park on Old-Growth Stumpage Prices." Prepared for Hammon, Jensen, Wallen & Associates, Oakland, CA. and the Land and Natural Resources Division, U.S. Dept. of Justice, Washington, D.C., February, 1985.

Thompson, R. P. and R. P. Latham. "An Analysis of 631(a) Claims by International Paper Company." Phase I report prepared for the Department of the Treasury, Internal Revenue Service, Washington, D.C., April, 1984.

Thompson, R. P. “Damage Appraisal of the Stubbs Property in Seminole Co., Oklahoma.” A Report prepared for Sun Exploration and Production Co., Oklahoma City, OK in the case of Martha Stubbs vs. Sun Exploration and Production Company, Case No. CIV-85-441-E, July, 1985.

Educational Materials Published

The following study guides were designed and continually updated to assist the student in progressing through the subject matter at the rapid quarterly pace.

1. Natural Resources Policy Analysis, Study Guide, 7th Edition, El Corral Bookstore
2. Natural Resource Economics & Valuation, Study Guide, 9th Edition, El Corral Bookstore
3. Sustainable Forest Management, Study Guide, 4th Edition, El Corral Bookstore
4. Urban Forestry, Study Guide, 4th Edition, El Corral Bookstore
5. Applications in Econometrics and Biometrics (co-author), 3rd Edition, El Corral Bookstore
6. Forest and Natural Resources Valuation Study Guide, 3rd Edition, El Corral Bookstore, 1994
7. Natural Resources Economics Study Guide, 3rd Edition, El Corral Bookstore, 1994
8. Natural Resources Administration Study Guide, 2nd Edition, El Corral Bookstore, 1993
9. Forest Management and Multiple-Use Planning, (co-author), 3rd Edition, El Corral Bookstore, 1994

Significant Research Projects (Grants & Contracts)

Co-PI, Statewide Urban Forest Inventory, USDA Forest Service, FIA grant, 2010	$992,000
PI, Identification of forestland management and market conditions for profitable investment in carbon storing forestry-offset projects using the California Climate Action Registry protocols, McIntire-Stennis & ARI, 2010	$37,000
Co-PI, California Disaster & Capability Preparedness Assessment Project, California Department of Homeland Security/ Office of Emergency Services, 2007,	$160,265
Consultant, Environmental damage appraisal on a wildland-urban interface forested property, Henderson & Borgeson, Attorneys at Law, Santa Barbara, 2007	$14,000
Characterizing the Regulatory Environment affecting the Forest Products Industry in California, California Forest Products Commission & the California Institute for the Study of Specialty Crops, Cal Poly, 2004	$106,196
2004 Survey of Urban Forestry in California, CDF-F, 1998 -2000, co-PI	$25,000
Development of Product Standards and Internet Market Site for California Urban Solidwood Materials, System-wide ARI,CDF-F, and the California Integrated Waste Management Board, 2001	$138,272

Establishing an Uneven-aged Growth and Yield Project at Swanton-Pacific, McIntire-Stennis Grant, co-PI, 1998-2003 $62,000
Oak Woodland Policy Decision Support System, Phase IIIb, McIntire-Stennis Grant, 1997-98, PI, 1997-1998 $17,000
Integrating the FNR Upper-Division Core through Ecosystem Management. Boswell Grant, PI, 1998 $10,000
1998 Survey of Urban Forestry in California, CDF-F, co-PI, 1998 -2000 $40,000
Development of CDF-F Shortcourse on Growth & Yield, Swanton-Pacific CFI System, Cal Poly Foundation, Summer 1997 $38,000
Development of a GIS Decision Support System for Oak Woodland Policy Analysis, Phase II, McIntire-Stennis, PI, 1997-1998 $10,985
Implementing an Ecosystem Management Philosophy in the Forestry and Nat. Res. Curriculum, USDA/Higher Education Challenge Grant Program, co-PI, 1995-1997 $200,000
Development of a GIS Decision Support System for Oak Woodland Policy Analysis, McIntire-Stennis, PI, 1996 $11,000
Land Values, Homeowner Concerns and Stewardship of the Ponderosa Pine/Mixed Conifer Interface Forest of California, California Resources Agency, CDF, Urban Forest Ecosystems Institute, co-PI, 1994 $75,464
An Environmental Impact Study on the Culture and Stocking of Resident Trout and Inland Salmon in California, California Resources Agency, CDF&G through the Coastal Resources Institute, 1 of 6 co-investigators, 1994 $120,000
Urban Forest Profiles for Sustainability, California Resources Agency, CDF through the Urban Forest Ecosystems Institute, PI, 1994 $50,000
K-Career Equity Leadership Program of the Natural Resources Management Department, a proposal to theUSDA Forest Service, Soil Conservation Service, USDI Bureau of Land Management and Park Service, co-PI, 1994 $100,000

Masters Thesis Advisor

- Barbara Kruger, M.S. awarded 1993
- Richard Hanna, M.S. awarded 1995, received Cal Poly Award for Best Graduate Research
- Sarah Cross, M.S. awarded 2003
- Marcello Espiritu, thesis committee member, UC Berkeley, M.S. awarded 2004
- Michael Garcia, M.S. awarded 2008
- Sarah Spann, active graduate student
- Steve Auten, active graduate student

Courses and Laboratories Taught

1. Natural Resources Management and Society (FNR 101), 92
2. Career Development in Forestry & Environ. Mgmt. (FNR 140), 04 - present
3. Intro. to Forest Ecosystem Mgmt. (FNR 201), 99 - 00
4. Natural Resources Policy (FNR 302), 90 - 97
5. Forest Mensuration, Lab Section (FNR 314), 92 - 99
6. Growth and Yield (FNR 316), 92 – 97
7. Natural Resources Economics and Valuation (FNR 326), 99 - present
8. Urban Forestry (FNR 350), 01 - 08
10. Natural Resources Economics (FNR 401), 90, 91, 93 - 98
11. Natural Resources Administration (FNR 406), 91 – 97
12. Sustainable Forest Management (FNR 414), 99 - present
13. Forest and Nat. Res. Valuation (FNR 415), 91, 92, 93 - 97
14. Forest Management and Multiple-Use Planning (FNR 418), team teach 91 - 97

15. Natural Resources Policy Analysis (FNR 435), 99 - present
16. Community Forestry (FNR 450), 99 - present
17. Ecosystem Management (FNR 465), 99 - present
18. Advanced Forest and Natural Resources Valuation (FNR 572), 93
19. Numerous special problems courses (FNR 100, 339, 400, 461, 500)
20. Community Forestry (FNR 450), 00 – present
21. Tropical Forest Ecosystem Management (FNR 503), EARTH Univ., Costa Rica, Su 2009
22. Biometrics & Econometrics (FNR 532), 99 - present
23. Social Systems in NRM (FNR 530), 99 - 07
24. Introduction to Careers in Forestry and Environmental Management (FNR 140), 06 - 08

Service

Professional Development/Service

- Treasurer, National Xi Sigma Pi Honorary Society, 2007 - 09
- Director, California Urban Forest Council, Board of Directors, 2002 – present
- Vice-Chair, Central Coast Chapter, California Urban Forest Council, 2002 - present
- Chair, Los Padres Chapter, Southern California Society, SAF, 1992 - 1993
- Central Coast Media Liaison for the California Licensed Foresters Association, 1994
- Past Vice-Chair, Los Padres Chapter, SAF, 1992
- Past Secretary-Treasurer, Los Padres Chapter, SAF, 1991

University

- Senator, Academic Senate, 2004-05
- Chair, Academic Senate, Student Affairs Committee, 1992-1993
- Student Affairs Council, Academic Senate, member 1991-1993
- Distance Learning Committee, member since Winter 1992

College

- CAFES representative to EARTH University Consortium, Costa Rica
- Curriculum Committee, 1998 - 2004
- Swanton-Pacific Innovative Curriculum Committee, member 1992; assisted in educational facilities planning
- CAGR Instructional Improvement Committee, member, 1993 - 2003
- CAGR Computer Committee, member 1992-93, 1993-94
- Ad Hoc Committee on Internships, member Fall 1990 to Summer 1991
- Open House Committee, 1990 - 02
- Assisted in the planning and evaluation of 1992 and 1994 timber harvests at Swanton Pacific

Department

- Coordinator, ENVM and FNR Degree Programs, 2006 - present
- Chair, NRM Curriculum Committee, 1994-08
- Co-Editor, FNR Accreditation Report for the Society of American Foresters culminating in accreditation in October 1994.
- Editor, FNR Re-Accreditation Report for the Society of American Foresters culminating in accreditation in October 2004.

HDR | ONE COMPANY *Many Solutions*℠

Memo

To:	Karl Dahlstrom and Todd Velnosky, Wind Capital Group		
From:	Angela Piner, HDR Engineering, Inc.	Project:	Broad Mountain
cc:			
Date:	10/16/09	Job No: 119860	

RE: SUMMARY OF CURRENT STUDIES REGARDING WIND FARMS AND PROPERTY VALUES

INTRODUCTION

Negative effects of wind facilities on property values are a common concern raised by citizens in opposition to wind facilities. At Wind Capital Group's request, HDR Engineering, Inc. reviewed recent, readily available studies regarding United States land-based wind farms and their effects on property values. Recent studies were those completed since 2001, when installed wind capacity jumped from 2,579 MW in 2000 to 4,273 MW in 2001 (AWEA, 2008).

There are several studies that are commonly referenced in relation to wind farms and property values. They can largely be grouped into two categories – survey based studies and transaction based studies (Hoen, 2006). Recent work completed by Hoen (2006) and Hoen & Wiser (2008) use hedonic regression analysis to support a more comprehensive analysis of wind farm effects on property values. A summary of the results of the survey based, transaction based, and hedonic pricing studies are included below. The source papers are included as attachments.

SURVEY BASED STUDY

Survey based studies utilize interviews with "experts" to ascertain effects. According to Mr. Hoen, "The survey studies do not give a clear indication as to whether there is an actual decrease in value . . . The results of these studies reinforce the need for more research . . . " (Hoen, 2006).

One survey based study was identified for this summary. ECONorthwest conducted a study to better understand the potential economic impact of wind power development in Kittitas County, Oregon. One facet of this study used tax assessor interviews and a literature review to determine the potential effects of wind farms on property values (Grover, 2002). Their nation-wide survey of tax assessors in areas with wind power projects (which included 22 wind projects in 13 different counties throughout the country) found no evidence supporting the claim that views of wind farms decrease property values. The study surmised that one of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbine are undesirable (Grover, 2002). As reported in interviews of tax assessors, some residents find views of wind turbines attractive.

TRANSACTION BASED STUDIES

Transaction based studies gather data on property values and compare sales prices of homes in a given area. These studies typically fall short by identifying whether the wind farms are actually the cause for property value effects (Hoen, 2006). HDR identified two recent studies in the United States.

REPP Study

This 2003 study of post-1998 wind farms in the United States examined data on property sales in the vicinity of wind projects and determined whether the presence of a wind project had an influence on property values for properties that were sold. It also attempted to address the extent to which wind projects have an influence on property values. The results of the study indicated there is no empirical support for the claim that wind development harms property values (Sterzinger, 2003). The study indicated that for the great majority of wind projects, the property values actually rose more quickly in the view shed than they did in the comparable community. Moreover, values increased faster in the view shed after the projects came on-line than they did before. Finally, after projects came on-line, values increased faster in the view shed than they did in the comparable community.

Due to the broad scope of this study, the analysis did not take into account whether the individual properties had a direct view of the wind developments or the distance to the turbines. Subsequent studies have addressed this issue.

Energy Center of Wisconsin

The 2004 collaborative study by the Energy Center of Wisconsin (ECW) examined wind turbine impact on local property values. The study attempted to address the shortcomings of the REPP report. In particular they included viewshed ground truthing of the data and distance effects in their analysis. This study came to no definitive conclusions of the effects of wind energy on property values, largely due to the fact that the sample size was small due to the relative rural nature of the surrounding environment. As a result, there were fewer than one in three transactions in the sample that involved properties within the view shed of the development (ECW 2004). The conclusions of the study outlined key elements to property value studies in relation to wind farms.

Poletti and Associates Study

Poletti and Associates (2005) conducted a study of the Forward Wind Energy Center in Wisconsin using on-site evaluation and property transactions near operating wind farms in Wisconsin and Illinois. According to this study, the selling prices of small residential or agricultural property near the operating wind farms in Wisconsin and Illinois were not significantly different from the selling prices of similar properties located in control areas some distance from these farms. Results were less conclusive at predicting the effects of the wind farm on improved residential property values at the Illinois site. However, the authors still concluded that, based on the sales of agricultural land, small residential tracts as well as anecdotal data, the Illinois wind farm has not affected prices or development in the project area.

HEDONIC PRICING MODEL

Hoen (2006) proposed the use of hedonic pricing models as a way to isolate the characteristics of properties that are affecting price. Hoen (2006) contends that this approach in assessing the link between property values and wind farms improves on previous studies that generally lack rigor and include insufficient detail to capture the complex relationships between wind farms and home transaction prices.

Madison County, NY Study

Mr. Hoen of the Bard Center for Environmental Policy conducted a study of impacts of wind turbine visibility on property values in Madison County, NY. The study provides an overview of previous studies that had been conducted and uses the Madison County wind farm for an analysis of potential effects.

The study found no statistically significant relationship between the sale price of homes and their proximity or visibility to the wind farm. They caution the use of the results of the study, in particular the transferability of the results would be limited to a community that is similar to the Fenner rural farming community evaluated in the study. However, he argues that the research done in this study does provide evidence that the presence of a wind farm does not devalue property.

LBNL Study Preliminary Results

The Lawrence Berkeley Laboratory is currently evaluating the impact of wind facilities on residential property values. Mr. Hoen and Mr. Wiser gave several presentations on the preliminary results of their research, most notably in June 2008 and November 2008. Their study evaluates data from 11 study areas that are surrounded by more than 25 wind facilities. These study areas are each located in Washington/Oregon, California, Iowa, Oklahoma, Texas, Illinois, Wisconsin, and two each in New York and Pennsylvania. These areas include approximately 8,500 property transactions. The study is reviewing three potential effects to the properties' values: area stigma ("industrialization" of the area), scenic vista stigma (decrease in quality of scenic vista), and nuisance effects (health concerns of residents). While their research results are preliminary the following conclusions have been surmised from their initial analyses:

- In regard to area stigma, there is no statistical evidence that homes near wind facilities are stigmatized by those facilities as compared to other homes in the region.
- In regard to scenic vista stigma, there is no statistical evidence that homes with a view of wind turbines have different values than homes without such views
- In regard to nuisance effects, the is not statistical evidence that homes within ¼, ½, and one mile of turbines sell for different values than those further away.

Hoen and Wiser (2008) concluded that, though one cannot rule out isolated cases where property values are negatively impacted, any such impacts within their sample were not widespread nor statistically identifiable.

REFERENCES

AWEA. 2008. *American Wind Energy Association Annual Wind Industry Report, Year Ending 2008*. http://www.awea.org/publications/reports/AWEA-Annual-Wind-Report-2009.pdf. Retrieved October 12, 2009.

Energy Center of Wisconsin (ECW). 2004. *Examining Wind Turbine Impact on Local Property Values*. A Study of Wind Energy Development in Wisconsin. Part 3: 119-137. July 1, 2004. http://www.ecw.org/prod/231-1.pdf. Retrieved October 12, 2009.

Grover, D. S. 2002. *Economic Impacts of Wind Power in Kittitas County, WA*. ECONorthwest for Phoenix Economic Development Group. 1-18. November 2002.

Hoen, Ben. 2006. Impacts *of Windmill Visibility on Property Values in Madison County, New York*, unpublished thesis (M.S.), Bard College, Bard Center for Environmental Policy.

Hoen, Ben and Ryan Wiser. 2008.*The Impact of Wind Facilities on Residential Property Values.* What We Know and What We Don't Know – 10 Area Preliminary Results. Lawrence Berkeley Laboratory. June 2008.

Hoen, Ben and Ryan Wiser. 2008.*The Impact of Wind Facilities on Residential Property Values.* What We Know and What We Don't Know. Lawrence Berkeley Laboratory. Mid-Atlantic/Southeast RWEI Annual Meeting. Alexandria, VA. November 14, 2008.

Poletti and Associates, Inc. 2005. *A Real Estate Study of the Proposed Forward Wind energy Center Dodge and Fond du Lac Counties, Wisconsin*. Prepared for Invenergy Wind LLC.

Sterzinger, G., F. Beck*, et al.*2003. *The Effect of Wind Development on Local Property Values*. Renewable Energy Policy Project. 1-77. May 2003.

LBNL-2829E

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis

Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer, and Gautam Sethi

Environmental Energy Technologies Division

December 2009

Download from http://eetd.lbl.gov/EA/EMP

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy (Wind & Hydropower Technologies Program) of the U.S. Department of Energy under Contract No. DE-AC02-05CH1123.

Disclaimer

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor The Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or The Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.

Ernest Orlando Lawrence Berkeley National Laboratory is an equal opportunity employer.

LBNL-2829E

The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis

Prepared for the

Office of Energy Efficiency and Renewable Energy
Wind & Hydropower Technologies Program
U.S. Department of Energy
Washington, D.C.

Principal Authors:

Ben Hoen, Ryan Wiser, Peter Cappers
Ernest Orlando Lawrence Berkeley National Laboratory

Mark Thayer
San Diego State University

Gautam Sethi
Bard College

1 Cyclotron Road, MS 90R4000
Berkeley CA 94720-8136

December 2009

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy (Wind & Hydropower Technologies Program) of the U.S. Department of Energy under Contract No. DE-AC02-05CH1123.

Abstract

With wind energy expanding rapidly in the U.S. and abroad, and with an increasing number of communities considering wind power development nearby, there is an urgent need to empirically investigate common community concerns about wind project development. The concern that property values will be adversely affected by wind energy facilities is commonly put forth by stakeholders. Although this concern is not unreasonable, given property value impacts that have been found near high voltage transmission lines and other electric generation facilities, the impacts of wind energy facilities on residential property values had not previously been investigated thoroughly. The present research collected data on almost 7,500 sales of single-family homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states. The conclusions of the study are drawn from eight different hedonic pricing models, as well as both repeat sales and sales volume models. The various analyses are strongly consistent in that none of the models uncovers conclusive evidence of the existence of any widespread property value impacts that might be present in communities surrounding wind energy facilities. Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact.

Table of Contents

List of Tables vi

List of Figures vii

Acknowledgements viii

Executive Summary ix

1. Introduction 1

2. Previous Research 4
   2.1. Hedonic Models and Environmental Disamenities 4
   2.2. Impacts of Wind Projects on Property Values 6

3. Data Overview 10
   3.1. Site Selection 10
   3.2. Data Collection 13
      3.2.1. Tabular Data 13
      3.2.2. GIS Data 15
      3.2.3. Field Data 15
      3.2.4. Field Data Collection 18
   3.3. Data Summary 18

4. Base Hedonic Model 23
   4.1. Dataset 23
   4.2. Model Form 24
   4.3. Analysis of Results 28

5. Alternative Hedonic Models 33
   5.1. View and Distance Stability Models 33
      5.1.1. Dataset and Model Form 34
      5.1.2. Analysis of Results 35
   5.2. Continuous Distance Model 36
      5.2.1. Dataset and Model Form 36
      5.2.2. Analysis of Results 37
   5.3. All Sales Model 37
      5.3.1. Dataset and Model Form 38
      5.3.2. Analysis of Results 39
   5.4. Temporal Aspects Model 42
      5.4.1. Dataset and Model Form 42
      5.4.2. Analysis of Results 44
   5.5. Orientation Model 47
      5.5.1. Dataset and Model Form 47
      5.5.2. Analysis of Results 49
   5.6. Overlap Model 50
      5.6.1. Dataset and Model Form 51
      5.6.2. Analysis of Results 52

6. Repeat Sales Analysis 55
   6.1. Repeat Sales Models and Environmental Disamenities Literature 55

6.2. Dataset ... 56
6.3. Model Form ... 57
6.4. Analysis of Results ... 59

7. Sales Volume Analysis ... 63
7.1. Dataset ... 63
7.2. Model Form ... 65
7.3. Analysis of Results ... 66

8. Wind Projects and Property Values: Summary of Key Results ... 69
8.1. Area Stigma ... 69
8.2. Scenic Vista Stigma ... 71
8.3. Nuisance Stigma ... 73

9. Conclusions ... 75

References ... 76

Appendix A : Study Area Descriptions ... 82
A.1 WAOR Study Area: Benton and Walla Walla Counties (Washington), and Umatilla County (Oregon) ... 84
A.2 TXHC Study Area: Howard County (Texas) ... 87
A.3 OKCC Study Area: Custer County (Oklahoma) ... 90
A.4 IABV Study Area: Buena Vista County (Iowa) ... 93
A.5 ILLC Study Area: Lee County (Illinois) ... 96
A.6 WIKCDC Study Area: Kewaunee and Door Counties (Wisconsin) ... 99
A.7 PASC Study Area: Somerset County (Pennsylvania) ... 102
A.8 PAWC Study Area: Wayne County (Pennsylvania) ... 105
A.9 NYMCOC Study Area: Madison and Oneida Counties (New York) ... 108
A.10 NYMC Study Area: Madison County (New York) ... 111

Appendix B : Methodology for Calculating Distances with GIS ... 114

Appendix C : Field Data Collection Instrument ... 117

Appendix D : Vista Ratings with Photos ... 120

Appendix E : View Ratings with Photos ... 122

Appendix F : Selecting the Primary (“Base”) Hedonic Model ... 124
F.1 Discussion of Fully Unrestricted Model Form ... 124
F.2 Analysis of Alterative Model Forms ... 127
F.3 Selecting a Base Model ... 131

Appendix G : OLS Assumptions, and Tests for the Base Model ... 132

Appendix H : Alternative Models: Full Hedonic Regression Results ... 139

List of Tables

Table 1: Summary of Existing Literature on Impacts of Wind Projects on Property Values..... 9
Table 2: Summary of Study Areas..... 12
Table 3: Definition of VIEW Categories..... 16
Table 4: Definition of VISTA Categories..... 17
Table 5: Summary of Transactions across Study Areas and Development Periods..... 19
Table 6: Summary Statistics: All Sales and Post-Construction Sales..... 21
Table 7: Summary of Variables of Interest: All Sales and Post-Construction Sales..... 22
Table 8: List of Variables of Interest Included in the Base Model..... 25
Table 9: List of Home and Site Characteristics Included in the Base Model..... 27
Table 10: Results from the Base Model..... 32
Table 11: Frequency Crosstab of VIEW and DISTANCE Parameters..... 35
Table 12: Results from Distance and View Stability Models..... 35
Table 13: Results from Continuous Distance Model..... 37
Table 14: Frequency Summary for DISTANCE in All Sales Model..... 39
Table 15: Results from All Sales Model..... 41
Table 16: Results from Equality Test of VIEW Coefficients in the All Sales Model..... 41
Table 17: Results from Equality Test of DISTANCE Coefficients in the All Sales Model..... 42
Table 18: Frequency Crosstab of DISTANCE and PERIOD..... 44
Table 19: Results from Temporal Aspects Model..... 45
Table 20: Results from Equality Test of Temporal Aspects Model Coefficients..... 47
Table 21: Frequency Crosstab of VIEW and ORIENTATION..... 49
Table 22: Percentage Crosstab of VIEW and ORIENTATION..... 49
Table 23: Results from Orientation Model..... 50
Table 24: Definition of OVERLAP Categories..... 51
Table 25: Frequency Crosstab of OVERLAP and VIEW..... 52
Table 26: Results from Overlap Model..... 54
Table 27: List of Variables Included in the Repeat Sales Model..... 57
Table 28: Results from Repeat Sales Model..... 60
Table 29: Sales Volumes by PERIOD and DISTANCE..... 64
Table 30: Equality Test of Sales Volumes between PERIODS..... 67
Table 31: Equality Test of Volumes between DISTANCES using 3-5 Mile Reference..... 67
Table 32: Equality Test of Sales Volumes between DISTANCES using 1-3 Mile Reference..... 67
Table 33: Impact of Wind Projects on Property Values: Summary of Key Results..... 69
Table A - 1: Summary of Study Areas..... 83
Table A - 2: Summarized Results of Restricted and Unrestricted Model Forms..... 128
Table A - 3: Summary of VOI Standard Errors for Restricted and Unrestricted Models..... 130
Table A - 4: Summary of VOI Coefficients for Restricted and Unrestricted Models..... 130
Table A - 5: Summary of Significant VOI Above and Below Zero in Unrestricted Models..... 131
Table A - 6: Full Results for the Distance Stability Model..... 139
Table A - 7: Full Results for the View Stability Model..... 140
Table A - 8: Full Results for the Continuous Distance Model..... 141
Table A - 9: Full Results for the All Sales Model..... 142
Table A - 10: Full Results for the Temporal Aspects Model..... 143
Table A - 11: Full Results for the Orientation Model..... 145
Table A - 12: Full Results for the Overlap Model..... 146

List of Figures

Figure 1: Map of Study Areas and Potential Study Areas 12
Figure 2: Frequency of VISTA Ratings for All and Post-Construction Transactions 20
Figure 3: Frequency of DISTANCE Ratings for Post-Construction Transactions 20
Figure 4: Frequency of VIEW Ratings for Post-Construction Transactions 21
Figure 5: Results from the Base Model for VISTA 29
Figure 6: Results from the Base Model for VIEW 30
Figure 7: Results from the Base Model for DISTANCE 31
Figure 8: Results from the Temporal Aspects Model 46
Figure 9: Repeat Sales Model Results for VIEW 61
Figure 10: Repeat Sales Model Results for DISTANCE 61
Figure 11: Sales Volumes by PERIOD and DISTANCE 65
Figure A - 1: Map of Study Areas 83
Figure A - 2: Map of WAOR Study Area 84
Figure A - 3: Map of TXHC Study Area 87
Figure A - 4: Map of OKCC Study Area 90
Figure A - 5: Map of IABV Study Area 93
Figure A - 6: Map of ILLC Study Area 96
Figure A - 7: Map of WIKCDC Study Area 99
Figure A - 8: Map of PASC Study Area 102
Figure A - 9: Map of PAWC Study Area 105
Figure A - 10: Map of NYMCOC Study Area 108
Figure A - 11: Map of NYMC Study Area 111
Figure A - 12: Field Data Collection Instrument 117
Figure A - 13: Field Data Collection Instrument - Instructions - Page 1 118
Figure A - 14: Field Data Collection Instrument - Instructions - Page 2 119
Figure A - 15: Histogram of Standardized Residuals for Base Model 133
Figure A - 16: Histogram of Mahalanobis Distance Statistics for Base Model 133
Figure A - 17: Histogram of Standardized Residuals for All Sales Model 134
Figure A - 18: Histogram of Mahalanobis Distance Statistics for All Sales Model 134

Acknowledgements

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy (Wind & Hydropower Technologies Program) of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231. The authors would particularly like to thank Megan McCluer, Patrick Gilman, Jim Ahlgrimm, Michele Desautels, and Steve Lindenberg, all of the U.S. Department of Energy, for their long-term support of this work. For reviewing drafts of this report and/or for providing comments that helped shape the early thinking on this project, the authors thank Mark Bolinger, Galen Barbose, and Larry Dale (Berkeley Lab), Alejandro Moreno (US DOE), Larry Flowers and Eric Lantz (NREL), Peter Dent and Sally Sims (Oxford Brookes University), Sandy Bond (Curtin Business School), Randy Winter, Dave Loomis, and Jennifer Hinman (Illinois State University), Thomas Priestley (CH2M Hill), Barton DeLacy (Cushman & Wakefield), Dave Maturen (Maturen Appraisal), Mike McCann (McCann Appraisal), Tom Hewson (Energy Ventures Analysis), Kimberly Centera (AES), Jeff Peterson (NYSERDA), Charles Kubert (Clean Energy Group), Lisa Linowes (Industrial Wind Action), Chris Taylor (Element Power), Sam Enfield (MAP Royalty, Inc.), and Laurie Jodziewicz (AWEA). Of course, any remaining omissions or inaccuracies are those of the authors.

Executive Summary

Overview

Wind power development in the United States has expanded dramatically in recent years. If that growth is to continue it will require an ever-increasing number of wind power projects to be sited, permitted, and constructed. Most permitting processes in the U.S. require some form of environmental impact assessment as well as public involvement in the siting process. Though public opinion surveys generally show that acceptance towards wind energy is high, a variety of concerns with wind power development are often expressed on the local level during the siting and permitting process. One such concern is the potential impact of wind energy projects on the property values of nearby residences.

Concerns about the possible impact of wind power facilities on residential property values can take many forms, but can be divided into the following non-mutually exclusive categories:

- Area Stigma: A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines.
- Scenic Vista Stigma: A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista.
- Nuisance Stigma: A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values.

Although concerns about the possible impact of wind energy facilities on the property values of nearby homes are reasonably well established, the available literature[1] that has sought to quantify the impacts of wind projects on residential property values has a number of shortcomings:

1) Many studies have relied on surveys of homeowners or real estate professionals, rather than trying to quantify real price impacts based on market data;
2) Most studies have relied on simple statistical techniques that have limitations and that can be dramatically influenced by small numbers of sales transactions or survey respondents;
3) Most studies have used small datasets that are concentrated in only one wind project study area, making it difficult to reliably identify impacts that might apply in a variety of areas;
4) Many studies have not reported measurements of the statistical significance of their results, making it difficult to determine if those results are meaningful;
5) Many studies have concentrated on an investigation of the existence of Area Stigma, and have ignored Scenic Vista and/or Nuisance Stigmas;
6) Only a few studies included field visits to homes to determine wind turbine visibility and collect other important information about the home (e.g., the quality of the scenic vista); and
7) Only two studies have been published in peer-reviewed academic journals.

[1] This literature is briefly reviewed in Section 2 of the full report, and includes: Jordal-Jorgensen (1996); Jerabek (2001); Grover (2002); Jerabek (2002); Sterzinger et al. (2003); Beck (2004); Haughton et al. (2004); Khatri (2004); DeLacy (2005); Poletti (2005); Goldman (2006); Hoen (2006); Firestone et al. (2007); Poletti (2007); Sims and Dent (2007); Bond (2008); McCann (2008); Sims et al. (2008); and Kielisch (2009).

This report builds on the previous literature that has investigated the potential impact of wind projects on residential property values by using a hedonic pricing model and by avoiding many of the shortcomings enumerated above. The hedonic pricing model is one of the most prominent and reliable methods for identifying the marginal impacts of different housing and community characteristics on residential property values (see side bar). This approach dates to the seminal work of Rosen (1974) and Freeman (1979), and much of the available literature that has investigated the impacts of potential disamenities on property values has relied on this method.[2]

What Is a Hedonic Pricing Model?
Hedonic pricing models are frequently used by economists and real estate professionals to assess the impacts of house and community characteristics on property values by investigating the sales prices of homes. A house can be thought of as a bundle of characteristics (e.g., number of square feet, number of bathrooms). When a price is agreed upon by a buyer and seller there is an implicit understanding that those characteristics have value. When data from a large number of residential transactions are available, the individual marginal contribution to the sales price of each characteristic for an average home can be estimated with a hedonic regression model. Such a model can statistically estimate, for example, how much an additional bathroom adds to the sale price of an average home. A particularly useful application of the hedonic model is to value non-market goods – goods that do not have transparent and observable market prices. For this reason, the hedonic model is often used to derive value estimates of amenities such as wetlands or lake views, and disamenities such as proximity to and/or views of high-voltage transmission lines, roads, cell phone towers, and landfills. It should be emphasized that the hedonic model is not typically designed to appraise properties (i.e., to establish an estimate of the market value of a home at a specified point in time), as would be done with an automated valuation model. Instead, the typical goal of a hedonic model is to estimate the marginal contribution of individual house or community characteristics to sales prices.

To seed the hedonic model with appropriate market data, this analysis collects information on a large quantity of residential home sales (i.e., transactions) (n = 7,459) from ten communities surrounding 24 existing wind power facilities spread across multiple parts of the U.S. (e.g., nine states). Homes included in this sample are located from 800 ft to over five miles from the nearest wind energy facility, and were sold at any point from before wind facility announcement to over four years after the construction of the nearby wind project. Each of the homes that sold was visited to determine the degree to which the wind facility was likely to have been visible at the time of sale and to collect other essential data.

To assess the potential impacts of all three of the property value stigmas described earlier, a base hedonic model is applied as well as seven alternative hedonic models each designed to investigate the reliability of the results and to explore other aspects of the data (see Table ES - 1 below). In addition, a repeat sales model is analyzed, and an investigation of possible impacts on sales volumes is

[2] Many of these studies are summarized in the following reviews: Kroll and Priestley (1992); McCann (1999); Bateman et al. (2001); Boyle and Kiel (2001); Jackson (2001); Simons and Saginor (2006); and Leonard et al. (2008). For further discussion of the hedonic model and its application to the quantification of environmental stigmas see Jackson (2005) and Simons (2006a).

conducted. Though some limitations to the analysis approach and available data are acknowledged, the resulting product is the most comprehensive and data-rich analysis to date in the U.S. or abroad on the impacts of wind projects on nearby property values.

Analysis Findings

Table ES - 1 describes the ten resulting statistical models that are employed to investigate the effects of wind facilities on residential sales prices, and the specific stigmas that those models investigate. Though all models test some combination of the three possible stigmas, they do so in different ways. For instance, the Base Model asks the question, "All else being equal, do homes near wind facilities sell for prices different than for homes located farther away?", while the All Sales Model asks, "All else being equal, do homes near wind facilities that sell after the construction of the wind facility sell for prices different from similar homes that sold before the announcement and construction of the facility?" Each model is therefore designed to not only test for the reliability of the overall results, but also to explore the myriad of potential effects from a variety of perspectives. Table ES-2 summarizes the results from these models.

Table ES - 1: Description of Statistical Models

Statistical Model	Description
Base Hedonic Model	Using only "post-construction" transactions (those that occurred after the wind facility was built), this model investigates all three stigmas in a straightforward manner
Alternative Hedonic Models	
View Stability	Using only post-construction transactions, this model investigates whether the Scenic Vista Stigma results from the Base Model are independent of the Nuisance and Area Stigma results
Distance Stability	Using only post-construction transactions, this model investigates whether the Nuisance and Area Stigma results from the Base Model are independent of the Scenic Vista Stigma results
Continuous Distance	Using only post-construction transactions, this model investigates Area and Nuisance Stigmas by applying a continuous distance parameter as opposed to the categorical variables for distance used in the previous models
All Sales	Using all transactions, this model investigates whether the results for the three stigmas change if transactions that occurred before the announcement and construction of the wind facility are included in the sample
Temporal Aspects	Using all transactions, this model further investigates Area and Nuisance Stigmas and how they change for homes that sold more than two years pre-announcement through the period more than four years post-construction
Orientation	Using only post-construction transactions, this model investigates the degree to which a home's orientation to the view of wind turbines affects sales prices
Overlap	Using only post-construction transactions, this model investigates the degree to which the overlap between the view of a wind facility and a home's primary scenic vista affects sales prices
Repeat Sales Model	Using paired transactions of homes that sold once pre-announcement and again post-construction, this model investigates the three stigmas, using as a reference transactions of homes located outside of five miles of the nearest wind turbine and that have no view of the turbines
Sales Volume Model	Using both pre-announcement and post-construction transactions, this model investigates whether the rate of home sales (not the price of those sales) is affected by the presence of nearby wind facilities

Table ES-2: Impact of Wind Projects on Property Values: Summary of Key Results

Statistical Model	Is there statistical evidence of: Area Stigma?	Scenic Vista Stigma?	Nuisance Stigma?	Section Reference
Base Model	No	No	No	*Section 4*
View Stability	Not tested	No	Not tested	*Section 5.1*
Distance Stability	No	Not tested	No	*Section 5.1*
Continuous Distance	No	No	No	*Section 5.2*
All Sales	No	No	Limited	*Section 5.3*
Temporal Aspects	No	No	No	*Section 5.4*
Orientation	No	No	No	*Section 5.5*
Overlap	No	Limited	No	*Section 5.6*
Repeat Sales	No	Limited	No	*Section 6*
Sales Volume	No	Not tested	No	*Section 7*

"No"…….. No statistical evidence of a negative impact
"Yes"……. Strong statistical evidence of a negative impact
"Limited"…….. Limited and inconsistent statistical evidence of a negative impact
"Not tested"…… This model did not test for this stigma

Base Model Results

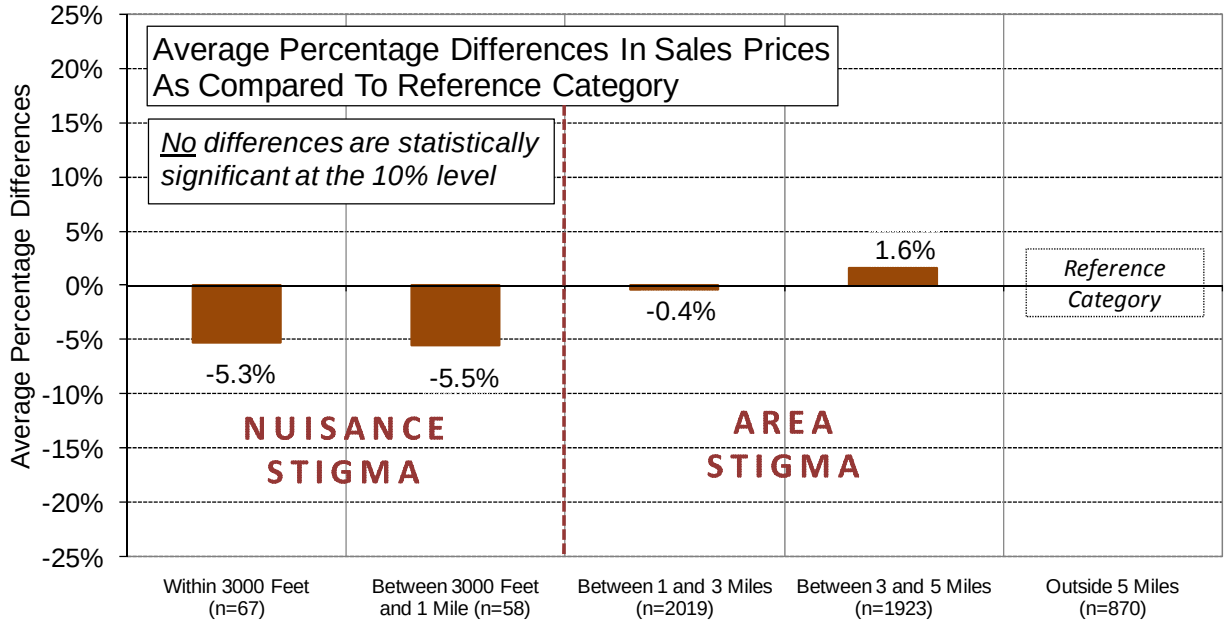
The Base Model serves as the primary model and allows all three stigmas to be explored. In sum, this model finds no persuasive evidence of any of the three potential stigmas: neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices.

- Area Stigma: To investigate Area Stigma, the model tests whether the sales prices of homes situated anywhere outside of one mile and inside of five miles of the nearest wind facility are measurably different from the sales price of those homes located outside of five miles. No statistically significant differences in sales prices between these homes are found (see Figure ES-1).
- Scenic Vista Stigma: For Scenic Vista Stigma, the model is first used to investigate whether the sales prices of homes with varying scenic vistas - absent the presence of the wind facility - are measurably different. The model results show dramatic and statistically significant differences in this instance (see Figure ES-2); not surprisingly, home buyers and sellers consider the scenic vista of a home when establishing the appropriate sales price. Nonetheless, when the model tests for whether homes with minor, moderate, substantial, or extreme views of wind turbines have measurably different sales prices, no statistically significant differences are apparent (see Figure ES-3).
- Nuisance Stigma: Finally, for Nuisance Stigma, the model is used to test whether the sales prices of homes situated inside of one mile of the nearest wind energy facility are measurably different from those homes located outside of five miles. Although sample size is somewhat limited in this case,[3] the model again finds no persuasive statistical evidence that wind

[3] 125 homes were located inside of one mile of the nearest wind facility and sold post-construction.

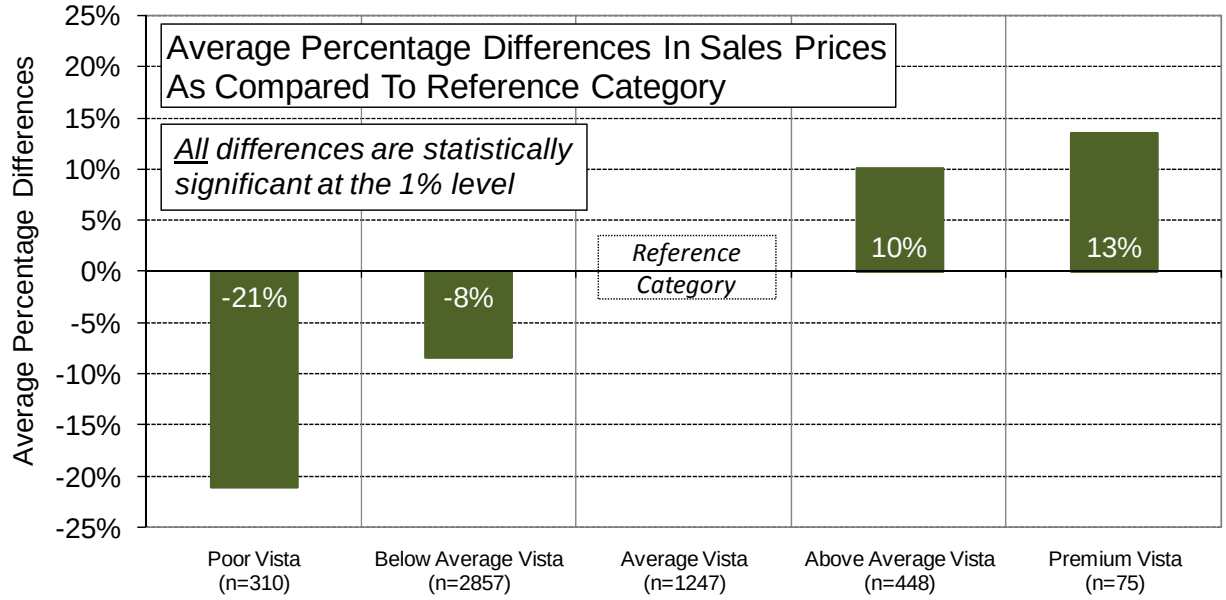
facilities measurably and broadly impact residential sales prices (see Figure ES-1 and later results).

Figure ES-1: Base Model Results: Area and Nuisance Stigma



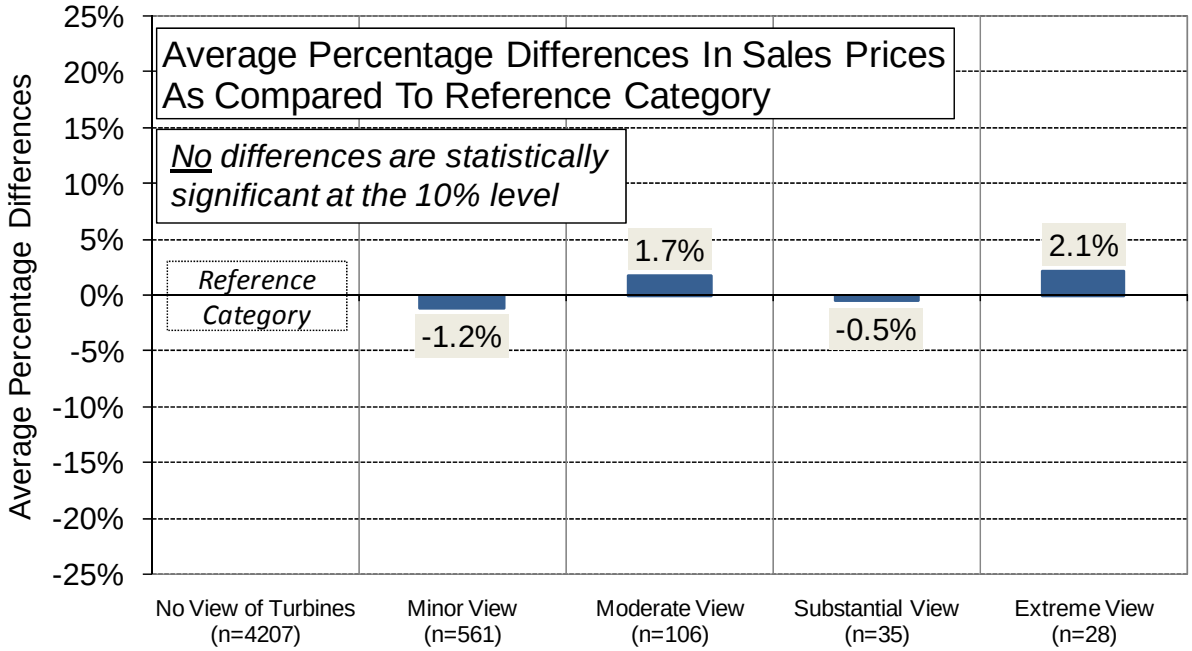
The reference category consists of transactions for homes situated more than five miles from the nearest turbine, and that occured after construction began on the wind facility

Figure ES-2: Base Model Results: Scenic Vista



The reference category consists of transactions for homes with an Average Vista, and that occured after construction began on the wind facility

Figure ES-3: Base Model Results: Scenic Vista Stigma



The reference category consists of transactions for homes without a view of the turbines, and that occured after construction began on the wind facility

The seven alternative hedonic models and the additional analysis contained in the Repeat Sales and Sales Volume Models (see Table ES-2) provide a fuller picture of the three stigmas and the robustness of the Base Model results.

Area Stigma: Other Model Results

Concentrating first on Area Stigma, the results from all of the models are similar: there is no statistical evidence of a widespread Area Stigma among the homes in this sample. Homes in the study areas analyzed here do not appear to be measurably stigmatized by the arrival of a wind facility, regardless of when those homes sold in the wind project development process and regardless of whether the homes are located one mile or five miles away from the nearest facility.

In the All Sales Model, for example, after adjusting for inflation,[4] homes that sold after wind facility construction and that had no view of the turbines are found to have transacted for higher prices - not lower - than those homes that sold prior to wind facility construction. Moreover, in the Temporal Aspects Model, homes that sold more than two years prior to the announcement of the wind facility and that were located more than five miles from where the turbines were eventually located are found to have transacted for lower prices - not higher - than homes situated closer to the turbines and that sold at any time after the announcement and construction of the wind facility (see Figure ES - 4). Further, in the Repeat Sales Model, homes located near the wind facilities that transacted more than once were found to have appreciated between those sales by an amount that was no different from that experienced by homes located in an area

[4] All sales prices in all models are adjusted for inflation, but because this model (and the Temporal Aspects Model) deals with time explicitly, it is mentioned specifically here.

many miles away from the wind facilities. Finally, as shown in Table ES-2, none of the other models identified evidence of a broadly negative and statistically significant Area Stigma.

Scenic Vista Stigma: Other Model Results

With respect to Scenic Vista Stigma, the seven alternative hedonic models and the additional analysis contained in the Repeat Sales Model find little consistent evidence of a broadly negative and statistically significant impact. Although there are 730 residential transactions in the sample that involve homes that had views of a wind facility at the time of sale, 160 of which had relatively significant views (i.e., a rating higher than Minor), none of the various models finds strong statistical evidence that the view of a nearby wind facility impacts sales prices in a significant and consistent manner.

When concentrating only on the view of the wind facilities from a home (and not testing for Area and Nuisance Stigmas simultaneously), for example, the results from the View Stability Model are very similar to those derived from the Base Model, with no evidence of a Scenic Vista Stigma. Similarly, the All Sales Model finds that homes that sold after wind facility construction and that had a view of the facility transacted for prices that are statistically indistinguishable from those homes that sold at any time prior to wind facility construction. The Orientation Model, meanwhile, fails to detect any difference between the sales prices of homes that had either a front, back, or side orientation to the view of the wind facility. As shown in Table ES-2, the Continuous Distance and Temporal Aspects models also do not uncover any evidence of a broadly negative and statistically significant Scenic Vista Stigma.

In the Repeat Sales Model, some limited evidence is found that a Scenic Vista Stigma may exist, but those effects are weak, fairly small, somewhat counter-intuitive, and are at odds with the results of other models. This finding is likely driven by the small number of sales pairs that are located within one mile of the wind turbines and that experience a dramatic view of those turbines. Finally, in the Overlap Model, where the degree to which a view of the wind facility overlaps the primary scenic vista from the home is accounted for, no statistically significant differences in sales prices are detected between homes with somewhat or strongly overlapping views when compared to those homes with wind turbine views that did not overlap the primary scenic vista. Though this model produces some weak evidence of a Scenic Vista Stigma among homes with Minor views of wind facilities, the same model finds that the sales prices of those homes with views that barely overlap the primary scenic vista are positively impacted by the presence of the wind facility. When these two results are combined, the overall impact is negligible, again demonstrating no persuasive evidence of a Scenic Vista Stigma.

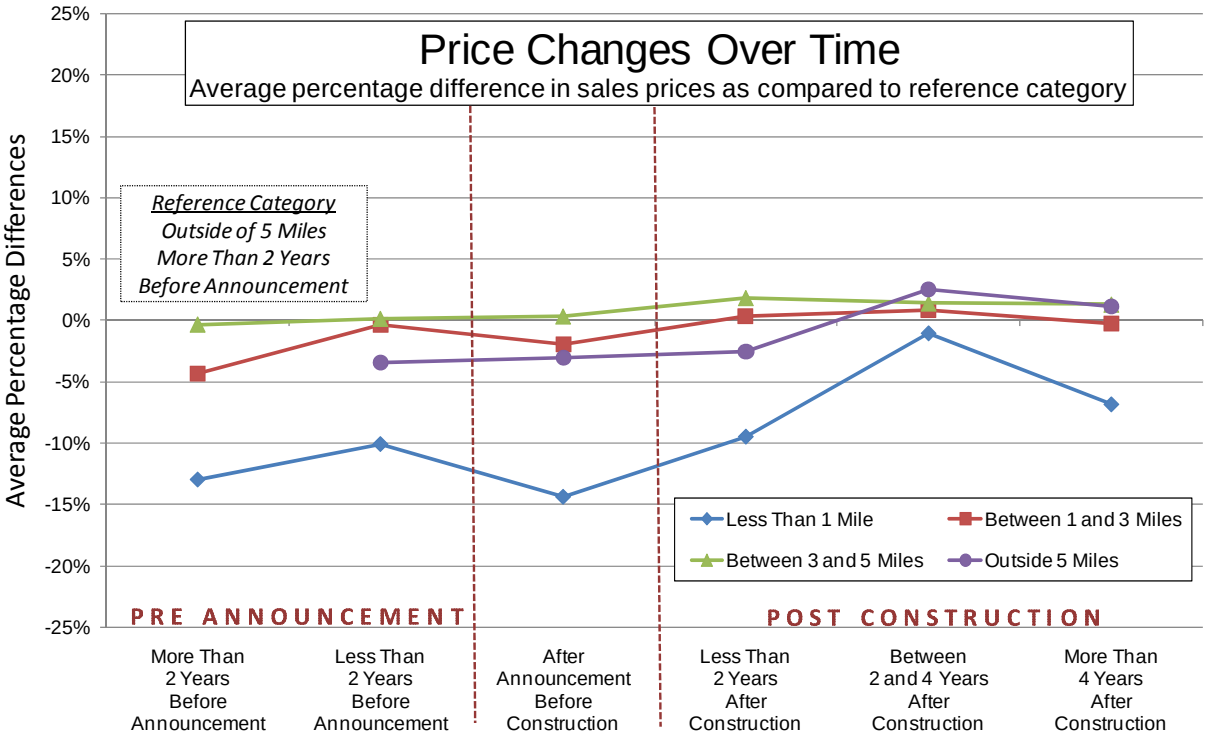
Nuisance Stigma: Other Model Results

Results for Nuisance Stigma from the seven alternative hedonic models and the additional analysis contained in the Repeat Sales and Sales Volume Models support the Base Model results. Taken together, these models present a consistent set of results: homes in this sample that are within a mile of the nearest wind facility, where various nuisance effects have been posited, have not been broadly and measurably affected by the presence of those wind facilities. These results imply that Nuisance Stigma effects are either not present in this sample, or are too small and/or infrequent to be statistically distinguished.

In the Distance Stability Model, for example, when concentrating only on the distance from homes to the nearest wind turbine (and not testing for Scenic Vista Stigma simultaneously), the results are very similar to those derived from the Base Model, with no statistical evidence of a Nuisance Stigma. These results are corroborated by the Continuous Distance, Orientation, Overlap, and Repeat Sales Models, none of which find a statistically significant relationship between distance and either sales prices or appreciation rates. Relatedly, the Sales Volume analysis finds no evidence that homes located within one mile of the nearest wind turbine are sold any more or less frequently than homes located farther away from the wind facilities.

In the All Sales Model, a weakly significant difference is found between the sales prices of homes located between 3000 feet and one mile of the nearest wind facility and the homes that sold before the announcement of the wind facility. This effect, however, is largely explained by the results of the Temporal Aspects Model, shown in Figure ES - 4. The Temporal Aspects Model finds that homes located within one mile of where the wind turbines would eventually be located sold for depressed prices well before the wind facility was even announced or constructed. In all time periods following the commencement of wind facility construction, however, inflation-adjusted sales prices increased - not decreased - relative to pre-announcement levels, demonstrating no statistical evidence of a Nuisance Stigma. The results from the All Sales Model (and, for that matter, the negative, albeit statistically insignificant coefficients inside of one mile in the Base Model, see Figure ES-1) are therefore an indication of sales price levels that preceded wind facility announcement construction, and that are not sustained after construction.

Figure ES - 4: Temporal Aspects Model Results: Area and Nuisance Stigma



The reference category consists of transactions of homes situated more than five miles from where the nearest turbine would eventually be located and that occurred more than two years before announcement of the facility

Conclusions and Further Research Needs

Though each of the analysis techniques used in this report has strengths and weaknesses, the results as a whole are strongly consistent in that none of the models uncovers conclusive evidence of the presence of any of the three property value stigmas that might be present in communities surrounding wind power facilities. Therefore, based on the data sample and analysis presented here, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact. Moreover, to the degree that homes and wind facilities in this sample are similar to homes and facilities in other areas of the United States, the results presented here are expected to be transferable to other areas.

This work builds on the existing literature in a number of respects, but there remain a number of areas for further research. The primary goal of subsequent research should be to concentrate on those homes located closest to wind facilities, where the data sample herein was the most limited. Additional research of the nature reported in this paper could be pursued, but with a greater number of transactions, especially for homes particularly close to wind facilities. A more detailed analysis of sales volume impacts may also be fruitful, as would an assessment of the potential impact of wind facilities on the length of time homes are on the market in advance of an eventual sale. Finally, it would be useful to conduct a survey of those homeowners living close to existing wind facilities, and especially those residents who have bought and sold homes in proximity to wind facilities after facility construction, to assess their opinions on the impacts of wind project development on their home purchase and sales decisions.

1. Introduction

Wind power development has expanded dramatically in recent years (GWEC, 2009). Although the percent of electricity supplied to the U.S. and globally from wind power projects installed through 2008 remains relatively low (1.9% and 1.5%, respectively) (Wiser and Bolinger, 2009), there are expectations that those percentages will rise and that wind energy could contribute a significant percentage of future electricity supply (GWEC, 2008; Wiser and Hand, 2010). Most recently, President Obama, in his 2009 State of the Union address, called for a doubling of renewable energy in three years (by 2012), and in 2008 the U.S. Department of Energy produced a report that analyzed the feasibility of meeting 20% of U.S. electricity demand with wind energy by 2030 (US DOE, 2008).

To meet these goals, a significant amount of wind project development activity would be required. The average size of wind power projects built in the U.S. in 2007 and 2008 was approximately 100 MW (Wiser and Bolinger, 2009) and the total amount of capacity required to reach 20% wind electricity is roughly 300,000 MW (US DOE, 2008). Therefore, to achieve 20% wind electricity by 2030, a total of 3,000 wind facilities may need to be sited and permitted. Most permitting processes in the U.S. require some form of environmental impact assessment, and some form of public involvement in the siting process. Though surveys show that public acceptance is high in general for wind energy (e.g., Wolsink, 2000; Firestone and Kempton, 2006), a variety of concerns are often expressed on the local level that can impact the length and outcome of the siting and permitting process. These concerns range from the potential impacts of wind projects on wildlife habitat and mortality, radar and communications systems, ground transportation and historic and cultural resources, to aesthetic and property value concerns as well as potential nuisance and health impacts. As a result, a variety of siting and permitting guidelines (AWEA, 2008) and impact assessments (NAS, 2007) have been completed.

Surveys of local communities considering wind facilities have consistently ranked adverse impacts on aesthetics and property values in the top tier of concerns (e.g., BBC R&C, 2005; Firestone and Kempton, 2006). Developers of wind energy echo this assessment: they ranked aesthetics and property values as two of the top concerns (first and third respectively) for individuals or communities opposed to wind power development (Paul, 2006). Local residents have even brought suit against a developer over property values (Dale Rankin v. FPL, 2008), and some developers have responded to these concerns by offering “neighbor agreements” that compensate nearby homeowners for the potential impacts of wind projects.

The two concerns of aesthetics and property values are intrinsically linked. It is well established that a home’s value will be increased if a high-quality scenic vista is enjoyed from the property (e.g., Seiler et al., 2001). Alternatively, it is reasonable to assume that if a home’s scenic vista overlaps with a view of a disamenity, the home might be devalued, as has been found for high-voltage transmission lines (HVTL) (Kroll and Priestley, 1992; Des-Rosiers, 2002). Whether a view of wind turbines similarly impacts home values is a key topic of debate in local siting decisions. Aesthetics alone, however, is not the only pathway through which wind projects might impact residential property values. Distance to the nearest wind turbine, for example, might also have an impact if various nuisance effects are prominent, such as turbine noise,

shadow flicker,[5] health or safety concerns, or other impacts, real or perceived. In this way, property values near wind turbines might be impacted in the same way as homes near roads might be devalued (Bateman et al., 2001). Additionally, there is evidence that proximity to a disamenity, even if that disamenity is not visible and is not so close as to have obvious nuisance effects, may still decrease a home's sales price, as has been found to be the case for landfills (Thayer et al., 1992).

Taken together, these general concerns about the possible impacts of wind projects on residential property values can be loosely categorized into three potential stigmas:

- Area Stigma: A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines.
- Scenic Vista Stigma: A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista.
- Nuisance Stigma: A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values.

These three potential stigmas are not mutually exclusive and could, in theory, be present in part or in combination for any single home. Consequently, all three potential impacts must be considered when analyzing the effects of wind facilities on residential sales prices.

Although concerns about the potential impact of wind projects on residential property values are often mentioned in siting cases, the state of the existing literature on this topic leaves much to be desired. To some extent, the growing body of research investigating this topic has come to opposing conclusions. The most recent and comprehensive of these studies have often concluded that no widespread impacts of wind projects on residential property values are apparent (Hoen, 2006; Sims and Dent, 2007; Sims et al., 2008). At the same time, pre-construction surveys of both homeowners and real estate experts have sometimes found an expectation of negative impacts (e.g. Haughton et al., 2004), and post-construction appraisals have sometimes come to similar conclusions (McCann, 2008; Kielisch, 2009). Given the state of the literature, it is not uncommon for local siting and permitting processes to involve contradicting testimony from experts, as occurred in 2004 when the Public Service Commission of Wisconsin heard opposing conclusions from two studies conducted by experienced home valuation experts (Poletti, 2005; Zarem, 2005).

This report contains the most comprehensive and data-rich analysis to date on the potential impacts of wind projects on nearby residential sales prices. Data from 7,459 residential transactions were collected from the surrounding communities of 24 individual wind projects in nine states and 14 counties in the United States.[6] Because of the large sample size, the diversity of wind projects included in the analysis, and the depth of information collected, a number of different analyses were possible. Specifically, this report relies heavily on a hedonic regression

[5] Shadow flicker occurs when the sun shines through the wind turbine blades when at a low angle to the horizon and shadows are cast on a window or interior wall of a residence (NAS, 2007).

[6] The majority of the analysis only includes homes that sold after wind facility construction began, totaling 4,937 transactions.

model[7] and uses various forms of that model to investigate potential effects and to confirm the robustness of the resulting findings. To further investigate the robustness of the results, a repeat sales model[8] and a sales volume model[9] are also utilized. In sum, this work builds and improves on the previous literature, and provides an in-depth assessment of the question of whether residential property values in the United States have been affected, in a statistically measurable way, by views of and proximity to wind power facilities.

The remainder of this report is structured as follows. The next section discusses the hedonic model in general, its application to environmental disamenities research, and some potentially analogous results drawn from these studies. This is followed by a summary of the existing literature that has investigated the effects of wind energy on residential property values. The report then turns to the data used in the analysis, a discussion of the primary (or "base") hedonic model, and an analysis of the results from that statistical model. Following that, a set of alternative hedonic models are estimated, as well as a repeat sales model and sales volume model, to test for the robustness of the "base" model results and to explore other aspects of the data. Taking into account the full set of results presented earlier, the report then discusses the three stigmas that may lead to wind projects impacting residential property values, and summarizes how the analysis informs the existence and magnitude of these potential effects. The report ends with a brief conclusion, and a discussion of future research possibilities. A number of appendices follow the conclusion, and contain detailed information on each wind project study area, the data collection instrument and qualitative rating systems used in the field research, the investigation of the best "base" model, the hedonic model assumptions and related tests, and full results from all of the additional statistical models estimated in the report.

[7] The hedonic regression model, which was briefly described in a sidebar in the Executive Summary, is described in detail in Section 2.1.

[8] A repeat sales model uses, as its dataset, only those homes that have sold more than once. By comparing annual appreciation rates of homes that sold once before facility announcement, and again after construction, it can be tested, in an alternative fashion, if home values are affected by the distance to or view of nearby wind turbines.

[9] Sales volume can be defined as the percentage of homes that fit a certain criteria (e.g. single family, on less than 25 acres, zoned residential, assessed for more than $10,000) that actually did sell. By comparing sales volumes at various distances to wind facilities, before and after the facility was built, a further robustness test is possible.

2. Previous Research

Hedonic pricing models are frequently used to assess the marginal impacts of house and community characteristics on sales prices and by extension on property values in general. Because the hedonic model is the primary statistical method used in this report, this section begins by describing the model in more detail and providing some relevant examples of its use. The section then reviews the existing literature on the effects of wind energy facilities on surrounding property values, highlights the shortcomings of that literature, and outlines how the present research addresses those shortcomings.

2.1. Hedonic Models and Environmental Disamenities

A house can be thought of as a bundle of characteristics (e.g., number of square feet, number of bathrooms, number of fireplaces, and amount of acreage). When a price is agreed upon between a buyer and seller there is an implicit understanding that those characteristics have value. When data from a number of sales transactions are available, the individual marginal contribution to the sales price of each characteristic can be estimated with a hedonic regression model (Rosen, 1974; Freeman, 1979). This relationship takes the basic form:

Sales price = *f* (house structural characteristics, other factors)

where "house structural characteristics" might include, but are not limited to, the number of square feet of living area, bathrooms, and fireplaces, the presence of central AC and the condition of the home, and "other factors" might include, but are not limited to, home site characteristics (e.g., number of acres), neighborhood characteristics (e.g., school district), market conditions at the time of sale (e.g., prevailing mortgage interest rates), and surrounding environmental conditions (e.g., proximity to a disamenity or amenity).

The relationship between the sales price of homes and the house characteristics and other factors can take various forms. The most common functional form is the semi-log construction where the dependent variable is the natural log of the inflation adjusted sales price, and the independent variables are unadjusted (not transformed) home characteristics and other factors. The usefulness of this form of hedonic model is well established (Malpezzi, 2003; Sirmans et al., 2005b; Simons and Saginor, 2006) assuming that certain threshold assumptions are met.[10] The model is used commonly by academics, real estate assessors, appraisers, and realtors when large datasets are available on past residential sales transactions, and when estimates of the marginal impact of certain house characteristics and other factors on sales prices are desired.[11]

---

[10] These assumptions, which are discussed in greater detail in Section 4.2 and Appendix G, include absence of outliers and/or influencers, presence of homoskedastic variances, absence of spatial and temporal autocorrelation, and absence of collinearity between the variables of interest and other independent variables.

[11] It should be emphasized that a hedonic model is not designed to appraise properties (i.e., to establish an estimate of the market value of a home at a specified point in time), as would be done with an automated valuation model (AVM). Rather, hedonic models are designed to estimate the marginal contribution of individual house or community characteristics to sales prices, which requires hedonic models to rely upon large data sets with a sizable number of explanatory variables. Appraisal models, on the other hand, are generally based on small, localized data sets (i.e., "comps") and a limited number of explanatory variables that pertain to nearby properties. Due to their higher level of accuracy through the use of significantly more information (e.g., diverse spatial, temporal, and

A particularly useful application of the hedonic regression model is to value non-market goods – goods that do not have transparent and observable market prices. For this reason, the hedonic model is often used to derive value estimates of amenities such as wetlands (e.g., Mahan et al., 2000) or lake views (e.g., Seiler et al., 2001), and disamenities, such as proximity to and/or views of high-voltage transmission lines (HVTLs) (e.g. Des-Rosiers, 2002), fossil fuel power plants (Davis, 2008), roads (e.g. Bateman et al., 2001), cell phone towers (e.g. Bond and Wang, 2007), and landfills (e.g., Thayer et al., 1992; Ready and Abdalla, 2005).

There are a number of useful reviews that describe the application of hedonic models in these circumstances (Kroll and Priestley, 1992; Farber, 1998; McCann, 1999; Bateman et al., 2001; Boyle and Kiel, 2001; Jackson, 2001; Ready and Abdalla, 2005; Simons and Saginor, 2006; Simons, 2006b; Leonard et al., 2008).[12] The large number of studies covered in these reviews demonstrate that hedonic models are regularly used to investigate the interplay between home values and distance to potential disamenities, teasing out if and how sales prices are adversely affected depending on the distance of a typical home from a disamenity. For example, Carroll et al. (1996) use a hedonic model to estimate a devaluation of 16% for homes "close to" a chemical plant, with a 6.5% increase in sales price per mile away out to 2.5 miles, at which point effects fade entirely. Dale et al. (1999) find a maximum effect of -4% near a lead smelter, with sales prices increasing 2% for each mile away out to two miles, where effects again fade. Ready and Abdalla (2005) find maximum effects near landfills of -12.4%, which fade entirely outside 2,400 feet, and maximum effects near confined animal feeding operations of -6.4%, which fade entirely outside of 1,600 feet. Meanwhile, studies of other energy infrastructure, such as HVTLs, find maximum effects of -5.7% for homes adjacent to a HVTL tower, and an increase in prices of 0.018% per foot away from the tower out to 300 feet (Hamilton and Schwann, 1995), and maximum effects of -14% for homes within 50 feet of a HVTL, but no effect for similar homes at 150 feet (Des-Rosiers, 2002). Further, for fossil fuel power plants, Davis (2008) finds average adverse effects of between 3 and 5% inside of two miles but that those effects fade entirely outside of that distance range.

In addition to investigating how sales prices change with distance to a disamenity, hedonic models have been used to investigate how prices have changed over time. For instance, sales prices have sometimes been found to rebound after the removal of a disamenity, such as a lead smelter (Dale et al., 1999), or to fade over time, as with HVTLs (Kroll and Priestley, 1992) or spent fuel storage facilities (Clark and Allison, 1999). Finally, hedonic models have been used to estimate how views of a disamenity affect sales prices. Des-Rosiers (2002), for example, finds that homes adjacent to a power line and facing a HVTL tower sell for as much as 20% less than similar homes that are not facing a HVTL tower.

---

characteristic information) and rigorous methodology, hedonic models can also be used as appraisal models. Automated valuation models cannot, however, be reliably used to measure marginal effects because they do not employ sufficient information to do so, and, more importantly, AVMs do not hold controlling characteristics constant, which could bias any resulting estimates of marginal effects.

[12] For further discussion of the hedonic model and its application to the quantification of environmental stigmas in comparison to other methods see Jackson (2005).

It is unclear how well the existing hedonic literature on other disamenities applies to wind turbines, but there are likely some similarities. For instance, in general, the existing literature seems to suggest that concerns about lasting health effects provide the largest diminution in sales prices, followed by concerns for one's enjoyment of the property, such as auditory and visual nuisances, and that all effects tend to fade with distance to the disamenity - as the perturbation becomes less annoying. This might indicate that property value effects from wind turbines are likely to be the most pronounced quite close to them, but fade quickly as their auditory and visual impacts fade. The existing hedonic literature also, in general, finds that effects fade with time as self-selecting buyers without prejudice towards the disamenity move into the area, or as the real or perceived risks of the disamenity are lessoned (Jackson, 2001). This implies that any stigmas related to wind turbines might also fade over time as local communities come to accept their presence.

2.2. Impacts of Wind Projects on Property Values

Turning to the literature that has investigated the potential property value effects from wind facilities directly, it deserves note that few studies have been academically peer-reviewed and published; in some cases, the work has been performed for a party on one side or the other of the permitting process (e.g., the wind developer or an opposition group). Nonetheless, at a minimum, a brief review of this existing literature will set the stage for and motivate the later discussion of the methods and results of the present work. The literature described below is summarized in Table 1. To frame this discussion, where possible, the three potential stigmas discussed earlier are used:

- Area Stigma: A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines.
- Scenic Vista Stigma: A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista.
- Nuisance Stigma: A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values.

In one of the most recent studies, Sims et al. (2008) used a hedonic model to investigate Scenic Vista Stigma using 199 residential transactions within ¼ of a mile of the 16-turbine Bears Down wind facility in Cornwall, UK. They found both large positive and smaller negative significant relationships between views of the turbines and sales prices depending on whether the view is seen from the front or rear of the home, respectively, but found no relationship between the number of wind turbines visible and sales prices. Previously, Sims and Dent (2007) used a hedonic model to investigate Nuisance and Scenic Vista Stigma with 919 transactions for homes within five miles of two wind facilities in the UK, finding only limited evidence of a relationship between proximity to and views of turbines and sales prices, which local real estate experts attributed to other causes. Hoen (2006) investigated Scenic Vista Stigma using a hedonic model to analyze 280 residential transactions occurring near a wind facility in Madison County, NY, and found no evidence that views of turbines significantly affects prices. Jordal-Jorgensen (1996) investigated Nuisance Stigma in Denmark, and found an adverse effect for homes located "close" to the turbines, but no statistical significance was reported.[13]

[13] A copy of this report could not be obtained and therefore its findings are reported based on other citations.

Using different statistical methods, Poletti (2005; 2007) used a *t*-Test to investigate Nuisance and Area Stigma by comparing the mean sales prices of 187 and 256 homes in Illinois and Wisconsin, respectively, located near wind facilities (target group) to those further away (control group).[14, 15] He split these target and control groups into respective smaller and more-homogenous sub-groups, such as large and small tracts, with and without homes, finding no statistical evidence that homes near the wind facilities sold for different prices than those farther away. Sterzinger et al. (2003) analyzed roughly 24,000 residential transactions, which were divided between those within five miles of a wind facility and those outside of five miles in an effort to assess Area Stigma. They compared residential appreciation rates over time, and found no apparent difference between those homes within and outside of five miles from a wind facility, but the statistical significance of this comparison was not reported.

Other authors have used smaller samples of residential transactions and a variety of simple statistical techniques, without reporting statistical significance, and have found a lack of evidence of effects from Nuisance Stigma (Jerabek, 2001; Jerabek, 2002; Beck, 2004) and Area Stigma (DeLacy, 2005; Goldman, 2006). These results, however, are somewhat contrary to what one appraiser has found. In his investigation of Nuisance Stigma around a wind facility in Lee County, IL, McCann (2008) found that two homes nearby a wind facility had lengthy selling periods that, he believes, also adversely affected transaction prices. Additionally, Kielisch (2009) investigated Nuisance Stigma by comparing twelve transactions of undeveloped land near two wind facilities in Wisconsin (Blue Sky Green Field and Forward) to undeveloped land transactions farther away. He found that land tracts near the wind facilities sold for dramatically lower prices ($/acre) than the comparable group, but the statistical significance of the comparison was not reported.

In addition to these revealed preference studies, a number of stated preference surveys (e.g., contingent valuation) and general opinion surveys have investigated the existence of potential effects.[16] A survey of <u>local residents</u>, conducted after the wind facilities were erected, found no evidence of Area Stigma (Goldman, 2006), while another found limited evidence of these stigmas (Bond, 2008).[17] Similarly, some surveys of <u>real estate experts</u> conducted after facility

[14] A *t*-Test is used to compare two sample means by discerning if one is significantly different from the other.

[15] The 2007 study used the data contained in the 2005 study in combination with new data consisting of transactions that occurred in the interim period.

[16] Contingent valuation is a survey based technique to value non-market goods (e.g., an environmental disamenity) that asks respondents what their "willingness to pay" (or "willingness to accept") is to have, for instance, a disamenity removed from (or to have it remain in) their neighborhood. This technique is distinct from a general opinion survey, which might ask whether respondents believe property values have been impacted by an environmental disamenity and, if so, "by how much." Although there are important distinctions between the two techniques, with the contingent valuation method often preferred by economic practitioners, for simplicity no distinction is made here between these two approaches. Finally, another subset of the survey literature focuses on public acceptance (i.e., opinion). Though these public acceptance surveys sometimes cover possible impacts on property values, those impacts are not quantified in economic terms. As a result, public acceptance survey results are not reported here.

[17] Bond (2008) asked respondents to declare if the wind facility, which is located roughly 7 miles away, would effect what they would be willing to pay for their house and 75% said either they would pay the same or more for their house, while the remainder would pay less. When those latter respondents were asked to estimate the percentage difference in value, their estimates averaged roughly 5%.

construction have found no evidence of Area or Nuisance Stigmas (Grover, 2002; Goldman, 2006). These results, however, are contrary to the expectations for Area, Scenic Vista, and Nuisance Stigma effects predicted by local residents (Haughton et al., 2004; Firestone et al., 2007) and real estate experts (Haughton et al., 2004; Khatri, 2004; Kielisch, 2009) prior to construction found elsewhere.[18] The difference between predicted and actual effects might be attributable, at least in part, to the fear of the unknown. For instance, Wolsink (1989) found that public attitudes toward wind power, on average, are at their lowest for local residents during the wind project planning stage, but return almost to pre-announcement levels after the facilities are built. This result is echoed by Exeter-Enterprises-Ltd. (1993) and Palmer (1997), whose post-construction surveys found higher approval than those conducted pre-construction. Others, however, have found that perceptions do not always improve, attributing the lack of improvement to the perceived "success" or lack therefore of the project, with strong disapproval forming if turbines sit idle (Thayer and Freeman, 1987) or are perceived as a waste of taxpayer dollars (Devine-Wright, 2004).

When this literature is looked at as a whole, it appears as if wind projects have been predicted to negatively impact residential property values when pre-construction surveys are conducted, but that sizable, widespread, and statistically significant negative impacts have largely failed to materialize post-construction when actual transaction data become available for analysis. The studies that have investigated Area Stigma with market data have failed to uncover any pervasive effect. Of the studies focused on Scenic Vista and Nuisance Stigmas, only one is known to have found statistically significant adverse effects, yet the authors contend that those effects are likely driven by variables omitted from their analysis (Sims and Dent, 2007). Other studies that have relied on market data have sometimes found the possibility of negative effects, but the statistical significance of those results have rarely been reported.

Despite these findings, the existing literature leaves much to be desired. First, many studies have relied on surveys of homeowners or real estate professionals, rather than trying to quantify real price impacts based on market data. Second, a number of studies conducted rather simplified analyses of the underlying data, potentially not controlling for the many drivers of residential sales prices. Third, many of the studies have relied upon a very limited number of residential sales transactions, and therefore may not have had an adequate sample to statistically discern any property value effects, even if effects did exist. Fourth, and perhaps as a result, many of the studies did not conduct, or at least have not published, the statistical significance of their results. Fifth, when analyzed, there has been some emphasis on Area Stigma, and none of the studies have investigated all three possible stigmas simultaneously. Sixth, only a few of the studies (Hoen, 2006; Sims and Dent, 2007; Sims et al., 2008; Kielisch, 2009) conducted field visits to the homes to assess the quality of the scenic vista from the home, and the degree to which the wind facility might impact that scenic vista. Finally, with two exceptions (Sims and Dent, 2007; Sims et al., 2008), none of the studies have been academically peer-reviewed and published.

[18] It should be noted that the samples used by both Khatri and Kielisch contained a subset of respondents who did have some familiarity with valuing homes near wind facilities.

Table 1: Summary of Existing Literature on Impacts of Wind Projects on Property Values

Document Type Author(s)	Year	Number of Transactions or Respondents	Before or After Wind Facility Construction Commenced	Area Stigma	Scenic Vista Stigma	Nuisance Stigma
Homeowner Survey						
Haughton et al.	2004	501	Before	- *	- *	
Goldman	2006	50	After	**none**		
Firestone et al.	2007	504	Before	- *	- *	
Bond	2008	~300	After		- ?	- ?
Expert Survey						
Grover	2002	13	After	**none**		**none**
Haughton et al.	2004	45	Before	- *	- *	
Khatri	2004	405	Before‡	- ?		- ?
Goldman	2006	50	After	**none**		**none**
Kielisch	2009	57	Before‡			- ?
Transaction Analysis - Simple Statistics						
Jerabek	2001	25	After			**none**
Jerabek	2002	7	After			**none**
Sterzinger et al.	2003	24,000	After	**none**		
Beck	2004	2	After			**none**
Poletti	2005	187	After	**none**		**none**
DeLacy	2005	21	Before†	**none**		
Goldman	2006	4	After	**none**		
Poletti	2007	256	After	**none**		**none**
McCann	2008	2	After			- ?
Kielisch	2009	103	After			- ?
Transaction Analysis - Hedonic Model						
Jordal-Jorgensen	1996	?	After			- ?
Hoen	2006	280	After		**none**	
Sims & Dent	2007	919	After			- *
Sims et al.	2008	199	After		-/+ *	

" none " indicates the majority of the respondents do not believe properties have been affected (for surveys) or that no effect was detected at 10% significance level (for transaction analysis)

"- ?" *indicates a negative effect without statistical significance provided*

"- *" *indicates statistically significant negative effect at 10% significance level*

"-/+ *" *indicates positive and negative statistically significant effects at 10% significance level*

† *Sales were collected after facility announcement but before construction*

‡ *Some respondents had experience with valuations near facilities while others did not*

3. Data Overview

The methods applied in the present work are intended to overcome many of the limitations of the existing literature. First, a large amount of data is collected from residential transactions within 10 miles of 24 different wind projects in the U.S., allowing for a robust statistical analysis across a pooled dataset that includes a diverse group of wind project sites. Second, all three potential stigmas are investigated by exploring the potential impact of wind projects on home values based both on the distance to and view of the projects from the homes. Third, field visits are made to every home in the sample, allowing for a solid assessment of the scenic vista enjoyed by each home and the degree to which the wind facility can be seen from the home, and to collect other value-influencing data from the field (e.g., if the home is situated on a cul-de-sac). Finally, a number of hedonic regression models are applied to the resulting dataset, as are repeat sales and sales volume analyses, in order to assess the robustness of the results.

Testing for the three potential stigmas requires a significant sample of residential transactions within close proximity to existing wind facilities. Unfortunately for the study, most wind power projects are not located near densely populated areas. As a result, finding a single wind project site with enough transaction data to rigorously analyze was not possible. Instead, the approach was to collect data from multiple wind project sites, with the resulting data then pooled together to allow for robust statistical analyses.[19] The remainder of this section describes the site selection process that is used, and provides a brief overview of both the selected study areas and the data that were collected from these areas. Also provided is a description of how scenic vista, views of turbines, and distances from turbines were quantified for use in the hedonic analysis, and a summary of the field data collection effort. The section ends with a brief summary of the resulting dataset.

3.1. Site Selection

For the purpose of this study, an ideal wind project area would:

1) Have a large number of residential transactions both before and, more importantly, after wind facility construction, and especially in close proximity (e.g., within 2 miles) of the facility;
2) Have comprehensive data on home characteristics, sales prices, and locations that are readily available in electronic form; and
3) Be reasonably representative of the types of wind power projects being installed in the United States.

To identify appropriate sites that met these criteria, and that also provided a diversity of locations, the authors obtained from Energy Velocity, LLC a set of Geographic Information System (GIS) coordinates representing 241 wind projects in the U.S. that each had a total nameplate capacity greater than 0.6 megawatts (MW) and had gone online before 2006.[20] Also provided were facility capacity, number of turbines, and announcement, construction, and operational dates. These data were cross-checked with a similar dataset provided by the American Wind Energy Association (AWEA), which also included some turbine hub-height information.

[19] A thorough discussion of this "pooled" approach is contained in Section 4.2 and in Appendix F.

[20] Energy Velocity, LLC was owned at the time by Global Energy Decisions, which was later purchased by Ventyx. The dataset is available as Velocity Suite 2008 from Ventyx.

By using a variety of different GIS sorting techniques involving nearby towns with populations greater than, for example, 2,500 people, using census tract population densities, and having discussions with wind energy stakeholders, a prospective list of 56 possible study areas was generated, which were then ranked using two scales: "highly desirable" to "least desirable," and "feasible" to "potentially unfeasible."[21] Then, through an iterative process that combined calls to county officials to discuss the number of residential transactions and data availability, with investigations using mapping software to find the location of individual wind turbines, and, in some cases, preliminary visits, a list of 17 prospective study areas were chosen as both "highly desirable" and "feasible." Ultimately, three of these proved to be "unfeasible" because of data availability issues and four "undesirable" because the study area was considered not representative. This effort ultimately resulted in a final set of ten study areas that encompass a total of 24 distinct wind facilities (see Figure 1 and Table 2).[22] A full description of each study area is provided in Appendix A.

[21] "Desirability" was a combination of a number of factors: the wind facility having more than one turbine; the study area having greater than 350 sales within 5 miles and within 10 years, 250 of which transacted following construction of the facility; having some transaction data old enough to pre-date facility announcement; having data on the core home and site characteristics (e.g., square feet, acres); and, where possible, having a concentration of sales within 1 mile of the facility. "Feasibility" was also a combination of factors: having home characteristic and sales data in electronic form; having GIS shapefiles of the parcel locations; and being granted ready access to this information.

[22] The "unfeasible" study areas were Cerro Gordo County, IA, Bennington County, VT, and Atlantic County, NJ. Cerro Gordo County, IA contained multiple wind projects totaling 140 MW. Although the data at this site were available in electronic form, the county only agreed to share data in paper form, which would have created an enormous data entry burden. Because another site in the sample was considered similar to the Cerro Gordo site (IABV), Cerro Gordo County was dropped from the prospective sites. Bennington County, VT contained the 11 turbine Searsburg Wind Project (6 MW) but had no electronic records. Atlantic County, NJ contained the five turbine Jersey Atlantic Wind Farm (7.5 MW), but had data in paper records only and the county was unresponsive to inquiries regarding the study. The "undesirable" study areas were Plymouth County, MA, Wood County, OH, Cascade County, MT, and Riverside County, CA. Although the data in Plymouth County, MA were more than adequate, this small, on-land, yet coastal Hull Wind facility (2 turbines, 2.5 MW) was not considered to be particularly representative of wind development across the US. Wood County's four turbine Bowling Green facility (7 MW) met the appropriate data requirements, but ultimately it was decided that this facility was too small and remote to be representative. Cascade County's six turbine Horseshoe Bend Wind Park (9 MW) did not have enough transactions to justify study. Riverside, CA, where roughly 2500 turbines are located, had less-than-desired home characteristic data, had transactions that came more than 10 years after large scale development began, and despite having homes that were within 1 mile of the turbines, those homes typically had limited views because of high subdivision walls.

Figure 1: Map of Study Areas and Potential Study Areas

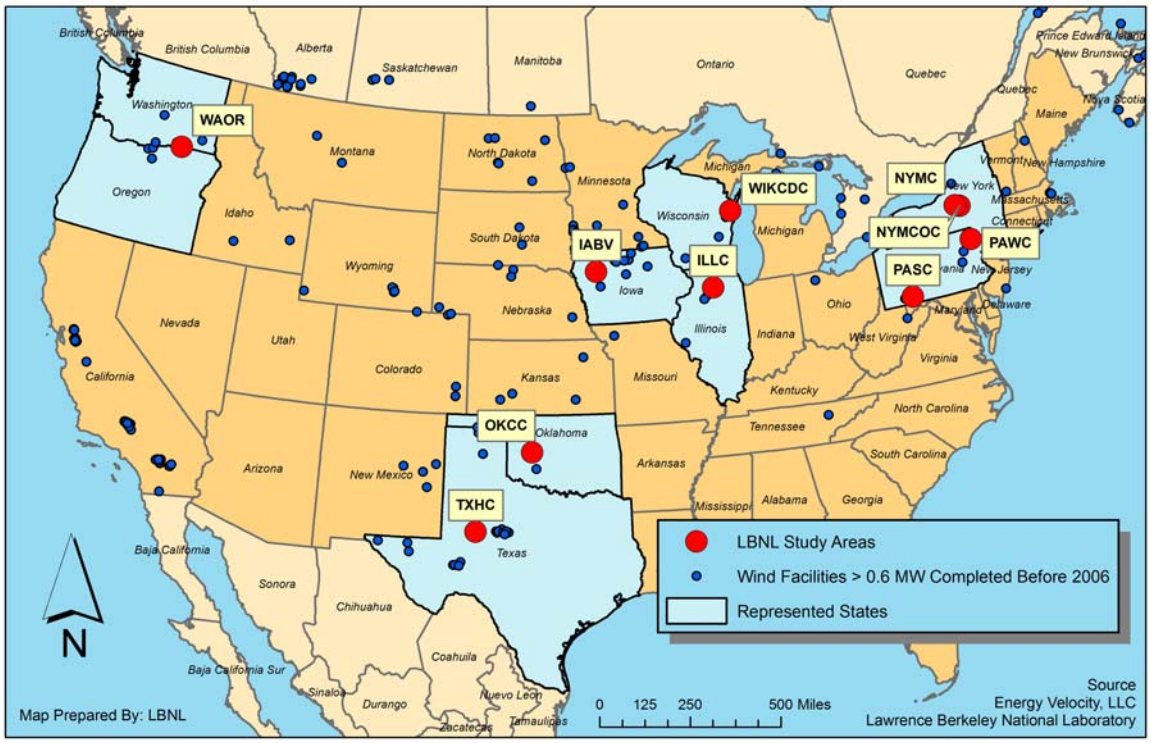


Table 2: Summary of Study Areas

Study Area Code	Study Area Counties, States	Facility Names	Number of Turbines	Number of MW	Max Hub Height (meters)	Max Hub Height (feet)
WAOR	Benton and Walla Walla Counties, WA and Umatilla County, OR	Vansycle Ridge, Stateline, Nine Canyon I & II, Combine Hills	582	429	60	197
TXHC	Howard County, TX	Big Spring I & II	46	34	80	262
OKCC	Custer County, OK	Weatherford I & II	98	147	80	262
IABV	Buena Vista County, IA	Storm Lake I & II, Waverly, Intrepid I & II	381	370	65	213
ILLC	Lee County, IL	Mendota Hills, GSG Wind	103	130	78	256
WIKCDC	Kewaunee and Door Counties, WI	Red River, Lincoln	31	20	65	213
PASC	Somerset County, PA	Green Mountain, Somerset, Meyersdale	34	49	80	262
PAWC	Wayne County, PA	Waymart	43	65	65	213
NYMCOC	Madison and Oneida Counties, NY	Madison	7	12	67	220
NYMC	Madison County, NY	Fenner	20	30	66	218
		TOTAL	**1345**	**1286**		

These 10 study areas and 24 projects are located in nine separate states, and include projects in the Pacific Northwest, upper Midwest, the Northeast, and the South Central region. The wind projects included in the sample total 1,286 MW, or roughly 13% of total U.S. wind power capacity installed at the time (the end of 2005). Turbine hub heights in the sample range from a

minimum of 164 feet (50 meters) in the Washington/Oregon (WAOR) study area, to a maximum of 262 (80 meters) (TXHC, OKCC and PASC), with nine of the ten study areas having hub heights of at least 213 feet (65 meters). The sites include a diverse variety of land types, including combinations of ridgeline (WAOR, PASC, and PAWC), rolling hills (ILLC, WIKCDC, NYMCOC, and NYMC), mesa (TXHC), and windswept plains (OKCC, IABV).[23]

3.2. Data Collection

In general, for each study area, residential transaction data in as close proximity to the wind turbines as possible was sought, from both before and after wind facility construction. To balance the cost and quantity of data collection in each study area with the desire to cover as many study areas as possible, the research effort sought to collect data on 400 to 1,250 transactions in each study area.[24] In some instances, this meant including all residential transactions within ten miles of the wind turbines. In others, only transactions within five miles were included. In some extreme instances, when the number of transactions inside of five miles far exceeded the 1,250 limit, all transactions in close proximity to the wind turbines (e.g., inside three miles) were included in combination with a random sample of transactions outside of that distance band (e.g., between three and five miles).[25] The data selection processes for each Study Area are contained in Appendix A.

Three primary sets of data are used in the analysis: tabular data, GIS data, and field data, each of which is discussed below. Following that, this subsection highlights the two qualitative variables that are essential to this analysis and that therefore require special attention, scenic vista and views of turbines, and then discusses the field data collection process.

3.2.1. Tabular Data

Berkeley Lab obtained tabular transaction data from participating counties[26] containing 7,459 "valid" [27] transactions of single family residential homes, on less than 25 acres,[28] which were

[23] Some areas, such as PASC, had both a ridgeline and rolling hills on which wind facilities were located.

[24] This range was chosen to ensure that a minimum of data were present in each study area to allow for a robust analysis, and yet not too much so as to make data collection (e.g., the visiting of each home) inordinately time and resource consuming in any individual study area.

[25] An alternative method would have been to collect data on every sale that occurred. Although in most cases this would be preferred, in ours it would not have added one additional transaction within close proximity or with dramatic views of wind turbine, the focus of the study. Rather, it would have added an overwhelming majority of transactions of homes without views and at distances outside of three miles from the turbines, all of which would have come at considerably cost and, more importantly, would not likely have influenced the results significantly while perhaps necessitating a reduction in the total number of study areas that could be included in the sample.

[26] In some cases, the county officials, themselves, extracted data from their database, and in some cases a company engaged to manage a county's data provided the necessary information. In either case the provider is referred to as "county." Detailed descriptions of the providers are presented in Appendix A.

[27] Validity was determined by each individual county data provider. A sale that is considered "valid" for county purposes would normally meet the minimum requirements of being arm's length; being a transfer of all rights and warrants associated with the real estate; containing an insignificant amount of personal property so as not to affect the price; demonstrating that neither party in the sale acting under duress or coercion; not being the result of a liquidation of assets or any other auction, a mortgage foreclosure, a tax sale, or a quit claim; and being appropriate for use in calculating the sales price to assessed value ratios that are reported to the state. Due to the formal requirements associated with this calculation, "validity" is often defined by a state's Department of Revenue, as shown, for example, here: http://www.orps.state.ny.us/assessor/manuals/vol6/rfv/index.htm. In addition, though the

sold for a price of more than $10,000,[29] which occurred after January 1, 1996,[30] and which had fully populated "core" home characteristics. These core characteristics are: number of square feet of the living area (not including finished basement), acres of land, bathrooms, and fireplaces, the year the home was built,[31] if the home had exterior wallsthatwere stone, a central air conditioning unit, and/or a finished basement, and the exterior condition of the home. The 7,459 residential transactions in the sample consist of 6,194 homes (a number of the homes in the sample sold more than once in the selected study period). Because each transaction had a corresponding set of the core home characteristic data, they could all be pooled into a single model. In addition to the home characteristic data, each county provided, at a minimum, the home's physical address and sales price. The counties often also provided data on homes in the study area that did not sell in the study period.[32] Finally, market-specific quarterly housing inflation indexes were obtained from Freddie Mac, which allowed nominal sales prices to be adjusted to 1996 dollars.[33]

---

sample originally contained 7,498 sales, 34 homes sold twice in a 6 month period and, after discussions with local officials, these transactions were considered likely to have been "invalid" despite the county coding them to the contrary. Additionally, five transactions produced standardized residuals that were more than six standard deviations away from the mean, indicating that these sales were abnormal and likely not valid. Both of these sets of transactions, totaling 39, were removed from the final dataset. Of the 39 sales, 32 sold following construction, 10 were concentrated in IABV and nine in TXHC with the others spread between seven of the remaining eight study areas. One of the homes was inside of one mile from the turbines at the time of sale, and two had views of the turbines (both of which were MINOR). The home that was located within one mile was surrounded by a number of other homes – at similar distances from the turbines - that transacted both before and after the wind facilities were built and were included in the sample. A more thorough discussion of the screening techniques used to ensure the appropriateness of the final data set are presented in detail in Appendix G under "Outliers/Influencers." Finally, it should be noted that the authors are aware of four instances in the study areas when homes were sold to wind developers. In two cases the developer did not resell the home; in the other two, the developer resold the home at a lower price than which it was purchased. But, because the sales were to a related party, these transactions were not considered "valid' and are therefore not included here. One might, however, reasonably expect that the property values of these homes were impacted by the presence of the wind turbines.

[28] Single family residences on more than 25 acres were considered to be likely candidates for alternative uses, such as agricultural and recreational, which could have an influence on sales price that was outside of the capabilities of the model to estimate. Because all records were for parcels that contained a residence, the model did not contain any "land-only" transactions. Further, none of the transactions provided for this research were for parcels on which a turbine was located.

[29] A sales price of $10,000 was considered the absolute minimum amount an improved parcel (one containing a residential structure) would sell for in any of the study areas and study periods. This provided an additional screen over and above the "valid" screen that the counties performed.

[30] This provided a maximum of 12 years of data. Some counties did not have accessible data back to 1996 but in all cases these countries had data on transactions that occurred before the wind facilities were erected.

[31] "Year Built" was used to construct a variable for the age of the home at the time of the sale.

[32] These data were used to calculate the "Sales Volume" percentages referred to in Section 7.

[33] Freddie Mac Conventional Mortgage Home Price Index: municipal statistical area (MSA) series data are available from the following site: http://www.freddiemac.com/finance/cmhpi/. Because most of the study areas do not fall within the MSAs, a collection of local experts was relied upon, including real estate agents, assessors, and appraisers, to decide which MSA most-closely matched that of the local market. In all cases the experts had consensus as to the best MSA to use. In one case (NYMCOC) the sample was split between two MSAs. These indexes are adjusted quarterly, and span the entire sample period. Therefore, during the housing boom, insofar as a boom occurred in the sample areas, the indexes increased in value. Subsequently when the market began falling, the index retracted.

3.2.2. GIS Data

GIS data on parcel location and shape were also required, and were obtained from the counties. The counties also often provided GIS layers for roads, water courses, water bodies, wind turbines (in some cases), house locations, and school district and township/town/village delineations. GIS data on census tract and school district delineations were obtained from the U.S. Census Bureau, if not provided by the county.[34] GIS data were obtained on water courses, water bodies, land elevations, and satellite imagery, as was necessary, from the U.S. Department of Agriculture.[35] Combined, these data allowed each home to be identified in the field, the construction of a GIS layer of wind turbine locations for each facility, and the calculation of the distance from each home to the nearest wind turbine.[36] Determining the distance from each home to the nearest wind turbine was a somewhat involved process, and is discussed in detail in Appendix B. Suffice it to say that each transaction had a unique distance ("DISTANCE")[37] that was determined as the distance between the home and nearest wind turbine at the time of sale, and that these distances are grouped into five categories: inside of 3000 feet (0.57 miles), between 3000 feet and one mile, between one and three miles, between three and five miles, and outside of five miles.[38] Finally, the GIS data were used to discern if the home was situated on a cul-de-sac and had water frontage, both of which were corroborated in the field.

3.2.3. Field Data

Additional data had to be collected through field visits to all homes in the sample. Two qualitative measures in particular – for scenic vista and for view of the wind turbines – are worth discussing in detail because each is essential to the analysis and each required some amount of professional judgment in its creation.

The impact or severity of the view of wind turbines ("VIEW") [39] may be related to some combination of the number of turbines that are visible, the amount of each turbine that is visible (e.g., just the tips of the blades or all of the blades and the tower), the distance to the nearest turbines, the direction that the turbines are arrayed in relation to the viewer (e.g., parallel or perpendicular), the contrast of the turbines to their background, and the degree to which the turbine arrays are harmoniously placed into the landscape (Gipe, 2002). Recent efforts have made some progress in developing quantitative measures of the aesthetic impacts of wind turbines (Torres-Sibillea et al., 2009),[40] but, at the time this project began, few measures had

---

[34] These data were sourced from the U.S. Census Bureau's Cartographic Boundary Files Webpage: http://www.census.gov/geo/www/cob/bdy_files.html.

[35] These data were sourced from the USDA Geospatial Data Gateway: http://datagateway.nrcs.usda.gov/GatewayHome.html.

[36] Although in some cases the county provided a GIS layer containing wind turbine points, often this was not available. A description of the turbine mapping process is provided in Appendix B.

[37] Distance measures are collectively and individually referred to as "DISTANCE" from this point forward.

[38] The minimum distance of "inside 3000 feet" was chosen because it was the closest cutoff that still provided an ample supply of data for analysis.

[39] View of turbines ratings are collectively and individually referred to as "VIEW" from this point forward.

[40] In addition to these possible field techniques, previous studies have attempted to use GIS to estimate wind turbine visibility using "line-of-sight" algorithms. For example, Hoen (2006) used these algorithms after adding ground cover to the underlying elevation layer. He found that the GIS method differed substantially from the data collected in the field. Seemingly, small inaccuracies in the underlying elevation model, errors in the software's algorithm, and the existence of ground cover not fully accounted for in the GIS, substantially biased GIS-based assessments of

been developed, and what had been developed was difficult to apply in the field (e.g., Bishop, 2002). As a result, the authors opted to develop an ordered qualitative VIEW rating system that consisted of placing the view of turbines into one of five possible categories: NO VIEW, MINOR, MODERATE, SUBSTANTIAL, and EXTREME. These ratings were developed to encompass considerations of distance, number of turbines visible, and viewing angle into one ordered categorical scale, and each rating is defined in Table 3:[41]

Table 3: Definition of VIEW Categories

NO VIEW	The turbines are not visible at all from this home.
MINOR VIEW	The turbines are visible, but the scope (viewing angle) is narrow, there are many obstructions, or the distance between the home and the facility is large.
MODERATE VIEW	The turbines are visible, but the scope is either narrow or medium, there might be some obstructions, and the distance between the home and the facility is most likely a few miles.
SUBSTANTIAL VIEW	The turbines are dramatically visible from the home. The turbines are likely visible in a wide scope and most likely the distance between the home and the facility is short.
EXTREME VIEW	This rating is reserved for sites that are unmistakably dominated by the presence of the wind facility. The turbines are dramatically visible from the home and there is a looming quality to their placement. The turbines are often visible in a wide scope or the distance to the facility is very small.

Photographic examples of each of the categories are contained in Appendix E.

visibility. This was corroborated elsewhere by Maloy and Dean (2001) and Riggs and Dean (2007). As a result of these findings, it was determined that field collection of VIEW data was essential.

[41]In addition to the qualitative rating system that was ultimately used in this study, a variety of quantitative data were collected that might describe the nature of the view of wind turbines, including the total number of turbines visible, the distance of the home to the nearest wind turbine, and the view scope/viewing angle (i.e., the degree to which the turbines spread out in front of the home: narrow, medium, or wide). To explore the validity of the qualitative rating scale two tests were conducted. First, a pre-study survey was conducted by showing 10 different off-site respondents 15 randomly selected photographs from the field representing the various rated VIEW categories. The higher VIEW ratings were oversampled to create a roughly equal distribution among the categories. The respondents rated the views into one of the qualitative categories. The on-site / field collected ratings matched the off-site responses 65% of the time, with 97% of the rankings differing by no more than one category. Ninety-eight percent of the on-site-ranked MINOR VIEWs and 89% of the EXTREME VIEWs were similarly ranked by off-site respondents. The on-site rankings were less than the off-site rankings 97% of the time; it is assumed that this is because on-site ratings took into account a greater portion of the panorama than were captured in the photos, which translated into a lower ranking. Secondly, a post hoc Multinomial Logistic Regression model was created that used the qualitative on-site VIEW ratings as the dependent variable and the quantitative measures of distance to nearest turbine, number of turbines visible, and view scope as the independent variables. This model produced high Pseudo R^2 statistics (Cox and Snell 0.88, Nagelkerke 0.95, and McFadden 0.79) and predicted values that were highly correlated with the actual qualitative rating (Pearson's 0.88). Therefore, both tests corroborated the appropriateness of the simpler qualitative VIEW rankings used herein.

In addition to the qualitative VIEW measurements, a rating for the quality of the scenic vista ("VISTA")[42] from each home, absent the existence of the wind facilities, was also collected in the field. An assessment of the quality of the VISTA from each home was needed because VIEW and VISTA are expected to be correlated; for example, homes with a PREMIUM VISTA are more likely to have a wide viewing angle in which wind turbines might also be seen. Therefore, to accurately measure the impacts of the VIEW of wind turbines on property values a concurrent control for VISTA (independent of any views of turbines) is required. Drawing heavily on the landscape-quality rating system developed by Buhyoff et al. (1994) and to a lesser degree on the systems described by others (Daniel and Boster, 1976; USDA, 1995), an ordered VISTA rating system consisting of five categories was developed: POOR, BELOW AVERAGE, AVERAGE, ABOVE AVERAGE, and PREMIUM, with each rating defined in Table 4:[43]

Table 4: Definition of VISTA Categories

POOR VISTA	These vistas are often dominated by visually discordant man-made alterations (not considering turbines), or are uncomfortable spaces for people, lack interest, or have virtually no recreational potential.
BELOW AVERAGE VISTA	These scenic vistas contain visually discordant man-made alterations (not considering turbines) but are not dominated by them. They are not inviting spaces for people, but are not uncomfortable. They have little interest or mystery and have minor recreational potential.
AVERAGE VISTA	These scenic vistas include interesting views that can be enjoyed often only in a narrow scope. These vistas may contain some visually discordant man-made alterations (not considering turbines), are moderately comfortable spaces for people, have some interest, and have minor recreational potential.
ABOVE AVERAGE VISTA	These scenic vistas include interesting views that often can be enjoyed in a medium to wide scope. They might contain some man-made alterations (not considering turbines), yet still possess significant interest and mystery, are moderately balanced and have some potential for recreation.
PREMIUM VISTA	These scenic vistas would include "picture postcard" views that can be enjoyed in a wide scope. They are often free or largely free of any discordant man made alterations (not considering turbines), possess significant interest, memorable qualities, and mystery and are well balanced and likely have a high potential for recreation.

Photographic examples of each of the categories are contained in Appendix D.

[42] Scenic vista ratings are individually and collectively referred to as "VISTA" from this point forward.

[43] The appropriateness of these rankings were tested in two ways. First, a set of 34 pictures taken on-site and representing various categories of VISTA were shown to 10 off-site respondents who were asked to rank them using the same categories, and then explain why they rated them as such. Although the off-site ratings matched the on-site ratings only 51% of the time, 94% of on- and off-site rankings differed by no more than one category, with 17% of the off-site rankings below the on-site and 26% ranked above. The descriptions of why the rankings where chosen by the off-site respondents illuminated the fact that off-site ratings did not take into account a number of aspects that were not adequately captured in the photos, but that were apparent in the field. This finding was borne out by a second test that had five individuals visit seven homes in the field to rank their scenic vistas. When all respondents were on-site, they similarly ranked the vista 72% of the time, with a rankingthat differed by no more than one category occurring one hundred percent of the time.

In addition to the VIEW and VISTA ratings, it was assumed that the orientation of the home to the view of turbines (e.g., front, back, or side) ("ORIENTATION"), and the degree to which the view of the turbines overlapped the primary scenic vista (e.g., not at all, barely, somewhat or strongly) ("OVERLAP"), might influence residential property values. As such, information on ORIENTATION and OVERLAP were also collected in the field.

3.2.4. Field Data Collection

Field data collection was conducted on a house-by-house basis. Each of the 6,194 homes was visited by the same individual to remove bias among field ratings. Data collection was conducted in the fall of 2006, and the spring, summer, and fall of 2007 and 2008. Each house was photographed and, when appropriate, so too were views of turbines and the prominent scenic vista.[44] Data on VIEW were collected only for those homes that sold after at least one wind power facility had been erected in the study area. When multiple wind facilities, with different construction dates, were visible from a home, field ratings for VIEW were made by taking into account which turbines had been erected at the time of sale. Additionally, if the season at the time of sale differed from that of data collection and, for example, if leaves were off the trees for one but on for the other, an effort was made to modulate the VIEW rating accordingly if necessary.[45]

Both VIEW and VISTA field ratings were arrived at through a Q-Sort method (Pitt and Zube, 1979), which is used to distinguish relatively similar rankings. For views of turbines, the rater first determined if the ranking was MINOR or EXTREME. If neither of these two rankings was appropriate, then only a choice between MODERATE and SUBSTANTIAL was required. Similarly, for VISTA rankings, first POOR and PREMIUM were distinguished from the others; if neither applied then BELOW AVERAGE or ABOVE AVERAGE could be selected. If neither of those were appropriate the VISTA, by default, was considered AVERAGE. In all cases, if wind turbines were visible from the home, the VISTA rankings were made as if those turbines did not exist.

3.3. Data Summary

The final dataset consists of 7,459 valid and screened residential transactions occurring between January 2, 1996 and June 30, 2007. Those transactions are arrayed across time and the ten wind project study areas as shown in Table 5. The sample of valid residential transactions ranges from 412 in Lee County, Illinois (ILLC) to 1,311 in Howard County, Texas (TXHC).[46] Of the total 7,459 transactions, 4,937 occurred after construction commenced on the relevant wind facilities. More specifically, 23% of the transactions (n=1,755) took place before any wind facility was announced and 10% occurred after announcement but before construction commenced (n=767),

[44] In many cases the prominent VISTA was homogenous across groups of home, for instance urban homes on the same road. In those cases a picture of the VISTA of one home was applied to all of the homes. All pictures were taken with a Canon EOS Rebel XTi Single Lens Reflex Camera with a 18-55mm lens. VIEW and VISTA pictures were taken with the lens set to 18mm, with the camera at head height, and with the center of the camera pointed at the center of the prominent VISTA or VIEW. Examples of the various VISTA and VIEW categories are contained in Appendices D and E respectively.

[45] This "modulation" occurred only for trees in the foreground, where, for instance, a single tree could obscure the view of turbines; this would not be the case for trees nearer the horizon.

[46] See description of "valid" in footnote 27 on page 13.

with the rest of the transactions occurring after construction commenced (66%, *n*=4,937).[47] Of that latter group, 17% (*n*=824, 11% of total) sold in the first year following the commencement of construction, 16% in the second year (*n*=811, 11% of total), and the remainder (67%) sold more than two years after construction commenced (*n*=3,302, 44% of total).

Table 5: Summary of Transactions across Study Areas and Development Periods

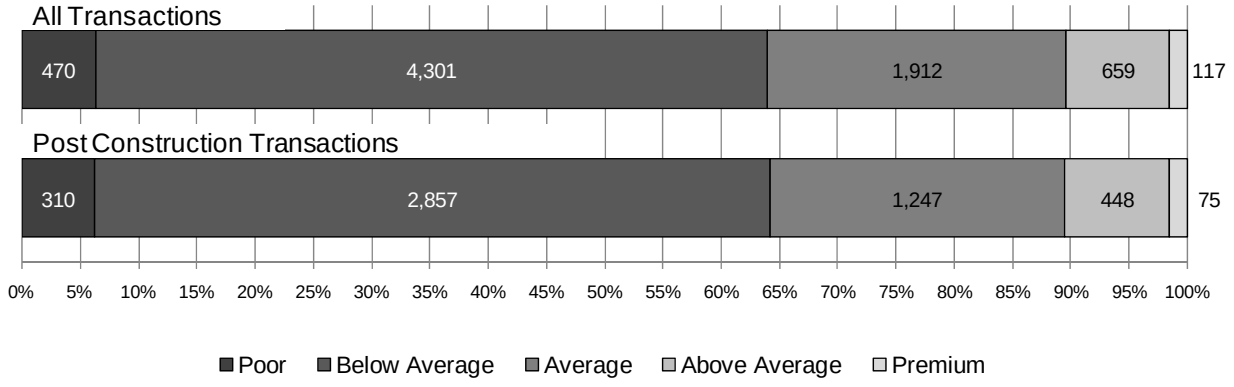
	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Benton/Walla Walla, WA & Umatilla, OR (WAOR)	226	45	76	59	384	**790**
Howard, TX (TXHC)	169	71	113	131	827	**1311**
Custer, OK (OKCC)	484	153	193	187	96	**1113**
Buena Vista, IA (IABV)	152	65	80	70	455	**822**
Lee, IL (ILLC)	115	84	62	71	80	**412**
Kewaunee/Door, WI (WIKCDC)	44	41	68	62	595	**810**
Somerset, PA (PASC)	175	28	46	60	185	**494**
Wayne, PA (PAWC)	223	106	64	71	87	**551**
Madison/Oneida, NY (MYMCOC)	108	9	48	30	268	**463**
Madison, NY (NYMC)	59	165	74	70	325	**693**
TOTAL	**1755**	**767**	**824**	**811**	**3302**	**7459**

A basic summary of the resulting dataset, including the many independent variables used in the hedonic models described later, is contained in Table 6 and Table 7. These tables present summary information for the full dataset (7,459 transactions) as well as the post-construction subset of that dataset (4,937 transactions); the latter is provided because much of the analysis that follows focuses on those homes that sold after wind facility construction. The mean nominal residential transaction price in the sample is $102,968, or $79,114 in 1996 dollars. The average house in the sample can be described as follows: it is 46 years old, has 1,620 square feet of finished living area above ground, is situated on 1.13 acres, has 1.74 bathrooms, and has a

[47] The announcement date (as well as construction and online dates) was provided by Energy Velocity with the GIS files as described in footnote 20 on page 10. The date corresponds to the first time the facility appears in the public record, which was often the permit application date. This constitutes the first well established date when the existing wind facility would have been likely known by the public, and therefore is appropriate to use for this analysis, but there remain a number of areas for potential bias in this date. First, the permit application date might be preceded by news reports of the impending application; alternatively, if the public record was not published online (that Energy Velocity used to establish their date), the "announcement" date – as used here - could, in fact, follow the permit application date. To address this, when possible, the authors had discussions with the developer of the facility. In most cases, the Energy Velocity dates were found to be accurate, and when they were not they were adjusted to reflect the dates provided by the developer. A second potential source of bias is the possibility that a different project was proposed but never built, but that influenced the residential market in the study area prior to the "announcement" date. Although this is likely rarer, we are aware of at least a few projects that fit that description in the study areas. A final source of bias might revolve around the likelihood that awareness of a project could occur even before the facility is formally announced. For example, a community member might know that a wind facility is being considered because they had been approached by the wind development company well ahead of a public announcement. In turn, they might have had private discussions regarding the facility with other members of the community. Taken together, it is appropriate to assume that there is some bias in the "announcement" date, and that awareness of the project might precede the date used in this analysis. How this bias might affect the results in this report is addressed further in Section 5.3 and footnote 74 on page 38.

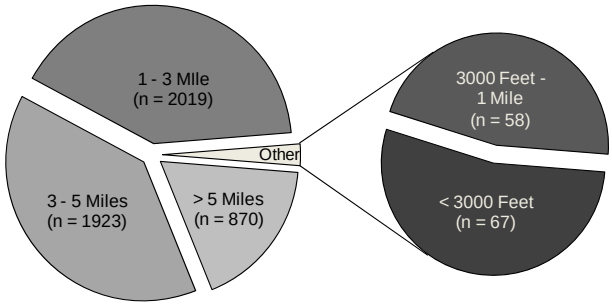
slightly better than average condition.[48] Within the full sample, 6% and 58% of homes had a poor or below average VISTA rating, respectively; 26% of homes received an average rating on this scale, with 9% above average and 2% experiencing premium vistas (see Figure 2).

Figure 2: Frequency of VISTA Ratings for All and Post-Construction Transactions



With respect to the variables of interest, among the post-construction subset of 4,937 transactions, the frequency of the DISTANCE categories is found to follow geometry with the smallest numbers of transactions occurring near the wind turbines and ever increasing numbers further away (see Figure 3). 67 transactions (1%) are situated inside of 3,000 feet (< 0.57 Miles), 58 (1%) are between 3,000 feet and one mile (0.57-1 mile), 2,019 (41%) occur outside of one mile but inside of three miles (1-3 miles), 1,923 (39%) occur between three and five miles (3-5 miles), and 870 (18%) occur outside of five miles (>5 miles).[49] In this same post-construction group, a total of 730 homes that sold (15%) have a view of the wind turbines (see Figure 4). A large majority of those homes have MINOR view ratings (n = 561, 11% of total), with 2% having MODERATE ratings (n=106) and the remaining transactions roughly split between SUBSTANTIAL and EXTREME ratings (n=35, 0.6%, and n=28, 0.5%, respectively). A full description of the variables of interest and how they are arrayed at the study area level is contained in Appendix A.

Figure 3: Frequency of DISTANCE Ratings for Post-Construction Transactions



[48] The variable for the condition of the home was not uniform across study areas because, in some cases, it took into account construction grade while in others it did not.

[49] These numbers and percentages are skewed slightly from the overall population of transactions because homes outside of three miles were often under-sampled to reduce field data collection burdens. Further, higher numbers of homes fall into each of the categories when the post-announcement-pre-construction transactions are included, as they are in some models. These additional transactions are described below in Table 7 under "All Sales."

Figure 4: Frequency of VIEW Ratings for Post-Construction Transactions

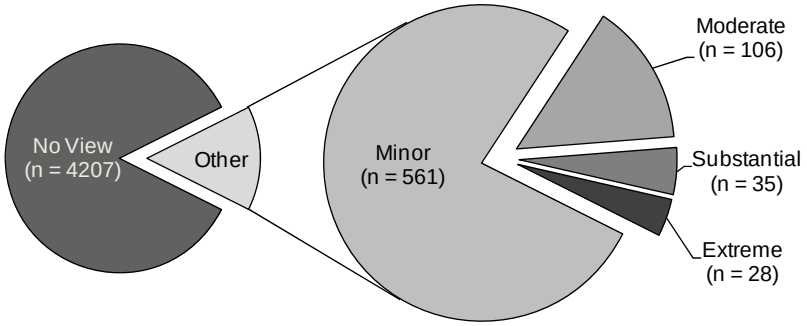


Table 6: Summary Statistics: All Sales and Post-Construction Sales

		All Sales			Post Construction Sales		
Variable Name	**Description**	**Freq. ***	**Mean**	**Std. Dev.**	**Freq. ***	**Mean**	**Std. Dev.**
SalePrice	The unadjusted sale price of the home (in US dollars)	7,459	102,968	64,293	4,937	110,166	69,422
SalePrice96	The sale price of the home adjusted to 1996 US dollars	7,459	79,114	47,257	4,937	80,156	48,906
LN_SalePrice96	The natural log transformation of the sale price of the home adjusted to 1996 US dollars	7,459	11.12	0.58	4,937	11.12	0.60
AgeatSale	The age of the home at the time of sale	7,459	46	37	4,937	47	36
AgeatSale_Sqrd	The age of the home at the time of sale squared	7,459	3,491	5,410	4,937	3,506	5,412
Sqft_1000	The number of square feet of above grade finished living area (in 1000s)	7,459	1.623	0.59	4,937	1.628	0.589
Acres	The number of Acres sold with the residence	7,459	1.13	2.42	4,937	1.10	2.40
Baths	The number of Bathrooms (Full Bath = 1, Half Bath = 0.5)	7,459	1.74	0.69	4,937	1.75	0.70
ExtWalls_Stone	If the home has exterior walls of stone, brick or stucco (Yes = 1, No = 0)	2,287	0.31	0.46	1,486	0.30	0.46
CentralAC	If the home has a Central AC unit (Yes = 1, No = 0)	3,785	0.51	0.50	2,575	0.52	0.50
Fireplace	The number of fireplace openings	2,708	0.39	0.55	1,834	0.40	0.55
Cul_De_Sac	If the home is situated on a cul-de-sac (Yes = 1, No = 0)	990	0.13	0.34	673	0.14	0.34
FinBsmt	If finished basement square feet is greater than 50% times first floor square feet (Yes = 1, No = 0)	1,472	0.20	0.40	992	0.20	0.40
Water_Front	If the home shares a property line with a body of water or river (Yes = 1, No = 0)	107	0.01	0.12	87	0.02	0.13
Cnd_Low	If the condition of the home is Poor (Yes = 1, No = 0)	101	0.01	0.12	69	0.01	0.12
Cnd_BAvg	If the condition of the home is Below Average (Yes = 1, No = 0)	519	0.07	0.25	359	0.07	0.26
Cnd_Avg	If the condition of the home is Average (Yes = 1, No = 0)	4,357	0.58	0.49	2,727	0.55	0.50
Cnd_AAvg	If the condition of the home is Above Average (Yes = 1, No = 0)	2,042	0.27	0.45	1,445	0.29	0.46
Cnd_High	If the condition of the home is High (Yes = 1, No = 0)	440	0.06	0.24	337	0.07	0.25
Vista_Poor	If the Scenic Vista from the home is Poor (Yes = 1, No = 0)	470	0.06	0.24	310	0.06	0.24
Vista_BAvg	If the Scenic Vista from the home is Below Average (Yes = 1, No = 0)	4,301	0.58	0.49	2,857	0.58	0.49
Vista_Avg	If the Scenic Vista from the home is Average (Yes = 1, No = 0)	1,912	0.26	0.44	1,247	0.25	0.44
Vista_AAvg	If the Scenic Vista from the home is Above Average (Yes = 1, No = 0)	659	0.09	0.28	448	0.09	0.29
Vista_Prem	If the Scenic Vista from the home is Premium (Yes = 1, No = 0)	117	0.02	0.12	75	0.02	0.12
SaleYear	The year the home was sold	7,459	2002	2.9	4,937	2004	2.3

** "Freq." applies to the number of cases the parameter's value is not zero*

Table 7: Summary of Variables of Interest: All Sales and Post-Construction Sales

		All Sales			Post Construction Sales		
Variable Name	**Description**	**Freq. ***	**Mean**	**Std. Dev.**	**Freq. ***	**Mean**	**Std. Dev.**
View_None	If the home sold after construction began and had no view of the turbines (Yes = 1, No = 0)	4,207	0.56	0.50	4,207	0.85	0.36
View_Minor	If the home sold after construction began and had a Minor View of the turbines (Yes = 1, No = 0)	561	0.08	0.26	561	0.11	0.32
View_Mod	If the home sold after construction began and had a Moderate View of the turbines (Yes = 1, No = 0)	106	0.01	0.12	106	0.02	0.15
View_Sub	If the home sold after construction began and had a Substantial View of the turbines (Yes = 1, No = 0)	35	-	0.07	35	0.01	0.08
View_Extrm	If the home sold after construction began and had a Extreme View of the turbines (Yes = 1, No = 0)	28	-	0.06	28	0.01	0.08
DISTANCE †	Distance to nearest turbine if the home sold after facility "announcement", otherwise 0	5,705	2.53	2.59	4,895	3.57	1.68
Mile_Less_0.57 †	If the home sold after facility "announcement" and was within 0.57 miles (3000 feet) of the turbines (Yes = 1, No = 0)	80	0.01	0.09	67	0.01	0.12
Mile_0.57to1 †	If the home sold after facility "announcement" and was between 0.57 miles (3000 feet) and 1 mile of the turbines (Yes = 1, No = 0)	65	0.01	0.09	58	0.01	0.11
Mile_1to3 †	If the home sold after facility "announcement" and was between 1 and 3 miles of the turbines (Yes = 1, No = 0)	2,359	0.27	0.44	2,019	0.41	0.49
Mile_3to5 †	If the home sold after facility "announcement" and was between 3 and 5 miles of the turbines (Yes = 1, No = 0)	2,200	0.26	0.44	1,923	0.39	0.49
Mile_Gtr5 †	If the home sold after facility "announcement" and was outside 5 miles of the turbines (Yes = 1, No = 0)	1,000	0.12	0.32	870	0.18	0.38

** "Freq." applies to the number of cases the parameter's value is not zero*

† "All Sales" freq., mean and standard deviation DISTANCE and DISTANCE fixed effects variables (e.g., Mile_1to3) include transactions that occurred after facility "announcement" and before "construction" as well as those that occured post-construction

4. Base Hedonic Model

This section uses the primary hedonic model ("Base Model") to assess whether residential sales prices are affected, in a statistically measurable way, by views of and proximity to wind power facilities. In so doing, it simultaneously tests for the presence of the three potential property value stigmas associated with wind power facilities: Area, Scenic Vista, and Nuisance. This section begins with a discussion of the dataset that is used and the form of the model that is estimated, and then turns to the results of the analysis. Various alternative hedonic models are discussed and estimated in Section 5, with Sections 6 and 7 providing a discussion of and results from the repeat sales and sales volume models.

4.1. Dataset

The data used for the Base Model were described in Section 3.3. A key threshold question is whether or not to include the residential transactions that pre-date the relevant wind facility. Specifically, though the complete dataset consists of 7,459 residential transactions, a number of these transactions (n = 2,522) occurred before the wind facility was constructed. Should these homes which, at the time of sale, would not have had any view of or distance to the wind facility, be included? Two approaches could be applied to address this issue. First, pre-construction transactions could be included in the hedonic model either as part of the reference category within which no wind-project property value impacts are assumed to exist, or instead by specifically identifying these pre-construction transactions through an indicator variable. Second, and alternatively, pre-construction transactions could simply be excluded from the analysis altogether.

For the purpose of the Base Model, the latter approach is used, therefore relying on only the post-construction subset of 4,937 residential transactions. This approach, as compared to the others, results in somewhat more intuitive findings because all homes have a distance greater than zero and have a possibility of some view of the turbines. More importantly, this approach minimizes the chance of inaccuracies that may otherwise exist due to inflation adjustment concerns or outdated home characteristics information.[50] Nonetheless, to test for the implications of this choice of datasets, alternative hedonic models that use the full dataset were estimated, and are discussed in detail in Sections 5.3 and 5.4.

[50] Home characteristics were obtained as of the last property assessment. The timing of that assessment relative to the timing of the home sale transaction dictates how representative the assessed home characteristics are of the subject home when it was sold. For example, if a home sold early in the study period but subsequently had significant improvements made that are reflected in the current assessment data used in the analysis, the model would assign value to these home characteristics at the time of sale when, in fact, those characteristics were inaccurate. Additionally, the inflation adjustment index used in this analysis to translate home values to real 1996 dollars came from the nearest or more appropriate municipal statistical area (MSA). Many of the wind projects in the analysis are located in relatively rural parts of the country, and the housing market in the nearest metropolitan area could be different than the market surrounding wind projects. Although these areas have – in many instances – recently begun to attract home buyers willing to commute back to the metropolitan areas on which the index is based, the older index adjustments are likely less accurate than the more recent adjustments. Using a subset of the data for the majority of the analyses that removes the older, pre-construction, homes minimizes both of these biases.

4.2. Model Form

A standard semi-log functional form is used for the hedonic models (as was discussed in Section 2.1), where the dependent variable (sales price in inflation-adjusted 1996 dollars) is transformed to its natural log form and the independent variables (e.g., square feet and acres) are not transformed. Using this form to examine the effect that views of, and distance to, wind facilities have on sales prices, the following basic model is estimated:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \varepsilon \qquad (1)$$

where
P represents the inflation-adjusted sales price,
N is the spatially weighted neighbors' predicted sales price,
S is the vector of *s* Study Area fixed effects variables (e.g., WAOR, OKCC, etc.),
X is a vector of *k* home and site characteristics (e.g., acres, square feet, number of bathrooms, condition of the home, age of home, VISTA, etc.),
VIEW is a vector of *v* categorical view of turbine variables (e.g., MINOR, MODERATE, etc.),
DISTANCE is a vector of *d* categorical distance to turbine variables (e.g., less than 3000 feet, between one and three miles, etc.),
β_0 is the constant or intercept across the full sample,
β_1 is a parameter estimate for the spatially weighted neighbor's predicted sales price,
β_2 is a vector of *s* parameter estimates for the study area fixed effects as compared to homes sold in the Washington/Oregon (WAOR) study area,
β_3 is a vector of *k* parameter estimates for the home and site characteristics,
β_4 is a vector of *v* parameter estimates for the VIEW variables as compared to homes sold with no view of the turbines,
β_5 is a vector of *d* parameter estimates for the DISTANCE variables as compared to homes sold situated outside of five miles, and
ε is a random disturbance term.

As such, this model, and all subsequent hedonic models, has four primary groups of parameters: variables of interest, spatial adjustments, study-area fixed effects, and home and site characteristics.

The variables of interest, VIEW and DISTANCE, are the focus of this study, and allow the investigation of the presence of Area, Scenic Vista, and Nuisance Stigmas. These variables were defined in Section 3, and are summarized in Table 8. Both VIEW and DISTANCE appear in the model together because a home's value may be affected in part by the magnitude of the view of the wind turbines, and in part by the distance from the home to those turbines, and both variables appear in the Base Model as ordered categorical values. The coefficients associated with these two vectors of variables (β_4 and β_5) represent the marginal impact of views of, and distances to, wind turbines on sales prices, as compared to a "reference" category of residential transactions, and should be ordered monotonically from low to high.[51] This form of variable was used to

[51] "Reference category" refers to the subset of the sample to which other observations are compared, and is pertinent when using categorical or "fixed effect" variables.

impose the least structure on the underlying data.[52] For the purpose of the Base Model, the reference category for the DISTANCE variables are those transactions of homes that were situated outside of five miles from the nearest wind turbine. The reference category for the VIEW variables are those transactions of homes that did not have a view of the wind facility upon sale. Among the post-construction sample of homes, these reference homes are considered the least likely to be affected by the presence of the wind facilities.[53]

Table 8: List of Variables of Interest Included in the Base Model

Variable Name	Description	Type	Expected Sign
View_None	If the home sold after construction began and had no view of the turbines (Yes = 1, No = 0)	Reference	n/a
View_Minor	If the home sold after construction began and had a Minor View of the turbines (Yes = 1, No = 0)	OC	-
View_Mod	If the home sold after construction began and had a Moderate View of the turbines (Yes = 1, No = 0)	OC	-
View_Sub	If the home sold after construction began and had a Substantial View of the turbines (Yes = 1, No = 0)	OC	-
View_Extrm	If the home sold after construction began and had an Extreme View of the turbines (Yes = 1, No = 0)	OC	-
Mile_Less_0.57	If the home sold after facility "construction" and was within 0.57 miles (3000 feet) of the turbines (Yes = 1, No = 0)	OC	-
Mile_0.57to1	If the home sold after facility "construction" and was between 0.57 miles (3000 feet) and 1 mile of the turbines (Yes = 1, No = 0)	OC	-
Mile_1to3	If the home sold after facility "construction" and was between 1 and 3 miles of the turbines (Yes = 1, No = 0)	OC	-
Mile_3to5	If the home sold after facility "construction" and was between 3 and 5 miles of the turbines (Yes = 1, No = 0)	OC	-
Mile_Gtr5	If the home sold after facility "construction" and was outside 5 miles of the turbines (Yes = 1, No = 0)	Reference	n/a

"OC" Ordered Categorical (1 = yes, 0 = no) values are interpreted in relation to the reference categorical case and are expected to have a monotonic order from low to high.

The three stigmas are investigated though these VIEW and DISTANCE variables. Scenic Vista Stigma is investigated through the VIEW variables. Area and Nuisance Stigmas, on the other hand, are investigated through the DISTANCE variables. To distinguish between Area and

[52] In place of the ordered categorical DISTANCE variables, practitioners often rely on a continuous DISTANCE form (e.g., Sims et al., 2008). Similar to ordered categorical variables, continuous variables have a natural ordering, either ascending or descending, but, unlike categorical variables, these "continuous" values are on a scale. Therefore, given any two of its values X_1 and X_2 and a specific functional form, the ratio "X_1/X_2" and the distance "$X_1 - X_2$" have a fixed meaning. Examples of continuous variables other than DISTANCE that are commonly used include the number of square feet of living area (in 1000s) in a home (SQFT_1000) or the acres in the parcel (ACRES). A continuous functional form of this nature "imposes structure" because practitioners must decide how price is related to the underlying variables through the selection of a specific functional relationship between the two. For instance, in the case of DISTANCE, is there a linear relationship (which would imply a similar marginal difference between two distances both near and far from the turbines), does it decay slowly as distance grows, or does it fade completely at some fixed distance? Because of the lack of literature in this area, no *a priori* expectations for which functional form is the best were established, and therefore unstructured categorical variables are used in the Base Model. Nonetheless, a continuous DISTANCE form is explored in Section 5.2.

[53] It is worth noting that these reference homes are situated in both rural and urban locales and therefore are not uniquely affected by influences from either setting. This further reinforces their worthiness as a reference category.

Nuisance Stigma, it is assumed that Nuisance effects are concentrated within one mile of the nearest wind turbine, while Area effects will be considered for those transactions outside of one mile. Any property value effects discovered outside of one mile and based on the DISTANCE variables are therefore assumed to indicate the presence of Area Stigma, while impacts within a mile may reflect the combination of Nuisance and Area Stigma.

The second set of variables in the Base Model - spatial adjustments - correct for the assumed presence of spatial autocorrelation in the error term (ε). It is well known that the sales price of a home can be systematically influenced by the sales prices of those homes that have sold nearby. Both the seller and the buyer use information from comparable surrounding sales to inform them of the appropriate transaction price, and nearby homes often experience similar amenities and disamenities. This lack of independence of home sale prices could bias hedonic regression results and, to help correct for this bias, a spatially (i.e., distance) weighted neighbors' sales price (N) is included in the model. Empirically, the neighbors' price has been found to be a strong (and sometimes even the strongest) predictor of home values (Leonard and Murdoch, forthcoming), and the coefficient β_1 is expected to be positive, indicating a positive correlation between the neighbors' and subject home's sales price. A more-detailed discussion of the importance of this variable, and how it was created, is contained in Appendix G.

The third group of variables in the Base Model - study area fixed effects - control for study area influences and the differences between them. The vector's parameters β_2 represent the marginal impact of being in any one of the study areas, as compared to a reference category. In this case, the reference category is the Washington/Oregon (WAOR) study area.[54] The estimated coefficients for this group of variables represent the combined effects of school districts, tax rates, crime, and other locational influences across an entire study area. Although this approach greatly simplifies the estimation of the model, because of the myriad of influences captured by these study-area fixed effects variables, interpreting the coefficient can be difficult. In general, though, the coefficients simply represent the mean difference in sales prices between the study areas and the reference study area (WAOR). These coefficients are expected to be strongly influential, indicating significant differences in sales prices across study areas.

The fourth group of variables in the Base Model are the core home and site characteristics (X), and include a range of continuous ("C"),[55] discrete ("D"),[56] binary ("B"),[57] and ordered categorical ("OC") variables. The specific home and site variables included in the Base Model are listed in Table 9 along with the direction of expected influence.[58] Variables included are age

[54] Because there is no intent to focus on the coefficients of the study area fixed effect variables, the reference case is arbitrary. Further, the results for the other variables in the model are completely independent of this choice.

[55] See discussion in footnote 52 on previous page.

[56] Discrete variables, similar to continuous variables, are ordered and the distance between the values, such as X_1 and X_2, have meaning, but for these variables, there are only a relatively small number of discrete values that the variable can take, for example, the number of bathrooms in a home (BATHROOMS).

[57] Binary variables have only two conditions: "on" or "off" (i.e., "1" or "0" respectively). Examples are whether the home has central air conditioning ("CENTRAL_AC") or if the home is situated on a cul-de-sac ("CUL_DE_SAC"). The coefficients for these variables are interpreted in relation to when the condition is "off."

[58] For those variables with a "+" sign it is expected that as the variable increases in value (or is valued at "1" as would be the case for fixed effects variables) the price of the home will increase, and the converse is true for the variables with a "-" sign. The expected signs of the variables all follow conventional wisdom (as discussed in

of the home, home and lot size, number of bathrooms and fireplaces, the condition of the home, the quality of the scenic vista from the home, if the home has central AC, a stone exterior, and/or a finished basement, and whether the home is located in a cul-de-sac and/or on a water way.[59]

Table 9: List of Home and Site Characteristics Included in the Base Model

Variable Name	Description	Type	Expected Sign
AgeatSale	The age of the home at the time of sale in years	C	-
AgeatSale_Sqrd	The age of the home at the time of sale squared	C	+
Sqft_1000	The number of square feet of above grade finished living area (in 1000s)	C	+
Acres	The number of Acres sold with the residence	C	+
Baths	The number of Bathrooms (Full Bath = 1, Half Bath = 0.5)	D	+
ExtWalls_Stone	If the home has exterior walls of stone, brick or stucco (Yes = 1, No = 0)	B	+
CentralAC	If the home has a Central AC unit (Yes = 1, No = 0)	B	+
Fireplace	The number of fireplace openings	D	+
Cul_De_Sac	If the home is situated on a cul-de-sac (Yes = 1, No = 0)	B	+
FinBsmt	If finished basement sqft > 50% times first floor sqft (Yes = 1, No = 0)	B	+
Water_Front	If the home shares a property line with a body of water or river (Yes = 1, No = 0)	B	+
Cnd_Low	If the condition of the home is Poor (Yes = 1, No = 0)	OC	-
Cnd_BAvg	If the condition of the home is Below Average (Yes = 1, No = 0)	OC	-
Cnd_Avg	If the condition of the home is Average (Yes = 1, No = 0)	Reference	n/a
Cnd_AAvg	If the condition of the home is Above Average (Yes = 1, No = 0)	OC	+
Cnd_High	If the condition of the home is High (Yes = 1, No = 0)	OC	+
Vista_Poor	If the Scenic Vista from the home is Poor (Yes = 1, No = 0)	OC	-
Vista_BAvg	If the Scenic Vista from the home is Below Average (Yes = 1, No = 0)	OC	-
Vista_Avg	If the Scenic Vista from the home is Average (Yes = 1, No = 0)	Reference	n/a
Vista_AAvg	If the Scenic Vista from the home is Above Average (Yes = 1, No = 0)	OC	+
Vista_Prem	If the Scenic Vista from the home is Premium (Yes = 1, No = 0)	OC	+

"C" Continuous, "D" Discrete, and "B" Binary (1 = yes, 0 = no) values are interpreted in relation to "No"

"OC" Ordered Categorical (1 = yes, 0 = no) values are interpreted in relation to the reference categorical case and are expected to have a monotonic order from low to high.

Sirmans et al., 2005a), save AgeatSale and AgeatSale_Sqrd, which are expected to be negative and positive, respectively. The magnitude of the coefficient of AgeatSale is expected to be larger than that of AgeatSale_Sqrd indicating an initial drop in value as a home increases in age, and then an increase in value as the home becomes considerably older and more "historic."

[59] Some characteristics, such as whether the home had a deck, a pool, or is located on a public sewer, are not available consistently across the dataset and therefore are not incorporated into the model. Other characteristics, such as the number of bedrooms, the number of stories, or if the home had a garage, are available but are omitted from the final model because they are highly correlated with characteristics already included in the model and therefore do not add significantly to the model's explanatory power. More importantly, and as discussed in Appendix G, when their inclusion or exclusion are tested, the results are stable with those derived from the Base Model.

It should be emphasized that in the Base Hedonic Model - equation (1) - and in all subsequent models presented in Section 5, all variables of interest, spatial adjustments, and home and site characteristics are pooled, and therefore their estimates represent the average across all study areas. Ideally, one would have enough data to estimate a model at the study area level - a fully unrestricted model - rather than pooled across all areas. This fully unrestricted model form, along with 15 other model forms (with some variables restricted and others not), are discussed in detail in Appendix F. In total, these 16 different models were estimated to explore which model was the most parsimonious (had the fewest parameters), performed the best (e.g., had the highest adjusted R^2 and the lowest Schwarz information criterion[60]), and had the most stable coefficients and standard errors. The basic pooled model described by equation (1) is found to fit that description, and that model is therefore chosen as the Base Model to which others are compared. By making this choice the effort concentrates on identifying the presence of potential property value impacts across all of the study areas in the sample as opposed to any single study area.[61]

Finally, to assure that the model produces the best linear unbiased parameter estimates, the underlying assumptions of Ordinary Least Squares (OLS) regression techniques must be verified:

1) Homoskedastic error term;
2) Absence of temporal serial correlation;
3) Reasonably limited multicollinearity; and
4) Appropriate controls for outliers and influencers.[62]

These assumptions, and the specific approaches that are used to address them, are discussed in detail in Appendix G.

4.3. Analysis of Results

Table 10 (on page 32) presents the results of the Base Model (equation 1).[63] The model performs well, with an adjusted R^2 of 0.77.[64] The spatial adjustment coefficient (β_1) of 0.29 (*p* value 0.00) indicates that a 10% increase in the spatially weighted neighbor's price increases the subject home's value by an average of 2.9%. The study-area fixed effects (β_2) variables are all significant at the one percent level, demonstrating important differences in home valuations

[60] The Schwarz information criterion measures relative parsimony between similar models (Schwarz, 1978).

[61] Because effects might vary between study areas, and the models estimate an average across all study areas, the full range of effects in individual study areas will go undetermined. That notwithstanding, there is no reason to suspect that effects will be completely "washed out." For that to occur, an effect in one study area would have to be positive while in another area it would have to be negative, and there is no reason to suspect that sales prices would increase because of the turbines in one community while decreasing in other communities.

[62] The absence of spatial autocorrelation is often included in the group of assumptions, but because it was discussed above (and in Appendix G), and is addressed directly by the variable (N_i) included in the model, it is not included in this list.

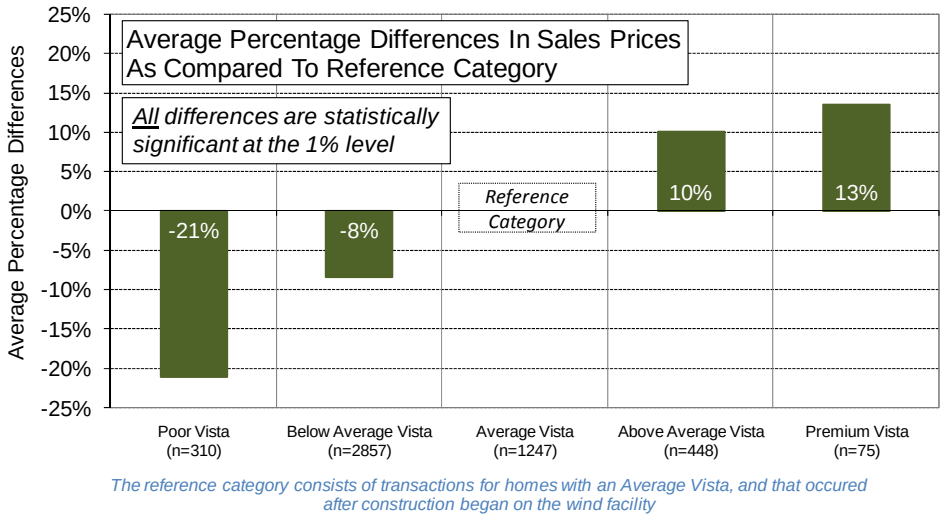
[63] This model and all subsequent models were estimated using the PROC REG procedure of SAS Version 9.2 TS1M0, which produces White's corrected standard errors.

[64] The appropriateness of the R^2 of 0.77 for this research is validated by the extensive hedonic literature that precedes it (see e.g., Kroll and Priestley, 1992; Boyle and Kiel, 2001; Simons, 2006b).

between the reference study area (WAOR) and the other nine study areas.[65] The sign and magnitudes of the home and site characteristics are all appropriate given the *a priori* expectations, and all are statistically significant at the one percent level.[66]

Of particular interest are the coefficient estimates for scenic vista (VISTA) as shown in Figure 5. Homes with a POOR vista rating are found, on average, to sell for 21% less (*p* value 0.00) than homes with an AVERAGE rating, while BELOW AVERAGE homes sell for 8% less (*p* value 0.00). Conversely, homes with an ABOVE AVERAGE vista are found to sell for 10% more (*p* value 0.00) than homes with an AVERAGE vista, while PREMIUM vista homes sell for 13% more than AVERAGE homes (*p* value 0.00). Based on these results, it is evident that home buyers and sellers capitalize the quality of the scenic vista in sales prices.[67]

Figure 5: Results from the Base Model for VISTA



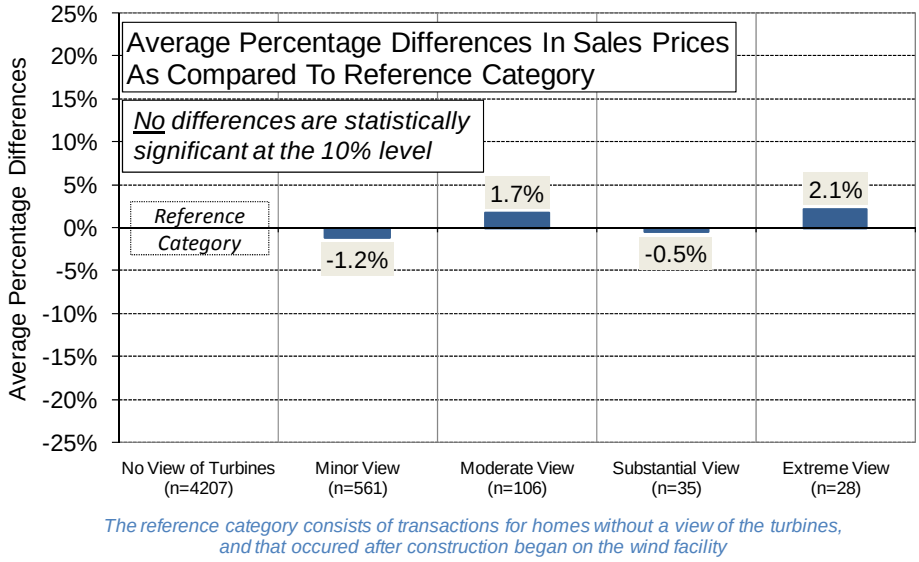
[65] The reference category WAOR study area has the highest mean and median house values in the sample (as shown in Appendix A) so the negative coefficients for all the study area fixed effect variables are appropriate.

[66] To benchmark the results against those of other practitioners the research by Sirmans et al. (2005a; 2005b) was consulted. They conducted a meta-analysis of 64 hedonic studies carried out in multiple locations in the U.S. during multiple time periods, and investigated the coefficients of ten commonly used characteristics, seven of which were included in the model. The similarities between their mean coefficients (i.e., the average across all 64 studies) and those estimated in the present Base Model are striking. The analysis presented here estimates the effect of square feet (in 1000s) on log of sales price at 0.28 and Sirmans et al. provide an estimate of 0.34, while ACRES was similarly estimated (0.02 to 0.03, Base Model and Sirmans et al., respectively). Further, AGEATSALE (age at the time of sale) (-0.006 to -0.009), BATHROOMS (0.09 to 0.09), CENTRALAC (0.09 to 0.08), and FIREPLACE (0.11 to 0.09) all similarly compare. As a group, the Base Model estimates differ from Sirmans et al. estimates in all cases by no more than a third of the Sirmans et al. mean estimate's standard deviation. This, taken with the relatively high adjusted R^2 of the Base Model, demonstrates the appropriateness of the model's specification.

[67] To benchmark these results they are compared to the few studies that have investigated the contribution of inland scenic vistas to sales prices. Benson et al. (2000) find that a mountain vista increases sales price by 8%, while Bourassa et al. (2004) find that wide inland vistas increase sales price by 7.6%. These both compare favorably to the 10% and 14% above average and premium rated VISTA estimates. Comparable studies for below average and poor VISTA were not found and therefore no benchmarking of those coefficients is conducted. Finally, it should again be noted that a home's scenic vista, as discussed in Section 3.2.3, was ranked without taking the presence of the wind turbines into consideration, even if those turbines were visible at the time of home sale.

Despite this finding for scenic vista, however, no statistically significant relationship is found between views of wind turbines and sales prices.[68] The coefficients for the VIEW parameters (β_4) are all relatively small, none are statistically significant, and they are not monotonically ordered (see Figure 6). Homes with EXTREME or SUBSTANTIAL view ratings, for which the Base Model is expected to find the largest differences, sell for, on average, 2.1% more (*p* value 0.80) and 0.5% less (*p* value 0.94) than NO VIEW homes that sold in the same post-construction period. Similarly, homes with MODERATE or MINOR view ratings sell, on average, for 1.7% more (*p* value 0.58) and 1.2% less (*p* value 0.40) than NO VIEW homes, respectively. None of these coefficients are sizable, and none are statistically different from zero. These results indicate that, among this sample at least, a statistically significant relationship between views of wind turbines and residential property values is not evident. In other words, there is an absence of evidence of a Scenic Vista Stigma in the Base Model.

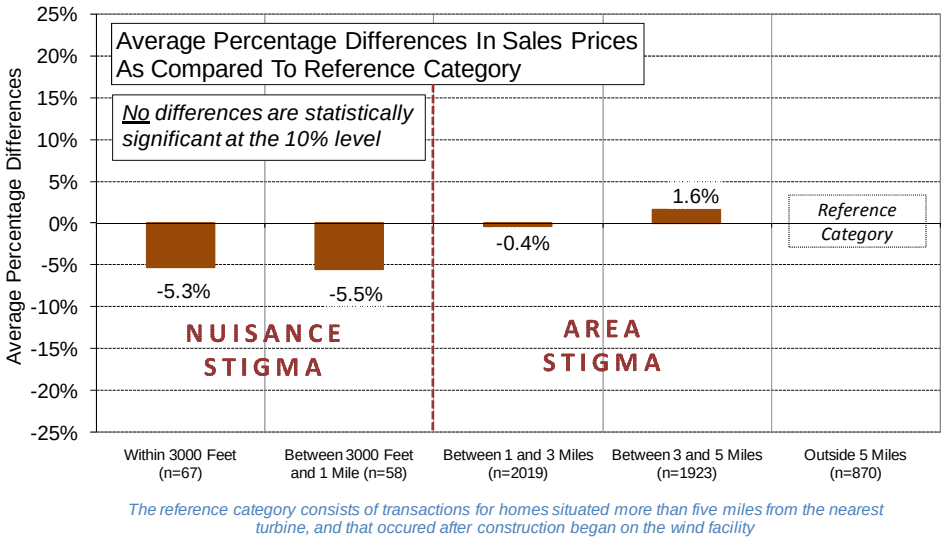
Figure 6: Results from the Base Model for VIEW



The coefficients for the DISTANCE parameters (β_5) are also all relatively small and none are statistically significant (see Figure 7). Homes that are situated within 3000 feet (0.57 miles) of the nearest wind turbine, at the time of sale, are found to sell for 5.3% less (*p* value 0.40), on average, than homes outside of 5 miles that sold in the same "post-construction" period. Meanwhile, homes between 3000 feet and 1 mile sold for 5.5% less (*p* value 0.30), on average, than homes more than 5 miles away. Homes that are within 1 to 3 miles of the nearest turbine, as compared to homes outside of 5 miles, sold for essentially the same, on average (coefficient = 0.004, *p* value 0.80), while homes between 3 and 5 miles sold for 1.6% more (*p* value 0.23).

[68] A significance level of 10% is used throughout this report, which corresponds to a *p*-value at or above 0.10. Although this is more liberal than the often used 5% (*p*-value at or above 0.05), it was chosen to give more opportunities for effects that might be fairly weak to be considered significant.

Figure 7: Results from the Base Model for DISTANCE



Looking at these results as a whole, a somewhat monotonic order from low to high is found as homes are situated further away from wind facilities, but all of the coefficients are relatively small and none are statistically different from zero. This suggests that, for homes in the sample at least, there is a lack of statistical evidence that the distance from a home to the nearest wind turbine impacts sales prices, and this is true regardless of the distance band.[69] As such, an absence of evidence of an Area or Nuisance Stigma is found in the Base Model. That notwithstanding, the -5% coefficients for homes that sold within one mile of the nearest wind turbine require further scrutiny. Even though the differences are not found to be statistically significant, they might point to effects that exist but are too small for the model to deem statistically significant due to the relatively small number of homes in the sample within 1 mile of the nearest turbine. Alternatively, these homes may simply have been devalued even before the wind facility was erected, and that devaluation may have carried over into the post construction period (the period investigated by the Base Model). To explore these possibilities, transactions that occurred well before the announcement of the wind facility to well after construction are investigated in the Temporal Aspects Model in the following "Alternative Models" section.

[69] It is worth noting that the number of cases in each of these categories (e.g., n = 67 for homes inside of 3000 feet and n = 58 between 3000 feet and one mile) are small, but are similar to the numbers of cases for other variables in the same model (e.g., LOW CONDITION, n = 69; PREMIUM VISTA, n = 75), the estimates of which were found to be significant above the 1% level.

Table 10: Results from the Base Model

	Coef.	SE	p Value	*n*
Intercept	7.62	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.33	0.04	0.00	87
Cnd_Low	-0.45	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.14	0.01	0.00	1,445
Cnd_High	0.23	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.03	0.00	1,071
OKCC	-0.44	0.02	0.00	476
IABV	-0.24	0.02	0.00	605
ILLC	-0.09	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.31	0.03	0.00	291
PAWC	-0.07	0.03	0.01	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
Post_Con_NoView	Omitted	Omitted	Omitted	4,207
View_Minor	-0.01	0.01	0.40	561
View_Mod	0.02	0.03	0.58	106
View_Sub	-0.01	0.07	0.94	35
View_Extrm	0.02	0.09	0.80	28
Mile_Less_0_57	-0.05	0.06	0.40	67
Mile_0_57to1	-0.05	0.05	0.30	58
Mile_1to3	0.00	0.02	0.80	2,019
Mile_3to5	0.02	0.01	0.23	1,923
Mile_Gtr5	Omitted	Omitted	Omitted	870

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**1**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**37**
F Statistic	**442.8**
Adjusted R Squared	**0.77**

5. Alternative Hedonic Models

The Base Hedonic Model presented in Section 4 found that residential property values have, on average, not been measurably affected by the presence of nearby wind facilities. To test the robustness of this result and to test for other possible impacts from nearby wind projects, the report now turns to a number of other hedonic models. These Alternative Models were created to investigate different approaches to exploring the impact of the variables of interest (#1 and #2, below) and to assess the presence of impacts that are not otherwise fully captured by the Base Model (#3 through #6, below).

1) **View and Distance Stability Models:** Using only post-construction transactions (the same as the Base Model) these models investigate whether the Scenic Vista Stigma (as measured with VIEW) results are independent of the Nuisance and Area Stigma results (as measured by DISTANCE) and vice versa.[70]
2) **Continuous Distance Model:** Using only post-construction transactions, this model investigates Area and Nuisance Stigmas by applying a continuous distance parameter as opposed to the categorical variables for distance used in the previous models.
3) **All Sales Model:** Using all transactions, this model investigates whether the results for the three stigmas change if transactions that occurred before the announcement and construction of the wind facility are included in the sample.
4) **Temporal Aspects Model:** Using all transactions, this model further investigates Area and Nuisance Stigmas and how they change for homes that sold more than two years pre-announcement through the period more than four years post-construction.
5) **Home Orientation Model:** Using only post-construction transactions, this model investigates the degree to which a home's orientation to the view of wind turbines affects sales prices.
6) **View and Vista Overlap Model:** Using only post-construction transactions, this model investigates the degree to which the overlap between the view of a wind facility and a home's primary scenic vista affects sales prices.

Each of these models is described in more depth in the pages that follow. Results are shown for the variables of interest only; full results are contained in Appendix H.

5.1. View and Distance Stability Models

The Base Model (equation 1) presented in Section 4 includes both DISTANCE and VIEW variables because a home's value might be affected in part by the magnitude of the view of a nearby wind facility and in part by the distance from the home to that facility. These two variables may be related, however, in-so-far as homes that are located closer to a wind facility are likely to have a more-dominating view of that facility. To explore the degree to which these two sets of variables are independent of each other (i.e. not collinear) and to further test the robustness of the Base Model results two alternative hedonic models are run, each of which includes only one of the sets of parameters (DISTANCE or VIEW). Coefficients from these models are then compared to the Base Model results.

[70] Recall that the qualitative VIEW variable incorporated the visible distance to the nearest wind facility.

5.1.1. Dataset and Model Form

The same dataset is used as in the Base Model, focusing again on post-construction transactions (n = 4,937). To investigate DISTANCE effects alone the following model is estimated:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \varepsilon \tag{2}$$

where
P represents the inflation-adjusted sales price,
N is the spatially weighted neighbors' predicted sales price,
S is the vector of *s* Study Area fixed effects variables (e.g., WAOR, OKCC, etc.),
X is a vector of *k* home and site characteristics (e.g., acres, square feet, number of bathrooms, condition of the home, age of home, VISTA, etc.),
DISTANCE is a vector of *d* categorical distance variables (e.g., less than 3000 feet, between one and three miles, etc.),
β_0 is the constant or intercept across the full sample,
β_1 is a parameter estimate for the spatially weighted neighbor's predicted sales price,
β_2 is a vector of *s* parameter estimates for the study area fixed effects as compared to transactions of homes in the WAOR study area,
β_3 is a vector of *k* parameter estimates for the home and site characteristics,
β_5 is a vector of *d* parameter estimates for the DISTANCE variables as compared to transactions of homes situated outside of five miles, and
ε is a random disturbance term.

The parameters of primary interest are β_5, which represent the marginal differences between home values at various distances from the wind turbines as compared to the reference category of homes outside of five miles. These coefficients can then be compared to the same coefficients estimated from the Base Model.

Alternatively, to investigate the VIEW effects alone, the following model is estimated:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \varepsilon \tag{3}$$

where
VIEW is a vector of *v* categorical view variables (e.g., MINOR, MODERATE, etc.),
β_4 is a vector of *v* parameter estimates for the VIEW variables, and
all other components are as defined in equation (2).

The parameters of primary interest in this model are β_4, which represent the marginal differences between home values for homes with varying views of wind turbines at the time of sale as compared to the reference category of homes without a view of those turbines. Again, these coefficients can then be compared to the same coefficients estimated from the Base Model.

Our expectation for both of the models described here is that the results will not be dramatically different from the Base Model, given the distribution of VIEW values across the DISTANCE values, and vice versa, as shown in Table 11. Except for EXTREME view, which is

concentrated inside of 3000 feet, all view ratings are adequately distributed among the distance categories.

Table 11: Frequency Crosstab of VIEW and DISTANCE Parameters

	Inside 3000 Feet	Between 3000 Feet and 1 Mile	Between 1 and 3 Miles	Between 3 and 5 Miles	Outside 5 Miles	Total
No View	6	12	1653	1695	841	**4207**
Minor View	14	24	294	202	27	**561**
Moderate View	8	13	62	21	2	**106**
Substantial View	11	9	10	5	0	**35**
Extreme View	28	0	0	0	0	**28**
TOTAL	**67**	**58**	**2019**	**1923**	**870**	**4937**

5.1.2. Analysis of Results

Summarized results for the variables of interest from the Base Model and the two Alternative Stability Models are presented in Table 12. (For brevity, the full set of results for the models is not shown in Table 12, but is instead included in Appendix H.) The adjusted R^2 for the View and Distance Stability Models is the same as for the Base Model, 0.77. All study area, spatial adjustment, and home and site characteristics are significant at or above the one percent level and are similar in magnitude to the estimates presented earlier for the Base Model.

The DISTANCE and VIEW coefficients, β_5 and β_4, are stable, changing no more than 3%, with most (7 out of 8) not experiencing a change greater than 1%. In all cases, changes to coefficient estimates for the variables of interest are considerably less than the standard errors. Based on these results, there is confidence that the correlation between the VIEW and DISTANCE variables is not responsible for the findings and that these two variables are adequately independent to be included in the same hedonic model regression. As importantly, no evidence of Area, Scenic Vista, or Nuisance Stigma is found in the sample, as none of the VIEW or DISTANCE variables are found to be statistically different from zero.

Table 12: Results from Distance and View Stability Models

		Base Model			Distance Stability			View Stability		
Variables of Interest	***n***	**Coef**	**SE**	**p Value**	**Coef**	**SE**	**p Value**	**Coef**	**SE**	**p Value**
No View	4207	Omitted	Omitted	Omitted				Omitted	Omitted	Omitted
Minor View	561	-0.01	0.01	0.39				-0.02	0.01	0.24
Moderate View	106	0.02	0.03	0.57				0.00	0.03	0.90
Substantial View	35	-0.01	0.07	0.92				-0.04	0.06	0.45
Extreme View	28	0.02	0.09	0.77				-0.03	0.06	0.58
Inside 3000 Feet	67	-0.05	0.06	0.31	-0.04	0.04	0.25			
Between 3000 Feet and 1 Mile	58	-0.05	0.05	0.20	-0.06	0.05	0.17			
Between 1 and 3 Miles	2019	0.00	0.02	0.80	-0.01	0.02	0.71			
Between 3 and 5 Miles	1923	0.02	0.01	0.26	0.01	0.01	0.30			
Outside 5 Miles	870	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted			

"Omitted" = reference category for fixed effects variables. "n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**1**	**2**	**3**
Dependent Variable	**LN_SalePrice96**	**LN_SalePrice96**	**LN_SalePrice96**
Number of Cases	**4937**	**4937**	**4937**
Number of Predictors (k)	**37**	**33**	**33**
F Statistic	**442.8**	**496.7**	**495.9**
Adjusted R Squared	**0.77**	**0.77**	**0.77**

5.2. Continuous Distance Model

The potential impact of wind facilities on residential property values based on Area and Nuisance effects was explored with the Base Model by using five ordered categorical DISTANCE variables. This approach was used in order to impose the least restriction on the functional relationship between distance and property values (as discussed in footnote 52 on page 25). The literature on environmental disamenities, however, more commonly uses a continuous distance form (e.g., Sims et al., 2008), which imposes more structure on this relationship. To be consistent with the literature and to test if a more rigid structural relationship might uncover an effect that is not otherwise apparent with the five distance categories used in the Base Model, a hedonic model that relies upon a continuous distance variable is presented here. One important benefit of this model is that a larger amount of data (e.g., n = 4,937) is used to estimate the continuous DISTANCE coefficient then was used to estimate any of the individual categorical estimates in the Base Model (e.g., n = 67 inside 3000 feet, n = 2019 between one and three miles). The Continuous Distance Model therefore provides an important robustness test to the Base Model results.

5.2.1. Dataset and Model Form

A number of different functional forms can be used for a continuous DISTANCE variable, including linear, inverse, cubic, quadratic, and logarithmic. Of the forms that are considered, an inverse function seemed most appropriate.[71] Inverse functions are used when it is assumed that any effect is most pronounced near the disamenity and that those effects fade asymptotically as distance increases. This form has been used previously in the literature (e.g., Leonard et al., 2008) to explore the impact of disamenities on home values, and is calculated as follows:

$$\text{InvDISTANCE} = 1/\text{DISTANCE} \tag{4}$$

where
DISTANCE is the distances to the nearest turbine from each home as calculated at the time of sale for homes that sold in the post-construction period.

For the purpose of the Continuous Distance Model, the same dataset is used as in the Base Model, focusing again on post-construction transactions (n = 4,937). InvDISTANCE has a maximum of 6.67 (corresponding to homes that were 0.15 miles, or roughly 800 feet, from the nearest wind turbine), a minimum of 0.09 (corresponding to a distance of roughly 11 miles), and a mean of 0.38 (corresponding to a distance of 2.6 miles). This function was then introduced into the hedonic model in place of the DISTANCE categorical variables as follows:

$$\ln(\text{P}) = \beta_0 + \beta_1\text{N} + \sum_{\text{s}}\beta_2\text{S} + \sum_{\text{k}}\beta_3\text{X} + \sum_{\text{v}}\beta_4\text{VIEW} + \beta_5\text{InvDISTANCE} + \varepsilon \tag{5}$$

where
InvDISTANCE_i is the inverse of the distance to the nearest turbine,
β_5 is a parameter estimate for the inverse of the distance to the nearest turbine, and

[71] The other distance functions (e.g., linear, quadratic, cubic & logarithmic) were also tested. Additionally, two-part functions with interactions between continuous forms (e.g., linear) and categorical (e.g., less than one mile) were investigated. Results from these models are briefly discussed below in footnote 72.

all other components are as defined in equation (1).

The coefficient of interest in this model is β_5, which, if effects exist, would be expected to be negative, indicating an adverse effect from proximity to the wind turbines.

5.2.2. Analysis of Results

Results for the variables of interest in the Continuous Distance Model and the Base Model are shown in Table 13. (For brevity, the full set of results for the model is not shown in Table 13, but is instead included in Appendix H.) The model performs well with an adjusted R^2 of 0.77. All study area, spatial adjustment, and home and site characteristics are significant at the one percent level. The coefficients for VIEW are similar to those found in the Base Model, demonstrating stability in results, and none are statistically significant. These results support the previous findings of a lack of evidence of a Scenic Vista Stigma.

Our focus variable InvDISTANCE produces a coefficient (β_5) that is slightly negative at -1%, but that is not statistically different from zero (*p* value 0.41), implying again that there is no statistical evidence of a Nuisance Stigma effect nor an Area Stigma effect and confirming the results obtained in the Base Model.[72]

Table 13: Results from Continuous Distance Model

	Base Model				Continuous Distance			
Variables of Interest	**Coef**	**SE**	**p Value**	***n***	**Coef**	**SE**	**p Value**	***n***
No View	Omitted	Omitted	Omitted	4,207	Omitted	Omitted	Omitted	4,207
Minor View	-0.01	0.01	0.39	561	-0.01	0.01	0.32	561
Moderate View	0.02	0.03	0.57	106	0.01	0.03	0.77	106
Substantial View	-0.01	0.07	0.92	35	-0.02	0.07	0.64	35
Extreme View	0.02	0.09	0.77	28	0.01	0.10	0.85	28
Inside 3000 Feet	-0.05	0.06	0.31	67				
Between 3000 Feet and 1 Mile	-0.05	0.05	0.20	58				
Between 1 and 3 Miles	0.00	0.02	0.80	2,019				
Between 3 and 5 Miles	0.02	0.01	0.26	1,923				
Outside 5 Miles	Omitted	Omitted	Omitted	870				
InvDISTANCE					-0.01	0.02	0.41	4,937

"Omitted" = reference category for fixed effects variables. "n" = number of cases in category when category = "1"

Model Information

Model Equation Number	**1**	**5**
Dependent Variable	**LN_SalePrice96**	**LN_SalePrice96**
Number of Cases	**4937**	**4937**
Number of Predictors (k)	**37**	**34**
F Statistic	**442.8**	**481.3**
Adjusted R Squared	**0.77**	**0.77**

5.3. All Sales Model

The Base Model presented earlier relied on only those transactions that occurred after the construction of the relevant wind facility. This approach, however, leaves open two key questions. First, it is possible that the property values of all of the post-construction homes in the

[72] As mentioned in footnote 71 on page 36, a number of alternative forms of the continuous distance function were also explored, including two-part functions, with no change in the results presented here. In all cases the resulting continuous distance function was not statistically significant.

sample have been affected by the presence of a wind facility, and therefore that the reference homes in the Base Model (i.e., those homes outside of five miles with no view of a wind turbine) are an inappropriate comparison group because they too have been impacted.[73] Using only those homes that sold before the announcement of the wind facility (pre-announcement) as the reference group would, arguably, make for a better comparison because the sales price of those homes are not plausibly impacted by the presence of the wind facility.[74] Second, the Base Model does not consider homes that sold in the post-announcement but pre-construction period, and previous research suggests that property value effects might be very strong during this period, during which an assessment of actual impacts is not possible and buyers and sellers may take a more-protective and conservative stance (Wolsink, 1989). This subsection therefore presents the results of a hedonic model that uses the full set of transactions in the dataset, pre- and post-construction.

5.3.1. Dataset and Model Form

Unlike the Base Model, in this instance the full set of 7,459 residential transactions is included. The following model is then estimated:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \varepsilon \tag{6}$$

where
VIEW is a vector of *v* categorical view variables (e.g., NONE, MINOR, MODERATE, etc.),
DISTANCE is a vector of *d* categorical distance variables (e.g., less than 3000 feet, between one and three miles, outside of five mile, etc.),
β_4 is a vector of *v* parameter estimates for the VIEW variables as compared to pre-construction transactions,
β_5 is a vector of *d* parameter estimates for the DISTANCE variables as compared to pre-announcement transactions, and
all other components are as defined in equation (1).

It is important to emphasize that the VIEW and DISTANCE parameters in equation (6) have different reference categories than they do in the Base Model - equation (1). In the Base Model, DISTANCE and VIEW are estimated in the post-construction period in reference to homes that sold outside of five miles and with no view of the turbines respectively.[75] In the All Sales Model, on the other hand, the coefficients for VIEW (β_4) are estimated in reference to all <u>pre-construction</u> transactions (spanning the pre-announcement and post-announcement-pre-construction periods) and the coefficients for DISTANCE (β_5) are estimated in reference to all <u>pre-announcement</u> transactions. In making a distinction between the reference categories for VIEW and DISTANCE, it is assumed that awareness of the view of turbines and awareness of

[73] This might be the case if there is an Area Stigma that includes the reference homes.

[74] As discussed in footnote 47 on page 19, it is conceivable that awareness might occur prior to the "announcement" date used for this analysis. If true, this bias is likely to be sporadic in nature and less of an issue in this model, when all pre-announcement transactions are pooled (e.g., both transactions near and far away from where the turbines were eventually located) than in models presented later (e.g., temporal aspects model). Nonetheless, if present, this bias may weakly draw down the pre-announcement reference category.

[75] See Section 4.1 and also footnote 51 on page 24 for more information on why the post-construction dataset and five-mile-no-view homes reference category are used in the Base Model.

the distance from them might not occur at the same point in the development process. Specifically, it is assumed that VIEW effects largely occur after the turbines are erected, in the post-construction period, but that DISTANCE effects might occur in the post-announcement-pre-construction timeframe. For example, after a wind facility is announced, it is not atypical for a map of the expected locations of the turbines to be circulated in the community, allowing home buyers and sellers to assess the distance of the planned facility from homes. Because of this assumed difference in when awareness begins for VIEW and DISTANCE, the DISTANCE variable is populated for transactions occurring in the post-announcement-pre-construction period as well as the post-construction period (see Table 14 below), but the VIEW variable is populated only for transactions in the post-construction period – as they were in the Base Model.[76]

Table 14: Frequency Summary for DISTANCE in All Sales Model

	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Post-Construction	67	58	2019	1923	870	**4937**
Post-Announcement-Pre-Construction	13	7	340	277	130	**767**
TOTAL	**80**	**65**	**2359**	**2200**	**1000**	**5704**

One beneficial consequence of the differences in reference categories for the VIEW and DISTANCE variables in this model, as opposed to the Base Model, is that this model can accommodate all of the possible VIEW and DISTANCE categories, including NO VIEW transactions and transactions of homes outside of five miles. Because of the inclusion of these VIEW and DISTANCE categories, the tests to investigate Area, Scenic Vista, and Nuisance Stigmas are slightly different in this model than in the Base Model. For Area Stigma, for example, how homes with no view of the turbines fared can now be tested; if they are adversely affected by the presence of the wind facility, then this would imply a pervasive Area Stigma impact. For Scenic Vista Stigma, the VIEW coefficients (MINOR, MODERATE, etc.) can be compared (using a *t*-Test) to the NO VIEW results; if they are significantly different, a Scenic Vista Stigma would be an obvious culprit. Finally, for Nuisance Stigma, the DISTANCE coefficients inside of one mile can be compared (using a *t*-Test) to those outside of five miles; if there is a significant difference between these two categories of homes, then homes are likely affected by their proximity to the wind facility.

5.3.2. Analysis of Results

Results for the variables of interest for this hedonic model are summarized in Table 15, and Base Model results are shown for comparison purposes. (For brevity, the full set of results for the model is not shown in Table 15, but is instead included in Appendix H.) The adjusted R^2 for the model is 0.75, down slightly from 0.77 for the Base Model, and indicating that this model has slightly more difficulty (i.e. less explanatory power) modeling transactions that occurred pre-

[76] It is conceivable that VIEW effects could occur before the turbines are constructed. In some cases, for example, developers will simulate what the project will look like after construction during the post-announcement but pre-construction timeframe. In these situations, home buyers and sellers might adjust home values accordingly based on the expected views of turbines. It is assumed, however, that such adjustments are likely to be reasonably rare, and VIEW effects are therefore estimated using only post-construction sales.

construction.[77] All study area, spatial adjustment, and home and site characteristics are significant at or above the one percent level and are similar in sign and magnitude to the estimates derived from the post-construction Base Model.

The VIEW coefficients (β_4) are clearly affected by the change in reference category. All of the VIEW parameter estimates are higher than the Base Model estimates for the same categories. Of particular interest is the NO VIEW coefficient, which represents the values of homes without a view of the turbines and that sold in the post-construction period, as compared to the mean value of homes that sold in the pre-construction period, all else being equal. These homes, on average, are estimated to sell for 2% (*p* value 0.08) more than similar pre-construction homes. If an Area Stigma existed, a negative coefficient for these NO VIEW homes would be expected. Instead, a positive and statistically significant coefficient is found.[78] It is outside the ability of this study to determine whether the increase is directly related to the wind turbines, or whether some other factor is impacting these results, but in either instance, no evidence of a pervasive Area Stigma associated with the presence of the wind facilities is found.

To test for the possibility of Scenic Vista Stigma, the coefficients for MINOR, MODERATE, SUBSTANTIAL, and EXTREME views can be compared to the NO VIEW coefficient using a simple *t*-Test. Table 16 presents these results. As shown, no significant difference is found for any of the VIEW coefficients when compared to NO VIEW transactions. This reinforces the findings earlier that, within the sample at least, there is no evidence of a Scenic Vista Stigma.

The DISTANCE parameter estimates (β_5) are also found to be affected by the change in reference category, and all are lower than the Base Model estimates for the same categories. This result likely indicates that the inflation-adjusted mean value of homes in the pre-announcement period is slightly higher, on average, than for those homes sold outside of five miles in the post-construction period. This difference could be attributed to the inaccuracy of the inflation index, a pervasive effect from the wind turbines, or to some other cause. Because the coefficients are not systematically statistically significant, however, this result is not pursued further. What is of interest, however, is the negative 8% estimate for homes located between 3000 feet and one mile of the nearest wind turbine (*p* value 0.03). To correctly interpret this result, and to compare it to the Base Model, one needs to discern if this coefficient is significantly different from the estimate for homes located outside of five miles, using a *t*-Test.

The results of this *t*-Test are shown in Table 17. The coefficient differences are found to be somewhat monotonically ordered. Moving from homes within 3000 feet (-0.06, *p* value 0.22), and between 3000 feet and one mile (-0.08, *p* value 0.04), to between one and three miles (0.00, *p* value 0.93) and between three and five miles (0.01, *p* value 0.32) the DISTANCE coefficients are found to generally increase. Nonetheless, none of these coefficients are statistically significant except one, homes that sold between 3000 feet and one mile. The latter finding suggests the possibility of Nuisance Stigma. It is somewhat unclear why an effect would be found in this model, however, when one was not evident in the Base Model. The most likely

[77] This slight change in performance is likely due to the inaccuracies of home and site characteristics and the inflation adjustment for homes that sold in the early part of the study period. This is discussed in more detail in footnote 50 on page 23.

[78] For more on the significance level used for this report, see footnote 68 on page 30.

explanation is that the additional homes that are included in this model, specifically those homes that sold post-announcement but pre-construction, are driving the results. A thorough investigation of these "temporal" issues is provided in the next subsection.

In summation, no evidence is found of an Area or Scenic Vista Stigma in this alternative hedonic model, but some limited not-conclusive evidence of a Nuisance Stigma is detected. To further explore the reliability of this latter result, the analysis now turns to the Temporal Aspects Model.

Table 15: Results from All Sales Model

	Base Model				All Sales			
Variables of Interest	**Coef**	**SE**	**p Value**	***n***	**Coef**	**SE**	**p Value**	***n***
Pre-Construction Sales	n/a	n/a	n/a	n/a	Omitted	Omitted	Omitted	2,522
No View	Omitted	Omitted	Omitted	4,207	0.02	0.01	0.08	4,207
Minor View	-0.01	0.01	0.39	561	0.00	0.02	0.77	561
Moderate View	0.02	0.03	0.57	106	0.03	0.03	0.41	106
Substantial View	-0.01	0.07	0.92	35	0.03	0.07	0.53	35
Extreme View	0.02	0.09	0.77	28	0.06	0.08	0.38	28
Inside 3000 Feet	-0.05	0.06	0.31	67	-0.06	0.05	0.18	80
Between 3000 Feet and 1 Mile	-0.05	0.05	0.20	58	-0.08	0.05	0.03	65
Between 1 and 3 Miles	0.00	0.02	0.80	2,019	0.00	0.01	0.80	2,359
Between 3 and 5 Miles	0.02	0.01	0.26	1,923	0.01	0.01	0.59	2,200
Outside 5 Miles	Omitted	Omitted	Omitted	870	0.00	0.02	0.78	1,000
Pre-Announcement Sales	n/a	n/a	n/a	n/a	Omitted	Omitted	Omitted	1,755

"Omitted" = reference category for fixed effects variables. "n" = number of cases in category when category = "1"

Model Information

Model Equation Number	**1**	**6**
Dependent Variable	**LN_SalePrice96**	**LN_SalePrice96**
Number of Cases	**4937**	**7459**
Number of Predictors (k)	**37**	**39**
F Statistic	**442.8**	**579.9**
Adjusted R Squared	**0.77**	**0.75**

Table 16: Results from Equality Test of VIEW Coefficients in the All Sales Model

	No View	**Minor View**	**Moderate View**	**Substantial View**	**Extreme View**
n	4,207	561	106	35	28
Coefficient	0.02	0.00	0.03	0.03	0.06
Coefficient Difference *	Reference	-0.02	0.00	0.01	0.04
Variance	0.0001	0.0003	0.0009	0.0030	0.0050
Covariance	n/a	0.00011	0.00010	0.00009	0.00008
Df	n/a	7419	7419	7419	7419
***t*-Test**	n/a	-1.20	0.17	0.23	0.58
Significance	n/a	0.23	0.87	0.82	0.57

** Differences are rounded to the nearest second decimal place.*
"n" = number of cases in category when category = "1"

Table 17: Results from Equality Test of DISTANCE Coefficients in the All Sales Model

	Inside 3000 Feet	Between 3000 Feet and 1 Mile	Between 1 and 3 Miles	Between 3 and 5 Miles	Outside 5 Miles
n	80	65	2,359	2,200	1,000
Coefficient	-0.06	-0.08	0.00	0.01	0.00
Coefficient Difference *	-0.05	-0.08	0.00	0.01	Reference
Variance	0.0019	0.0015	0.0002	0.0002	0.0003
Covariance	0.00010	0.00013	0.00013	0.00015	n/a
Df	7419	7419	7419	7419	n/a
***t* Test**	-1.23	-2.06	0.09	1.00	n/a
Significance	0.22	0.04	0.93	0.32	n/a

** Differences are rounded to the nearest second decimal place.*
"n" = number of cases in category when category = "1"

5.4. Temporal Aspects Model

Based on the results of the All Sales Model, a more thorough investigation of how Nuisance and Area Stigma effects might change throughout the wind project development period is warranted. As discussed previously, there is some evidence that property value impacts may be particularly strong after the announcement of a disamenity, but then may fade with time as the community adjusts to the presence of that disamenity (e.g., Wolsink, 1989). The Temporal Aspects Model presented here allows for an investigation of how the different periods of the wind project development process affect estimates for the impact of DISTANCE on sales prices.

5.4.1. Dataset and Model Form

Here the full set of 7,459 residential transactions is used, allowing an exploration of potential property value impacts (focusing on the DISTANCE variable) throughout time, including in the pre-construction period. The following model is then estimated:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{y}} \beta_5 (\mathrm{DISTANCE} \cdot \mathrm{PERIOD}) + \varepsilon \qquad (7)$$

where
DISTANCE is a vector of categorical distance variables (e.g., less than one mile, between one and three miles, etc.),
PERIOD is a vector of categorical development period variables (e.g., after announcement and before construction, etc.),
β_5 is a vector of *y* parameter estimates for each DISTANCE and PERIOD category as compared to the transactions more than two years before announcement and outside of five miles, and all other components are as defined in equation (1).

The PERIOD variable contains six different options:
1) More than two years before announcement;
2) Less than two years before announcement;
3) After announcement but before construction;
4) Less than two years after construction;
5) Between two and four years after construction; and

6) More than four years after construction.

In contrast to the Base Model, the two DISTANCE categories inside of one mile are collapsed into a single "less than one mile" group. This approach increases the number of transactions in each crossed subcategory of data, and therefore enhances the stability of the parameter estimates and decreases the size of the standard errors, thus providing an increased opportunity to discover statistically significant effects. Therefore, in this model the DISTANCE variable contains four different options:

1) Less than one mile;
2) Between one and three miles;
3) Between three and five miles; and
4) Outside of five miles.[79]

The number of transactions in each of the DISTANCE and PERIOD categories is presented in Table 18.

The coefficients of interest are β_5, which represent the vector of marginal differences between homes sold at various distances from the wind facility (DISTANCE) during various periods of the development process (PERIOD) as compared to the reference group. The reference group in this model consists of transactions that occurred more than two years before the facility was announced for homes that were situated more than five miles from where the turbines were ultimately constructed. It is assumed that the value of these homes would not be affected by the future presence of the wind facility. The VIEW parameters, although included in the model, are not interacted with PERIOD and therefore are treated as controlling variables.[80]

Although the comparisons of these categorical variables <u>between</u> different DISTANCE and PERIOD categories is be interesting, it is the comparison of coefficients <u>within</u> each PERIOD and DISTANCE category that is the focus of this section. Such comparisons, for example, allow one to compare how the average value of homes inside of one mile that sold two years before announcement compare to the average value of homes inside of one mile that sold in the post-announcement-pre-construction period. For this comparison, a *t*-Test similar to that in the All Sales Model is used.

---

[79] For homes that sold in the pre-construction time frame, no turbines yet existed, and therefore DISTANCE is created using a proxy: the Euclidian distance to where the turbines were eventually constructed. This approach introduces some bias when there is more than one facility in the study area. Conceivably, a home that sold in the post-announcement-pre-construction period of one wind facility could also be assigned to the pre-announcement period of another facility in the same area. For this type of sale, it is not entirely clear which PERIOD and DISTANCE is most appropriate, but every effort was made to apply the sale to the wind facility that was most likely to have an impact. In most cases this meant choosing the closest facility, but in some cases, when development periods were separated by many years, simply the earliest facility was chosen. In general, any bias created by these judgments is expected to be minimal because, in the large majority of cases, the development process in each study area was more-or-less continuous and focused in a specific area rather then being spread widely apart.

[80] As discussed earlier, the VIEW variable was considered most relevant for the post-construction period, so delineations based on development periods that extended into the pre-construction phase were unnecessary. It is conceivable, however, that VIEW effects vary in periods following construction, such as in the first two years or after that. Although this is an interesting question, the numbers of cases for the SUBSTANTIAL and EXTREME ratings – even if combined – when divided into the temporal periods were too small to be fruitful for analysis.

Table 18: Frequency Crosstab of DISTANCE and PERIOD

	More Than 2 Years Before Announcement	Less Than 2 Years Before Announcement	After Announcement Before Construction	Less Than 2 Years After Construction	Between 2 and 4 Years After Construction	More Than 4 Years After Construction	Total
Less Than 1 Mile	38	40	20	39	45	43	**225**
Between 1 and 3 Miles	283	592	340	806	502	709	**3,232**
Between 3 and 5 Miles	157	380	277	572	594	757	**2,737**
Outside of 5 Miles	132	133	130	218	227	425	**1,265**
TOTAL	**610**	**1,145**	**767**	**1,635**	**1,368**	**1,934**	**7,459**

5.4.2. Analysis of Results

Results for the variables of interest for this hedonic model are presented in Table 19; as with previous models, the full set of results is contained in Appendix H. Similar to the All Sales Model discussed in the previous section, the adjusted R^2 for the model is 0.75, down slightly from 0.77 for the Base Model, and indicating that this model has slightly more difficulty (i.e., less explanatory power) modeling transactions that occurred before wind facility construction. All study area, spatial adjustment, and home and site characteristics are significant at or above the one percent level, are of the appropriate sign, and are similar in magnitude to the estimates derived from the post-construction Base Model.

All of the DISTANCE / PERIOD interaction coefficients for distances outside of one mile are relatively small ($-0.04 < \beta_5 < 0.02$) and none are statistically significant. This implies that there are no statistically significant differences in property values between the reference category homes – homes sold more than two years before announcement that were situated outside of five miles from where turbines were eventually erected – and any of the categories of homes that sold outside of one mile at any other period in the wind project development process. These comparisons demonstrate, arguably more directly than any other model presented in this report that Area Stigma effects likely do not exist in the sample.

The possible presence of a Nuisance Stigma is somewhat harder to discern. For homes that sold inside of one mile of the nearest wind turbine, in three of the six periods there are statistically significant negative differences between average property values when compared to the reference category. Transactions completed more than two years before facility announcement are estimated to be valued at 13% less (*p* value 0.02) than the reference category, transactions less than two years before announcement are 10% lower (*p* value 0.06), and transactions after announcement but before construction are 14% lower (*p* value 0.04). For other periods, however, these marginal differences are considerably smaller and are not statistically different from the reference category. Sales prices in the first two years after construction are, on average, 9% less (*p* value 0.15), those occurring between three and four years following construction are, on average, 1% less (*p* value 0.86), and those occurring more than four years after construction are, on average, 7% less (*p* value 0.37).

Table 19: Results from Temporal Aspects Model

Variables of Interest		Temporal Aspects			
		Coef	**SE**	**p Value**	***n***
Inside 1 Mile	**More Than 2 Years Before Announcement**	-0.13	0.06	0.02	38
	Less Than 2 Years Before Announcement	-0.10	0.05	0.06	40
	After Announcement Before Construction	-0.14	0.06	0.04	21
	2 Years After Construction	-0.09	0.07	0.11	39
	Between 2 and 4 Years After Construction	-0.01	0.06	0.85	44
	More Than 4 Years After Construction	-0.07	0.08	0.22	42
Between 1-3 Miles	**More Than 2 Years Before Announcement**	-0.04	0.03	0.18	283
	Less Than 2 Years Before Announcement	0.00	0.03	0.91	592
	After Announcement Before Construction	-0.02	0.03	0.54	342
	2 Years After Construction	0.00	0.03	0.90	807
	Between 2 and 4 Years After Construction	0.01	0.03	0.78	503
	More Than 4 Years After Construction	0.00	0.03	0.93	710
Between 3-5 Miles	**More Than 2 Years Before Announcement**	0.00	0.04	0.92	157
	Less Than 2 Years Before Announcement	0.00	0.03	0.97	380
	After Announcement Before Construction	0.00	0.03	0.93	299
	2 Years After Construction	0.02	0.03	0.55	574
	Between 2 and 4 Years After Construction	0.01	0.03	0.65	594
	More Than 4 Years After Construction	0.01	0.03	0.67	758
Outside 5 Miles	**More Than 2 Years Before Announcement**	Omitted	Omitted	Omitted	132
	Less Than 2 Years Before Announcement	-0.03	0.04	0.33	133
	After Announcement Before Construction	-0.03	0.03	0.39	105
	2 Years After Construction	-0.03	0.03	0.44	215
	Between 2 and 4 Years After Construction	0.03	0.03	0.44	227
	More Than 4 Years After Construction	0.01	0.03	0.73	424

"Omitted" = reference category for fixed effects variables.
"n" indicates number of cases in category when category = "1"

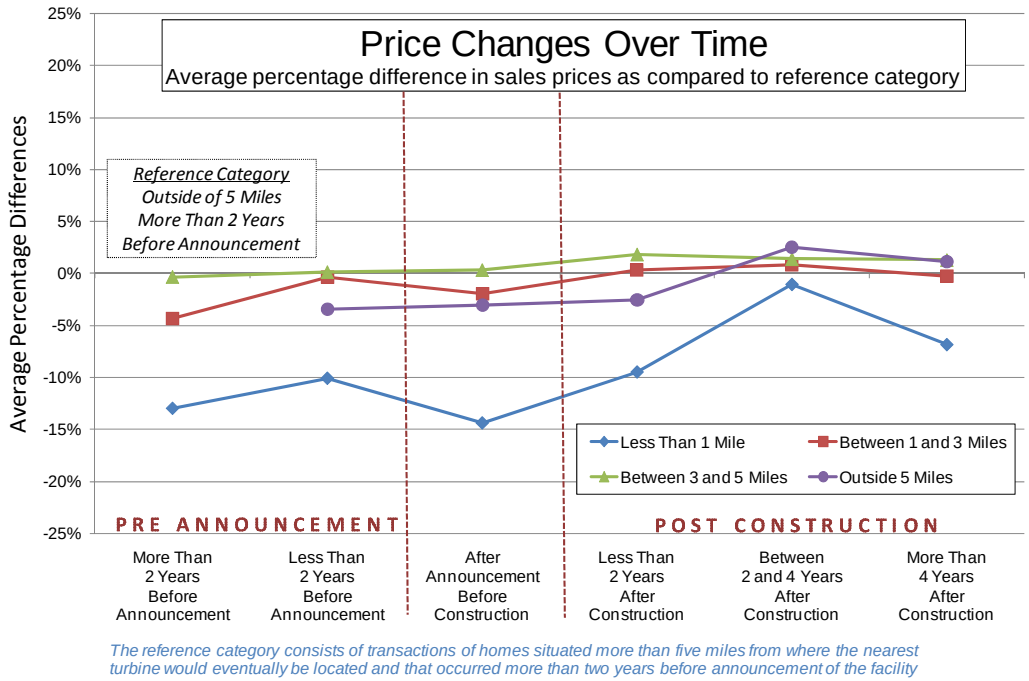
Model Information

Model Equation Number	**7**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**7459**
Number of Predictors (k)	**56**
F Statistic	**404.5**
Adjusted R Squared	**0.75**

What these results suggest (as shown in Figure 8) is that homes inside of one mile in the sample, on average, were depressed in value (in relation to the reference category) before and after the announcement of the wind facility and up to the point that construction began, but that those values rebounded somewhat after construction commenced.[81] This conclusion also likely explains why a significant and negative effect for homes that sold between 3000 feet and one mile is found in the All Sales Model presented in Section 5.3: homes within this distance range that sold prior to facility construction were depressed in value and most likely drove the results for homes that sold after announcement. Regardless, these results are not suggestive of a pervasive Nuisance Stigma.

[81] As discussed in footnotes 47 (on page 19) and 74 (on page 38), the "announcement date" often refers to the first time the proposed facility appeared in the press. "Awareness" of the project in the community may precede this date, however, and therefore transactions occurring in the period "less than two years before announcement" could conceivably have been influenced by the prospective wind project, but it is considerably less likely that those in the period more than two years before announcement would have been influenced.

Figure 8: Results from the Temporal Aspects Model



To explore Nuisance Stigma further, the analysis again turns to the *t*-Test and compares the coefficients for transactions that occurred more than two years before wind facility announcement (during which time the future wind facility is not expected to have any impact on sales prices) to the estimates for the DISTANCE coefficients in the periods that follow. These results are shown in Table 20. Focusing on those transactions inside of one mile, it is found that all coefficients are greater in magnitude than the reference category except during the post-announcement-pre-construction period (which is 1% less and is not statistically significant; *p* value 0.90), indicating, on average, that home values are increasing or staying stable from the pre-announcement reference period onward. These increases, however, are not statistically significant except in the period of two to four years after construction (0.12, *p* value 0.08). With respect to Nuisance Stigma, the more important result is that, relative to homes that sold well before the wind facility was announced, no statistically significant adverse effect is found in any period within a one mile radius of the wind facility. Therefore, the -5% (albeit not statistically significant) average difference that is found in the Base Model, and the -8% (statistically significant) result that is found in the All Sales Model (for homes between 3000 feet and one mile) appear to both be a reflection of depressed home prices that preceded the construction of the relevant wind facilities. If construction of the wind facilities were downwardly influencing the sales prices of these homes, as might be deduced from the Base or All Sales Models alone, a diminution in the inflation adjusted price would be seen as compared to pre-announcement levels. Instead, an increase is seen. As such, no persuasive evidence of a Nuisance Stigma is evident among this sample of transactions.[82]

[82] It should be noted that the numbers of study areas represented for homes situated inside of one mile but in the periods "more than two years before announcement" and "more than four years after construction" are fewer ($n = 5$) than in the other temporal categories ($n = 8$). Further, the "more than two years before announcement – inside of one mile" category is dominated by transactions from one study area (OKCC). For these reasons, there is less

Turning to the coefficient differences for distances greater than one mile in Table 20, again, no statistical evidence of significant adverse impacts on home values is uncovered. Where statistically significant differences are identified, the coefficients are greater than the reference category. These findings corroborate the earlier Area Stigma results, and re-affirm the lack of evidence for such an effect among the sample of residential transactions included in this analysis.

Table 20: Results from Equality Test of Temporal Aspects Model Coefficients

	More Than 2 Years Before Announcement	Less Than 2 Years Before Announcement	After Announcement Before Construction	Less Than 2 Years After Construction	Between 2 and 4 Years After Construction	More Than 4 Years After Construction
Less Than 1 Mile	Reference	0.03 (0.45)	-0.01 (-0.13)	0.04 (0.56)	0.12 (1.74)*	0.06 (0.88)
Between 1 and 3 Miles	Reference	0.04 (1.92)*	0.02 (0.86)	0.05 (2.47)**	0.05 (2.27)**	0.04 (1.82)*
Between 3 and 5 Miles	Reference	0.01 (0.37)	0.01 (0.34)	0.02 (0.77)	0.02 (0.78)	0.02 (0.79)
Outside of 5 Miles †	Reference	-0.04 (-0.86)	-0.03 (-0.91)	-0.03 (-0.77)	0.03 (0.81)	0.01 (0.36)

*Numbers in parenthesis are t-Test statistics. Significance = *** 1% level, ** 5% level, * 10% level, <blank> below the 10% level.*

† For homes outside of 5 miles, the coefficient differences are equal to the coefficients in the Temporal Aspects Model, and therefore the t-values were produced via the OLS.

5.5. Orientation Model

All of the hedonic models presented to this point use a VIEW variable that effectively assumes that the impact of a view of wind turbines on property values will not vary based on the orientation of the home to that view; the impact will be the same whether the view is seen from the side of the home or from the back or front. Other literature, however, has found that the impact of wind projects on property values may be orientation-dependent (Sims et al., 2008). To investigate this possibility further a parameter for orientation is included in the model.

5.5.1. Dataset and Model Form

The same dataset is used as in the Base Model, focusing on post-construction transactions (*n* = 4,937). To investigate whether the orientation of a home to the turbines (ORIENTATION) has a marginal impact on residential property values, over and above that of the VIEW impacts alone, the following hedonic model is estimated:[83]

---

confidence in these two estimates (-13% and -7% respectively) than for the estimates for other temporal periods inside of one mile. Based on additional sensitivity analysis not included here, it is believed that if they are biased, both of these estimates are likely biased downward. Further, as discussed in footnote 47 on page 19, there is a potential for bias in the "announcement" date in that awareness of a project may precede the date that a project enters the public record (i.e., the "announcement" date used for this analysis). Taken together, these two issues might imply that the curve shown in Figure 8 for "less than one mile" transactions, instead of having a flat and then increasing shape, may have a more of an inverse parabolic (e.g., "U") shape. This would imply that a relative minimum in sales prices is reached in the period after awareness began of the facility but before construction commenced, and then, following construction, prices recovered to levels similar to those prior to announcement (and awareness). These results would be consistent with previous studies (e.g., Wolsink, 1989; Devine-Wright, 2004) but cannot be confirmed without the presence of more data. Further research on this issue is warranted. In either case, such results would not change the conclusion here of an absence of evidence of a pervasive Nuisance Stigma in the post-construction period.

[83] The various possible orientations of the home to the view of turbines will be, individually and collectively, referred to as "ORIENTATION" in this report.

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \sum_{\mathrm{o}} \beta_6 \mathrm{ORIENTATION} + \varepsilon \tag{8}$$

where
ORIENTATION is a vector of *o* ORIENTATION variables (e.g., SIDE, FRONT, and BACK),
β_6 is a vector of *o* parameter estimates for ORIENTATION variables, and
all other components are as defined in equation (1).[84]

The ORIENTATION categories include FRONT, BACK, and SIDE, and are defined as follows:

- SIDE: The orientation of the home to the view of the turbines is from the side.
- FRONT: The orientation of the home to the view of the turbines is from the front.
- BACK: The orientation of the home to the view of the turbines is from the back.

The orientation of the home to the view of the wind facilities was determined in the course of the field visits to each home. If more than one orientation to the turbines best described the home (e.g., back and side, or front, back, and side) they were coded as such (e.g., turbines visible from back and side: SIDE = 1; BACK = 1; FRONT = 0).[85]

Not surprisingly, ORIENTATION is related to VIEW. Table 21 and Table 22 provide frequency and percentage crosstabs of ORIENTATION and VIEW. As shown, those homes with more dramatic views of the turbines generally have more ORIENTATION ratings applied to them. For instance, 25 out of 28 EXTREME VIEW homes have all three ORIENTATION ratings (i.e., FRONT, BACK, and SIDE). Virtually all of the MINOR VIEW homes, on the other hand, have only one ORIENTATION. Further, MINOR VIEW homes have roughly evenly spread orientations to the turbines across the various possible categories of FRONT, BACK, and SIDE. Conversely, a majority of the MODERATE and SUBSTANTIAL VIEW ratings coincide with an ORIENTATION from the back of the house.[86]

---

[84] Ideally, one would enter ORIENTATION in the model through an interaction with VIEW. There are two ways that could be accomplished: either with the construction of multiple fixed effects ("dummy") variables, which capture each sub-category of VIEW and ORIENTATION, or through a semi-continuous interaction variable, which would be created by multiplying the ordered categorical variable VIEW by an ordered categorical variable ORIENTATION. Both interaction scenarios are problematic, the former because it requires increasingly small subsets of data, which create unstable coefficient estimates, and the latter because there are no *a priori* expectations for the ordering of an ordered categorical ORIENTATION variable and therefore none could be created and used for the interaction. As a result, no interaction between the two variables is reported here.

[85] An "Angle" orientation was also possible, which was defined as being between Front and Side or Back and Side. An Angle orientation was also possible in combination with Back or Front (e.g., Back-Angle or Front-Angle). In this latter case, the orientation was coded as one of the two prominent orientations (e.g., Back or Front). An Angle orientation, not in combination with Front or Back, was coded as Side.

[86] The prevalence of BACK orientations for MODERATE and SUBSTANTIAL VIEW homes may be because BACK views might more-frequently be kept without obstruction, relative to SIDE views.

Table 21: Frequency Crosstab of VIEW and ORIENTATION

		VIEW				
		Minor	**Moderate**	**Substantial**	**Extreme**	**Total**
ORIENTATION	**Front**	217	33	17	27	**294**
	Back	164	67	24	25	**280**
	Side	194	17	15	27	**253**
	Total	**561**	**106**	**35**	**28**	**730**

Note: Total of ORIENTATION does not sum to 730 because multiple orientations are possible for each VIEW.

Table 22: Percentage Crosstab of VIEW and ORIENTATION

		VIEW				
		Minor	**Moderate**	**Substantial**	**Extreme**	**Total**
ORIENTATION	**Front**	39%	31%	49%	96%	**40%**
	Back	29%	63%	69%	89%	**38%**
	Side	35%	16%	43%	96%	**35%**

Note: Percentages are calculated as a portion of the total for each VIEW ratings (e.g., 24 of the 35 SUBSTANTIAL rated homes have a BACK ORIENTATION = 69%). Columns do not sum to 100% because multiple orientations are possible for each VIEW.

The parameter estimates of interest in this hedonic model are those for ORIENTATION (β_6) and VIEW (β_4). β_6 represent the marginal impact on home value, over and above that of VIEW alone, of having a particular orientation to the turbines. In the Base Model the VIEW coefficients effectively absorb the effects of ORIENTATION, but in this model they are estimated separately. Because a home's surrounding environment is typically viewed from the front or back of the house, one would expect that, to the extent that wind facility VIEW impacts property values, that impact would be especially severe for homes that have FRONT or BACK orientations to those turbines. If this were the case, the coefficients for these categories would be negative, while the coefficient for SIDE would be to be close to zero indicating little to no incremental impact from a SIDE ORIENTATION.

5.5.2. Analysis of Results

Results for the variables of interest for this hedonic model are shown in Table 23; as with previous models, the full set of results is contained in Appendix H. The model performs well with an adjusted R^2 of 0.77. All study area, spatial adjustment, and home and site characteristics are significant at or above the one percent level, are of the appropriate sign, and are similar in magnitude to the estimates derived from the post-construction Base Model. The coefficients for DISTANCE and VIEW are stable, in sign and magnitude, when compared to the Base Model results, and none of the marginal effects are statistically significant.

The coefficients for the variables of interest (β_6) do not meet the *a priori* expectations. The estimated effect for SIDE ORIENTATION, instead of being close to zero, is -3% (*p* value 0.36), while BACK and FRONT, instead of being negative and larger, are estimated at 3% (*p* value 0.37) and -1% (*p* value 0.72), respectively. None of these variables are found to be even marginally statistically significant, however, and based on these results, it is concluded that there is no evidence that a home's orientation to a wind facility affects property values in a measurable way. Further, as with previous models, no statistical evidence of a Scenic Vista Stigma is found among this sample of sales transactions.

Table 23: Results from Orientation Model

	Base Model				Orientation Model			
Variables of Interest	**Coef**	**SE**	**p Value**	***n***	**Coef**	**SE**	**p Value**	***n***
No View	Omitted	Omitted	Omitted	4207	Omitted	Omitted	Omitted	4207
Minor View	-0.01	0.01	0.39	561	-0.01	0.06	0.88	561
Moderate View	0.02	0.03	0.57	106	0.00	0.06	0.96	106
Substantial View	-0.01	0.07	0.92	35	-0.01	0.09	0.85	35
Extreme View	0.02	0.09	0.77	28	0.02	0.17	0.84	28
Inside 3000 Feet	-0.05	0.06	0.31	67	-0.04	0.07	0.46	67
Between 3000 Feet and 1 Mile	-0.05	0.05	0.20	58	-0.05	0.05	0.26	58
Between 1 and 3 Miles	0.00	0.02	0.80	2019	0.00	0.02	0.83	2019
Between 3 and 5 Miles	0.02	0.01	0.26	1923	0.02	0.01	0.26	1923
Outside 5 Miles	Omitted	Omitted	Omitted	870	Omitted	Omitted	Omitted	870
Front Orientation					-0.01	0.06	0.72	294
Back Orientation					0.03	0.06	0.37	280
Side Orientation					-0.03	0.06	0.36	253

"Omitted" = reference category for fixed effects variables. "n" = number of cases in category when category = "1"

Model Information

Model Equation Number	**1**	**8**
Dependent Variable	**LN_SalePrice96**	**LN_SalePrice96**
Number of Cases	**4937**	**4937**
Number of Predictors (k)	**37**	**40**
F Statistic	**442.8**	**410.0**
Adjusted R Squared	**0.77**	**0.77**

5.6. Overlap Model

The Orientation Model, presented above, investigated, to some degree, how the potential effects of wind turbines might be impacted by how a home is oriented to the surrounding environment. In so doing, this model began to peel back the relationship between VIEW and VISTA, but stopped short of looking at the relationship directly. It would be quite useful, though, to understand the explicit relationship between the VISTA and VIEW variables. In particular, one might expect that views of wind turbines would have a particularly significant impact on residential property values when those views strongly overlap ("OVERLAP") the prominent scenic vista from a home. To investigate this possibility directly, and, in general, the relationship between VIEW and VISTA, a parameter for OVERLAP is included in the model.

5.6.1. Dataset and Model Form

Data on the degree to which the view of wind turbines overlaps with the prominent scenic vista from the home (OVERLAP) were collected in the course of the field visits to each home.[87] The categories for OVERLAP included NONE, BARELY, SOMEWHAT, and STRONGLY, and are described in Table 24: [88]

Table 24: Definition of OVERLAP Categories

OVERLAP - NONE	The scenic vista does not contain any view of the turbines.
OVERLAP - BARELY	A small portion (~ 0 - 20%) of the scenic vista is overlapped by the view of turbines, and might contain a view of a few turbines, only a few of which can be seen entirely.
OVERLAP - SOMEWHAT	A moderate portion (~20-50%) of the scenic vista contains turbines, and likely contains a view of more than one turbine, some of which are likely to be seen entirely.
OVERLAP - STRONGLY	A large portion (~50-100%) of the scenic vista contains a view of turbines, many of which likely can be seen entirely.

A crosstab describing the OVERLAP designations and the VIEW categories is shown in Table 25. As would be expected, the more dramatic views of wind turbines, where the turbines occupy more of the panorama, are coincident with the OVERLAP categories of SOMEWHAT or STRONGLY. Nonetheless, STRONGLY are common for all VIEW categories. Similarly, SOMEWHAT is well distributed across the MINOR and MODERATE rated views, while BARELY is concentrated in the MINOR rated views.

The same dataset is used as in the Base Model, focusing on post-construction transactions (*n* = 4,937). To investigate whether the overlap of VIEW and VISTA has a marginal impact on residential property values, over and above that of the VIEW and VISTA impacts alone, the following hedonic model is estimated:[89]

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \sum_{\mathrm{t}} \beta_6 \mathrm{VISTA} + \sum_{\mathrm{p}} \beta_7 \mathrm{OVERLAP} + \varepsilon \tag{9}$$

where
VIEW is a vector of *v* categorical view variables (e.g., MINOR, MODERATE, etc.),
VISTA is a vector of *t* categorical scenic vista variables (e.g., POOR, BELOW-AVERAGE, etc.),
OVERLAP is a vector of *p* categorical overlap variables (e.g., BARELY, SOMEWHAT, etc.),

[87] Scenic vista was rated while taking into account the entire panorama surrounding a home. But, for each home, there usually was a prominent direction that offered a preferred scenic vista. Often, but not always, the home was orientated to enjoy that prominent scenic vista. Overlap is defined as the degree to which the view of the wind facility overlaps with this prominent scenic vista.

[88] "…can be seen entirely" refers to being able to see a turbine from the top of the sweep of its blade tips to below the nacelle of the turbine where the sweep of the tips intersects the tower.

[89] Although VISTA appears in all models, and is usually included in the vector of home and site characteristics represented by X, it is shown separately here so that it can be discussed directly in the text that follows.

β_4 is a vector of *v* parameter estimates for VIEW fixed effects variables as compared to transactions of homes without a view of the turbines,
β_6 is a vector of *t* parameter estimates for VISTA fixed effect variables as compared to transactions of homes with an AVERAGE scenic vista,
β_7 is a vector of *o* parameter estimates for OVERLAP fixed effect variables as compared to transactions of homes where the view of the turbines had no overlap with the scenic vista, and all other components are as defined in equation (1).

The variables of interest in this model are VIEW, VISTA and OVERLAP, and the coefficients β_4, β_6, and β_7 are therefore the primary focus. Theory would predict that the VISTA coefficients in this model would be roughly similar to those derived in the Base Model, but that the VIEW coefficients may be somewhat more positive as the OVERLAP variables explain a portion of any negative impact that wind projects have on residential sales prices. In that instance, the OVERLAP coefficients would be negative, indicating a decrease in sales price when compared to those homes that experience no overlap between the view of wind turbines and the primary scenic vista.

Table 25: Frequency Crosstab of OVERLAP and VIEW

		VIEW					
		None	**Minor**	**Moderate**	**Substantial**	**Extreme**	**Total**
OVERLAP	**None**	4,207	317	3	0	0	**4,527**
	Barely	0	139	10	1	0	**150**
	Somewhat	0	81	42	7	2	**132**
	Strongly	0	24	51	27	26	**128**
	Total	**4,207**	**561**	**106**	**35**	**28**	**4,937**

5.6.2. Analysis of Results

Results for the variables of interest for this hedonic model are shown in Table 26; as with previous models, the full set of results is contained in Appendix H. The model performs well with an adjusted R^2 of 0.77. All study area, spatial adjustment, and home and site characteristics are significant at or above the one percent level, are of the appropriate sign, and are similar in magnitude to the estimates derived from the post-construction Base Model.

As expected from theory, the VISTA parameters are stable across models with no change in coefficient sign, magnitude, or significance. Counter to expectations, however, the VIEW coefficients, on average, decrease in value. MINOR VIEW is now estimated to adversely affect a home's sale price by 3% (*p* value 0.10) and is weakly significant, but none of the other VIEW categories are found to be statistically significant. Oddly, the OVERLAP rating of BARELY is found to significantly <u>increase</u> home values by 5% (*p* value 0.08), while none of the other OVERLAP ratings are found to have a statistically significant impact.

Taken at face value, these results are counterintuitive. For instance, absent any overlap of view with the scenic vista (NONE), a home with a MINOR view sells for 3% less than a home with no view of the turbines. If, alternatively, a home with a MINOR view BARELY overlaps the prominent scenic vista, it not only enjoys a 2% <u>increase</u> in value over a home with NO VIEW of the turbines but a 5% <u>increase</u> in value over homes with views of the turbines that do not overlap

with the scenic vista. In other words, the sales price increases when views of turbines overlap the prominent scenic vista, at least in the BARELY category. A more likely explanation for these results are that the relatively high correlation (0.68) between the VIEW and OVERLAP parameters is spuriously driving one set of parameters up and the other down. More importantly, when the parameters are combined, they offer a similar result as was found in the Base Model. Therefore, it seems that the degree to which the view of turbines overlaps the scenic vista has a negligible effect on sales prices among the sample of sales transactions analyzed here.[90]

Despite these somewhat peculiar results, other than MINOR, none of the VIEW categories are found to have statistically significant impacts, even after accounting for the degree to which those views overlap the scenic vista. Similarly, none of the OVERLAP variables are simultaneously negative and statistically significant. This implies, once again, that a Scenic Vista Stigma is unlikely to be present in the sample. Additionally, none of the DISTANCE coefficients are statistically significant, and those coefficients remain largely unchanged from the Base Model, reaffirming previous results in which no significant evidence of either an Area or a Nuisance Stigma was found.

[90] An alternative approach to this model was also considered, one that includes an interaction term between VIEW and VISTA. For this model it is assumed that homes with higher rated scenic vistas might have higher rated views of turbines, and that these views of turbines would decrease the values of the scenic vista. To construct the interaction, VISTA, which can be between one and five (e.g., POOR=1,…PREMIUM=5), was multiplied by VIEW, which can be between zero and four (e.g. NO VIEW=0, MINOR=1,…EXTREME=4). The resulting interaction (VIEW*VISTA) therefore was between zero and sixteen (there were no PREMIUM VISTA homes with an EXTREME VIEW), with zero representing homes without a view of the turbines, one representing homes with a POOR VISTA and a MINOR VIEW, and sixteen representing homes with either a PREMIUM VISTA and a SUBSTANTIAL VIEW or an ABOVE AVERAGE VISTA and an EXTREME VIEW. The interaction term, when included in the model, was relatively small (-0.013) and weakly significant (*p* value 0.10 – not White's corrected). The VISTA estimates were unchanged and the VIEW parameters were considerably larger and positive. For instance, EXTREME was 2% in the Base Model and 16% in this "interaction" model. Similarly, SUBSTANTIAL was -1% in the Base Model and 13% in this model. Therefore, although the interaction term is negative and weakly significant, the resulting VIEW estimates, to which it would need to be added, fully offset this negative effect. These results support the idea that the degree to which a VIEW overlaps VISTA has a likely negligible effect on sales prices, while also confirming that there is a high correlation between the interaction term and VIEW variables.

Table 26: Results from Overlap Model

Variables of Interest	Base Model				Overlap Model			
	Coef	**SE**	**p Value**	***n***	**Coef**	**SE**	**p Value**	***n***
No View	Omitted	Omitted	Omitted	4,207	Omitted	Omitted	Omitted	4,207
Minor View	-0.01	0.01	0.39	561	-0.03	0.02	0.10	561
Moderate View	0.02	0.03	0.57	106	-0.02	0.04	0.65	106
Substantial View	-0.01	0.07	0.92	35	-0.05	0.09	0.43	35
Extreme View	0.02	0.09	0.77	28	-0.03	0.10	0.73	28
Inside 3000 Feet	-0.05	0.06	0.31	67	-0.05	0.06	0.32	67
Between 3000 Feet and 1 Mile	-0.05	0.05	0.20	58	-0.05	0.05	0.27	58
Between 1 and 3 Miles	0.00	0.02	0.80	2,019	0.00	0.02	0.82	2,019
Between 3 and 5 Miles	0.02	0.01	0.26	1,923	0.02	0.01	0.26	1,923
Outside 5 Miles	Omitted	Omitted	Omitted	870	Omitted	Omitted	Omitted	870
Poor Vista	-0.21	0.02	0.00	310	-0.21	0.02	0.00	310
Below Average Vista	-0.08	0.01	0.00	2,857	-0.08	0.01	0.00	2,857
Average Vista	Omitted	Omitted	Omitted	1,247	Omitted	Omitted	Omitted	1,247
Above Average Vista	0.10	0.02	0.00	448	0.10	0.02	0.00	448
Premium Vista	0.13	0.04	0.00	75	0.13	0.04	0.00	75
View Does Not Overlap Vista					Omitted	Omitted	Omitted	320
View Barely Overlaps Vista					0.05	0.03	0.08	150
View Somewhat Overlaps Vista					0.01	0.03	0.66	132
View Strongly Overlaps Vista					0.05	0.05	0.23	128

"Omitted" = reference category for fixed effects variables. "n" = number of cases in category when category = "1"

Model Information

Model Equation Number	**1**	**9**
Dependent Variable	**LN_SalePrice96**	**LN_SalePrice96**
Number of Cases	**4937**	**4937**
Number of Predictors (k)	**37**	**40**
F Statistic	**442.8**	**409.7**
Adjusted R Squared	**0.77**	**0.77**

6. Repeat Sales Analysis

In general, the Base and Alternative Hedonic Models presented in previous sections come to the same basic conclusion: wind power facilities in this sample have no demonstrable, widespread, sizable, and statistically significant affect on residential property values. These hedonic models contain 29 or more controlling variables (e.g., house and site characteristics) to account for differences in home values across the sample. Although these models perform well and explain nearly 80% of the variation in sales prices among homes in the sample, it is always possible that variables not included in (i.e., "omitted from") the hedonic models could be correlated with the variables of interest, therefore biasing the results.

A common method used to control for omitted variable bias in the home assessment literature is to estimate a repeat sales model (Palmquist, 1982). This technique focuses on just those homes that have sold on more than one occasion, preferably once before and once after the introduction of a possible disamenity, and investigates whether the price appreciation between these transactions is affected by the presence of that disamenity. In this section a repeat sales analysis is applied to the dataset, investigating in a different way the presence of the three possible property value stigmas associated with wind facilities, and therefore providing an important cross-check to the hedonic model results. The section begins with a brief discussion of the general form of the Repeat Sales Model and a summary of the literature that has employed this approach to investigate environmental disamenities. The dataset and model used in the analysis is then described, followed by a summary of the results from that analysis.

6.1. Repeat Sales Models and Environmental Disamenities Literature

Repeat sales models use the annual sales-price appreciation rates of homes as the dependent variable. Because house, home site, and neighborhood characteristics are relatively stable over time for any individual home, many of those characteristics need not be included in the repeat sales model, thereby increasing the degrees of freedom and allowing sample size requirements to be significantly lower and coefficient estimates to be more efficient (Crone and Voith, 1992). A repeat sales analysis is not necessarily preferred over a traditional hedonic model, but is rather an alternative analysis approach that can be used to test the robustness of the earlier results (for further discussion see Jackson, 2003). The repeat sales model takes the basic form:

Annual Appreciation Rate (AAR) = *f* (TYPE OF HOUSE, OTHER FACTORS)

where
TYPE OF HOUSE provides an indication of the segment of the market in which the house is situated (e.g., high end vs. low end), and
OTHER FACTORS include, but are not limited to, changes to the environment (e.g., proximity to a disamenity).

The dependent variable is the adjusted annual appreciation rate and is defined as follows:

$$\mathrm{AAR} = \exp\left[\frac{\ln\left(P_1 / P_2\right)}{t_1 - t_2}\right] - 1 \qquad (10)$$

where

P_1 is the adjusted sales price at the first sale (in 1996 dollars),
P_2 is the adjusted sales price at the second sale (in 1996 dollars),
t_1 is the date of the first sale,
t_2 is the date of the second sale, and
$(t_1 - t_2)$ is determined by calculating the number of days that separate the sale dates and dividing by 365.

As with the hedonic regression model, the usefulness of the repeat sales model is well established in the literature when investigating possible disamenities. For example, a repeat sales analysis was used to estimate spatial and temporal sales price effects from incinerators by Kiel and McClain (1995), who found that appreciation rates, on average, are not sensitive to distance from the facility during the construction phase but are during the operation phase. Similarly, McCluskey and Rausser (2003) used a repeat sales model to investigate effects surrounding a hazardous waste site. They found that appreciation rates are not sensitive to the home's distance from the disamenity before that disamenity is identified by the EPA as hazardous, but that home values are impacted by distance after the EPA's identification is made.

6.2. Dataset

The 7,459 residential sales transactions in the dataset contain a total of 1,253 transactions that involve homes that sold on more than one occasion (i.e., a "pair" of sales of the same home). For the purposes of this analysis, however, the key sample consists of homes that sold once before the announcement of the wind facility, and that subsequently sold again after the construction of that facility. Therefore any homes that sold twice in either the pre-announcement or post-construction periods were not used in the repeat sales sample.[91] These were excluded because either they occurred before the effect would be present (for pre-announcement pairs) or after (for post-announcement pairs). This left a total of 368 pairs for the analysis, which was subsequently reduced to 354 usable pairs.[92]

The mean AAR for the sample is 1.0% per year, with a low of -10.5% and a high of 13.4%. Table 27 summarizes some of the characteristics of the homes used in the repeat sales model. The average house in the sample has 1,580 square feet of above-ground finished living area, sits on a parcel of 0.67 acres, and originally sold for $70,483 (real 1996 dollars). When it sold a second time, the average home in the sample was located 2.96 miles from the nearest wind turbine (14 homes were within one mile, 199 between one and three miles, 116 between three and five miles, and 25 outside of five miles). Of the 354 homes, 14% (n = 49) had some view of the facility (35 were rated MINOR, five MODERATE, and nine either SUBSTANTIAL or EXTREME). Because of the restriction to those homes that experienced repeat sales, the sample is relatively small for those homes in close proximity to and with dramatic views of wind facilities.

[91] 752 pairs occurred after construction began, whereas 133 pairs occurred before announcement.

[92] Of the 368 pairs, 14 were found to have an AAR that was either significantly above or below the mean for the sample (mean +/- 2 standard deviations). These pairs were considered highly likely to be associated with homes that were either renovated or left to deteriorate between sales, and therefore were removed from the repeat sales model dataset. Only two of these 14 homes had views of the wind turbines, both of which were MINOR. All 14 of the homes were situated either between one and three miles from the nearest turbine (n = 8) or between three and five miles away (n = 6).

Table 27: List of Variables Included in the Repeat Sales Model

Variable Name	Description	Type	Sign	Freq.	Mean	Std. Dev.	Min.	Max.
SalePrice96_Pre	The Sale Price (adjusted for inflation into 1996 dollars) of the home as of the first time it had sold	C	+	354	$ 70,483	$ 37,798	$ 13,411	$ 291,499
SalePrice96_Pre_Sqr	SalePrice96_Pre Squared (shown in millions)	C	–	354	$ 6,393	$ 8,258	$ 180	$ 84,972
Acres	Number of Acres that sold with the residence	C	+	354	0.67	1.34	0.07	10.96
Sqft_1000	Number of square feet of finished above ground living area (in 1000s)	C	+	354	1.58	0.56	0.59	4.06
No View	If the home had no view of the turbines when it sold for the second time (Yes = 1, No = 0)	Omitted	n/a	305	0.86	0.35	0	1
Minor View	If the home had a Minor View of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	35	0.10	0.30	0	1
Moderate View	If the home had a Moderate View of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	5	0.01	0.12	0	1
Substantial/Extreme View	If the home had a Substantial or Extreme View of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	9	0.03	0.12	0	1
Less than 1 Mile	If the home was within 1 mile (5280 feet) of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	14	0.02	0.13	0	1
Between 1 and 3 Miles	If the home was between 1 and 3 miles of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	199	0.56	0.50	0	1
Between 3 and 5 Miles	If the home was between 3 and 5 miles of the turbines when it sold for the second time (Yes = 1, No = 0)	OC	–	116	0.33	0.47	0	1
Outside 5 Miles	If the home was outside 5 miles of the turbines when it sold for the second time (Yes = 1, No = 0)	Omitted	n/a	25	0.07	0.26	0	1

"C" Continuous, "OC" Ordered Categorical (1 = yes, 0 = no) values are interpreted in relation to the "Omitted" category. This table does not include the study area fixed effects variables that are included in the model (e.g., WAOR, TXHC, NYMC). The reference case for these variables is the WAOR study area.

6.3. Model Form

To investigate the presence of Area, Scenic Vista, and Nuisance Stigmas, the adjusted annual appreciation rate (AAR) is calculated for the 354 sales pairs in the manner described in equation (10), using inflation adjusted sales prices. The following model is then estimated:

$$\text{AAR} = \beta_0 + \sum_{s} \beta_1 \text{S} + \sum_{k} \beta_2 \text{X} + \sum_{v} \beta_3 \text{VIEW} + \sum_{d} \beta_4 \text{DISTANCE} + \varepsilon \qquad (11)$$

where

AAR represents the inflation-adjusted Annual Appreciation Rate for repeat sales,

S is the vector of *s* Study Area fixed effects variables (e.g., WAOR, OKCC, etc.),

X is a vector of *k* home, site and sale characteristics (e.g., acres, square feet, original sales price),

VIEW is a vector of *v* categorical view variables (e.g., MINOR, MODERATE, etc.),

DISTANCE is a vector of *d* categorical distance variables (e.g., less than one mile, between one and three miles, etc.),

β_0 is the constant or intercept across the full sample,

β_1 is a vector of *s* parameter estimates for the study area fixed effects as compared to sales that occurred in the WAOR study area,

β_2 is a vector of *k* parameter estimates for the home, site, and sale characteristics,

β_3 is a vector of *v* parameter estimates for the VIEW variables as compared to transactions of homes with no view of the turbines,

β_4 is a vector of *d* parameter estimates for the DISTANCE variables as compared to transactions of homes outside of five miles, and

ε is a random disturbance term.

Effectively, this model seeks to identify reasons that AARs vary among those sales pairs in the sample. Reasons for such differences in AARs might include variations in home and site characteristics, the study area in which the sale occurs, or the degree to which the home is in proximity to or has a dramatic view of a wind facility. As such, the model as shown by equation (11) has three primary groups of parameters: variables of interest; home, site, and sale characteristics; and study area fixed effects.

The variables of interest are VIEW and DISTANCE, and the coefficients β_3 and β_4 are therefore the primary focus of this analysis. Because of the small numbers of homes in the sample situated inside of 3000 feet and between 3000 feet and one mile, they are collapsed into a single category (inside one mile). For the same reason, homes with SUBSTANTIAL or EXTREME VIEWS are collapsed into a single category (SUBSTANTIAL/EXTREME). In this model, therefore, the influence on appreciation rates of the following variables of interest is estimated: MINOR, MODERATE, and SUBSTANTIAL/EXTREME VIEWS, and less than one mile, between one and three mile, and between three and five mile DISTANCES. For the VIEW fixed-effects variables, the reference category is NO VIEW; for DISTANCE, it is homes outside of five miles. As with previous models, if effects exist, it is expected that all of the coefficients would be negative and monotonically ordered.

The number of home, site, and sale characteristics included in a repeat sales model is typically substantially lower than in a hedonic model. This is to be expected because, as discussed earlier, the repeat sales model explores variations in AARs for sales pairs from individual homes, and home and site characteristics are relatively stable over time for any individual home. Nonetheless, various characteristics have been found by others (e.g., Kiel and McClain, 1995; McCluskey and Rausser, 2003) to affect appreciation rates. For the purposes of the Repeat Sales Model, these include the number of square feet of living space (SQFT_1000), the number of acres (ACRES), the inflation-adjusted price of the home at the first sale (SalePrice96_Pre), and that sales price squared (SalePrice96_Pre_Sqr). Of those characteristics, the SQFT_1000 and ACRES coefficients are expected to be positive indicating that, all else being equal, an increase in living area and lot size increases the relative appreciation rate. Conversely, it is expected that the combined estimated effect of the initial sales prices (SalePrice96_Pre and SalePrice96_Pre_Sqr) will trend downward, implying that as the initial sales price of the house increases the appreciation rate decreases. These expectations are in line with the previous literature (Kiel and McClain, 1995; McCluskey and Rausser, 2003).

Finally, the study-area fixed effects variables (β_1) are included in this model to account for differences in inflation adjusted appreciation rates that may exist across study areas (e.g., WAOR, TXHC, NYMC). The WAOR study area is the reference category, and all study-area coefficients therefore represent the marginal change in AARs compared to WAOR (the intercept represents the marginal change in AAR for WAOR by itself). These study area parameters provide a unique look into Area Stigma effects. Recall that the appreciation rates used in this model are adjusted for inflation by using an inflation index from the nearby municipal statistical area (MSA). These MSAs are sometimes quite far away (as much as 20 miles) and therefore would be unaffected by the wind facility. As such, any variation in the study area parameters (and the intercept) would be the result of local influences not otherwise captured in the inflation

adjustment, and represent another test for Area Stigma; if effects exist, it is expected that the β_0 and β_1 coefficients will be negative.

As with the hedonic models presented earlier, the assumptions of homoskedasticity, absence of spatial autocorrelation, reasonably little multicollinearity, and appropriate controls for outliers are addressed as described in the associated footnote and in Appendix G.[93]

6.4. Analysis of Results

The results from the Repeat Sales Model are presented in Table 28. The model performs relatively poorly overall, with an Adjusted R^2 of just 0.19 (and an *F*-test statistic of 5.2). Other similar analyses in the literature have produced higher performance statistics but have done so with samples that are considerably larger or more homogenous than ours.[94] The low R^2 found here should not be cause for undue concern, however, given the relatively small sample spread across ten different study areas. Moreover, many of the home and site characteristics are found to be statistically significant, and of the appropriate sign. The coefficient for the adjusted initial sales price (SalePrice96_Pre), for example, is statistically significant, small, and negative (-0.000001, *p* value 0.00), while the coefficient for the adjusted initial sales price squared (SalePrice96_Pre_Sqr) is also statistically significant and considerably smaller (<0.000000, *p* value 0.00). These results imply, consistent with the prior literature, that for those homes in the sample, an increase in initial adjusted sales price decreases the average percentage appreciation rate. ACRES (0.002, *p* value 0.10) and SQFT_1000 (0.02, *p* value 0.00) are both positive, as expected, and statistically significant.

Of particular interest are the intercept term and the associated study-area fixed effect coefficients, and what they collectively say about Area Stigma. The coefficient for the intercept (β_0) is 0.005 (*p* value 0.81), which is both extremely small and not statistically significant. Likewise, the study-area fixed effects are all relatively small (less than 0.03 in absolute terms) and none are statistically significant. As discussed above, if a pervasive Area Stigma existed, it would be expected to be represented in these coefficients. Because all are small and statistically insignificant, it can again be concluded that there is no persuasive evidence of an Area Stigma among this sample of home transactions.

[93] All results are produced using White's corrected standard errors to control for heteroskedasticity. Spatial autocorrelation, with this small sample, is impossible to control. Because of the small sample, an even smaller number of neighboring sales exist, which are required to construct the spatial matrix. As such, spatial autocorrelation is not addressed in the repeat sales model. As with the hedonic models, some multicollinearity might exist, but that multicollinearity is unlikely to be correlated with the variables of interest. Outliers are investigated and dealt with as discussed in footnote 91 on page 56.

[94] McCluskey and Rausser (2003) had a sample of over 30,000 repeat sales and had an *F*-test statistic of 105; Kiel and McClain (1995) produced an R^2 that ranged from 0.40 to 0.63 with samples ranging from 53 to 145, but all sales took place in North Andover, MA.

Table 28: Results from Repeat Sales Model

	Coef.	SE	p Value	*n*
Intercept	0.005	0.02	0.81	354
WAOR	Omitted	Omitted	Omitted	6
TXHC	-0.01	0.02	0.63	57
OKCC	0.03	0.02	0.11	102
IABV	0.02	0.02	0.14	59
ILLC	-0.01	0.02	0.38	18
WIKCDC	0.02	0.03	0.50	8
PASC	-0.01	0.02	0.67	32
PAWC	0.02	0.02	0.16	35
NYMCOC	0.02	0.02	0.23	24
NYMC	0.03	0.02	0.13	13
SalePrice96_Pre	-0.000001	0.0000002	0.00	354
SalePrice96_Pre_Sqr	0.0000000	0.0000000	0.00	354
Acres	0.002	0.001	0.10	354
Sqft_1000	0.02	0.01	0.00	354
No View	Omitted	Omitted	Omitted	305
Minor View	-0.02	0.01	0.02	35
Moderate View	0.03	0.03	0.29	5
Substantial/Extreme View	-0.02	0.01	0.09	9
Less than 1 Mile	0.03	0.01	0.01	14
Between 1 and 3 Miles	0.01	0.01	0.59	199
Between 3 and 5 Miles	0.01	0.01	0.53	116
Outside 5 Miles	Omitted	Omitted	Omitted	25

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**11**
Dependent Variable	**SalePrice96_AAR**
Number of Cases	**354**
Number of Predictors (k)	**19**
F Statistic	**5.2**
Adjusted R2	**0.19**

Turning to the variables of interest, mixed results (see Figure 9 and Figure 10) are found. For homes with MINOR or SUBSTANTIAL/EXTREME VIEWS, despite small sample sizes, appreciation rates after adjusting for inflation are found to decrease by roughly 2% annually (*p* values of 0.02 and 0.09, respectively) compared to homes with NO VIEW. Though these findings initially seem to suggest the presence of Scenic Vista Stigma, the coefficients are not monotonically ordered, counter to what one might expect: homes with a MODERATE rated view appreciated on average 3% annually (*p* value 0.29) compared to homes with NO VIEW. Adding to the suspicion of these VIEW results, the DISTANCE coefficient for homes situated inside of one mile, where eight out of the nine SUBSTANTIAL/EXTREME rated homes are located, is positive and statistically significant (0.03, *p* value 0.01). If interpreted literally, these results suggest that a home inside of one mile with a SUBSTANTIAL/EXTREME rated view would experience a decrease in annual appreciation of 2% compared to homes with no views of turbines, but simultaneously would experience an increase of 3% in appreciation compared to homes outside of five miles. Therefore, when compared to those homes outside of five miles and with no view of the wind facilities, these homes would experience an overall increase in AAR by 1%. These results are counterintuitive and are likely driven by the small number of sales pairs

that are located within one mile of the wind turbines and experience a dramatic view of those turbines.

Figure 9: Repeat Sales Model Results for VIEW

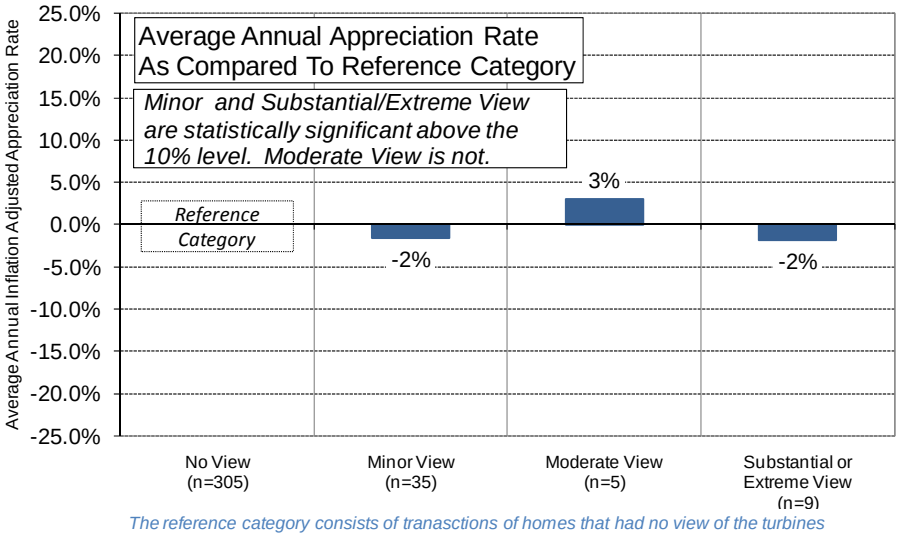
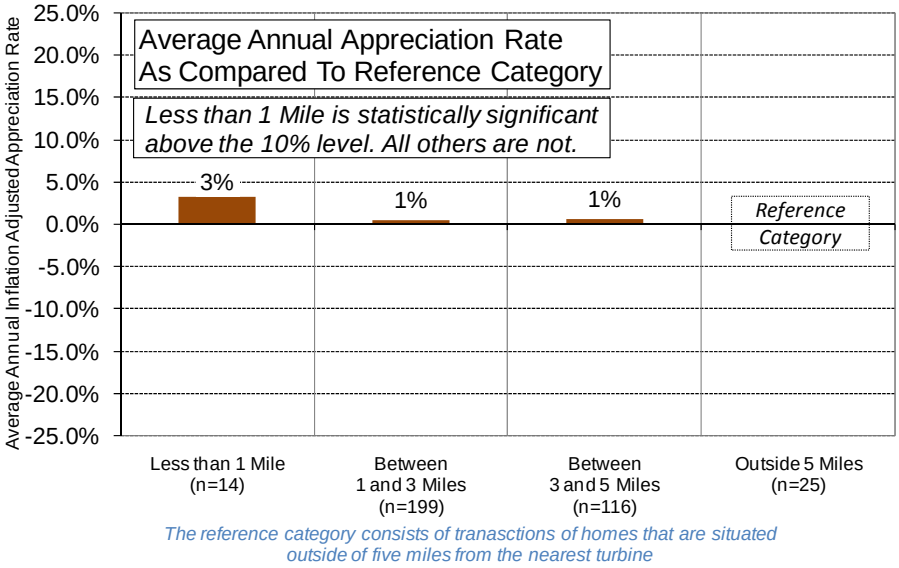


Figure 10: Repeat Sales Model Results for DISTANCE



Regardless of the reason for this result, again no persuasive evidence of consistent and widespread adverse effects is found from the presence of the wind facilities in the sample, reinforcing the findings from the previous hedonic analysis. Specifically, there is no evidence that an Area Stigma exists in that homes outside of one mile and inside of five miles do not appreciate differently than homes farther away. Similarly, there is no evidence of a Nuisance Stigma. Appreciation rates for homes inside of one mile are not adversely affected; in fact, significantly higher appreciation rates are found for these homes than for those homes located outside of five miles from the nearest wind facility. Finally, though some evidence is found that a Scenic Vista Stigma may exist in the sample of repeat sales, it is weak, fairly small, and

somewhat counter-intuitive. This result is likely driven by the small number of sales pairs that are located within one mile of the wind turbines and that experience a dramatic view of those turbines.

7. Sales Volume Analysis

The analysis findings to this point suggest that, among the sample of sales transactions analyzed in this report, wind facilities have had no widespread and statistically identifiable impact on residential property values. A related concern that has not yet been addressed is that of sales volume: does the presence of wind facilities either increase or decrease the rate of home sales transactions? On the one hand, a decrease in sales volumes might be expected. This might occur if homeowners expect that their property values will be impacted by the presence of the wind facility, and therefore simply choose not to sell their homes as a result, or if they try to sell but are not easily able to find willing buyers. Alternatively, an increase in sales volume might be expected if homeowners that are located near to or have a dominating view of wind turbines are uncomfortable with the presence of those turbines. Though those homes may sell at a market value that is not impacted by the presence of the wind facilities, self-selection may lead to accelerated transaction volumes shortly after facility announcement or construction as homeowners who view the turbines unfavorably sell their homes to individuals who are not so stigmatized. To address the question of whether and how sales volumes are impacted by nearby wind facilities, sales volumes are analyzed for those homes located at various distances from the wind facilities in the sample, during different facility development periods.

7.1. Dataset

To investigate whether sales volumes are affected by the presence of wind facilities two sets of data are assembled: (1) the number of homes available to sell annually within each study area, and (2) the number of homes that actually did sell annually in those areas. Homes potentially "available to sell" are defined as all single family residences within five miles of the nearest turbine that are located on a parcel of land less than 25 acres in size, that have only one residential structure, and that had a market value (for land and improvements) above $10,000.[95] Homes that "did sell" are defined as every valid sale of a single family residence within five miles of the nearest turbine that are located on a parcel of land less than 25 acres in size, that have only one residential structure, and that sold for more than $10,000.

The sales data used for this analysis are slightly different from those used in the hedonic analysis reported earlier. As mentioned in Section 3.3, a number of study areas were randomly sampled to limit the transactions outside of 3 miles if the total number of transactions were to exceed that which could efficiently be visited in the field (n ~1,250). For the sales volume analysis, however, field data collection was not required, and all relevant transactions could therefore be used. Secondly, two study areas did not provide the data necessary for the sales volume analysis (WAOR and OKCC), and are therefore excluded from the sample. Finally, data for some homes that were "available to sell" were not complete, and rather than including only a small selection of these homes, these subsets of data were simply excluded from the analysis. These excluded homes include those located outside of five miles of the nearest wind turbine, and those available to sell or that did sell more than three years before wind facility announcement.[96] The resulting

[95] "Market value" is the estimated price at which a home would sell as of a given point in time.

[96] For instance, some providers supplied sales data out to ten miles, but only provided homes available to sell out to five miles. As well, data on homes that did sell were not consistently available for periods many years before announcement.

dataset spans the period starting three years prior to facility announcement and ending four years after construction. All homes in this dataset are situated inside of five miles, and each is located in one of the eight represented study areas.[97]

The final set of homes potentially "available to sell" and that actually "did sell" are then segmented into three distance categories: inside of one mile, between one and three miles, and between three and five miles. For each of these three distance categories, in each of the eight study areas, and for each of the three years prior to announcement, the period between announcement and construction, and each of the four years following construction, the number of homes that sold as a percentage of those available to sell is calculated.[98] This results in a total of 24 separate sales volume calculations in each study area, for a total of 192 calculations across all study areas. Finally, these sales volumes are averaged across all study areas into four development period categories: less than three years before announcement, after announcement but before construction, less than two years after construction, and between two and four years after construction.[99] The resulting average annual sales volumes, by distance band and development period, are shown in Table 29 and Figure 11.

Table 29: Sales Volumes by PERIOD and DISTANCE

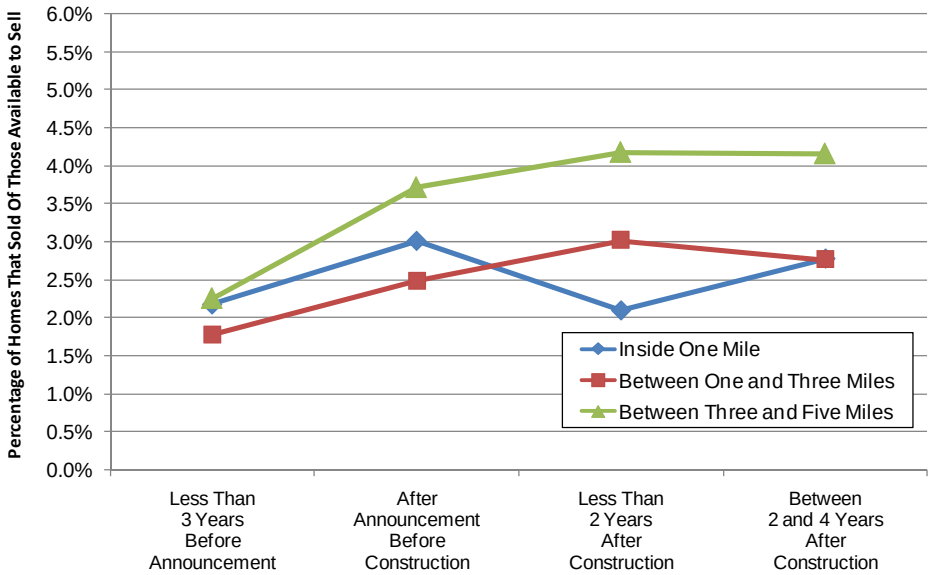
	Inside 1 Mile	**Between 1 and 3 Miles**	**Between 3 and 5 Miles**
Less Than 3 Years Before Announcement	2.2%	1.8%	2.3%
After Announcement Before Construction	3.0%	2.5%	3.7%
Less Than 2 Years After Construction	2.1%	3.0%	4.2%
Between 2 and 4 Years After Construction	2.8%	2.8%	4.2%

[97] The number of homes "available to sell" is constructed for each year after 1996 based on the year the homes in each study area were built. For many homes in the sample, the year built occurred more than three years before wind facility announcement, and therefore those homes are "available to sell" in all subsequent periods. For some homes, however, the home was built during the wind facility development process, and therefore becomes "available" some time after the first period of interest. For those homes, the build year is matched to the development dates so that it becomes "available" during the appropriate period. For this reason, the number of homes "available to sell" increases in later periods.

[98] For the period after announcement and before construction, which in all study areas was not exactly 12 months, the sales volume numbers are adjusted so that they corresponded to an average over a 12 month period.

[99] These temporal groupings are slightly different from those used in the hedonic Temporal Aspects Model. Namely, the period before announcement is not divided into two parts – more than two years before announcement and less than two years before announcement – but rather only one – less than three years before announcement. This simplification is made to allow each of the interaction categories to have enough data to be meaningful.

Figure 11: Sales Volumes by PERIOD and DISTANCE



7.2. Model Form

To investigate whether the rate of sales transactions is measurably affected by the wind facilities, the various resulting sales volumes shown above in Table 29 and Figure 11 are compared using a *t*-Test, as follows:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \tag{12}$$

where

$\bar{x}_1$ and $\bar{x}_2$ are the mean sales volumes from the two categories being compared,

s_1^2 and s_2^2 are variances of the sales volumes from the two categories being compared, and

n_1 and n_2 are numbers of representative volumes in the two categories.[100]

The degrees of freedom used to calculate the *p*-value of the *t* statistic equals the lower of $(n_1 - 1)$ or $(n_2 - 1)$.

Three sets of *t*-Tests are conducted. First, to test whether sales volumes have changed with time and are correlated with wind facility construction, the volumes for each DISTANCE group in later periods (x_1) are compared to the volume in that same group in the pre-announcement period (x_2). Second, to test whether sales volumes are impacted by distance to the nearest wind turbine, the volumes for each PERIOD group at distances closer to the turbines (x_1) are compared to the volume in that same group in the three to five mile distance band (x_2). Finally, for reasons that will become obvious later, the sales volumes for each PERIOD group at distances within one

[100] The number of representative volumes could differ between the two categories. For instance, the "less than three years before announcement" category represents three years – and therefore three volumes – for each study area for each distance band, while the "less than two years after construction" category represents two years – and therefore two volumes – for each study area for each distance band.

mile and outside of three miles of the turbines (x_1) are compared to the sales volume in that same group in the one to three mile distance band (x_2). These three tests help to evaluate whether sales volumes are significantly different after wind facilities are announced and constructed, and whether sales volumes near the turbines are affected differently than for those homes located farther away.[101]

7.3. Analysis of Results

Table 29 and Figure 11 above show the sales volumes in each PERIOD and DISTANCE category, and can be interpreted as the percentage of homes that are available to sell that did sell in each category, on an annual average basis. The sales volume between one and three miles and before facility announcement is the lowest, at 1.8%, whereas the sales volumes for homes located between three and five miles in both periods following construction are the highest, at 4.2%.

The difference between these two sales volumes can be explained, in part, by two distinct trends that are immediately noticeable from the data presented in Figure 11. First, sales volumes <u>in all periods</u> are highest for those homes located in the three to five mile distance band. Second, sales volumes <u>at virtually all distances</u> are higher after wind facility announcement than they were before announcement.[102]

To test whether these apparent trends are borne out statistically the three sets of *t*-Tests described earlier are performed, the results of which are shown in Table 30, Table 31, and Table 32. In each table, the difference between the subject volume (x_1) and the reference volume (x_2) is listed first, followed by the *t* statistic, and whether the statistic is significant at or above the 90% level ("*").

Table 30 shows that mean sales volumes in the post-announcement periods are consistently greater than those in the pre-announcement period, and that those differences are statistically significant in four out of the nine categories. For example, the post-construction sales volumes for homes in the three to five mile distance band in the period less than two years after construction (4.2%) and between three and four years after construction (4.2%) are significantly greater than the pre-announcement volume of 2.3% (1.9%, $t = 2.40$; 1.9%, $t = 2.31$). Similarly, the post-construction sales volumes between one and three miles are significantly greater than the pre-announcement volume. These statistically significant differences, it should be noted, could be as much related to the low reference volume (i.e., sales volume in the period less than

[101] An alternative method to this model would be to pool the homes that "did sell" with the homes "available to sell" and construct a Discrete Choice Model where the dependent variable is zero (for "no sale") or one (for "sale") and the independent variables would include various home characteristics and the categorical distance variables. This would allow one to estimate the probability that a home sells dependent on distance from the wind facility. Because home characteristics data for the homes "available to sell," was not systematically collected it was not possible to apply this method to the dataset.

[102] It is not entirely clear why these trends exist. Volumes may be influenced upward in areas farther from the wind turbines, where homes, in general, might be more densely sited and homogenous, both of which might be correlated with greater home sales transactions. The converse might be true in more rural areas, nearer the wind turbines, where homes may be more unique or homeowners less prone to move. The increasing sales volumes seen in periods following construction, across all distance bands, may be driven by the housing bubble, when more transactions were occurring in general.

three years before announcement), as they are to the sales volumes to which the reference category is compared. Finally, when comparing post-construction volumes inside of a mile, none are statistically different than the 2.2% pre-announcement level.

Table 30: Equality Test of Sales Volumes between PERIODS

	Inside 1 Mile	Between 1 and 3 Miles	Between 3 and 5 Miles
Less Than 3 Years Before Announcement	Reference	Reference	Reference
After Announcement Before Construction	0.8% (0.72)	0.7% (0.99)	1.5% (1.49)
Less Than 2 Years After Construction	-0.1% (-0.09)	1.2% (2.45) *	1.9% (2.4) *
Between 2 and 4 Years After Construction	0.6% (0.54)	1% (2.24) *	1.9% (2.31) *

Numbers in parenthesis represent t-Test statistics. "" = significantly different at or below the 10% level*

Turning to sales volumes in the same development period but between the different distance bands, consistent but less statistically significant results are uncovered (see Table 31). Although all sales volumes inside of three miles, for each period, are less than their peers outside of three miles, those differences are statistically significant in only two out of eight instances. Potentially more important, when one compares the sales volumes inside of one mile to those between one and three miles (see Table 32), small differences are found, none of which are statistically significant. In fact, on average, the sales volumes for homes inside of one mile are greater or equal to the volumes of those homes located between one and three miles in two of the three post-announcement periods. Finally, it should be noted that the volumes for the inside one mile band, in the period immediately following construction, are less than those in the one to three mile band in the same period. Although not statistically significant, this difference might imply an initial slowing of sales activity that, in later periods, returns to more normal levels. This possibility is worth investigating further and is therefore recommended for future research.

Table 31: Equality Test of Volumes between DISTANCES using 3-5 Mile Reference

	Inside 1 Mile	Between 1 and 3 Miles	Between 3 and 5 Miles
Less Than 3 Years Before Announcement	-0.1% (-0.09)	-0.5% (-0.88)	Reference
After Announcement Before Construction	-0.7% (-0.56)	-1.2% (-1.13)	Reference
Less Than 2 Years After Construction	-2.1% (-2.41) *	-1.2% (-1.48)	Reference
Between 2 and 4 Years After Construction	-1.4% (-1.27)	-1.4% (-1.82) *	Reference

Numbers in parenthesis represent t-Test statistics. "" = significantly different at or below the 10% level*

Table 32: Equality Test of Sales Volumes between DISTANCES using 1-3 Mile Reference

	Inside 1 Mile	Between 1 and 3 Miles	Between 3 and 5 Miles
Less Than 3 Years Before Announcement	0.4% (0.49)	Reference	0.5% (0.88)
After Announcement Before Construction	0.5% (0.47)	Reference	1.2% (1.13)
Less Than 2 Years After Construction	-0.9% (-1.38)	Reference	1.2% (1.48)
Between 2 and 4 Years After Construction	0% (0.01)	Reference	1.4% (1.82) *

Numbers in parenthesis represent t-Test statistics. "" = significantly different at or below the 10% level*

Taken together, these results suggest that sales volumes are not conclusively affected by the announcement and presence of the wind facilities analyzed in this report. At least among this sample, sales volumes increased in all distance bands after the announcement and construction of the wind facilities. If this result was driven by the presence of the wind facilities, however, one would expect that such impacts would be particularly severe for those homes in close proximity to wind facilities. In other words, sales volumes would be the most affected inside of one mile, where views of the turbines are more frequent and where other potential nuisances are more noticeable than in areas farther away. This is not borne out in the data - no statistically significant differences are found for sales volumes inside of one mile as compared to those between one and three miles, and sales volumes outside of three miles are higher still. Therefore, on the whole, this analysis is unable to find persuasive evidence that wind facilities have a widespread and identifiable impact on overall residential sales volumes. It is again concluded that neither Area nor Nuisance Stigma are in evidence in this analysis.

8. Wind Projects and Property Values: Summary of Key Results

This report has extensively investigated the potential impacts of wind power facilities on the value (i.e., sales prices) of residential properties that are in proximity to and/or that have a view of those wind facilities. In so doing, three different potential impacts of wind projects on property values have been identified and analyzed: Area Stigma, Scenic Vista Stigma, and Nuisance Stigma. To assess these potential impacts, a primary (Base) hedonic model has been applied, seven alternative hedonic models have been explored, a repeat sales analysis has been conducted, and possible impacts on sales volumes have been evaluated. Table 33 outlines the resulting ten tests conducted in this report, identifies which of the three potential stigmas those tests were designed to investigate, and summarizes the results of those investigations. This section synthesizes these key results, organized around the three potential stigmas.

Table 33: Impact of Wind Projects on Property Values: Summary of Key Results

	Is there statistical evidence of:			
Statistical Model	**Area Stigma?**	**Scenic Vista Stigma?**	**Nuisance Stigma?**	**Section Reference**
Base Model	No	No	No	*Section 4*
View Stability	Not tested	No	Not tested	*Section 5.1*
Distance Stability	No	Not tested	No	*Section 5.1*
Continuous Distance	No	No	No	*Section 5.2*
All Sales	No	No	Limited	*Section 5.3*
Temporal Aspects	No	No	No	*Section 5.4*
Orientation	No	No	No	*Section 5.5*
Overlap	No	Limited	No	*Section 5.6*
Repeat Sales	No	Limited	No	*Section 6*
Sales Volume	No	Not tested	No	*Section 7*

"No"…….. No statistical evidence of a negative impact
"Yes"……. Strong statistical evidence of a negative impact
"Limited"…….. Limited and inconsistent statistical evidence of a negative impact
"Not tested"…… This model did not test for this stigma

8.1. Area Stigma

Area Stigma is defined as a concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines. Though these impacts might be expected to be especially severe at close range to the turbines, the impacts could conceivably extend for a number of miles around a wind facility. Modern wind turbines are visible from well outside of five miles in many cases, so if an Area Stigma exists, it is possible that all of the homes in the study areas inside of five miles would be affected.

As summarized in Table 33, Area Stigma is investigated with the Base, Distance Stability, Continuous Distance, All Sales, Temporal Aspects, Orientation, and Overlap hedonic models. It is also tested, somewhat differently, with the Repeat Sales and Sales Volume analyses. In each case, if an Area Stigma exists, it is expected that the sales prices (and/or sales volume) of homes

located near wind facilities would be broadly affected by the presence of those facilities, with effects decreasing with distance.

The Base Model finds little evidence of an Area Stigma, as the coefficients for the DISTANCE variables are all relatively small and none are statistically different from zero. For homes in this sample, at least, there is no statistical evidence from the Base Model that the distance from a home to the nearest wind turbine impacts sales prices, regardless of the distance band. Perhaps a more direct test of Area Stigma, however, comes from the Temporal Aspects Model. In this model, homes in all distance bands that sold after wind facility announcement are found to sell, on average, for prices that are not statistically different from those for homes that sold more than two years prior to wind facility announcement. Again, no persuasive evidence of an Area Stigma is evident.

The Repeat Sales and Sales Volume Models also investigate Area Stigma. The Repeat Sales Model's 354 homes, each of which sold once before facility announcement and again after construction, show average inflation-adjusted annual appreciation rates that are small and not statistically different from zero. If homes in all study areas were subject to an Area Stigma, one would expect a negative and statistically significant intercept term. Similarly, if homes in any individual study area experienced an Area Stigma, the fixed effect terms would be negative and statistically significant. Neither of these expectations is borne out in the results. The Sales Volume Model tells a similar story, finding that the rate of residential transactions is either not significantly different between the pre- and post-announcement periods, or is greater in later periods, implying, in concert with the other tests, that increased levels of transactions do not signify a rush to sell, and therefore lower prices, but rather an increase in the level of transactions with no appreciable difference in the value of those homes.

The All Sales, Distance Stability, Continuous Distance, Orientation, and Overlap Models corroborate these basic findings. In the All Sales and Distance Stability Models, for example, the DISTANCE coefficients for homes that sold outside of one mile but within five miles, compared to those that sold outside of five miles, are very similar: they differ by no more than 2%, and this small disparity is not statistically different from zero. The same basic findings resulted from the Orientation and Overlap Models. Further, homes with No View as estimated in the All Sales Model are found to appreciate in value, after adjusting for inflation, when compared to homes that sold before wind facility construction (0.02, p value 0.06); an Area Stigma effect should be reflected as a negative coefficient for this parameter. Finally, despite using all 4,937 cases in a single distance variable and therefore having a correspondingly small standard error, the Continuous Distance Model discovers no measurable relationship between distance from the nearest turbine and the value of residential properties.

Taken together, the results from these models are strikingly similar: there is no evidence of a widespread and statistically significant Area Stigma among the homes in this sample. Homes in these study areas are not, on average, demonstrably and measurably stigmatized by the arrival of a wind facility, regardless of when they sold in the wind project development process and regardless of whether those homes are located one mile or five miles away from the nearest wind facility.

Drawing from the previous literature on environmental disamenities discussed in Section 2.1, one likely explanation for this result is simply that any effects that might exist may have faded to a level indistinguishable from zero at distances outside of a mile from the wind facilities. For other disamenities, some of which would seemingly be more likely to raise concerns, effects have been found to fade quickly with distance. For example, property value effects near a chemical plant have been found to fade outside of two and a half miles (Carroll et al., 1996), near a lead smelter (Dale et al., 1999) and fossil fuel plants (Davis, 2008) outside of two miles, and near landfills and confined animal feeding operations outside of 2,400 feet and 1,600 feet, respectively (Ready and Abdalla, 2005). Further, homes outside of 300 feet (Hamilton and Schwann, 1995) or even as little as 150 feet (Des-Rosiers, 2002) from a high voltage transmission line have been found to be unaffected. A second possible explanation for these results could be related to the view of the turbines. In the sample used for this analysis, a large majority of the homes outside of one mile (n = 4,812) that sold after wind-facility construction commenced cannot see the turbines (n = 4,189, 87%), and a considerably larger portion have – at worst – a minor view of the turbines (n = 4,712, 98%). Others have found that the sales prices for homes situated at similar distances from a disamenity (e.g., HVTL) depend, in part, on the , view of that disamenity (Des-Rosiers, 2002). Similarly, research has sometimes found that annoyance with a wind facility decreases when the turbines cannot be seen (Pedersen and Waye, 2004). Therefore, for the overwhelming majority of homes outside of a mile that have either a minor rated view or no view at all of the turbines, the turbines may simply be out of sight, and therefore, out of mind.

8.2. Scenic Vista Stigma

Scenic Vista Stigma is defined as concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista. It has as its basis an admission that home values are, to some degree, derived from the quality of what can be seen from the property and that if those vistas are altered, sales prices might be measurably affected. The Base, View Stability, Continuous Distance, All Sales, Temporal Aspects, Orientation, Overlap, and Repeat Sales Models each test whether Scenic Vista Stigma is present in the sample.

The Base Model, as well as subsequent Alternative Hedonic Models, demonstrates persuasively that the quality of the scenic vista – absent wind turbines – impacts sales prices. Specifically, compared to homes with an AVERAGE VISTA, those having a POOR or a BELOW AVERAGE rating are estimated to sell for 21% (p value 0.00) and 8% (p value 0.00) less, on average. Similarly, homes with an ABOVE AVERAGE or PREMIUM rating are estimated to sell for 10% (p value 0.00) and 13% (p value 0.00) more than homes with an AVERAGE vista rating. Along the same lines, homes in the sample with water frontage or situated on a cul-de-sac sell for 33% (p value 0.00) and 10% (p value 0.00) more, on average, than those homes that lack these characteristics. Taken together, these results demonstrate that home buyers and sellers consistently take into account what can be seen from the home when sales prices are established, and that the models presented in this report are able to clearly identify those impacts.[103]

[103] Of course, cul-de-sacs and water frontage bestow other benefits to the home owner beyond the quality of the scenic vista, such as safety and privacy in the case of a cul-de-sac, and recreational potential and privacy in the case of water frontage.

Despite this finding, those same hedonic models are unable to identify a consistent and statistically significant Scenic Vista Stigma associated with wind facilities. Home buyers and sellers, at least among this sample, do not appear to be affected in a measurable way by the visual presence of wind facilities. Regardless of which model was estimated, the value of homes with views of turbines that were rated MODERATE, SUBSTANTIAL, or EXTREME are found to be statistically indistinguishable from the prices of homes with no view of the turbines. Specifically, the 25 homes with EXTREME views in the sample, where the home site is "unmistakably dominated by the [visual] presence of the turbines," are not found to have measurably different property values, and neither are the 31 homes with a SUBSTANTIAL view, where "the turbines are dramatically visible from the home."[104] The same finding holds for the 106 homes that were rated as having MODERATE views of the wind turbines. Moreover, the Orientation and Overlap Models show that neither the orientation of the home with respect to the view of wind turbines, nor the overlap of that view with the prominent scenic vista, have measurable impacts on home prices.

The All Sales Model compares homes with views of the turbines (in the post-construction period) to homes that sold before construction (when no views were possible), and finds no statistical evidence of adverse effects within any VIEW category. Moreover, when a *t*-Test is performed to compare the NO VIEW coefficient to the others, none of the coefficients for the VIEW ratings are found to be statistically different from the NO VIEW homes. The Repeat Sales Model comes to a similar result, with homes with MODERATE views appreciating at a rate that was not measurably different from that of homes with no views (0.03, *p* value 0.29). The same model also finds that homes with SUBSTANTIAL/EXTREME views appreciate at a rate 2% slower per year (*p* value 0.09) than their NO VIEW peers. Homes situated inside of one mile, however, are found to appreciate at a rate 3% more (*p* value 0.01) than reference homes located outside of five miles. Eight of the nine homes situated inside of one mile had either a SUBSTANTIAL or EXTREME view. Therefore, to correctly interpret these results, one would add the two coefficients for these homes, resulting in a combined 1% increase in appreciation as compared to the reference homes situated outside of five miles with no view of turbines, and again yielding no evidence of a Scenic Vista Stigma.

Although these results are consistent across most of the models, there are some individual coefficients from some models that differ. Specifically, homes with MINOR rated views in the Overlap and Repeat Sales Models are estimated to sell for 3% less (*p* value 0.10) and appreciate at a rate 2% less (*p* value 0.02) than NO VIEW homes. Taken at face value, these MINOR VIEW findings imply that homes where "turbines are visible, but, either the scope is narrow, there are many obstructions, or the distance between the home and the facility is large" are systematically impacted in a modest but measurable way. Homes with more dramatic views of a wind facility in the same models, on the other hand, are found to not be measurably affected. Because of the counterintuitive nature of this result, and because it is contradicted in the results of other models presented earlier, it is more likely that there is some aspect of these homes that was not modeled appropriately in the Overlap and Repeat Sales Models, and that the analysis is picking up the effect of omitted variable(s) rather than a systematic causal effect from the wind facilities.

[104] See Section 3.2.3 and Appendix C for full description of VIEW ratings.

Taken together, the results from all of the models and all of the VIEW ratings support, to a large degree, the Base Model findings of no evidence of a Scenic Vista Stigma. Although there are 160 residential transactions in the sample with more dramatic views than MINOR, none of the model specifications is able to find any evidence that those views of wind turbines measurably impacted average sales prices, despite the fact that those same models consistently find that home buyers and sellers place value on the quality of the scenic vista.

8.3. Nuisance Stigma

Nuisance Stigma is defined as a concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values. If these factors impact residential sales prices, those impacts are likely to be concentrated within a mile of the wind facilities. The Base, Distance Stability, Continuous Distance, All Sales, Temporal Aspects, Orientation, Overlap, Repeat Sales, and Sales Volume Models all investigate the possible presence of a Nuisance Stigma.

The Base Model finds that those homes within 3000 feet and those between 3000 feet and one mile of the nearest wind turbine sold for roughly 5% less than similar homes located more than five miles away, but that these differences are not statistically significant (*p* values of 0.40 and 0.30, respectively). These results remain unchanged in the Distance Stability Model, as well as in the Orientation and Overlap Models. Somewhat similarly, in the All Sales Model, when all transactions occurring after wind facility announcement are assumed to potentially be impacted (rather than just those occurring after construction, as in the Base Model), and a comparison is made to the average of all transactions occurring pre-announcement (rather than the average of all transactions outside of five miles, as in the Base Model), these same coefficients grow to -6% (*p* value 0.23) and -8% (*p* value 0.08) respectively. Although only one of these coefficients was statistically significant, they are large enough to warrant further scrutiny.

The Temporal Aspects Model provides a clearer picture of these findings. It finds that homes that sold prior to wind facility announcement and that were situated within one mile of where the turbines were eventually located sold, on average, for between 10% and 13% less than homes located more than five miles away and that sold in the same period. Therefore, the homes nearest the wind facility's eventual location were already depressed in value before the announcement of the facility. Most telling, however, is what occurred after construction. Homes inside of one mile are found to have inflation-adjusted sales prices that were either statistically undistinguishable from, or in some cases greater than, pre-announcement levels. Homes sold in the first two years after construction, for example, have higher prices (0.07, *p* value 0.32), as do those homes that sold between two and four years after construction (0.13, *p* value 0.06) and more than four years after construction (0.08, *p* value 0.24). In other words, there is no indication that these homes experienced a decrease in sales prices after wind facility construction began. Not only does this result fail to support the existence of a Nuisance Stigma, but it also indicates that the relatively large negative coefficients estimated in the Base and All Sales Models are likely caused by conditions that existed prior to wind facility construction and potentially prior to facility announcement.[105]

[105] See footnote 82 on page 46 for a discussion of possible alternative explanations to this scenario.

These results are corroborated by the Continuous Distance Model, which finds no statistically significant relationship between an inverse DISTANCE function and sales prices (-0.01, sig 0.46). Similarly, in the Repeat Sales Model, homes within one mile of the nearest turbine are not found to be adversely affected; somewhat counter-intuitively, they are found to appreciate faster (0.03, *p* value 0.01) than their peers outside of five miles. Finally, the Sales Volume analysis does not find significant and consistent results that would suggest that the ability to sell one's home within one mile of a wind facility is substantially impacted by the presence of that facility.

Taken together, these models present a consistent set of results: the sales prices of homes in this sample that are within a mile of wind turbines, where various nuisance effects have been posited, are not measurably affected compared to those homes that are located more than five miles away from the facilities or that sold well before the wind projects were announced. These results imply that widespread Nuisance Stigma effects are either not present in the sample, or are too small or sporadic to be statistically identifiable.

Though these results may appear counterintuitive, it may simply be that property value impacts fade rapidly with distance, and that few of the homes in the sample are close enough to the subject wind facilities to be substantially impacted. As discussed earlier, studies of the property value impacts of high voltage transmission lines often find that effects fade towards zero at as little distance as 200 feet (see, e.g., Gallimore and Jayne, 1999; Watson, 2005). None of the homes in the present sample are closer than 800 feet to the nearest wind turbine, and all but eight homes are located outside of 1000 feet of the nearest turbine. It is therefore possible that, if any effects do exist, they exist at very close range to the turbines, and that those effects are simply not noticeable outside of 800 feet. Additionally, almost half of the homes in the sample that are located within a mile of the nearest turbine have either no view or a minor rated view of the wind facilities, and some high voltage transmission line (HVTL) studies have found a decrease in adverse effects if the towers are <u>not</u> visible (Des-Rosiers, 2002) and, similarly, decreases in annoyance with wind facility sounds if turbines cannot be seen (Pedersen and Waye, 2004). Finally, effects that existed soon after the announcement or construction of the wind facilities might have faded over time. More than half of the homes in the sample sold more than three years after the commencement of construction, while studies of HVTLs have repeatedly found that effects fade over time (Kroll and Priestley, 1992) and studies of attitudes towards wind turbines have found that such attitudes often improve after facility construction (Wolsink, 1989). Regardless of the explanation, the fact remains that, in this sizable sample of residential transactions, no persuasive evidence of a widespread Nuisance Stigma is found, and if these impacts do exist, they are either too small or too infrequent to result in any widespread and consistent statistically observable impact.

9. Conclusions

Though surveys generally show that public acceptance towards wind energy is high, a variety of concerns with wind development are often expressed at the local level. One such concern that is often raised in local siting and permitting processes is related to the potential impact of wind projects on the property values of nearby residences.

This report has investigated the potential impacts of wind power facilities on the sales prices of residential properties that are in proximity to and/or that have a view of those wind facilities. It builds and improve on the previous literature that has investigated these potential effects by collecting a large quantity of residential transaction data from communities surrounding a wide variety of wind power facilities, spread across multiple parts of the U.S. Each of the homes included in this analysis was visited to clearly determine the degree to which the wind facility was visible at the time of home sale and to collect other essential data. To frame the analysis, three potentially distinct impacts of wind facilities on property values are considered: Area, Scenic Vista, and Nuisance Stigma. To assess these potential impacts, the authors applied a base hedonic model, explored seven alternative hedonic models, conducted a repeat sales analysis, and evaluated possible impacts on sales volumes. The result is the most comprehensive and data-rich analysis to date on the potential impacts of wind projects on nearby property values.

Although each of the analysis techniques used in this report has strengths and weaknesses, the results are strongly consistent in that each model fails to uncover conclusive evidence of the presence of any of the three property value stigmas. Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact. Moreover, to the degree that homes in the present sample are similar to homes in other areas where wind development is occurring, the results herein are expected to be transferable.

Finally, although this work builds on the existing literature in a number of respects, there remain a number of areas for further research. The primary goal of subsequent research should be to concentrate on those homes located closest to wind facilities, where the least amount of data are available. Additional research of the nature reported in this paper could be pursued, but with a greater number of transactions, especially for homes particularly close to wind facilities. Further, it is conceivable that cumulative impacts might exist whereby communities that have seen repetitive development are affected uniquely, and these cumulative effects may be worth investigating. A more detailed analysis of sales volume impacts may also be fruitful, as would an assessment of the potential impact of wind facilities on the length of time homes are on the market in advance of an eventual sale. Finally, it would be useful to conduct a survey of those homeowners living close to existing wind facilities, and especially those residents who have bought and sold homes in proximity to wind facilities after facility construction, to assess their opinions on the impacts of wind project development on their home purchase and sales decisions.

References

American Wind Energy Association (AWEA) (2008) Wind Energy Siting Handbook. American Wind Energy Association, Washington, DC. February, 2008. 183 pages.

Bateman, I., Day, B. and Lake, I. (2001) The Effect of Road Traffic on Residential Property Values: A Literature Review and Hedonic Pricing Study. Prepared for Scottish Executive and The Stationary Office, Edinburgh, Scotland. January, 2001. 207 pages.

BBC Research & Consulting (BBC R&C) (2005) Wind Power Facility Siting Case Studies: Community Response. BBC Research & Consulting. Prepared for National Wind Coordinating Committee, c/o RESOLVE, Washington, DC. June, 2005. 51 pages.

Beck, D. (2004) How Hull Wind "I" Impacted Property Values in Pemberton. Letter sent to C. McCabe. July 28, 2004.

Benson, E. D., Hansen, J. L. and Aurthur L. Schwartz, J. (2000) Water Views and Residential Property Values. *The Appraisal Journal.* 68(3): 260-270.

Bishop, I. (2002) Determination of Thresholds of Visual Impact: The Case of Wind Turbines. *Environment and Planning B: Planning and Design.* 29: 707-718.

Bond, S. (2008) Attitudes Towards the Development of Wind Farms in Australia. *Journal of Environmental Health Australia.* 8(3): 19-32.

Bond, S. and Wang, K. K. (2007) The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods. *The Appraisal Journal.* 75(4): 362-370.

Bourassa, S. C., Hoesli, M. and Sun, J. (2004) What's in a View? *Environment and Planning.* 36(8): 1427-1450.

Boyle, M. A. and Kiel, K. A. (2001) A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities. *Journal of Real Estate Research.* 9(2): 117-144.

Buhyoff, G. J., Miller, P. A., Roach, J. W., Zhou, D. and Fuller, L. G. (1994) An AI Methodology for Landscape Visual Assessments. *AI Applications.* 8(1): 1-13.

Carroll, T. M., Clauretie, T. M., Jensen, J. and Waddoups, M. (1996) The Economic Impact of a Transient Hazard on Property Values: The 1988 PEPCON Explosion in Henderson, Nevada. *Journal of Real Estate Finance and Economics.* 13(2): 143-167.

Case, B., Clapp, J., Dubin, R. and Rodriguez, M. (2004) Modeling Spatial and Temporal House Price Patterns: A Comparison of Four Models. *The Journal of Real Estate Finance and Economics.* 29(2): 167-191.

Clark, D. E. and Allison, T. (1999) Spent Nuclear Fuel and Residential Property Values: The Influence of Proximity, Visual Cues and Public Information. *Papers in Regional Science.* 78(4): 403-421.

Crone, T. M. and Voith, R. P. (1992) Estimating House Price Appreciation: A Comparison of Methods. *Journal of Housing Economics.* 2(4): 324-338.

Dale, L., Murdoch, J. C., Thayer, M. A. and Waddell, P. A. (1999) Do Property Values Rebound from Environmental Stigmas? Evidence from Dallas. *Land Economics.* 75(2): 311-326.

Dale Rankin et al. v. FPL Energy LLC et al. (Dale Rankin v. FPL) (2008). 42nd District Court - Taylor County TX. August 21, 2008. 11-07-00074-CV.

Daniel, T. C. and Boster, R. S. (1976) Measuring Landscape Aesthetics: The Scenic Beauty Estimation Method. Forest Service - Rocky Mountian Forest and Range Experiment Station in Fort Collins Colorado. Prepared for U.S. Department of Agriculture, Washington, D.C. 66 pages.

Davis, L. W. (2008) The Effect Of Power Plants On Local Housing Values And Rents: Evidence From Restricted Census Microdata. Prepared for Center for Energy and Environmental Policy Research (CEEPR), Cambridge, MA. June 18, 2008. 34 pages. 08-009.

DeLacy, B. (2005) Technical Memorandum: Impacts of The Kittitas Valley Wind Power Project on Local Property Values. Cushman & Wakefield of Oregon. Prepared for Sagebrush Power Partners, LLC. December 29, 2005. 15 pages. File Number 06-34001-9012.

Des-Rosiers, F. (2002) Power Lines, Visual Encumbrance and House Values: A Microspatial Approach to Impact Measurement. *Journal of Real Estate Research.* 23(3): 275-301.

Devine-Wright, P. (2004) Beyond NIMBYism: Towards an Integrated Framework for Understanding Public Perceptions of Wind Energy. *Wind Energy.* 8(2): 125 - 139.

Dubin, R. A. (1998) Spatial Autocorrelation: A Primer. *Journal of Housing Economics.* 7(4): 304 -327.

Durbin, J. and Watson, G. S. (1951) Testing for Serial Correlation in Least-Squares Regression. *Biometrika.* 38(1-2): 159-178.

Espey, M., Fakhruddin, F., Gering, L. R. and Lin, H. (2007) Living on the Edge: Residential Property Values in the Urban-Rural Interface. *Journal of Agricultural and Applied Economics.* 39(3): 689-699.

Exeter-Enterprises-Ltd. (1993) Attitudes to Wind Power: A Survey of Opinion in Cornwall and Devon. Prepared for Department of Trade and Industry as Cited in Devine-Wright (2004). ETSU Report W/13/00354/038/REP.

Farber, S. (1998) Undesirable Facilities and Property Values: A Summary of Empirical Studies. *Ecological Economics.* 24(1): 1-14.

Firestone, J. and Kempton, W. (2006) Public Opinion about Large Offshore Wind Power: Underlying Factors. *Energy Policy.* 35(3): 1584-1598.

Firestone, J., Kempton, W. and Krueger, A. (2007) Delaware Opinion on Offshore Wind Power - Interim Report. University of Delaware College of Marine and Earth Studies, Newark, DE. January, 2007. 16 pages.

Freeman, A. M. (1979) Hedonic Prices, Property Values and Measuring Environmental Benefits: A Survey of the Issues. *Scandinavian Journal of Economics.* 81(2): 154-173.

Gallimore, P. and Jayne, M. R. (1999) Public and Professional Perceptions of HVOTL Risks: The Problem of Circularity. *Journal of Property Research.* 16(3): 243-255. Cited by Elliott and Wadley, 2002.

Gipe, P. (2002) Design as if People Matter: Aesthetic Guidelines for a Wind Power Future. Section in Wind Power in View: Energy Landscapes in a Crowded World. Academic Press. Davis, CA. pp. 173-212 of 234 pages. ISBN 0-12-546334-0.

Global Wind Energy Council (GWEC) (2008) Global Wind Energy Outlook. Global Wind Energy Council, Brussels, Belgium, and Greenpeace, Amsterdam, The Netherlands. October, 2008. 60 pages.

Global Wind Energy Council (GWEC) (2009) Global Wind 2008 Report. Global Wind Energy Council, Brussels, Belgium, and Greenpeace, Amsterdam, The Netherlands. 60 pages.

Goldberger, A. S. (1991) A Course in Econometrics. Harvard University Press. Cambridge, MA. 178 pages.

Goldman, J. C. (2006) A Study in the Impact of Windmills on Property Values in Tucker County, West Virginia for the Proposed Beech Ridge Energy, L.L.C. project in Greenbrier County, West Virginia. Goldman Associates Inc. Prepared for Spilman Thomas & Battle, P.L.L.C., Charleston, WV. April, 2006. 51 pages. West Virginia Case No. 05-1590-E-CS.

Grover, D. S. (2002) Economic Impacts of Wind Power in Kittitas County, WA. ECONorthwest. Prepared for Phoenix Economic Development Group, Ellensburg, WA. November, 2002. 18 pages.

Gujarati, D. N. (2003) Basic Econometrics: Fourth Edition. McGraw-Hill/Irwin. New York, NY. 1002 pages. ISBN 0-07-233542-4.

Hamilton, S. and Schwann, G. (1995) Do High Voltage Electric Transmission Lines Affect Property Value? *Land Economics.* 71(4): 436-444.

Haughton, J., Giuffre, D., Barrett, J. and Tuerck, D. G. (2004) An Economic Analysis of a Wind Farm in Nantucket Sound. Beacon Hill Institute at Suffolk University, Boston, MA. May, 2004. 83 pages.

Hoen, B. (2006) Impacts of Windfarm Visibility on Property Values in Madison County, New York. Thesis Prepared for Masters Degree in Environmental Policy. Bard College, Annandale-On-Hudson, NY. April, 2006. 73 pages.

Jackson, T. O. (2001) The Effects of Environmental Contamination on Real Estate: A Literature Review. *Journal of Real Estate Research.* 9(2): 93-116.

Jackson, T. O. (2003) Methods and Techniques for Contaminated Property Valuation. *The Appraisal Journal.* 71(4): 311-320.

Jackson, T. O. (2005) Evaluating Environmental Stigma with Multiple Regression Analysis. *The Appraisal Journal.* 73(4): 363-369.

Jerabek, J. (2001) Property Values and their Relationship to the Town of Lincoln's Wind Turbine Projects. Letter sent to R. Bingen. January 30, 2001.

Jerabek, J. (2002) Property Values Respective to Wind Turbine Locations. Letter sent to Township of Lincoln Wind Turbine Moratorium Study Committee. January 29, 2002.

Jordal-Jorgensen, J. (1996) Visual Effect and Noise from Windmills - Quantifying and Valuation. Social Assessment of Wind Power in Denmark. J. Munksgaard and A. Larsen. Prepared for The Institute of Local Government Studies (AKF), Copenhagen, Denmark. April 1996.

Khatri, M. (2004) RICS Wind Farm Research: Impact of Wind Farms on the Value of Residential Property and Agricultural Land. Prepared for Royal Institute of Chartered Surveyors, London, UK. November 3, 2004. 11 pages.

Kiel, K. A. and McClain, K. T. (1995) The Effect Of An Incinerator Siting On Housing Appreciation Rates. *Journal of Urban Economics.* 37(3): 311-323.

Kielisch, K. (2009) Wind Turbine Impact Study: Dodge and Fond Du Lac Counties, WI. Appraisal Group One. Prepared for Calumet County Citizens for Responsible Energy (CCCRE), Calumet County, WI. September 9, 2009. 73 pages.

Kleinbaum, D. G., Kupper, L. L. and Muller, K. E. (1988) Applied Analysis and other Multivariate Methods, Second Edition. PWS-Kent. Boston, MA. 210 pages.

Kroll, C. A. and Priestley, T. (1992) The Effects of Overhead Transmission Lines on Property Values: A Review and Analysis of the Literature. Prepared for Edison Electric Institute, Washington, DC. July, 1992. 99 pages.

Leonard, T. and Murdoch, J. (forthcoming) The Neighborhood Effects of Foreclosure. *Journal of Geographical Systems*.

Leonard, T., Murdoch, J. and Thayer, M. (2008) The Price Effects of Environmental Disamenities in Residential Real-Estate Markets: A Review of the Literature. Working Paper. September, 2008: 14 pages.

LeSage, J. P. (1999) The Theory and Practice of Spatial Econometrics. University of Toledo. Toledo, Ohio. 284 pages.

Mahalanobis, P. C. (1936) On the Generalized Distance in Statistics. *Proceedings of the National Institute of Sciences of India.* 2(1): 49-55.

Mahan, B. L., Polasky, S. and Adams, R. M. (2000) Valuing Urban Wetlands: A Property Price Approach. *Land Economics.* 76(1): 100-113.

Maloy, M. A. and Dean, D. J. (2001) An Accuracy Assessment of Various GIS-Based Viewshed Delineation Techniques. *Photogrammetric Engineering and Remote Sensing.* 67(11): 1293-1298.

Malpezzi, S. (2003) Hedonic Pricing Models: A Selective and Applied Review. Section in Housing Economics and Public Policy: Essays in Honor of Duncan Maclennan. Wiley-Blackwell. Hoboken, NJ. pp. 67-85 of 328 pages. ISBN 978-0-632-06461-8.

McCann, M. S. (2008) Real Estate Impact Evaluation of the Horizon Wind Energy Proposed Rail Splitter Wind Farm. Prepared for Hinshaw & Culbertson, LLP, Rockford, IL. May, 2008. 24 pages.

McCann, R. J. (1999) A Review of the Literature on Property Value Impacts from Industrial Activities. *M. Cubed* (Working Paper): 16 pages.

McCluskey, J. J. and Rausser, G. C. (2003) Hazardous Waste Sites and Housing Appreciation Rates. *Journal of Environmental Economics and Management.* 45(2): 166-176.

National Academy of Sciences (NAS) (2007) Environmental Impacts of Wind-Energy Projects. Committee on Environmental Impacts of Wind Energy Projects - National Research Council. National Academy of Sciences. Washington, DC. 394 pages. ISBN: 0-309-10831-4.

Newman, J. (1956) The World of Mathematics, Volume 2. Simon & Schuster. New York. 1247 pages. ISBN# 0-486-41150-8.

Palmer, J. (1997) Public Acceptance Study of the Searsburg Wind Power Project - One Year Post Construction. Prepared for Vermont Environmental Research Associates, Inc., Waterbury Center, VT. December 1997. 58 pages.

Palmquist, R. B. (1982) Measuring Environmental Effects on Property Values Without Hedonic Regressions. *Journal of Urban Economics.* 11(3): 333-347.

Paul, T. (2006) Understanding and Predicting Community Responses to Wind Energy Development Applications. Thesis Prepared for Master of Science. Bard College, Annandale-on-Hudson, NY. April, 2006. 76 pages.

Pedersen, E. and Waye, K. P. (2004) Perception and Annoyance due to Wind Turbine Noise: A Dose-Response Relationship. *The Journal of the Acoustical Society of America.* 116(6): 3460-3470.

Pitt, D. G. and Zube, E. H. (1979). The Q-Sort Method: Use in Landscape Assessment Research and Landscape Planning. Presented at Applied Techniques for Analysis and Management of the Visual Resource, Incline Village, Nevada. April 23-25, 1979.

Poletti, P. (2005) A Real Estate Study of the Proposed Forward Wind Energy Center Dodge and Fond Du Lac Counties, Wisconsin. Poletti and Associates. Prepared for Invenergy Wind LLC, Chicago, IL. May, 2005. 106 pages.

Poletti, P. (2007) A Real Estate Study of the Proposed White Oak Wind Energy Center, Mclean & Woodford Counties, Illinois. Polleti and Associates. Prepared for Invenergy Wind LLC, Chicago, IL. January, 2007. 63 pages.

Ready, R. C. and Abdalla, C. W. (2005) The Amenity and Disamenity Impacts of Agriculture: Estimates from a Hedonic Pricing Model. *American Journal of Agricultural Economics.* 87(2): 314-326.

Riggs, P. D. and Dean, D. J. (2007) An Investigation into the Causes of Errors and Inconsistencies in Predicted Viewsheds. *Transactions in GIS.* 11(2): 175-196.

Rosen, S. (1974) Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy.* 82(1): 34-55.

Schwarz, G. E. (1978) Estimating the Dimension of a Model. *Annals of Statistics.* 6(2): 461-464.

Seiler, M. J., Bond, M. T. and Seiler, V. L. (2001) The Impact of World Class Great Lakes Water Views on Residential Property Values. *The Appraisal Journal.* 69(3): 287-295.

Simons, R. (2006a) When Bad Things Happen To Good Property. Environmental Law Institute Press. Washington DC. 350 pages. ISBN: 9781585761012.

Simons, R. (2006b) Peer Reviewed Evidence on Property Value Impacts by Source of Contamination. Section in When Bad Things Happen To Good Property. Environmental Law Institute Press. Washington DC. p. 350. ISBN: 9781585761012.

Simons, R. A. and Saginor, J. D. (2006) A Meta-Analysis of the Effect of Environmental Contamination and Positive Amenities on Residential Real Estate Values. *Journal of Real Estate Research.* 28(1): 71-104.

Sims, S. and Dent, P. (2007) Property Stigma: Wind Farms Are Just The Latest Fashion. *Journal of Property Investment & Finance.* 25(6): 626-651.

Sims, S., Dent, P. and Oskrochi, G. R. (2008) Modeling the Impact of Wind Farms on House Prices in the UK. *International Journal of Strategic Property Management.* 12(4): 251-269.

Sirmans, G. S., Lynn, M., Macpherson, D. A. and Zietz, E. N. (2005a). The Value of Housing Characteristics: A Meta Analysis. Presented at Mid Year Meeting of the American Real Estate and Urban Economics Association. May 2005.

Sirmans, G. S., Macpherson, D. A. and Zietz, E. N. (2005b) The Composition of Hedonic Pricing Models. *Journal of Real Estate Literature.* 13(1): 3-42.

Sterzinger, G., Beck, F. and Kostiuk, D. (2003) The Effect of Wind Development on Local Property Values. Renewable Energy Policy Project, Washington, DC. May, 2003. 77 pages.

Thayer, M., Albers, H. and Rhamation, M. (1992) The Impact of Landfills on Residential Property Values. *Journal of Real Estate Research.* 7(3): 265-282.

Thayer, R. L. and Freeman, C. N. (1987) Altamont: Public Perceptions of a Wind Energy Landscape. *Landscape and Urban Planning.* 14(1987): 379-398.

Torres-Sibillea, A., V. Cloquell-Ballester and Darton, R. (2009) Development and Validation of a Multicriteria Indicator for the Assessment of Objective Aesthetic Impact of Wind Farms. *Renewable and Sustainable Energy Reviews.* 13(1): 40-66.

United States Department of Agriculture (USDA) (1995) Landscape Aesthetics: A Handbook for Scenic Management. United States Department of Agriculture - Forest Service, Washington, DC. December 1995.

United States Department of Energy (US DOE) (2008) 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. U.S. Department of Energy, Washington, DC. May, 2008. 248 pages.

Watson, M. (2005) Estimation of Social and Environmental Externalities for Electricity Infrastructure in the Northwest Sector. Reviewed by Martin Hill. Prepared for Prepared for Parsons Brinckerhoff by Integral Energy, Sydney, Australia. August 2005. 73 pages.

White, H. (1980) A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica.* 48(4): 817-838.

Wiser, R. and Bolinger, M. (2009) 2008 Wind Technologies Market Report. Lawrence Berkeley National Laboratory. Prepared for U.S. Department of Energy, Washington, DC. July, 2009. 68 pages. DOE/GO-102009-2868.

Wiser, R. and Hand, M. (2010) Wind Power: How Much, How Soon, and At What Cost? Section in Generating Electricity in a Carbon-Constrained World. Elsevier. Oxford, UK. p. 632. ISBN-13: 978-1-85617-655-2.

Wolsink, M. (1989) Attitudes and Expectancies about Wind Turbines and Wind Farms. *Wind Engineering.* 13(4): 196-206.

Wolsink, M. (2000) Wind Power and the NIMBY-Myth: Institutional Capacity and the Limited Significance of Public Support. *Renewable Energy.* 21(1): 49-64.

Zarem, K. L. (2005) Direct Testimony Regarding Forward Wind Project, Dodge and Fond Du Lac Counties, Wisconsin. Public Service Commission of Wisconsin, Madison, Wisconsin. June, 2005. 12 pages. Docket No. 9300-CE-100.

Appendix A: Study Area Descriptions

The analysis reported in the body of the report used data from ten different wind-project study areas, across nine different states and 14 counties, and surrounding 24 different wind facilities. Each of the study areas is unique, but as a group they provide a good representation of the range of wind facility sizes, hub heights, and locations of recent wind development activity in the U.S. (see Figure A - 1 and Table A - 1). This appendix describes each of the ten study areas, and provides the following information: a map of the study area; a description of the area; how the data were collected; statistics on home sales prices in the sample and census-reported home values for the towns, county, and state that encompass the area; data on the wind facilities contained within the study area; and frequency tables for the variables of interest (i.e., views of turbines, distance to nearest turbine ,and development period).

Figure A - 1: Map of Study Areas

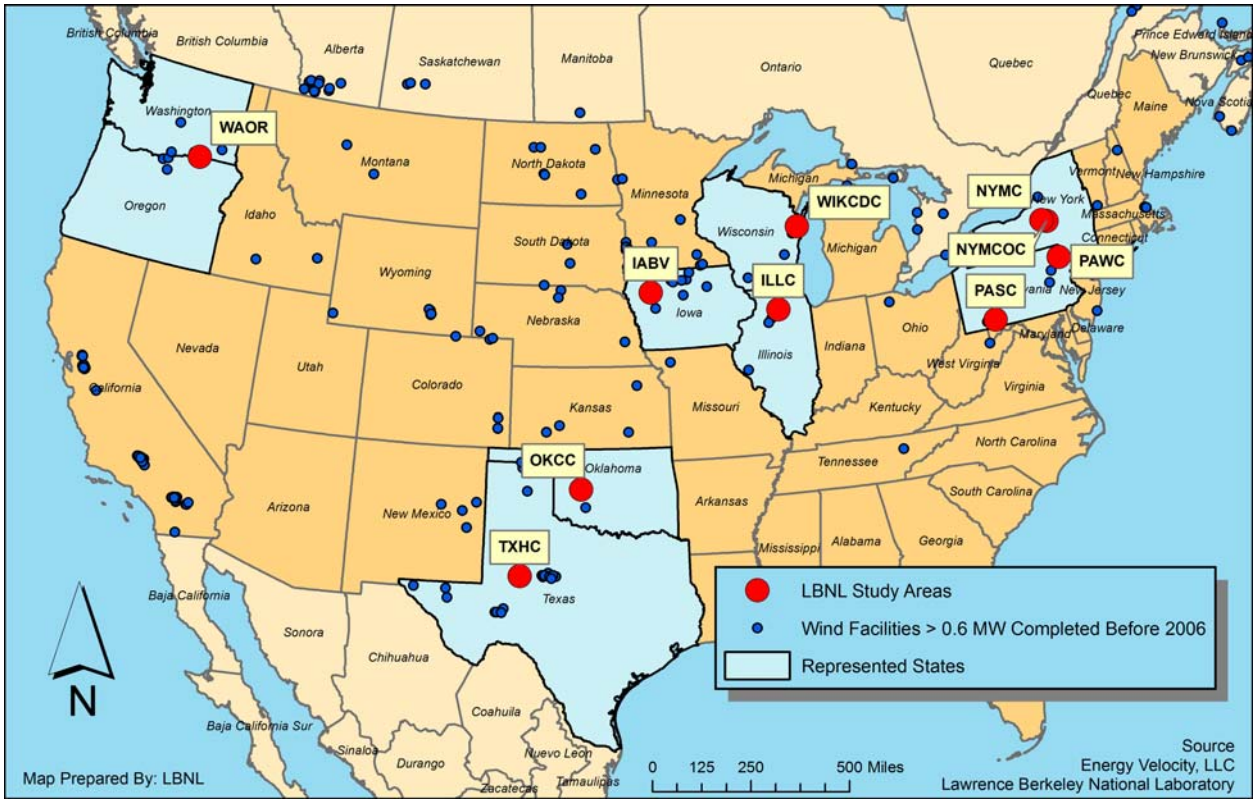
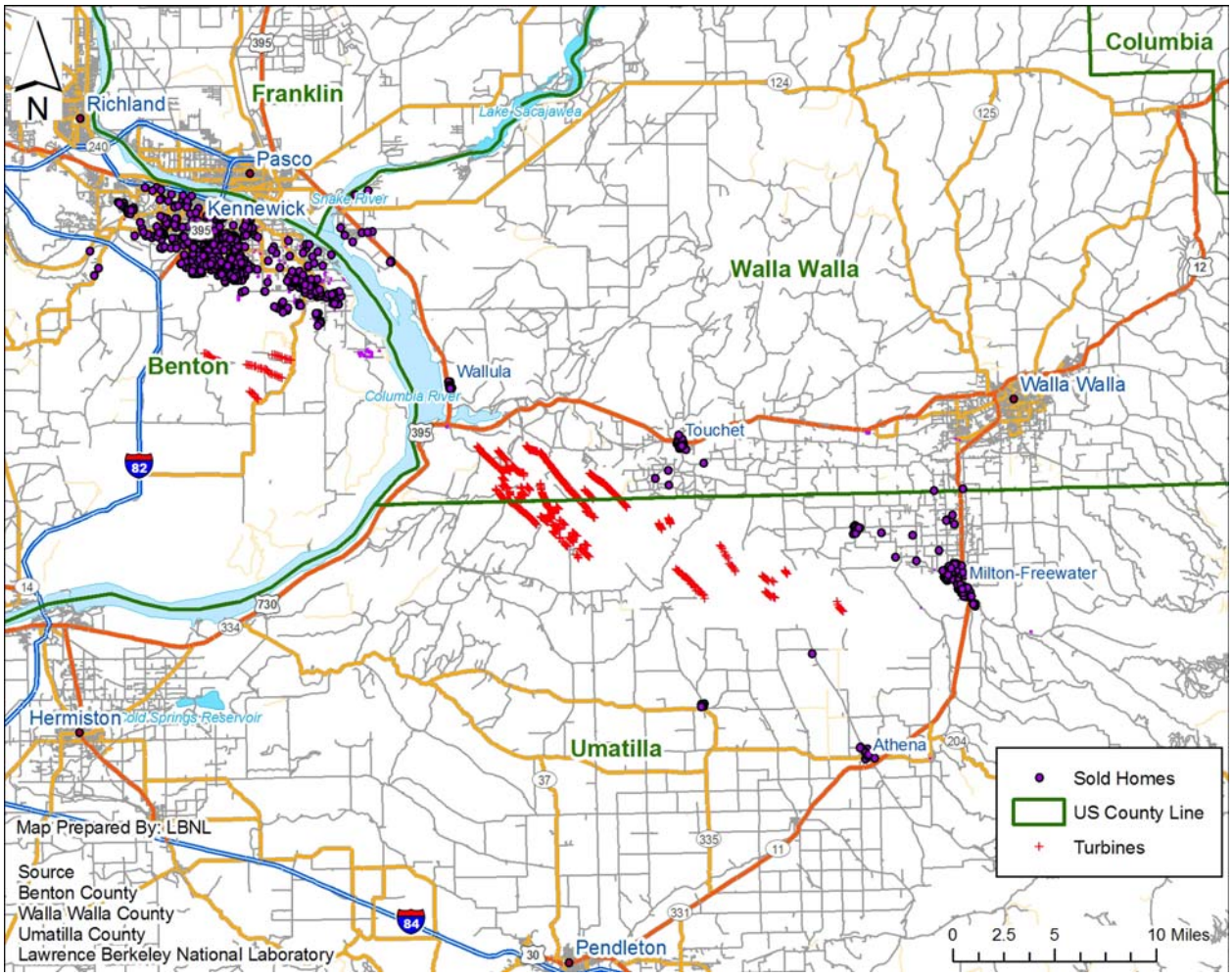


Table A - 1: Summary of Study Areas

Study Area Code	Study Area Counties, States	Facility Names	Number of Turbines	Number of MW	Max Hub Height (meters)	Max Hub Height (feet)
WAOR	Benton and Walla Walla Counties, WA and Umatilla County, OR	Vansycle Ridge, Stateline, Nine Canyon I & II, Combine Hills	582	429	60	197
TXHC	Howard County, TX	Big Spring I & II	46	34	80	262
OKCC	Custer County, OK	Weatherford I & II	98	147	80	262
IABV	Buena Vista County, IA	Storm Lake I & II, Waverly, Intrepid I & II	381	370	65	213
ILLC	Lee County, IL	Mendota Hills, GSG Wind	103	130	78	256
WIKCDC	Kewaunee and Door Counties, WI	Red River, Lincoln	31	20	65	213
PASC	Somerset County, PA	Green Mountain, Somerset, Meyersdale	34	49	80	262
PAWC	Wayne County, PA	Waymart	43	65	65	213
NYMCOC	Madison and Oneida Counties, NY	Madison	7	12	67	220
NYMC	Madison County, NY	Fenner	20	30	66	218
		TOTAL	**1345**	**1286**		

A.1 WAOR Study Area: Benton and Walla Walla Counties (Washington), and Umatilla County (Oregon)

Figure A - 2: Map of WAOR Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area combines data from the three counties - Benton and Walla Walla in Washington, and Umatilla in Oregon - that surround the Vansycle Ridge, Stateline, Combine Hills, and Nine Canyon wind projects. Wind development began in this area in 1997 and, within the sample of wind projects, continued through 2003. In total, the wind facilities in this study area include 582 turbines and 429 MW of nameplate capacity, with hub heights that range from 164 feet to almost 200 feet. The wind facilities are situated on an East-West ridge that straddles the Columbia River, as it briefly turns South. The area consists of undeveloped highland/plateau grassland, agricultural tracks for winter fruit, and three towns: Kennewick (Benton County), Milton-Freewater (Umatilla County), and Walla Walla (Walla Walla County). Only the first two of these towns are represented in the dataset because Walla Walla is situated more than 10 miles from the nearest wind turbine. Also in the area are Touchet and Wallula, WA, and Athena, OR,

all very small communities with little to no services. Much of the area to the North and South of the ridge, and outside of the urban areas, is farmland, with homes situated on small parcels adjoining larger agricultural tracts.

Data Collection and Summary

Data for this study area were collected from a myriad of sources. For Benton County, sales and home characteristic data and GIS parcel shapefiles were collected with the assistance of county officials Eric Beswick, Harriet Mercer, and Florinda Paez, while state official Deb Mandeville (Washington Department of State) provided information on the validity of the sales. In Walla Walla County, county officials Bill Vollendorff and Tiffany Laposi provided sales, house characteristic, and GIS data. In Umatilla County, county officials Jason Nielsen, Tracie Diehl, and Tim McElrath provided sales, house characteristic, and GIS data.

Based on the data collection, more than 8,500 homes are found to have sold within ten miles of the wind turbines in this study area from January 1996 to June 2007. Completing field visits to this number of homes would have been overly burdensome; as a result, only a sample of these home sales was used for the study. Specifically, all valid sales within three miles of the nearest turbine are used, and a random sample of those homes outside of three miles but inside of five miles in Benton County and inside ten miles in Walla Walla and Umatilla Counties. This approach resulted in a total of 790 sales, with prices that ranged from $25,000 to $647,500, and a mean of $134,244. Of those 790 sales, 519 occurred after wind facility construction commenced, and 110 could see the turbines at the time of sale, though all but four of these homes had MINOR views. No homes within this sample were located within one mile of the nearest wind turbine, with the majority occurring outside of three miles.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
1/23/1996	6/29/2007	790	$ 125,803	$ 134,244	$ 25,000	$ 647,500

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Vansycle Ridge	25	38	Aug-97	Feb-98	Aug-98	Vestas	50
Stateline Wind Project, Phase I (OR)	83	126	Jun-00	Sep-01	Dec-01	Vestas	50
Stateline Wind Project, Phase I (WA)	177	268	Jun-00	Feb-01	Dec-01	Vestas	50
Stateline Wind Project, Phase II	40	60	Jan-02	Sep-02	Dec-02	Vestas	50
Nine Canyon Wind Farm	48	37	Jun-01	Mar-02	Sep-02	Bonus	60
Combine Hills Turbine Ranch I	41	41	Apr-02	Aug-03	Dec-03	Mitsubishi	55
Nine Canyon Wind Farm II	16	12	Jun-01	Jun-03	Dec-03	Bonus	60

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Benton/Walla Walla, WA & Umatilla, OR (WAOR)	226	45	76	59	384	790

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Benton/Walla Walla, WA & Umatilla, OR (WAOR)	271	409	106	4	0	0	790

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Benton/Walla Walla, WA & Umatilla, OR (WAOR)	271	0	0	20	277	222	790

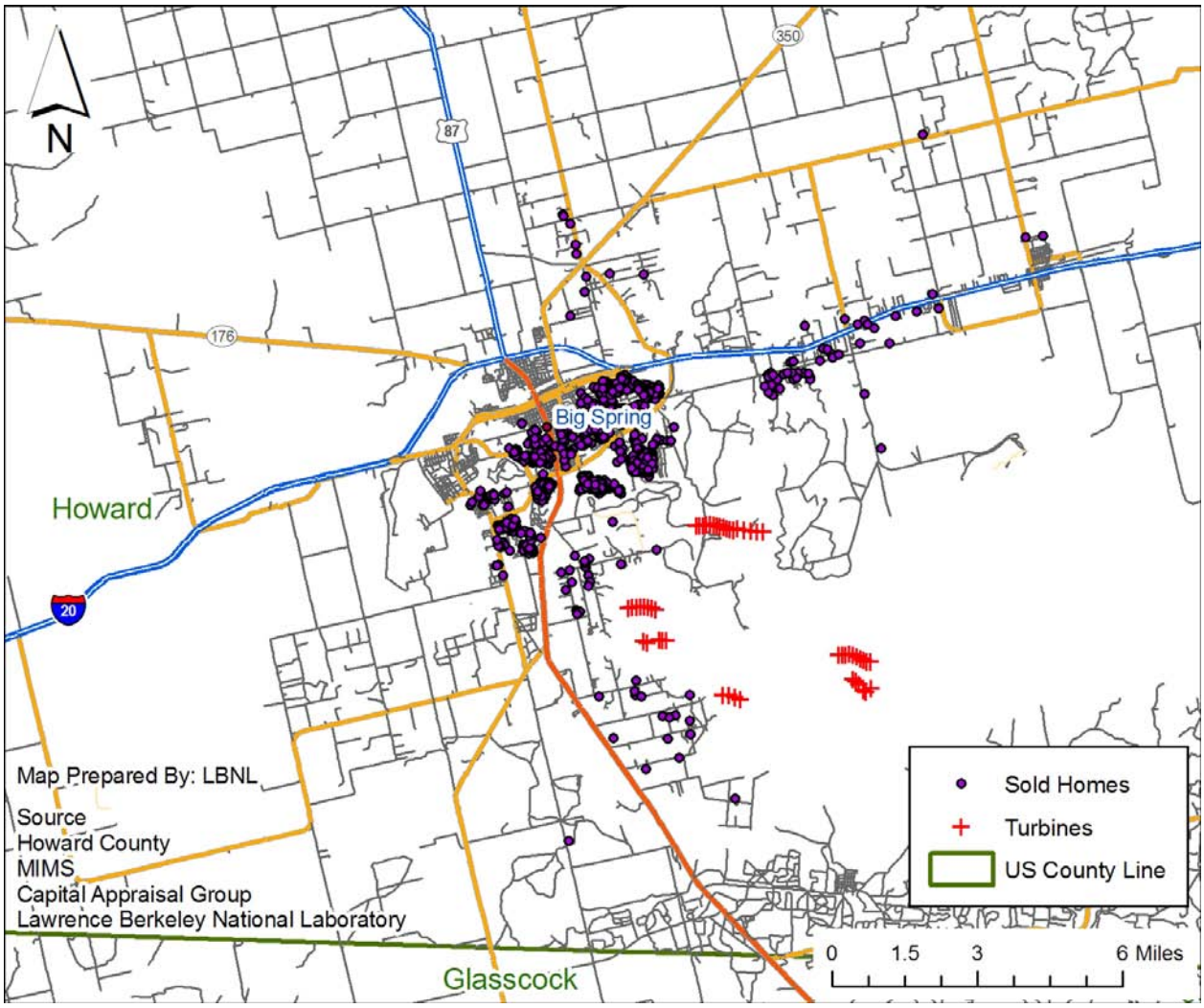
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Kennewich, WA	City	62,182	12.5%	2,711	32.3	$ 45,085	$ 155,531	46%
Walla Walla, WA	City	30,794	4.0%	2,847	33.8	$ 38,391	$ 185,706	91%
Milton Freewater, OR	Town	6,335	-2.0%	3,362	31.7	$ 30,229	$ 113,647	47%
Touchet, WA	Town	413	n/a	340	33.6	$ 47,268	$ 163,790	81%
Benton	County	159,414	3.6%	94	34.4	$ 51,464	$ 162,700	46%
Walla Walla	County	57,709	1.0%	45	34.9	$ 43,597	$ 206,631	89%
Umatilla	County	73,491	0.6%	23	34.6	$ 38,631	$ 138,200	47%
Washington	State	6,488,000	10.1%	89	35.3	$ 55,591	$ 300,800	79%
Oregon	State	3,747,455	9.5%	36	36.3	$ 48,730	$ 257,300	69%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

A.2 TXHC Study Area: Howard County (Texas)

Figure A - 3: Map of TXHC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area is entirely contained within Howard County, Texas, and includes the city of Big Spring, which is situated roughly 100 miles South of Lubbock and 275 miles West of Dallas in West Texas. On top of the Northern end of the Edwards Plateau, which runs from the Southeast to the Northwest, sits the 46 turbine (34 MW) Big Spring wind facility, which was constructed in 1998 and 1999. Most of the wind turbines in this project have a hub height of 213 feet, but four are taller, at 262 feet. The plateau and the wind facility overlook the city of Big Spring which, when including its suburbs, wraps around the plateau to the South and East. Surrounding the town are modest farming tracks and arid, undeveloped land. These lands, primarily to the South of the facility towards Forsan (not shown on map), are dotted with small oil rigs. Many of the homes in Big Spring do not have a view of the wind facility, but others to the South and East do have such views.

Data Collection and Summary

County officials Brett McKibben, Sally Munoz, and Sheri Proctor were extremely helpful in answering questions about the data required for this project, and the data were provided by two firms that manage it for the county. Specifically, Erin Welch of the Capital Appraisal Group provided the sales and house characteristic data and Paul Brandt of MIMS provided the GIS data.

All valid single-family home sales transactions within five miles of the nearest turbine and occurring between January 1996 and March 2007 were included in the dataset, resulting in 1,311 sales.[106] These sales ranged in price from $10,492 to $490,000, with a mean of $74,092. Because of the age of the wind facility, many of the sales in the sample occurred after wind facility construction had commenced (*n* = 1,071). Of those, 104 had views of the turbines, with 27 having views more dramatic than MINOR. Four homes sold within a mile of the facility, with the rest falling between one and three miles (*n* = 584), three to five miles (*n* = 467), and outside of five miles (*n* = 16).

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
1/2/1996	3/30/2007	1,311	$66,500	$74,092	$10,492	$490,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Big Spring I	27.7	42	Jan-98	Jul-98	Jun-99	Vestas	65
Big Spring II	6.6	4	Jan-98	Jul-98	Jun-99	Vestas	80

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Howard, TX (TXHC)	169	71	113	131	827	1311

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Howard, TX (TXHC)	240	967	77	22	5	0	1311

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Howard, TX (TXHC)	240	0	4	584	467	16	1311

[106] If parcels intersected the five mile boundary, they were included in the sample, but were coded as being outside of five miles.

Census Statistics

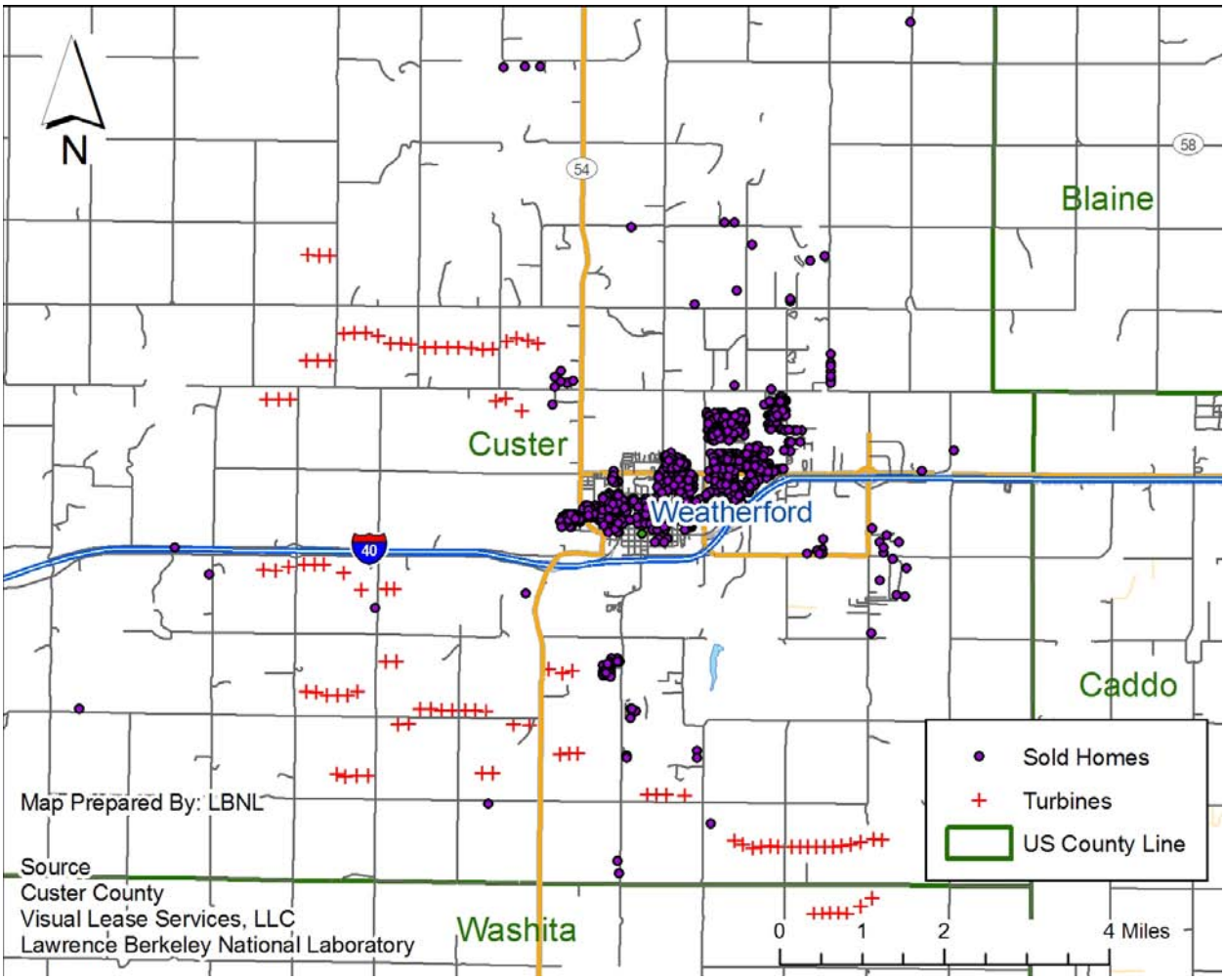
Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Big Spring	City	24,075	-5.4%	1,260	35.1	$ 32,470	$ 54,442	50%
Forsan	Town	220	-4.0%	758	36.8	$ 50,219	$ 64,277	84%
Howard	County	32,295	-1.9%	36	36.4	$ 36,684	$ 60,658	58%
Texas	State	23,904,380	14.6%	80	32.3	$ 47,548	$ 120,900	47%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants.

.

A.3 OKCC Study Area: Custer County (Oklahoma)

Figure A - 4: Map of OKCC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area is entirely contained within Custer County, Texas, and includes the Weatherford wind facility, which is situated near the city of Weatherford, 70 miles due west of Oklahoma City and near the western edge of the state. The 98 turbine (147 MW) Weatherford wind facility straddles Highway 40, which runs East-West, and U.S. County Route 54, which runs North-South, creating an "L" shape that is more than six miles long and six miles wide. Development began in 2004, and was completed in two phases ending in 2006. The turbines are some of the largest in the sample, with a hub height of 262 feet. The topography of the study area is mostly flat plateau, allowing the turbines to be visible from many parts of the town and the surrounding rural lands. There are a number of smaller groupings of homes that are situated to the North and South of the city, many of which are extremely close to the turbines and have dramatic views of them.

Data Collection and Summary

County Assessor Debbie Collins and mapping specialist Karen Owen were extremely helpful in gathering data and answering questions at the county level. Data were obtained directly from the county and from Visual Lease Services, Inc and OKAssessor, where representatives Chris Mask, Terry Wood, Tracy Leniger, and Heather Brown helped with the request.

All valid single-family residential transactions within five miles of the nearest wind turbine and occurring between July 1996 and June 2007 were included in the dataset, resulting in 1,113 sales.[107] These sales ranged in price from $11,000 to $468,000, with a mean of $100,445. Because of the relatively recent construction of the facility, 58% of the sales (n = 637) occurred before construction, leaving 476 sales with possible views of the turbines. Of those 476 sales, 25 had more-dramatic view ratings than MINOR and 17 sales occurred inside of one mile.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
7/7/1996	6/29/2007	1,113	$91,000	$100,445	$11,000	$468,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Weatherford Wind Energy Center	106.5	71	Mar-04	Dec-04	May-05	GE Wind	80
Weatherford Wind Energy Center Expansion	40.5	27	May-05	Oct-05	Jan-06	GE Wind	80

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Custer, OK (OKCC)	**484**	**153**	**193**	**187**	**96**	**1113**

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Custer, OK (OKCC)	**637**	**375**	**76**	**6**	**7**	**12**	**1113**

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Custer, OK (OKCC)	**637**	**16**	**1**	**408**	**50**	**1**	**1113**

[107] Portions of the town of Weatherford, both North and South of the town center, were not included in the sample due to lack of available data. The homes that were mapped, and for which electronic data were provided, however, were situated on all sides of these unmapped areas and were similar in character to those that were omitted. None of the unmapped homes were within a mile of the nearest wind turbine.

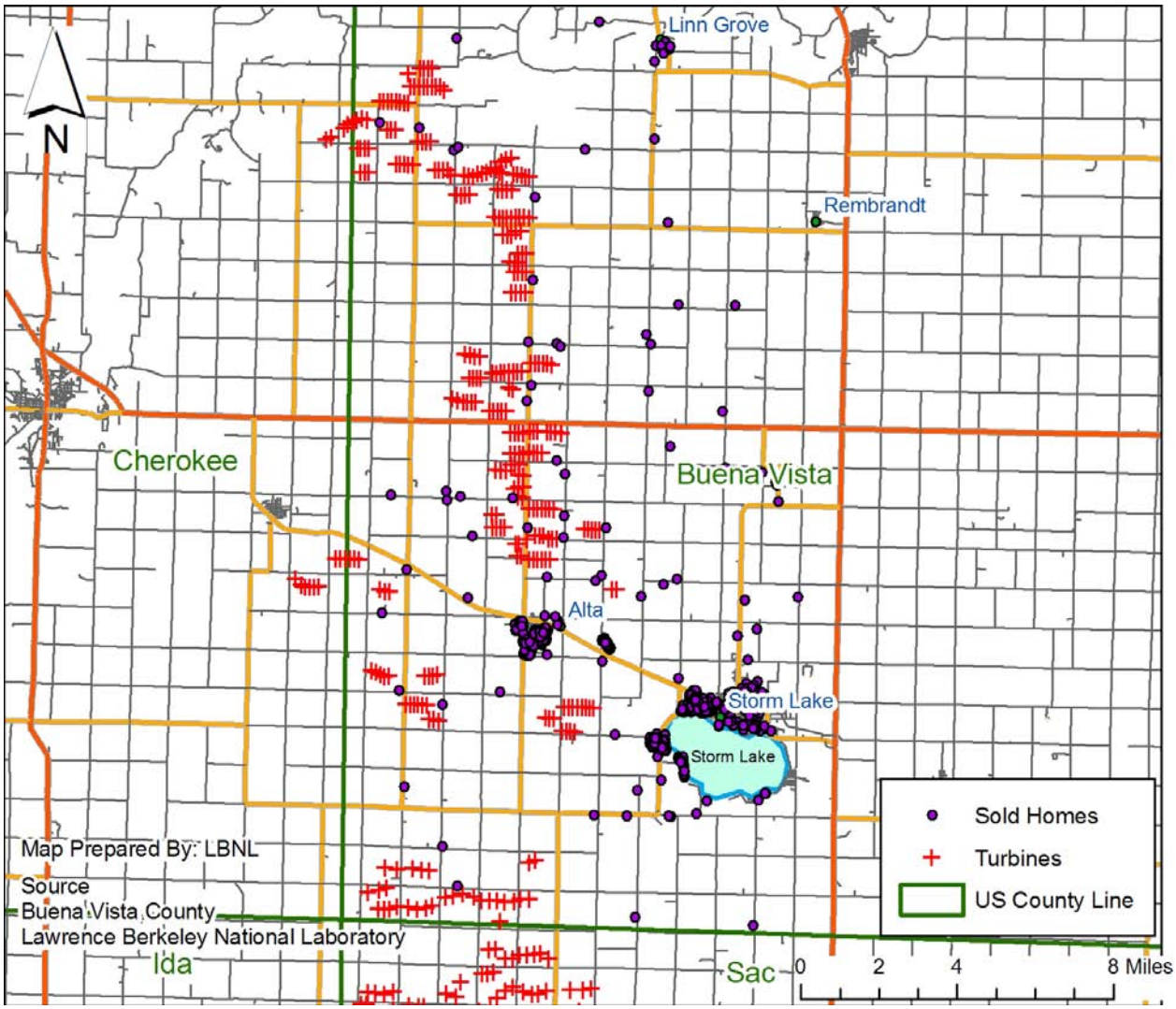
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Weatherford	City	10,097	1.2%	1,740	24.1	$ 32,543	$ 113,996	45%
Hydro	Town	1,013	-3.7%	1,675	39.2	$ 35,958	$ 66,365	68%
Custer	County	26,111	3.6%	26	32.7	$ 35,498	$ 98,949	52%
Oklahoma	State	3,617,316	4.8%	53	35.5	$ 41,567	$ 103,000	46%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants.

A.4 IABV Study Area: Buena Vista County (Iowa)

Figure A - 5: Map of IABV Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area includes the sizable Storm Lake and Intrepid wind facilities, which are mostly situated in Buena Vista County, located in Northwestern Iowa, 75 miles East of Sioux City. The facilities also stretch into Sac County to the South and Cherokee County to the West. The facilities total 381 turbines (370 MW) and are more than 30 miles long North to South and eight miles wide East to West. Development began on the first Storm Lake facility in 1998 and the last of the Intrepid development was completed in 2006. The largest turbines have a hub height of 213 feet at the hub, but most are slightly smaller at 207 feet. The majority of the homes in the sample surround Storm Lake (the body of water), but a large number of homes are situated on small residential plots located outside of the town and nearer to the wind facility. Additionally, a number of sales occurred in Alta - a small town to the East of Storm Lake -thatis straddled by the

wind facilities and therefore provides dramatic views of the turbines. In general, except for the depression in which Storm Lake sits, the topography is very flat, largely made up corn fields, and the turbines are therefore visible from quite far away. The housing market is driven, to some extent, by the water body, Storm Lake, which is a popular recreational tourist destination, and therefore development is occurring to the East and South of the lake. Some development is also occurring, to a lesser degree, to the East of Alta.

Data Collection and Summary

County Assessor Kathy A. Croker and Deputy Assessor Kim Carnine were both extremely helpful in answering questions and providing GIS data. Sales and home characteristic data were provided by Vanguard Appraisals, Inc., facilitated by the county officials. David Healy from MidAmerican provided some of the necessary turbine location GIS files.

The county provided data on valid single-family residential transactions between 1996 and 2007 for 1,743 homes inside of five miles of the nearest wind turbine. This sample exceeded the number for which field data could reasonably be collected; as a result, only a sample of these homes sales was used for the study. Specifically, all transactions that occurred within three miles of the nearest turbine were used, in combination with a random sample (totaling roughly 10%) of those homes between three and five miles. This approach resulted in 822 sales, with prices that ranged from $12,000 to $525,000, and a mean of $94,713. Development of the wind facilities in this area occurred relatively early in the sample period, and therefore roughly 75% of the sales (*n* = 605) occurred after project construction had commenced. Of those 605 sales, 105 had views of the turbines, 37 of which were ranked with a view rating more dramatic than MINOR, and 30 sales occurred within one mile of the nearest wind turbine.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
1/2/1996	3/30/2007	822	$79,000	$94,713	$12,000	$525,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Storm Lake I	112.5	150	Feb-98	Oct-98	Jun-99	Enron	63
Storm Lake II	80.3	107	Feb-98	Oct-98	Apr-99	Enron	63
Waverly	1.5	2	Feb-98	Oct-98	Jun-99	Enron	65
Intrepid	160.5	107	Mar-03	Oct-04	Dec-04	GE Wind	65
Intrepid Expansion	15.0	15	Jan-05	Apr-05	Dec-05	Mitsubishi	65

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Buena Vista, IA (IABV)	**152**	**65**	**80**	**70**	**455**	**822**

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Buena Vista, IA (IABV)	**217**	**500**	**68**	**18**	**8**	**11**	**822**

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Buena Vista, IA (IABV)	**217**	**22**	**8**	**472**	**101**	**2**	**822**

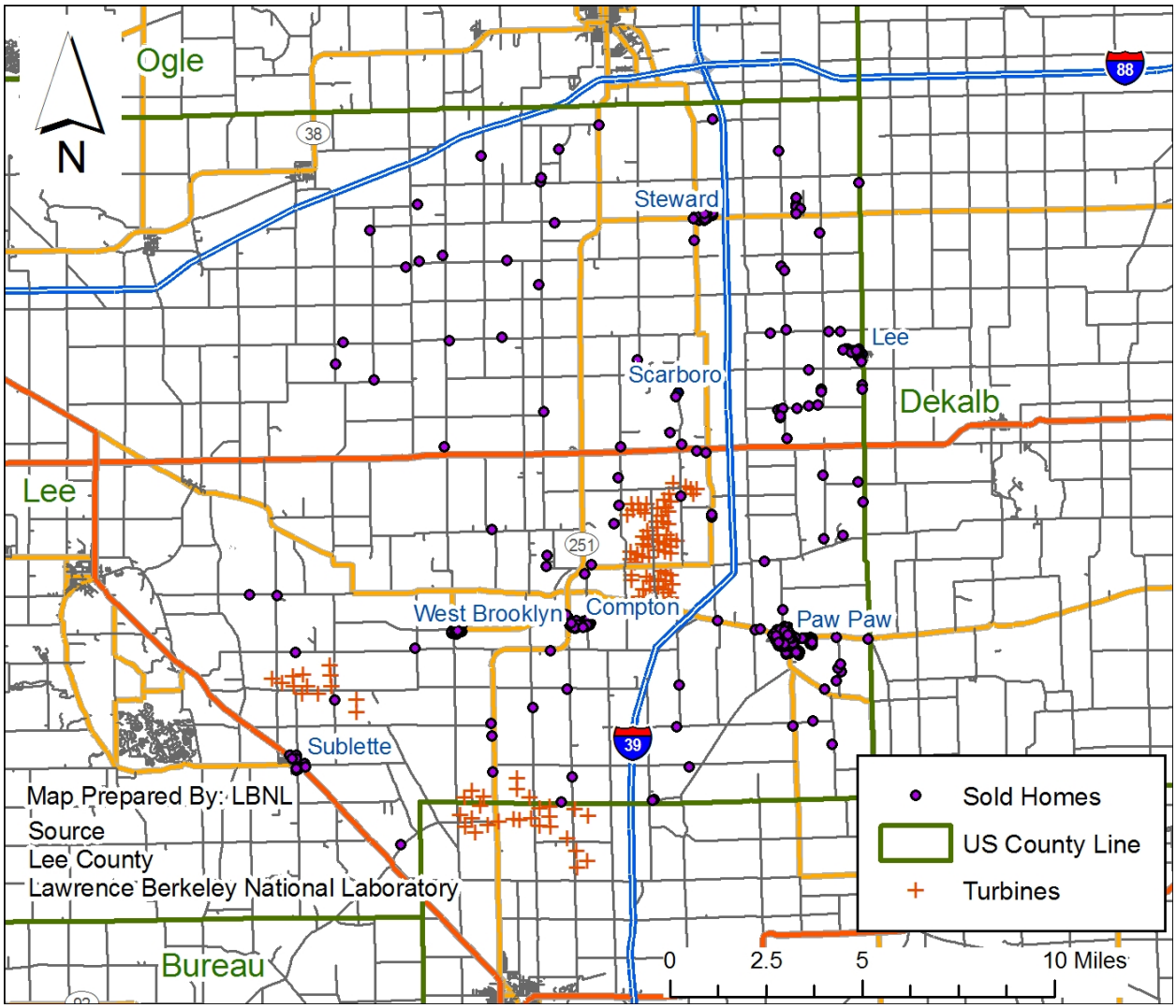
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Storm Lake	City	9,706	-3.9%	2,429	31.7	$ 39,937	$ 99,312	41%
Alta	Town	1,850	-1.0%	1,766	35.1	$ 40,939	$ 98,843	48%
Buena Vista	County	19,776	-3.1%	36	36.4	$ 42,296	$ 95,437	45%
Iowa	State	3,002,555	2.6%	52	36.6	$ 47,292	$ 117,900	43%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants.

A.5 ILLC Study Area: Lee County (Illinois)

Figure A - 6: Map of ILLC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area is situated roughly 80 miles due West of Chicago, in Lee County, Illinois, and includes two wind facilities. The 63 turbine (53 MW) Mendota Hills Wind Project sits just West of North-South Highway 39, and 10 miles South of East-West Highway 88. Development began on the facility in 2001 and was completed in 2003. The second facility, the 40 turbine (80 MW) GSG Wind Farm is South and West of the Mendota Hills facility, and is broken into two parts: roughly one third of the turbines are situated two miles due north of the small town of Sublette, with the remainder located roughly six miles to the southeast and spanning the line separating Lee from La Salle County. Development began on this project in the fall of 2006 and was completed in April of the following year. The town of Paw Paw, which is East of Highway 38 and both facilities, is the largest urban area in the study area, but is further away from the

facilities than the towns of Compton, West Brooklyn, Scarboro, and Sublette. Also, to the North of the facilities are the towns of Lee, to the East of Highway 38, and Steward, just to the West. Although many home sales occurred in these towns, a significant number of additional sales occurred on small residential tracts in more-rural areas or in small developments. The topography of the area is largely flat, but falls away slightly to the East towards Paw Paw. The area enjoyed significant development during the real estate boom led by commuters from the Chicago metropolitan area, which was focused in the Paw Paw area but was also seen in semi-rural subdivisions to the Southwest and North of the wind facility.

Data Collection and Summary

County Supervisor Wendy Ryerson was enormously helpful in answering questions and providing data, as were Carmen Bollman and GIS Director, Brant Scheidecker, who also work in the county office. Wendy and Carmen facilitated the sales and home characteristic data request and Brant provided the GIS data. Additionally, real estate brokers Neva Grevengoed of LNG Realtor, Alisa Stewart of AC Corner Stone, and Beth Einsely of Einsely Real Estate were helpful in understanding the local market.

The county provided information on 412 valid single-family transactions that occurred between 1998 and 2007 within 10 miles of the nearest wind turbine, all of which were included in the sample.[108] These sales ranged in price from $14,500 to $554,148, with a mean of $128,301. Of those sales, 213 occurred after construction commenced on the wind facility and, of those, 36 had views of the turbines – nine of which were rated more dramatically than MINOR. Only two sales occurred within one mile of the nearest wind turbine.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
5/1/1998	3/2/2007	412	$113,250	$128,301	$14,500	$554,148

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Mendota Hills	50.4	63	Nov-01	Aug-03	Nov-03	Gamesa	65
GSG Wind Farm	80	40	Dec-05	Sep-06	Apr-07	Gamesa	78

Source: AWEA & Ventyx Inc.

[108] This county was not able to provide data electronically back to 1996, as would have been preferred, but because wind project development did not occur until 2001, there was ample time in the study period to establish pre-announcement sale price levels.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Lee, IL (ILLC)	115	84	62	71	80	412

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Lee, IL (ILLC)	199	177	27	7	1	1	412

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Lee, IL (ILLC)	199	1	1	85	69	57	412

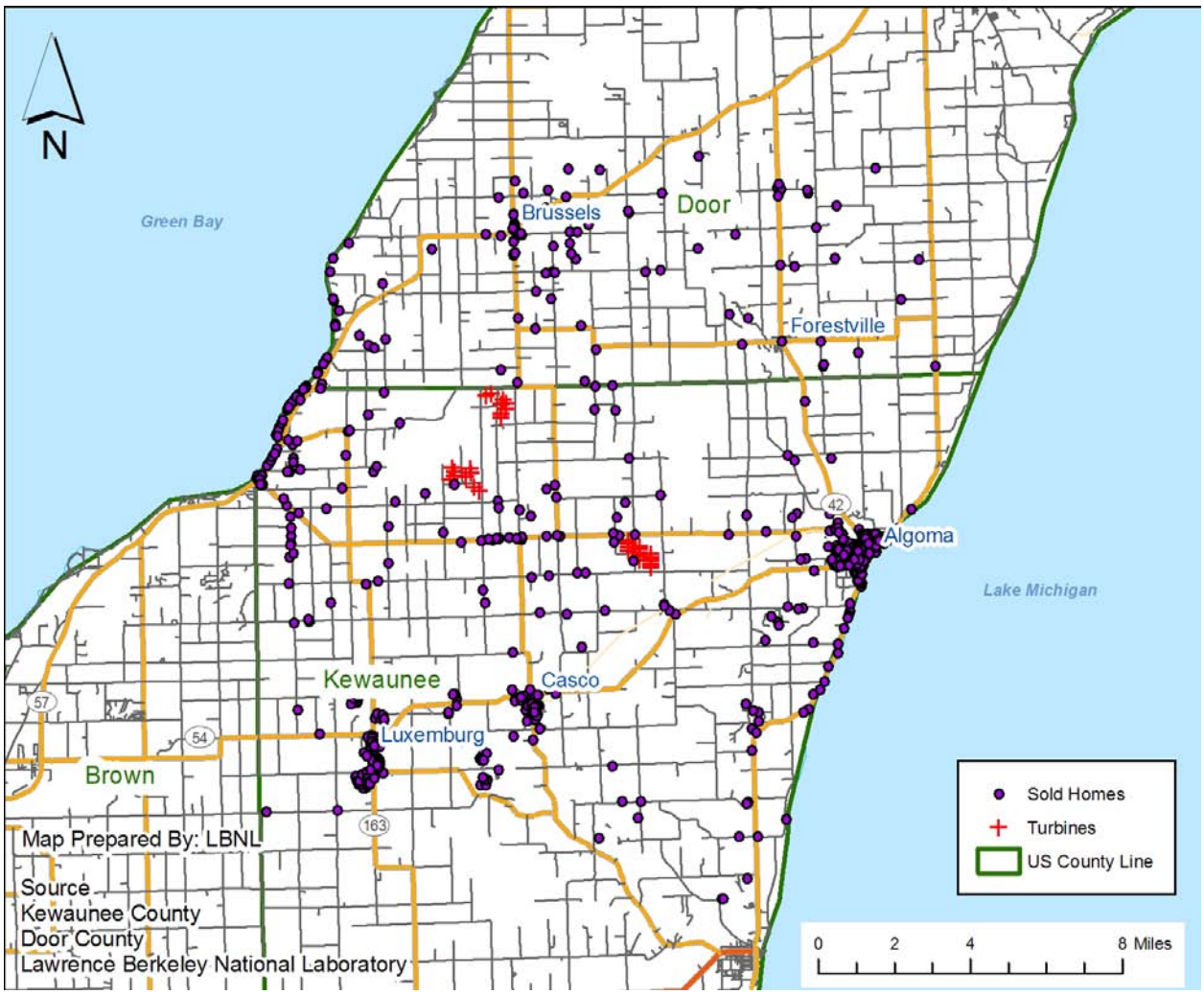
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Paw Paw	Town	884	2.6%	1,563	38.0	$ 48,399	$ 151,954	n/a
Compton	Town	337	-2.9%	2,032	32.8	$ 44,023	$ 114,374	n/a
Steward	Town	263	-3.0%	2,116	35.2	$ 59,361	$ 151,791	n/a
Sublette	Town	445	-2.4%	1,272	37.7	$ 55,910	$ 133,328	n/a
Lee	County	35,450	-1.7%	49	37.9	$ 47,591	$ 136,778	64%
Illinois	State	12,852,548	3.5%	223	34.7	$ 54,124	$ 208,800	60%
US	Country	301,139,947	7.0%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

A.6 WIKCDC Study Area: Kewaunee and Door Counties (Wisconsin)

Figure A - 7: Map of WIKCDC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area includes the Red River (17 turbines, 14 MW) and Lincoln (14 turbines, 9 MW) wind facilities. It is situated on the "thumb" jutting into Lake Michigan, Northeast of Green Bay, Wisconsin, and spans two counties, Kewaunee and Door. There is a mix of agricultural, small rural residential, waterfront, and urban land use in this area. The three largest towns are Algoma to the East of the facilities and on the lake, Casco, which is six miles due South of the turbines, and Luxemburg, four miles West of Casco. There is a smaller village, Brussels, to the North in Door County. The remainder of the homes is situated on the water or in small rural residential parcels between the towns. Topographically, the "thumb" is relatively flat except for a slight crown in the middle, and then drifting lower to the edges. The East edge of the "thumb" ends in bluffs over the water, and the western edge drops off more gradually, allowing those parcels to

enjoy small beaches and easy boat access. There is some undulation of the land, occasionally allowing for relatively distant views of the wind turbines, which stand at a hub height of 213 feet.

Data Collection and Summary

Kewaunee and Door Counties did not have a countywide system of electronic data storage for either sales or home characteristic data. Therefore, in many cases, data had to be collected directly from the town or city assessor. In Kewaunee County, Joseph A. Jerabek of the town of Lincoln, Gary Taicher of the town of Red River, Melissa Daron of the towns of Casco, Pierce, and West Kewaunee, Michael Muelver of the town of Ahnapee and the city of Algoma, William Gerrits of the town of Casco, Joseph Griesbach Jr. of the town of Luxemburg, and David Dorschner of the city of Kewaunee all provided information. In Door County, Scott Tennessen of the town of Union and Gary Maccoux of the town of Brussels were similarly very helpful in providing information. Additionally, Andy Pelkey of Impact Consultants, Inc., John Holton of Associated Appraisal Consultants, Andy Bayliss of Dash Development Group, and Lue Van Asten of Action Appraisers & Consultants all assisted in extracting data from the myriad of storage systems used at the town and city level. The State of Wisconsin provided additional information on older sales and sales validity, with Mary Gawryleski, James Bender, and Patrick Strabala from the Wisconsin Department of Revenue being extremely helpful. GIS data were obtained from Steve Hanson from Kewaunee County and Tom Haight from Door County.

After collecting data from each municipality, a total of 810 valid single-family home sales transactions were available for analysis, ranging in time from 1996 to 2007. These sales ranged in price from $20,000 to $780,000, with a mean of $116,698. Because development of the wind facilities occurred relatively early in the study period, a large majority of the sales transactions, 75% (n = 725), occurred after project construction had commenced. Of those, 64 had views of the turbines, 14 of which had more dramatic than MINOR views, and 11 sales occurred within one mile.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
2/2/1996	6/30/2007	810	$98,000	$116,698	$20,000	$780,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Red River	11.2	17	Apr-98	Jan-99	Jun-99	Vestas	65
Lincoln	9.2	14	Aug-98	Jan-99	Jun-99	Vestas	65

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Kewaunee/Door, WI (WIKCDC)	44	41	68	62	595	810

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Kewaunee/Door, WI (WIKCDC)	85	661	50	9	2	3	810

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Kewaunee/Door, WI (WIKCDC)	85	7	4	63	213	438	810

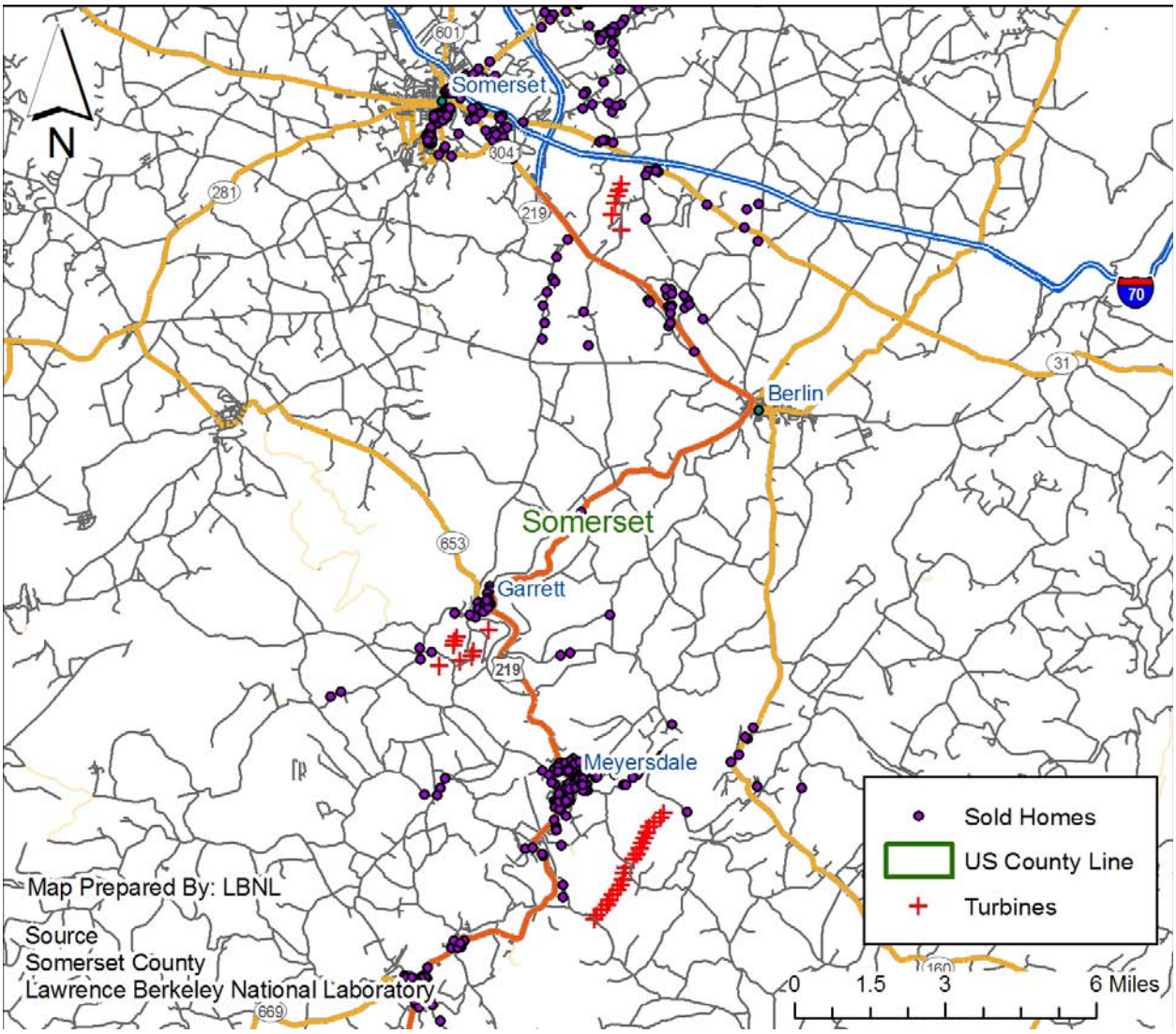
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Algoma	Town	3,186	-4.7%	1,305	41.8	$ 39,344	$ 112,295	51%
Casco	Town	551	-2.8%	985	35.6	$ 53,406	$ 141,281	n/a
Luxemburg	Town	2,224	15.3%	1,076	32.0	$ 53,906	$ 167,403	n/a
Kewaunee	County	20,533	1.4%	60	37.5	$ 50,616	$ 148,344	57%
Door	County	27,811	2.4%	58	42.9	$ 44,828	$ 193,540	57%
Wisconsin	State	5,601,640	0.3%	103	36.0	$ 50,578	$ 168,800	50%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

A.7 PASC Study Area: Somerset County (Pennsylvania)

Figure A - 8: Map of PASC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area includes three wind facilities, Somerset (6 turbines, 9 MW, 210 ft hub height) to the North, Meyersdale (20 turbines, 30 MW, 262 ft hub height) to the South, and Green Mountain (8 turbines, 10 MW, 197 ft hub height) between them. All of the projects are located in Somerset County, roughly 75 miles southeast of Pittsburg in the Southwest section of Pennsylvania. None of the three facilities are separated by more than 10 miles, so all were included in one study area. To the North of the facilities is East-West U.S. Highway 70, which flanks the city of Somerset. Connecting Somerset with points South is County Route 219, which zigzags Southeast out of Somerset to the smaller towns of Berlin (not included in the data), Garret to the Southwest, and Meyersdale, which is Southeast of Garret. These towns are flanked by two ridges that run from the Southwest to the Northeast. Because of these ridges and the

relatively high elevations of all of the towns, this area enjoys winter recreation, though the coal industry, which once dominated the area, is still an integral part of the community with mining occurring in many places up and down the ridges. Although many of the home sales in the sample occurred in the towns, a number of the sales are for homes situated outside of town corresponding to either rural, rural residential, or suburban land uses.

Data Collection and Summary

The County Assessor, Jane Risso, was extremely helpful, and assisted in providing sales and home characteristic data. Glen Wagner, the IT director, worked with Gary Zigler, the county GIS specialist, to extract both GIS and assessment data from the county records. Both Gary and Jane were extremely helpful in fielding questions and providing additional information as needs arose.

The county provided a total of 742 valid residential single-family home sales transactions within four miles of the nearest wind turbine. All of the sales within three miles were used (n = 296), and a random sample (~ 44%) of those between three and four miles were used, yielding a total of 494 sales that occurred between May 1997 and March 2007. These sales ranged in price from $12,000 to $360,000, with a mean of $69,770. 291 sales (~ 60% of the 494) occurred after construction commenced on the nearest wind facility. Of these 291 sales, 73 have views of the turbines, 18 of which are more dramatic than MINOR, and 35 sales occurred within one mile.[109]

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
5/1/1997	3/1/2007	494	$62,000	$69,770	$12,000	$360,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
GreenMountain Wind Farm	10.4	8	Jun-99	Dec-99	May-00	Nordex	60
Somerset	9.0	6	Apr-01	Jun-01	Oct-01	Enron	64
Meyersdale	30.0	20	Jan-03	Sep-03	Dec-03	NEG Micon	80

Source: AWEA & Ventyx Inc.

[109] This study area was one of the earliest to have field work completed, and therefore the field data collection process was slower resulting in a lower number of transactions than many other study areas.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Somerset, PA (PASC)	**175**	**28**	**46**	**60**	**185**	**494**

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Somerset, PA (PASC)	**203**	**218**	**55**	**15**	**2**	**1**	**494**

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Somerset, PA (PASC)	**203**	**17**	**18**	**132**	**124**	**0**	**494**

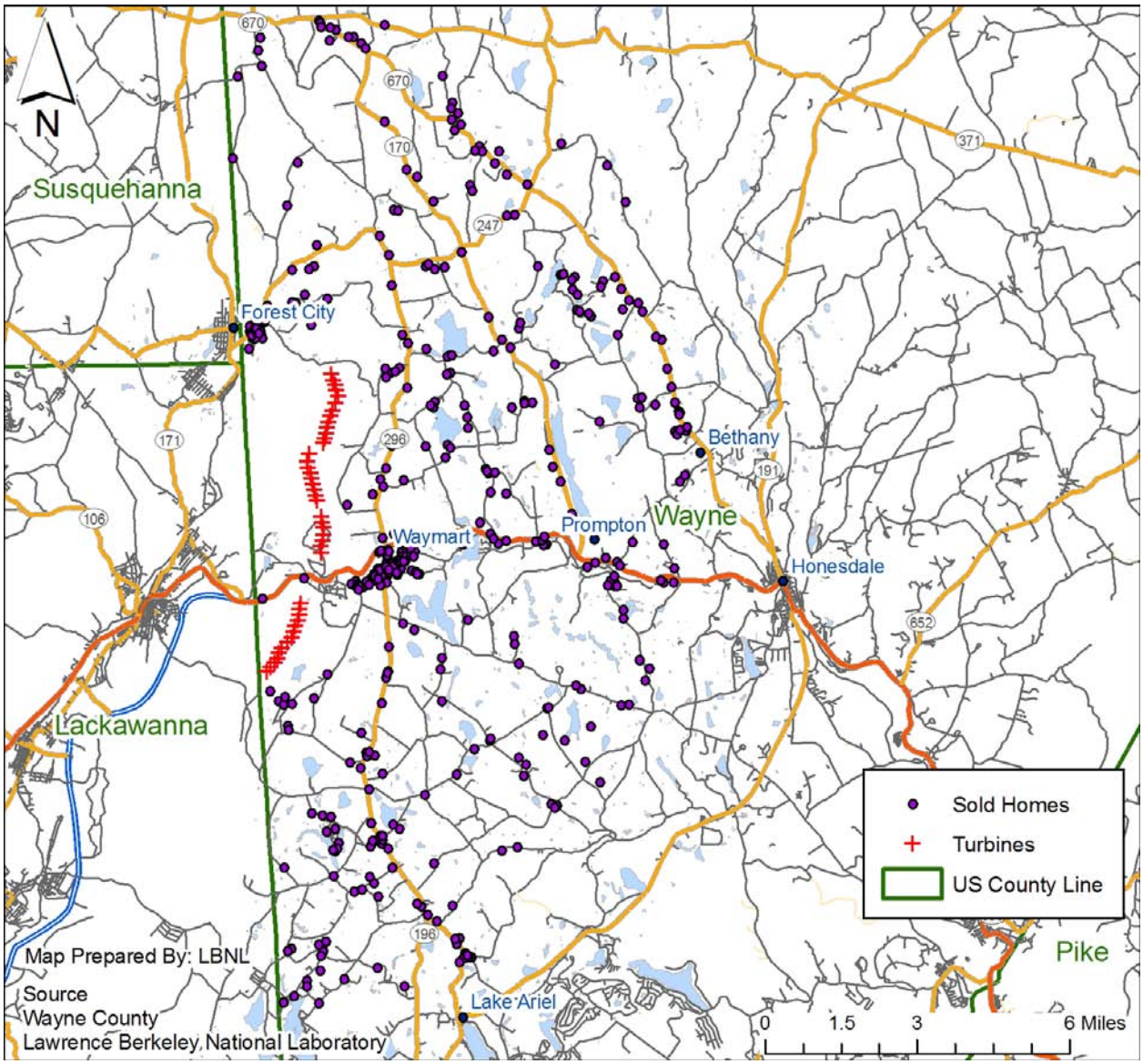
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Somerset	Town	6,398	-4.8%	2,333	40.2	$ 35,293	$ 123,175	n/a
Berlin	Town	2,092	-4.0%	2,310	41.1	$ 35,498	$ 101,704	n/a
Garrett	Town	425	-4.7%	574	34.5	$ 29,898	$ 54,525	n/a
Meyersdale	Town	2,296	-6.6%	2,739	40.9	$ 29,950	$ 79,386	n/a
Somerset Cou	County	77,861	-2.7%	72	40.2	$ 35,293	$ 94,500	41%
Pennsylvania	State	12,440,621	1.3%	277	38.0	$ 48,576	$ 155,000	60%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

A.8 PAWC Study Area: Wayne County (Pennsylvania)

Figure A - 9: Map of PAWC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area includes the Waymart wind facility, which sits atop the North-South ridge running along the line separating Wayne County from Lackawanna and Susquehanna Counties in Northeast Pennsylvania. The 43 turbine (65 MW, 213 ft hub height) facility was erected in 2003, and can be seen from many locations in the study area and especially from the towns of Waymart, which sits East of the facility, and Forest City, which straddles Wayne and Susquehanna Counties North of the facility. The study area is dominated topographically by the ridgeline on which the wind turbines are located, but contains rolling hills and many streams, lakes, and natural ponds. Because of the undulating landscape, views of the wind facility can be

maintained from long distances, while some homes relatively near the turbines have no view of the turbines whatsoever. The area enjoys a substantial amount of second home ownership because of the bucolic scenic vistas, the high frequency of lakes and ponds, and the proximity to larger metropolitan areas such as Scranton, roughly 25 miles to the Southwest, and Wilkes-Barre a further 15 miles Southwest.

Data Collection and Summary

John Nolan, the County Chief Assessor, was very helpful in overseeing the extraction of the data from county records. GIS specialist Aeron Lankford provided the GIS parcel data as well as other mapping layers, and Bruce Grandjean, the IT and Data Specialist, provided the sales and home characteristic data as well as fielding countless questions as they arose. Additionally, real estate brokers Dotti Korpics of Bethany, Kent Swartz of Re Max, and Tom Cush of Choice #1 Country Real Estate were instrumental providing context for understanding the local market.

The county provided data on 551 valid single-family transactions that occurred between 1996 and 2007, all of which were included in the sample. These sales ranged in price from $20,000 to $444,500, with a mean of $111,522. Because of the relatively recent development of the wind facility, only 40% (n = 222) of the sales transaction occurred after the construction of the facility had commenced. Of those sales, 43 (19%) had views of the turbines, ten of which had more dramatic than MINOR views, and 11 were situated within one mile.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
7/12/1996	9/25/2006	551	$96,000	$111,522	$20,000	$444,500

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Waymart Wind Farm	64.5	43	Feb-01	Jun-03	Oct-03	GE Wind	65

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Wayne, PA (PAWC)	223	106	64	71	87	551

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Wayne, PA (PAWC)	329	179	33	8	2	0	551

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Wayne, PA (PAWC)	329	1	10	95	55	61	551

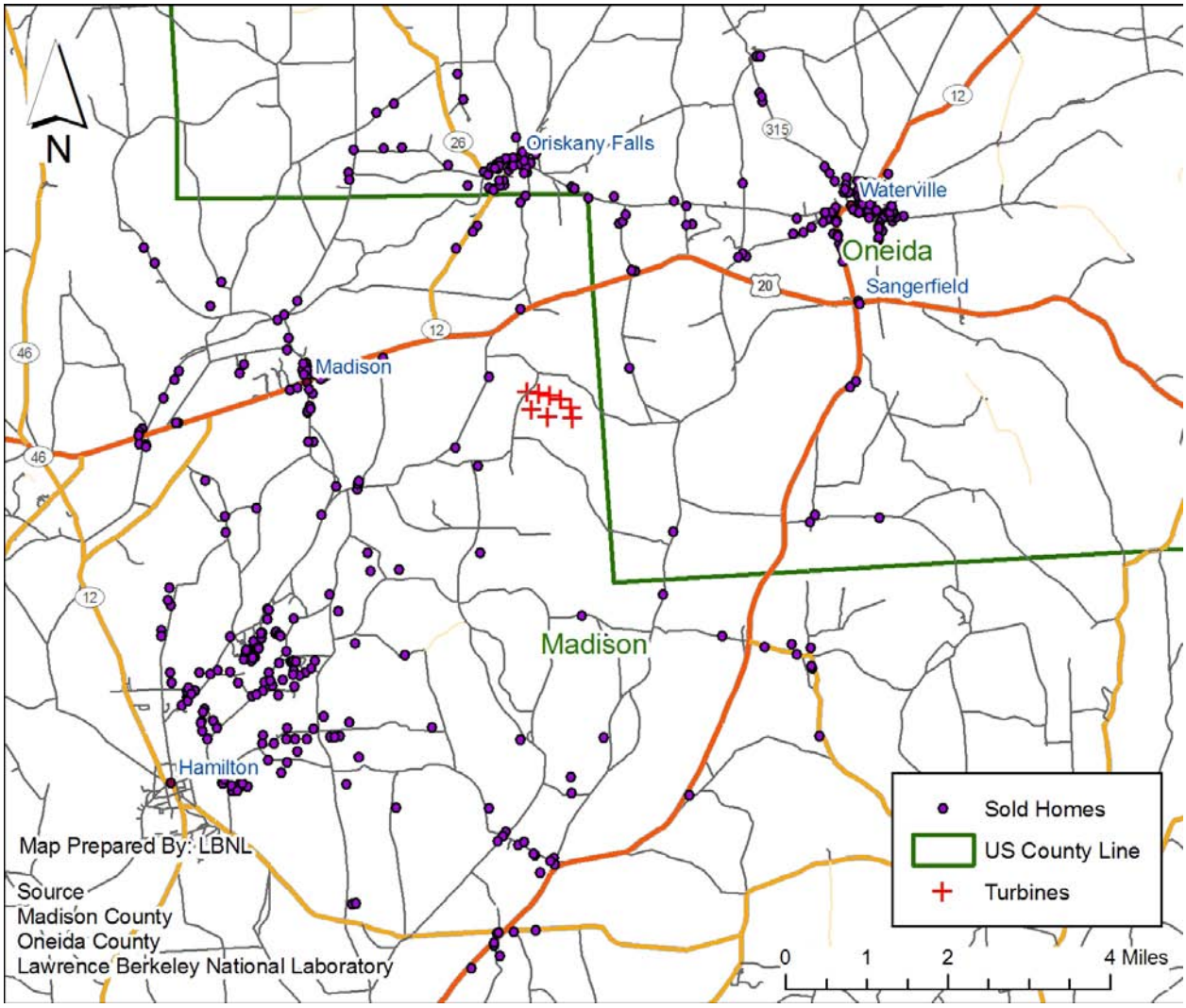
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Waymart	Town	3,075	116.0%	1,111	41.7	$ 43,797	$ 134,651	56%
Forest City	Town	1,743	-5.2%	1,929	45.6	$ 32,039	$ 98,937	67%
Prompton	Town	237	-1.6%	149	41.9	$ 30,322	$ 162,547	56%
Wayne	County	51,708	5.9%	71	40.8	$ 41,279	$ 163,060	57%
Lackawanna	County	209,330	-1.9%	456	40.3	$ 41,596	$ 134,400	48%
Pennsylvania	State	12,440,621	1.3%	277	38.0	$ 48,576	$ 155,000	60%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants.

A.9 NYMCOC Study Area: Madison and Oneida Counties (New York)

Figure A - 10: Map of NYMCOC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area surrounds the seven turbine (12 MW, 220 ft hub height) Madison wind facility, which sits atop an upland rise in Madison County, New York. The area is roughly 20 miles Southwest of Utica and 40 miles Southeast of Syracuse. The facility is flanked by the towns moving from the Southwest, clockwise around the rise, from Hamilton and Madison in Madison County, NY, to Oriskany Falls, Waterville, and Sangerfield in Oneida County, NY. Hamilton is the home of Colgate University, whose staff lives throughout the area around Hamilton and stretching up into the town of Madison. Accordingly, some development is occurring near the college. To the Northeast, in Oneida County, the housing market is more depressed and less development is apparent. The study area in total is a mix of residential, rural residential, and

rural landscapes, with the largest portion being residential homes in the towns or immediately on their outskirts. The topography, although falling away from the location of the wind facility, does not do so dramatically, so small obstructions can obscure the views of the facility.

Data Collection and Summary

Data were obtained from both Madison and Oneida Counties for this study area. In Madison County, Kevin Orr, Mike Ellis, and Carol Brophy, all of County's Real Property Tax Services Department, were extremely helpful in obtaining the sales, home characteristic, and GIS data. In Oneida County, Jeff Quackenbush and Richard Reichert in the Planning Department were very helpful in obtaining the county data. Additionally, discussions with real estate brokers Susanne Martin of Martin Real Estate, Nancy Proctor of Prudential, and Joel Arsenault of Century 21 helped explain the housing market and the differences between Madison and Oneida Counties.

Data on 463 valid sales transactions of single family residential homes that occurred between 1996 and 2006 were obtained, all of which were located within seven miles of the wind facility. These sales ranged in price from $13,000 to $380,000, with a mean of $98,420. Roughly 75% (*n* = 346) of these sales occurred after construction commenced on the wind facility, of which 20 could see the turbines, all of which were rated as having MINOR views, except one which had a MODERATE rating; only two sales involved homes that were situated inside of one mile.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
1/6/1996	12/26/2006	463	$77,500	$98,420	$13,000	$380,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Madison Windpower	11.6	7	Jan-00	May-00	Sep-00	Vestas	67

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Madison/Oneida, NY (MYMCOC)	108	9	48	30	268	463

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Madison/Oneida, NY (MYMCOC)	117	326	19	1	0	0	463

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Madison/Oneida, NY (MYMCOC)	117	1	1	80	193	71	463

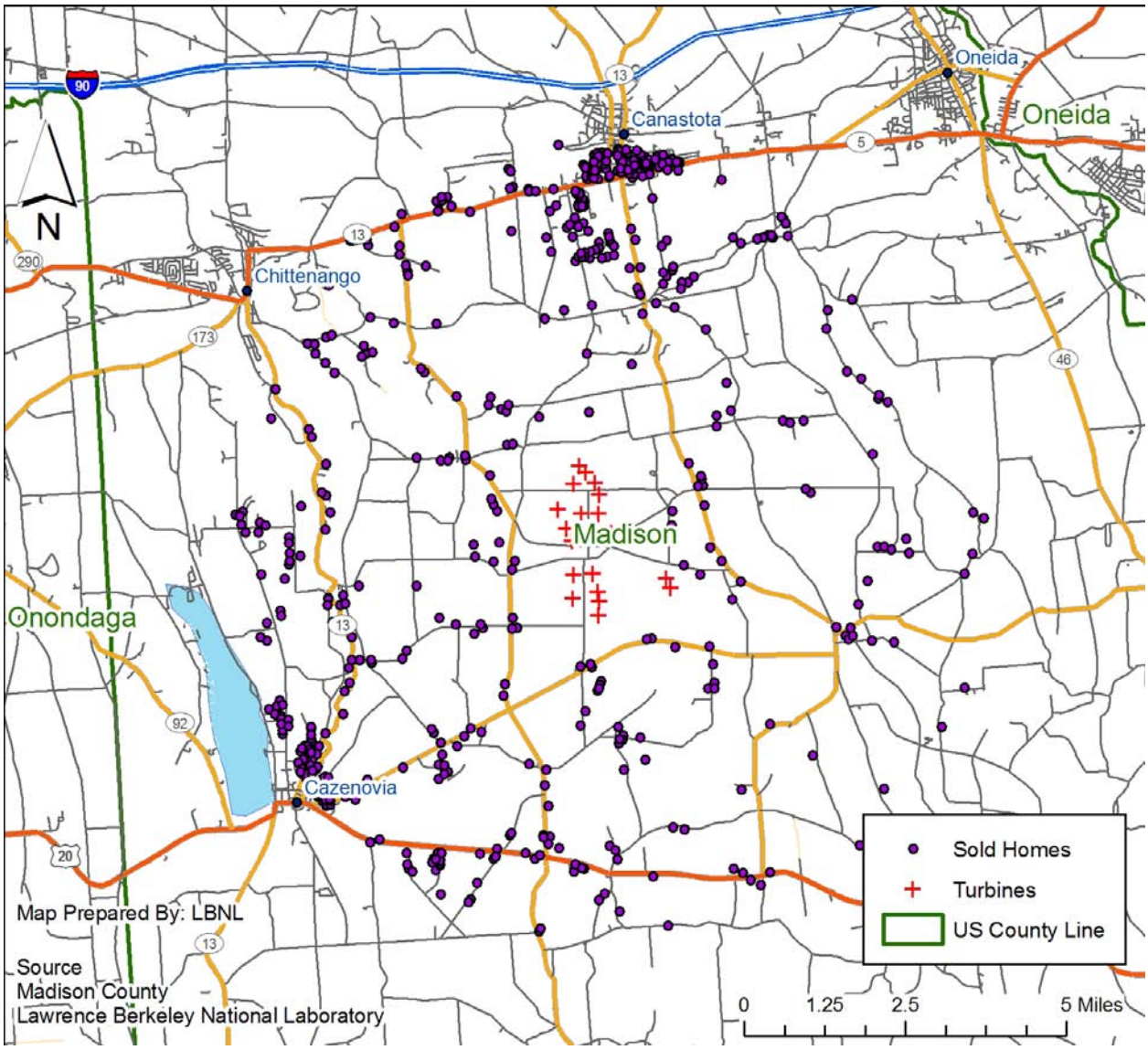
Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Madison	Town	304	-2.9%	605	38.1	$ 36,348	$ 94,734	n/a
Hamilton	Town	3,781	7.9%	1,608	20.8	$ 48,798	$ 144,872	n/a
Orinkany Fal	Town	1,413	-2.9%	1,703	40.8	$ 47,689	$ 105,934	n/a
Waterville	Town	1,735	-3.2%	1,308	37.8	$ 46,692	$ 104,816	n/a
Sangerfield	Town	2,626	-1.4%	85	37.6	$ 47,563	$ 106,213	n/a
Madison	County	69,829	0.6%	106	36.1	$ 53,600	$ 109,000	39%
Oneida	County	232,304	-1.3%	192	38.2	$ 44,636	$ 102,300	40%
New York	State	19,297,729	1.7%	408	35.9	$ 53,514	$ 311,000	109%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

A.10 NYMC Study Area: Madison County (New York)

Figure A - 11: Map of NYMC Study Area



Note: "Sold Homes" include all sold homes both before and after construction.

Area Description

This study area surrounds the 20 turbine (30 MW, 218 ft hub height) Fenner wind facility in Madison County, New York, roughly 20 miles East of Syracuse and 40 miles West of Utica in the middle of New York. The study area is dominated by two roughly parallel ridges. One, on which the Fenner facility is located, runs Southeast to Northwest and falls away towards the town of Canastota. The second ridge runs roughly North from Cazenovia, and falls away just South of the town of Chittenango. Surrounding these ridges is an undulating landscape with many water features, including the Chittenango Falls and Lake Cazenovia. A number of high-priced homes are situated along the ridge to the North of Cazenovia, some of which are afforded

views of the lake and areas to the West, others with views to the East over the wind facility, and a few having significant panoramic views. The west side of the study area has a number of drivers to its real estate economy: it serves as a bedroom community for Syracuse, is the home to Cazenovia College, and enjoys a thriving summer recreational population. Canastota to the North, and Oneida to the East, are older industrial towns, both of which now serve as feeder communities for Syracuse because of easy access to Highway 90. Between the towns of Cazenovia and Canastota are many rural residential properties, some of which have been recently developed, but most of which are homes at least a half century old.

Data Collection and Summary

Data were obtained from the Madison County Real Property Tax Services department directed by Carol Brophy. As the first study area that was investigated, IT and mapping specialists Kevin Orr and Mike Ellis were subjected to a large number of questions from the study team and were enormously helpful in helping shape what became the blueprint for other study areas. Additionally, real estate brokers Nancy Proctor of Prudential, Joel Arsenault of Century 21, Don Kinsley of Kingsley Real Estate, and Steve Harris of Cazenovia Real Estate were extremely helpful in understanding the local market.

Data on 693 valid sales transactions of single family residential structures that occurred between 1996 and 2006 were obtained, most of which were within five miles of the wind facility. These sales ranged in price from $26,000 to $575,000, with a mean of $124,575. Roughly 68% of these sales (n = 469) occurred after construction commenced on the wind facility, 13 of which were inside of one mile, and 74 of which had views of the turbines. Of that latter group, 24 have more dramatic than MINOR views of the turbines.

Area Statistics

Study Period Begin	Study Period End	Number of Sales	Median Price	Mean Price	Minimum Price	Maximum Price
1/31/1996	9/29/2006	693	$109,900	$124,575	$26,000	$575,000

Facility Statistics

Facility Name	Number of MW	Number of Turbines	Announce Date	Construction Begin Date	Completion Date	Turbine Maker	Hub Height (Meters)
Fenner Wind Power Project	30	20	Dec-98	Mar-01	Nov-01	Enron	66

Source: AWEA & Ventyx Inc.

Variables of Interest Statistics

Development Period	Pre Announcement	Post Announcement Pre Construction	1st Year After Construction	2nd Year After Construction	2+ Years After Construction	Total
Madison, NY (NYMC)	**59**	**165**	**74**	**70**	**325**	**693**

View of Turbines	Pre Construction	None	Minor	Moderate	Substantial	Extreme	Total
Madison, NY (NYMC)	**224**	**395**	**50**	**16**	**8**	**0**	**693**

Distance to Nearest Turbine	Pre Construction	< 0.57 Miles	0.57 - 1 Miles	1 - 3 Miles	3 - 5 Miles	> 5 Miles	Total
Madison, NY (NYMC)	**224**	**2**	**11**	**80**	**374**	**2**	**693**

Census Statistics

Name	Type	2007 Population	% Change Since 2000	Population Per Mile^2	Median Age	Median Income	Median House 2007	% Change Since 2000
Cazenovia	Town	2,835	8.6%	1,801	32.3	$ 58,172	$ 159,553	n/a
Chittenango	Town	4,883	-0.5%	2,000	36.0	$ 58,358	$ 104,845	n/a
Canastota	Town	4,339	-1.7%	1,306	37.3	$ 45,559	$ 93,349	n/a
Oneida	City	10,791	-1.7%	490	36.9	$ 47,173	$ 99,305	n/a
Morrisville	Town	2,155	0.6%	1,869	20.4	$ 45,852	$ 102,352	n/a
Madison	County	69,829	0.6%	106	36.1	$ 53,600	$ 109,000	39%
New York	State	19,297,729	1.7%	408	35.9	$ 53,514	$ 311,000	109%
US	Country	301,139,947	6.8%	86	37.9	$ 50,233	$ 243,742	46%

Source: City-Data.com & Wikipedia. "% Change Since 2000" refers to the percentage change between 2000 and 2007 for the figures in the column to the left (population or median house price). "Town" signifies any municipality with less than 10,000 inhabitants. "n/a" signifies data not available.

.

Appendix B: Methodology for Calculating Distances with GIS

For each of the homes in the dataset, accurate measurements of the distance to the nearest wind turbine at the time of sale were needed, and therefore the exact locations of both the turbines and the homes was required. Neither of these locations was available from a single source, but through a combination of techniques, turbine and home locations were derived. This section describes the data and techniques used to establish accurate turbine and home locations, and the process for then calculating distances between the two.

There were a number of possible starting points for mapping accurate wind turbine locations. First, the Energy Velocity data, which covered all study areas, provided a point estimate for project location, but did not provide individual turbine locations. The Federal Aviation Administration (FAA), because of permitting and aviation maps, maintains data on turbine locations, but at the time of this study, that data source did not cover all locations, contained data on structures that no longer exist, and was difficult to use.[110] Finally, in some cases, the counties had mapped the wind turbines into GIS.

In the end, because no single dataset was readily available to serve all study areas, instead the variety of data sources described above was used to map and/or confirm the location of every turbine in the 10 study areas. The process began with high-resolution geocoded satellite and aerial ortho imagery that the United States Department of Agriculture (USDA) collects and maintains under its National Agriculture Imagery Program (NAIP), and which covers virtually all of the areas in this investigation. Where needed, older ortho imagery from the USDA was used. Combining these data with the Energy Velocity data, and discussions with local officials, and maps provided by the county or the developer, locating and mapping all of the turbines in each study area was possible.

Home locations were provided directly by some counties; in other cases, a parcel centroid was created as a proxy.[111] In some situations, the centroid did not correspond to the actual house location, and therefore required further refinement. This refinement was only required and conducted if the parcel was near the wind turbines, where the difference of a few hundred feet, for example, could alter its distance rating in a meaningful fashion, or when the parcel included a considerable amount of acreage, where inaccuracy in home location could be considerable. Therefore, parcels inside of 1.5 miles of the nearest wind turbine and of any size, and parcels outside of 1.5 miles and larger than 5 acres, were both examined using the USDA NAIP imagery to determine the exact home location. In cases where the parcel centroid was not centered over the home, the location was adjusted, using the ortho image as a guide, to the actual house location.

With both turbine and home locations identified, the next step was to determine distances between the two. To do so, the date when each transaction in the sample occurred was taken into

[110] A newer FAA database is now available that clears up many of these earlier concerns.

[111] A "parcel centroid" is the mathematical center point of a polygon, and was determined by XTools Pro (www.xtoolspro.com).

account, combined with the determination of which turbines were in existence at what time.[112] This required breaking the transactions in the sample into three categories: 1) those occurring before any wind facility was announced in the study area, 2) those occurring after the first wind facility was announced in the area but before all development was complete in the area, and 3) those occurring after all wind development in the area was complete. Any sale that occurred before wind development was announced in the study area was coded with a distance to the nearest turbine derived from the actual turbine locations after all wind development had occurred.[113] Homes that sold after all wind development had occurred were treated similarly, with distances derived from the set of turbines in place after all development had taken place. The final set of homes - those that sold after announcement of the first facility, but before the construction of the last - had to be treated, essentially, on a case by case basis. Some homes were located within five miles of one wind facility but more than five miles from another wind facility in the same study area (e.g., many homes in PASC). In this case the distance to that closer facility could be applied in a similar fashion as would be the case if only one facility was erected (e.g., NYMC or PAWC). Another group of homes, those that sold during the development of the first facility in the study area, were given the distance to that facility, regardless of distance to the other facilities in the study area. The final and most complicated group of homes consisted of those that were within five miles of multiple wind facilities, and that sold after the first facility had been erected. In those cases, the exact configuration of turbines was determined for each stage of the development process. In study areas with multiple facilities that were developed over multiple periods, there might be as many as six possible configurations (e.g., IABV). In this final scenario, the distance to the closest turbine was used, assuming it had been "announced" at the time of sale.

Once the above process was complete, the mechanics of calculating distances from the turbines to the homes was straightforward. After establishing the location of a set of turbines, for instance those constructed in the first development in the area, a euclidian distance raster was derived that encompassed every home in the study area.[114] The calculations were made using a 50-foot resolution state-plane projection and North American Datum from 1983 (NAD83). As discussed above, similar rasters were created for each period in the development cycle for each study area, depending on the turbine configuration at that time. Ultimately, a home's sale date was matched to the appropriate raster, and the underlying distance was extracted. Taking everything into account discussed above, it is expected that these measurements are accurate to

[112] It is recognized that the formal date of sale will follow the date at which pricing decisions were made. It is also recognized, as mentioned in Section 3, that wind facility announcement and construction dates are likely to be preceded by "under the radar" discussions in the community. Taken together, these two factors might have the effect, in the model, of creating some apparent lag in when effects are shown, compared to the earlier period in which effects may begin to occur. For this to bias the results, however, effects would have to disappear or dramatically lesson with time (e.g., less than one year after construction) such that the effects would not be uncovered with the models in later periods. Based on evidence from other potentially analogous infrastructure (e.g., HVTL), any fading of effects would likely occur over many years, so it is assumed that any bias is likely minimal.

[113] These distances were used to compare homes sold, for instance, within 1 mile of where the turbines were eventually erected with similar homes sold after the turbines were erected (see, for example, the Temporal Aspects Model).

[114] A "Raster" is a grid of, in this case, 50 feet by 50 feet squares, each of which contains a number representing the number of feet from the center of the square to the nearest turbine.

within roughly 150 feet inside of 1.5 miles and within a maximum of roughly 1150 feet outside of 1.5 miles.[115]

[115] The resolution of the raster is 50 feet, so the hypotenuse is 70 feet. If the home is situated in the top left of a raster cell and the turbine is situated in the bottom right of a diagonally adjacent cell, they could be separated by as much as 140 feet, yet the raster distance would only be 50 feet, a difference of 90 feet. Moreover, the resolution of the Ortho image is 40 feet so that location could additionally be off by another 55 feet along the diagonal. These two uncertainties total to roughly 150 feet for homes inside of 1.5 miles. Outside of 1.5 miles the variation between centroid and house location for parcels smaller than 5 acres could be larger still. If a 4.9 acre parcel had a highly irregular rectangular shape of 102 by 2100 feet, for instance, the centroid could be as much as 1050 feet from the property line. If the home was situated 50 feet from the property line then the actual house location could be off by as much as 1000 feet. Adding this to the 150 feet from above leads to a total discrepancy of 1150 feet (0.22 miles) for homes outside of 1.5 miles on parcels smaller than 5 acres. Of course, these extreme scenarios are highly unlikely to be prevalent.

Appendix C: Field Data Collection Instrument

Figure A - 12: Field Data Collection Instrument

House # (Control/ Key #)			County		
House Address					
Home Characteristics			**House Photo Number(s)**		
Cul-De-Sac?	No(0) / Yes(1)		Waterfront?		No(0) / Yes(1)
Scenic Vista Characteristics			**Vista Photo Numbers**		
Overall Quality of Scenic Vista: Poor (1), Below Average (2), Average (3), Above Average (4), Premium (5)					
View of Turbines Characteristics			**View Photo Numbers**		
Total # of Turbines visible			Orientation of Home to View: See Below		
# of Turbines- blade tips only visible			Side (S), Front (F), Back (B), Angled (A)		
# of Turbines- nacelle/hub visible					
# of Turbines- tower visible			View Scope: Narrow(1), Medium(2), Wide(3)		
The Degree to which the View of Turbines Dominate the Site? Non-Existent (0), Minor (1), Moderate (2), Substantial (3), Extreme (4)					
Degree to which the Turbines Overlap the Prominent Scenic Vista? Not at all (0), Barely (1), Somewhat (2), Strongly (3), Entirely (4)					
Notes:					

Figure A - 13: Field Data Collection Instrument - Instructions - Page 1

Home Characteristics

Cul-De-Sac? No(0)/Yes(1)	Is the home situated on a cul-de-sac?
Waterfront? No(0)/Yes(1)	Is the home situated on the waterfront?

"Vista" Characteristics

Overall Quality of Scenic Vista: Poor (1)	This rating is reserved for vistas of unmistakably poor quality. These vistas are often dominated by visually discordant man-made alterations (not considering turbines), or are uncomfortable spaces for people, lack interest, or have virtually no recreational potential.
Overall Quality of Scenic Vista: Below Average (2)	The home's vista is of the below average quality. These vistas contain visually discordant man-made alterations (not considering turbines) but are not dominated by them. They are not inviting spaces for people, but are not uncomfortable. They have little interest, mystery and have minor recreational potential.
Overall Quality of Scenic Vista: Average (3)	The home's vista is of the average quality. These vistas include interesting views which can be enjoyed often only a narrow scope. These vistas may contain some visually discordant man-made alterations (not considering turbines), are moderately comfortable spaces for people, have some interest, and have minor recreational potential.
Overall Quality of Scenic Vista: Above Average (4)	The vista from the home is of above average quality. These vistas include interesting views which often can be enjoyed in a medium to wide scope. They might contain some man made alterations (not considering turbines), yet still possess significant interest and mystery, are moderately balanced and have some potential for recreation.
Overall Quality of Scenic Vista: Premium (5)	This rating is reserved for vistas of unmistakably premium quality. These vistas would include "picture post card" views which can be enjoyed in a wide scope. They are often free or largely free of any discordant man made alterations (not considering turbines), possess significant interest, memorable qualities, mystery and are well balanced and likely have a high potential for recreation.
Degree Turbines Overlap Prominent Vista? Not at all (0))	The vista does not contain any view of the turbines.
Degree Turbines Overlap Prominent Vista? Barely (1)	A small portion (~ 0 - 20%) of the vista is overlapped by the view of turbines therefore the vista might contain a view of a few turbines, only a few of which can be seen entirely (from below the sweep of the blades to the top of their tips).
Degree Turbines Overlap Prominent Vista? Somewhat (2)	A moderate portion (~20-50%) of the vista contains turbines, and likely contains a view of more than one turbine, some of which are likely to be seen entirely (from below the sweep of the blades to the top of their tips).
Degree Turbines Overlap Prominent Vista? Strongly (3)	A large portion (~50-80%) of the vista contains a view of turbines, many of which likely can be seen entirely (from below the sweep of the blades to the top of their tips).
Degree Turbines Overlap Prominent Vista? Entirely (4)	This rating is reserved for situations where the turbines overlap virtually the entire (~80-100%) vista from the home. The vista likely contains a view of many turbines, virtually all of which can be seen entirely (from below the sweep of the blades to the top of their tips).

Figure A - 14: Field Data Collection Instrument - Instructions - Page 2

View of Turbines Characterist

House Orientation to View of Turbines: Side (S)	Orientation of home to the view of the turbines is from the side.
House Orientation to View of Turbines: Front (F)	Orientation of home to the view of the turbines is from the front.
House Orientation to Vista of Turbines: Back (B)	Orientation of home to the view of the turbines is from the back.
House Orientation to Vista of Turbines: Angled (A)	Orientation of home to the view of the turbines is from an angle.
View of Turbines Scope: Narrow(1)	The view of the turbines is largely blocked by trees, large shrubs or man made features in the foreground (0-300 feet) allowing 0 - 30 degrees of view of the wind facility
View of Turbines Scope: Medium(2)	The view of turbines is partially blocked by trees, large shrubs or man made features in the foreground (0-300 feet) allowing only 30-90 degrees of view of the wind facility.
View of Turbines Scope: Wide(3)	The view of the turbines is free or almost free from blockages by trees, large shrubs or man made features in the foreground (0-300 feet) allowing at least 90 degrees of view of the wind facility.
Degree to which View of Turbines Dominates the Site? None (0)	The turbines are not visible at all frrom this home.
Degree to which View of Turbines Dominates the Site? Minor (1)	The turbines are visible but either the scope is narrow, there are many obstructions, or the distance between the home and the facility is large.
Degree to which View of Turbines Dominates the Site? Moderate (2)	The turbines are visible but the scope is either narrow or medium, there might be some obstructions, and the distance between the home and the facility is most likely a few miles.
Degree to which View of Turbines Dominates the Site? Substantial (3)	The turbines are dramatically visible from the home. The turbines are likely visible in a wide scope, and most likely the distance between the home and the facility is short.
Degree to which View of Turbines Dominates the Site? Extreme (4)	This rating is reserved for sites that are unmistakably dominated by the presence of the windfarm. The turbines are dramatically visible from the home and there is a looming quality to their placement. The turbines are often visible in a wide scope, or the distance to the facility is very small.

Appendix D: Vista Ratings with Photos

POOR VISTA

BELOW AVERAGE VISTA

AVERAGE VISTA

ABOVE AVERAGE VISTA

PREMIUM VISTA

Appendix E: View Ratings with Photos

MINOR VIEW

3 turbines visible from front orientation, nearest 1.4 miles (TXHC)

5 turbines visible from front orientation, nearest 0.9 miles (NYMC)

MODERATE VIEW

18 turbines visible from back orientation, nearest 1.6 miles (ILLC)

6 turbines visible from back orientation, nearest 0.8 miles (PASC)

SUBSTANTIAL VIEW

90 turbines visible from all orientations, nearest 0.6 miles (IABV)

27 turbines visible from multiple orientations, nearest 0.6 miles (TXHC)

EXTREME VIEW

6 turbines visible from multiple orientations, nearest 0.2 miles (WIKCDC)

212 turbines visible from all orientations, nearest 0.4 miles (IABV)

Appendix F: Selecting the Primary ("Base") Hedonic Model

Equation (1) as described in Section 4.2 is presented in this report as the primary (or "Base") model to which all other models are compared. As noted earlier, in the Base Hedonic Model and in all subsequent models presented in Section 5 all variables of interest, spatial adjustments, and home and site characteristics are pooled, and therefore their estimates represent the average across all study areas. Ideally, one would have enough data to estimate a model at the study area level - a fully unrestricted model - rather than pooled across all areas. In this appendix, alternative model forms are presented that unrestrict these variables at the level of study areas. As shown here, these investigations ultimately encouraged the selection of the somewhat simpler pooled Base Model as the primary model, and to continue to use restricted or pooled models in the alternative hedonic analyses.

F.1 Discussion of Fully Unrestricted Model Form

The Base Model described by equation (1) has variables that are pooled, and the coefficients for these variables therefore represent the average across all study areas (after accounting for study area fixed effects). An alternative (and arguably superior) approach would be to estimate coefficients at the level of each study area, thereby allowing coefficient values to vary among study areas.[116] This fully interacted – or unrestricted – model would take the following form:

$$\ln(\mathrm{P}) = \beta_0 + \sum_{\mathrm{s}} \beta_1 \left(\mathrm{N} \cdot \mathrm{S}\right) + \sum_{\mathrm{c}} \beta_2 \left(\mathrm{Y}\right) + \sum_{\mathrm{k}} \beta_3 \left(\mathrm{X} \cdot \mathrm{S}\right) + \sum_{\mathrm{v}} \beta_4 (\mathrm{VIEW} \cdot \mathrm{S}) + \sum_{\mathrm{d}} \beta_5 (\mathrm{DISTANCE} \cdot \mathrm{S}) + \varepsilon \tag{F13}$$

where

P represents the inflation-adjusted sale price,
N is the spatially weighted neighbors' predicted sale price,
S is a vector of *s* study areas (e.g., WAOR, OKCC, etc.),
Y is a vector of *c* study area locational characteristics (e.g., census tract, school district, etc.),
X is a vector of k home and site characteristics (e.g., acres, square feet, number of bathrooms, condition of the home, age of home, VISTA, etc.),
VIEW is a vector of v categorical view of turbine variables (e.g., MINOR, MODERATE, etc.),
DISTANCE is a vector of d categorical distance to turbine variables (e.g., less than 3000 feet, between one and three miles, etc.),
β_0 is the constant or intercept across the full sample,
β_1 is a vector of *s* parameter estimates for the spatially weighted neighbor's predicted sale price for S study areas,
β_2 is a vector of *c* parameter estimates for the study area locational fixed effect variables,
β_3 is a vector of *k* parameter estimates for the home and site characteristics for S study areas,
β_4 is a vector of *v* parameter estimates for the VIEW variables as compared to homes sold with no view of the turbines for S study areas,

[116] For instance, the marginal contribution of Acres (the number of acres) to the selling price would be estimated for each study area (i.e., Acres_WAOR, Acres_TXHC etc.), as would the variables of interest: VIEW and DISTANCE.

β_5 is a vector of *d* parameter estimates for the DISTANCE variables as compared to homes sold situated outside of five miles for S study areas, and
ε is a random disturbance term.

To refresh, the fully restricted equation (1) takes the following form:

$$\ln(\mathrm{P}) = \beta_0 + \beta_1 \mathrm{N} + \sum_{\mathrm{s}} \beta_2 \mathrm{S} + \sum_{\mathrm{k}} \beta_3 \mathrm{X} + \sum_{\mathrm{v}} \beta_4 \mathrm{VIEW} + \sum_{\mathrm{d}} \beta_5 \mathrm{DISTANCE} + \varepsilon \qquad (1)$$

where
P represents the inflation-adjusted sale price,
N is the spatially weighted neighbors' predicted sale price,
S is the vector of *s* Study Area fixed effects variables (e.g., WAOR, OKCC, etc.),
X is a vector of *k* home and site characteristics (e.g., acres, square feet, number of bathrooms, condition of the home, age of home, VISTA, etc.),
VIEW is a vector of *v* categorical view of turbine variables (e.g., MINOR, MODERATE, etc.),
DISTANCE is a vector of *d* categorical distance to turbine variables (e.g., less than 3000 feet, between one and three miles, etc.),
β_0 is the constant or intercept across the full sample,
β_1 is a parameter estimate for the spatially weighted neighbor's predicted sale price,
β_2 is a vector of *s* parameter estimates for the study area fixed effects as compared to homes sold in the Washington/Oregon (WAOR) study area,
β_3 is a vector of *k* parameter estimates for the home and site characteristics,
β_4 is a vector of *v* parameter estimates for the VIEW variables as compared to homes sold with no view of the turbines,
β_5 is a vector of *d* parameter estimates for the DISTANCE variables as compared to homes sold situated outside of five miles, and
ε is a random disturbance term.

The significant change between equations (1) and (F13) is that each of the primary groups of variables in equation (F13) is interacted with the study areas (S) so that parameters can be estimated at the study area level. For example, whereas ACRES is estimated in equation (1) across all study areas, in equation (F13) it is estimated for each study area (i.e., Acres_WAOR, Acres_TXHC, etc).[117] Similarly, when considering the possible impact of wind facilities on residential sales prices, equation (1) seeks average effects that exist over the entire sample, while equation (F13) instead looks for differential effects in each individual study area. Additionally, in equation (F13), instead of estimating fixed effects using inter-study area parameters alone (e.g., WAOR, TXHC), a set of intra-study area effects (Y) - school district and census tract delineations - are added.[118] These latter coefficients represent not only effects that are presumed

[117] This change is made because, theoretically, the contribution to sales prices of home or site characteristics may differ between study areas – for instance Central_AC in Texas vs. New York – and therefore estimating them at the study area level may increase the explanatory power of the model.

[118] In the evaluation and selection of the best model to use as the "Base Model" a set of census tract and school district delineations were used instead of the study area fixed effects. These more-granular fixed effects were extracted from GIS using house locations and census tract and school district polygons. Often, the school district and census tract delineations were not mutually exclusive. For example, in Wisconsin the WIKCDC study area contains four school districts and six census tracts, none of which completely overlap. Alternatively, in some study

to exist over each entire study area (inter-study area effects), but also intra-study area effects such as differences in home valuation due to school districts, distances to amenities, and other locationally bound influences. As with the inter-study area coefficients, because of the myriad influences captured by these variables, interpretation of any single coefficient can be difficult. However, it is expected that such coefficients would be influential, indicating significant differences in value between homes in each study area and across study areas due to school district quality and factors that differ between census tracts (e.g., crime rates).

Although the fully unrestricted model described by equation (F13) is arguably superior to the fully restricted model described in equation (1) because of its ability to resolve differences between and within study areas that are not captured by the Base Model, there are three potential drawbacks:

- Model parsimony and performance;
- Standard error magnitudes; and
- Parameter estimate stability.

Each of these potential drawbacks is discussed in turn below:

Model parsimony and performance: In general, econometricians prefer a simpler, more parsimonious statistical model. In this instance, variables should be added to a model only if their addition is strongly supported by theory and if the performance of the model is substantially improved by their inclusion. As such, if a model with a relatively small number of parameters performs well, it should be preferred to a model with more parameters unless the simple model can be "proven to be inadequate" (Newman, 1956). To prove the inadequacy of a simpler model requires a significant increase in performance to be exhibited from the more complex model. In this case, as presented later, performance is measured using the combination of Adjusted R^2, Modified R^2, and the Schwarz information criterion (see footnote 119 on page 127).

Standard error magnitudes: The magnitude of the standard errors for the variables of interest, as well as the other controlling variables, are likely to increase in the unrestricted model form because the number of cases for each variable will decrease when they are estimated at the study area level. Within each study area, there are a limited number of home transactions that meet the criteria for inclusion in the model, but even more limiting is the number of home transactions within each study area that have the characteristics of interest. For example, in Lee County, IL (ILLC), there are 205 post-construction home sales, while in Wayne County, PA (PAWC) there are 222. More importantly, in those areas, the data include a total of one and eleven sales inside of one mile, respectively, and a total of one and two homes with either EXTREME or SUBSTANTIAL rated views of turbines. With so few observations, there is increased likelihood that a single or small group of observations will strongly influence the sample mean of an independent variable. Since the standard error is derived from the variance of the parameter estimate, which in turn is derived from the summed deviation of each observation's actual level relative to its sample mean, this standard error is more likely to be larger than if a larger sample were considered. If the presence of wind facilities does have a detrimental effect on property

---

areas the school district and census tracts perfectly overlapped, and in those cases either both were omitted as the reference category or one was included and the other withdrawn from the model to prevent perfect collinearity.

values, that effect seems likely to be relatively small, at least outside of the immediate vicinity of the wind turbines. The smaller sample sizes for the independent variables that come with the unrestricted model, which may decrease statistical precision by producing larger standard errors, would likely decrease the ability to accurately identify these possible effects statistically. To explore the magnitude of this concern, the difference in standard errors of the variables of interest is investigated among the restricted and unrestricted models.

Parameter estimate stability: In an unrestricted model, parameter estimates are more likely to be unstable because the sample of home transactions with any particular characteristic may be small and thus not representative of the population as a whole. As mentioned above, there are a limited number of transactions within each study area that have the characteristics of interest. Restricting the sample size by using an unrestricted model increases the likelihood that a limited number of observations, which in the population as a whole represent a very small segment, will drive the results in one direction or another, thereby leading to erroneous conclusions. The difference in parameter estimates is investigated by comparing the coefficients for the unrestricted variables of interest to those for the restricted variables of interest. Additionally, the sign of any significant variables will be investigated for the unrestricted models, which might help uncover potentially spurious results.

F.2 Analysis of Alterative Model Forms

Here the spectrum of alternative models is explored, from the fully restricted equation (1) to the fully unrestricted equation (F13). To do so, not only are these two ends of the spectrum estimated, but also 14 intermediate models are estimated that consist of every combination of restriction of the four variable groups (i.e., variables of interest, spatial adjustments, study area delineations, and home and site characteristics). This produces a total of 16 models over which to assess model parsimony and performance, standard error size, and coefficient stability. This process allows for an understanding of model performance but, more importantly, to ultimately define a "Base Model" that is parsimonious (i.e., has the fewest parameters), robust (i.e., high adjusted R^2), and best fits the purpose of investigating wind facility impacts on home sales prices.

Table A - 2 presents the performance statistics for each of the 16 models defined above, moving from the fully restricted model equation (1) ("Model 1") to the fully unrestricted model equation (F13) ("Model 16"). In columns 2 – 5 of the table, the "R" represents a restriction for this variable group (i.e., not crossed with the study areas) and the "U" represents the case when the variable group is unrestricted (i.e., crossed with the study areas). Also shown are summary model statistics (i.e., Adjusted R^2, Modified R^2, and Schwarz information criterion - "SIC"), as well as the number of estimated parameters (*k*). [119] All models were run using the post-construction data subset of the sample of home sales transactions (*n* = 4,937).

[119] Goldberger (1991), as cited by Gujarati (2003), suggests using a Modified $R^2 = (1 - k/n) * R^2$ to adjust for added parameters. For example, Models 1 and 14 have Modified R^2 of 0.76, yet Adjusted R^2 of 0.77 and 0.78 respectively. Therefore the Modified R^2 penalizes their measure of explanatory power more than the Adjusted R^2 when taking into account the degrees of freedom. Similarly, the Schwarz information criterion penalizes the models for increased numbers of parameters (Schwarz, 1978). More importantly, practitioners often rely on the Schwarz criterion – over the Modified or Adjusted R^2 statistics - to rank models with the same dependent variable by their relative parsimony (Gujarati, 2003). Therefore it will be used for that purpose here.

Model Parsimony and Performance

Overall, the fully restricted model (1) performs well with only 37 independent variables, producing an Adjusted R^2 of 0.77. Despite the limited number of explanatory variables, the model explains ~77% of the variation in home prices in the sample. When the fully unrestricted model 16 (equation F13) is estimated, which lies at the other end of the spectrum, it performs only slightly better, with an Adjusted R^2 of 0.81, but with an additional 285 explanatory variables. It is therefore not surprising that the Modified R^2 is 0.76 for Model 1 and is only 0.77 for Model 16. Similarly, the Schwarz information criterion (SIC) increases from 0.088 to 0.110 when moving from model 1 to model 16 indicating relatively less parsimony. Combined, these metrics show that the improvement in the explanatory power of model 16 over model 1 is not enough to overcome the lack of parsimony. Turning to the 14 models that lie between Models 1 and 16, in general, little improvement in performance is found over Model 1, and considerably less parsimony, providing little initial justification to pursue a more complex specification than equation (1).

Table A - 2: Summarized Results of Restricted and Unrestricted Model Forms

Model [1]	Study Area [2]	Spatial Adjustment	Home and Site Characteristics	Variables of Interest	Adj R^2	Modified R^2	SIC	*k* †
1	R	R	R	R	0.77	0.76	0.088	37
2	U	R	R	R	0.74	0.73	0.110	111
3	R	U	R	R	0.77	0.76	0.088	46
4	R	R	U	R	0.80	0.78	0.095	188
5	R	R	R	U	0.77	0.76	0.093	88
6	U	U	R	R	0.78	0.76	0.094	120
7	R	U	U	R	0.80	0.77	0.096	197
8	R	R	U	U	0.80	0.77	0.101	239
9	U	R	U	R	0.80	0.77	0.107	262
10	U	R	R	U	0.76	0.75	0.107	162
11	R	U	R	U	0.77	0.76	0.094	97
12	U	U	U	R	0.81	0.77	0.103	271
13	R	U	U	U	0.80	0.77	0.103	248
14	U	U	R	U	0.78	0.76	0.100	171
15	U	R	U	U	0.80	0.76	0.113	313
16	U	U	U	U	0.81	0.77	0.110	322

"R" indicates parameters are pooled ("restricted") across the study areas.
"U" indicates parameters are not pooled ("unrestricted"), and are instead estimated at the study area level.
1 - *Model numbers do not correspond to equation numbers listed in the report; equation (1) is Model 1, and equation (F1) is Model 16.*
2 - *In its restricted form "Study Area" includes only inter-study area delineations, while unrestricted "Study Area" includes intra-study area delineations of school district and census tract.*
† - *Numbers of parameters do not include intercept or omitted variables.*

The individual contributions to model performance from unrestricting each of the variable groups in turn (as shown in Models 2-5) further emphasizes the small performance gains that are earned despite the sizable increases in the number of parameters. As a single group, the

unrestricted Home and Site Characteristics model (Model 4) makes the largest impact on model performance, at least with respect to the Adjusted R^2 (0.80), but this comes with the addition of 151 estimated parameters a slight improvement in the Modified R^2 (0.78) and a worsening SIC (0.095). Adding unrestricted Study Area delineations (Model 2), on the other hand, adversely affects performance (Adj. R^2 = 0.74, Modified R^2 = 0.73) and adds 74 estimated parameters (SIC = 0.110). Similarly, unrestricting the Spatial Adjustments (Model 3) offers little improvement in performance (Adj. R^2 = 0.77, Modified R^2 = 0.76) despite adding nine additional variables (SIC = 0.088). Finally, unrestricting the Variables of Interest (Model 5) does not increase model performance (Adj. R^2 = 0.77, Modified R^2 = 0.76) and adds 51 variables to the model (SIC = 0.093). This pattern of little model improvement yet considerable increases in the number of estimated parameters (i.e., less parsimony) continues when pairs or trios of variable groups are unrestricted. With an Adjusted R^2 of 0.77, the fully restricted equation (1) performs more than adequately, and is, by far, the most parsimonious.

Standard Error Magnitudes

Table A - 3 summarizes the standard errors for the variables of interest for all of the 16 models, grouped into restricted and unrestricted model categories. The table specifically compares the medians, minimums, and maximums of the standard errors for the models with restricted variables of interest (1, 2, 3, 4, 6, 7, 9 and 12) to those with unrestricted variables of interest (5, 8, 10, 11, 13, 14, 15 and 16).[120] The table demonstrates that the unrestricted standard errors for the variables of interest are significantly larger than the restricted standard errors. In fact, the minimum standard errors in the unrestricted models are often higher than the maximum standard errors produced in the restricted models. For example, the maximum standard error for an EXTREME VIEW in the restricted models is 0.09, yet the minimum in the unrestricted models is 0.12, with a maximum of 0.34. To put this result in a different light, a median standard error for the unrestricted EXTREME VIEW variable of 0.25 would require an effect on house prices larger than 50% to be considered statistically significant at the 90% level. Clearly, the statistical power of the unrestricted models is weak.[121] Based on other disamenities, as discussed in Section 2.1, an effect of this magnitude is very unlikely. Therefore, based on these standard errors, there is no apparent reason to unrestrict the variables of interest.

[120] For the restricted models, the medians, minimums, and maximums are derived across all eight models for each variable of interest. For the unrestricted models, they are derived across all study areas and all eight models for each variable of interest.

[121] At 90% confidence a standard error of 0.25 would produce a confidence interval of roughly +/- 0.42 (0.25 * 1.67). An effect of this magnitude represents a 52% change in sales prices because sales price is in a natural log form (*e* ^ 0.42-1 = 0.52).

Table A - 3: Summary of VOI Standard Errors for Restricted and Unrestricted Models

Standard Errors	Restricted Models			Unrestricted Models		
	Standard Errors			Standard Errors		
	Median	Min	Max	Median	Min	Max
Minor View	0.01	0.01	0.02	0.05	0.03	0.07
Moderate View	0.03	0.03	0.03	0.10	0.06	0.18
Substantial View	0.05	0.05	0.06	0.19	0.10	0.29
Extreme View	0.08	0.08	0.09	0.25	0.12	0.34
Inside 3000 Feet	0.05	0.05	0.06	0.21	0.09	0.33
Between 3000 Feet and 1 Mile	0.04	0.04	0.05	0.13	0.08	0.40
Between 1 and 3 Miles	0.02	0.02	0.02	0.05	0.02	0.11
Between 3 and 5 Miles	0.01	0.01	0.02	0.05	0.02	0.10

Parameter Estimate Stability

Table A - 4 summarizes the coefficient estimates for the variables of interest for all of the 16 models. The table specifically compares the medians, minimums, and maximums of the coefficients for the models with restricted variables of interest (1, 2, 3, 4, 6, 7, 9 and 12) to those with unrestricted variables of interest (5, 8, 10, 11, 13, 14, 15 and 16). As shown, the coefficients in the unrestricted models diverge significantly from those in the restricted models. For example, in the restricted models, the median coefficient for homes inside of 3000 feet is -0.03, with a minimum of -0.06 and a maximum of -0.01, yet in the unrestricted models the median coefficient is 0.06, with a minimum of -0.38 and a maximum of 0.32. Similarly, a MODERATE VIEW in the restricted models has a median of 0.00, with a minimum of -0.01 and a maximum of 0.03, whereas the unrestricted models produce coefficients with a median of -0.05 and with a minimum of -0.25 and a maximum of 0.35.

Table A - 4: Summary of VOI Coefficients for Restricted and Unrestricted Models

Parameters	Restricted Models			Unrestricted Models		
	Coefficients			Coefficients		
	Median	Min	Max	Median	Min	Max
Minor View	-0.02	-0.03	0.00	-0.02	-0.16	0.24
Moderate View	0.00	-0.01	0.03	-0.05	-0.25	0.35
Substantial View	-0.01	-0.04	0.02	-0.08	-0.31	0.13
Extreme View	0.03	0.02	0.05	-0.03	-0.23	0.09
Inside 3000 Feet	-0.03	-0.06	-0.01	0.06	-0.38	0.32
Between 3000 Feet and 1 Mile	-0.04	-0.06	-0.01	-0.10	-0.44	0.52
Between 1 and 3 Miles	-0.01	-0.03	0.02	0.00	-0.23	0.40
Between 3 and 5 Miles	0.02	0.01	0.04	0.05	-0.05	0.32

Turning from the levels of the coefficients to the stability of their statistical significance and sign across models more reasons for concern are found. Table A - 5 summarizes the results of the unrestricted models, and presents the number of statistically significant variables of interest as a percent of the total estimated. The table also breaks these results down into two groups, those

with coefficients above zero and those with coefficients below zero.[122] It should be emphasized here that it is the *a priori* expectation that, if effects exist, all of these coefficients would be less than zero, indicating an adverse effect on home prices from proximity to and views of wind turbines. Despite that expectation, when the variables of interest are unrestricted it is found that they are as likely to be above zero as they are below.[123] In effect, the small numbers of cases available for analysis at the study area level produce unstable results, likely because the estimates are being unduly influenced by either study area specific effects that are not captured by the model or by a limited number of observations that represents a larger fraction of the overall sample in that model.[124]

Table A - 5: Summary of Significant VOI Above and Below Zero in Unrestricted Models

Significant Variables	Unrestricted Models		
	Total	Below Zero	Above Zero
Minor View	32%	14%	18%
Moderate View	23%	11%	13%
Substantial View	4%	4%	0%
Extreme View	0%	0%	0%
Inside 3000 Feet	23%	15%	8%
Between 3000 Feet and 1 Mile	30%	14%	16%
Between 1 and 3 Miles	56%	32%	24%
Between 3 and 5 Miles	45%	3%	43%

F.3 Selecting a Base Model

To conclude, it was found that all three concerns related to the estimation and use of an unrestricted model form are borne out in practice. Despite experimenting with 16 different combinations of interactions, little overall improvement in performance is discovered. Where performance gains are found they are at the expense of parsimony as reflected in the lack of increase in the Modified R^2 and the relatively higher Schwartz information criterion. Further, divergent and spurious coefficients of interest and large standard errors are associated with those coefficients. Therefore the fully restricted model, equation (1), is used in this report as the "Base Model".

[122] The "Total" percentage of significant coefficients is calculated by counting the total number of significant coefficients across all 8 unrestricted models for each variable of interest, and dividing this total by the total number of coefficients. Therefore, a study area that did not have any homes in a group (for example, homes with EXTREME VIEWS) was not counted in the "total number of coefficients" sum. Any differences between the sum of "above" and "below" zero groups from the total are due to rounding errors.

[123] The relatively larger number of significant variables for the MINOR rated view, MODERATE rated view, Mile 1 to 3, and Mile 3 to 5 parameters are likely related to the smaller standard errors for those categories, which result from larger numbers of cases.

[124] Another possible explanation for spurious results in general is measurement error, when parameters do not appropriately represent what one is testing for. In this case though, the VIEW variables have been adequately "ground truthed" during the development of the measurement scale, and are similar to the VISTA variables, which were found to be very stable across study areas. DISTANCE, or for that matter, distance to any disamenity, has been repeatedly found to be an appropriate proxy for the size of effects. As a result, it is not believed that measurement error is a likely explanation for the results presented here.

Appendix G: OLS Assumptions, and Tests for the Base Model

A number of criteria must be met to ensure that the Base Model and Alternative Hedonic Models produce unbiased coefficient estimates and standard errors: 1) appropriate controls for outliers and influencers; 2) homoskedasticity; 3) absence of serial or spatial autocorrelation; and 4) reasonably limited multicollinearity. Each of these criteria, and how they are addressed, is discussed below.

Outliers and Influencers: Home sale prices that are well away from the mean, also called outliers and influencers, can cause undue influence on parameter estimates. A number of formal tests are available to identify these cases, the most common being Mahalanobis' Distance ("M Distance") (Mahalanobis, 1936) and standardized residual screening. M Distance measures the degree to which individual observations influence the mean of the residuals. If any single observation has a strong influence on the residuals, it should be inspected and potentially removed. An auxiliary, but more informal, test for identifying these potentially influential observations is to see when the standardized absolute value of the residual exceeds some threshold. Both the Base Model and the All Sales Model were run using the original dataset of 7,464 transactions and the 4,940 transactions which occurred post-construction respectively. For both models the standardized residuals and the M Distance statistics were saved.[125] The histograms of these two sets of statistics from the two regressions are shown in Figure A - 15 through Figure A - 18.

[125] For the M Distance statistics all variables of interest were removed from the model. If they were left in the M-Distance statistics could be influenced by the small numbers of cases in the variables of interest. If these parameters were strongly influenced by a certain case, it could drive the results upward. Inspecting the controlling variables in the model, and how well they predicted the sale prices of the transactions in the sample, was of paramount importance therefore the variables of interest were not included.

Figure A - 15: Histogram of Standardized Residuals for Base Model

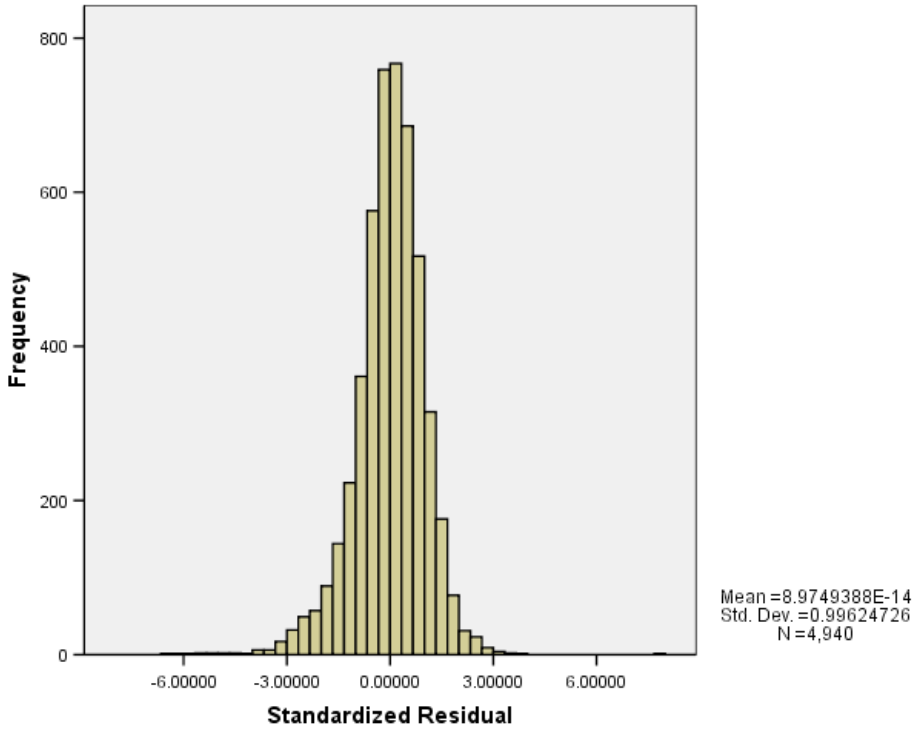


Figure A - 16: Histogram of Mahalanobis Distance Statistics for Base Model

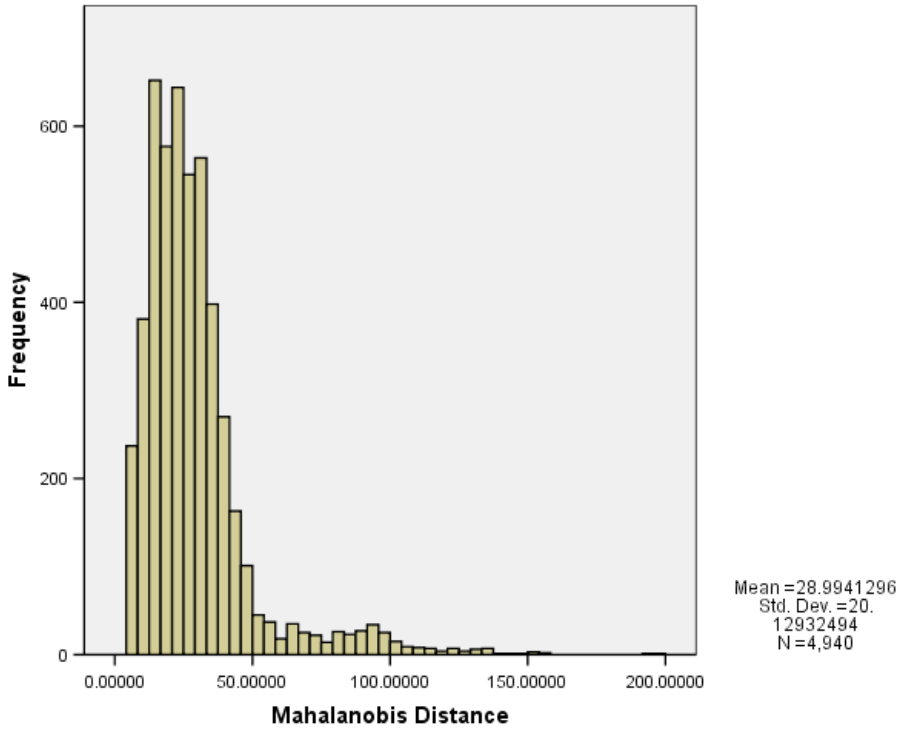


Figure A - 17: Histogram of Standardized Residuals for All Sales Model

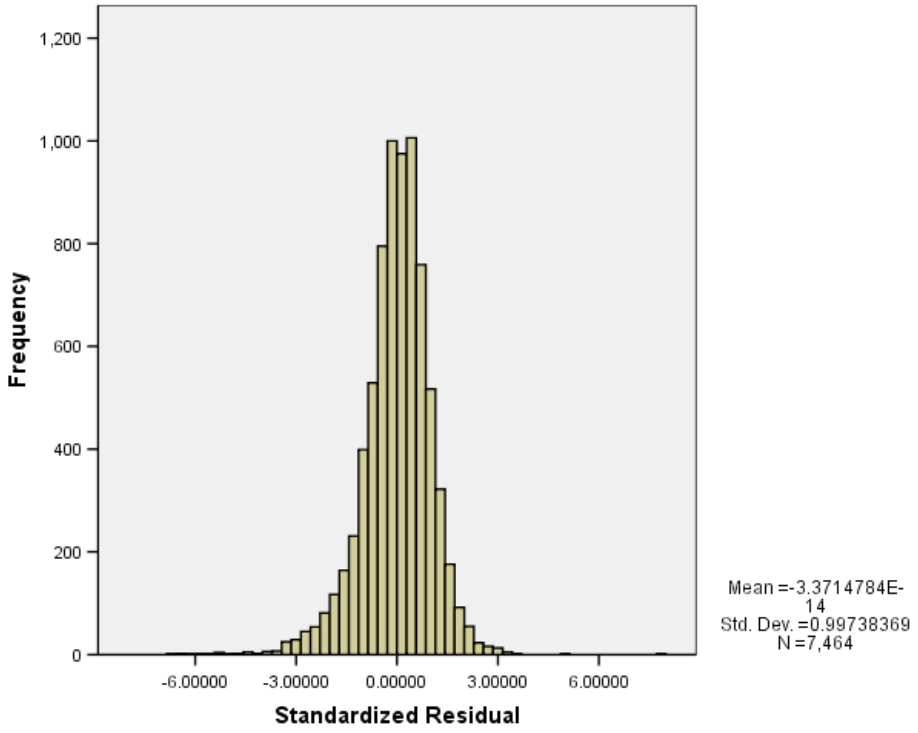
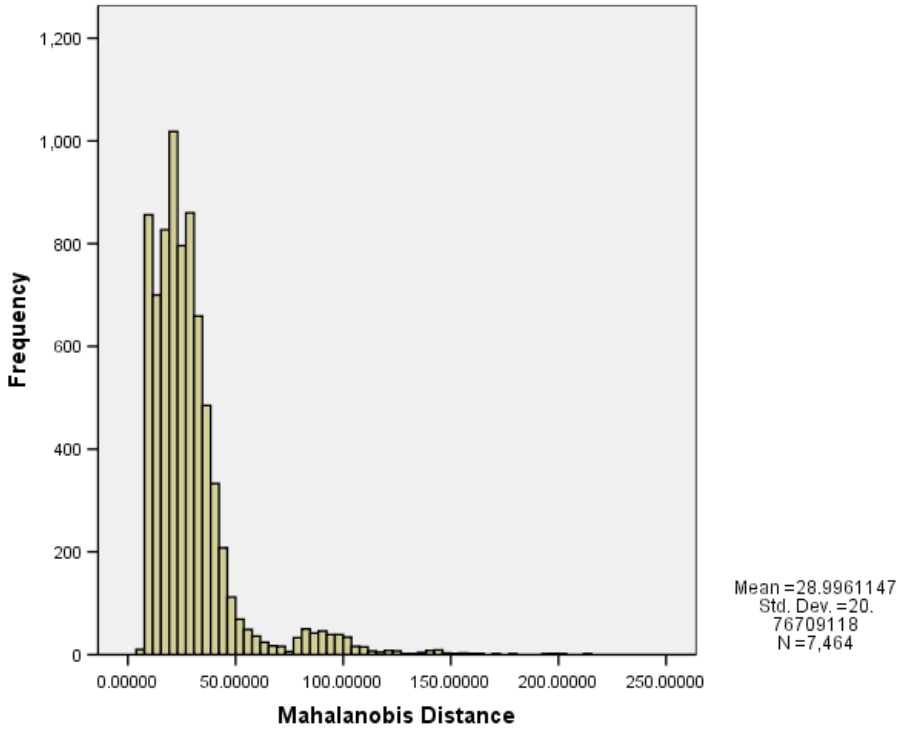


Figure A - 18: Histogram of Mahalanobis Distance Statistics for All Sales Model



The M Distance histograms suggested that a cutoff of 150 may be appropriate, which would exclude 15 cases from the All Sales Model and seven cases from the Base Model (all of the latter of which were among the 15 outliers in the All Sales Model). The Standardized Residual histograms suggested a cutoff of 4, 5, or 6, which would exclude 13, 8, and 3 cases from the Base Model, and 22, 12, and 5 cases from the All Sales Model. A case-by-case investigation of each of these sales transactions was then conducted by comparing their home characteristics (e.g., square feet, baths, age, etc.) against their study area and panel model cohorts to ensure that none had been inappropriately coded. None of the M Distance flagged cases seemed to be inappropriately coded, and none of those cases were removed from the final dataset as a result. Five cases that were flagged from the All Sales Model (which corresponded to three cases in the Base Model) with a Standardized Residual greater than six, however, were clearly outliers. One had a sale price that was more than $200,000 more than any other transaction in the model, and the other four had exceptionally low prices, yet high numbers of corresponding characteristics that would suggest higher home sales prices (such as over 2000 square feet – all four cases – or more than two bathrooms – three cases).

As a result of these investigations, these five cases were removed from the model. One of the five cases occurred prior to announcement, one occurred after announcement and before construction, and the other three occurred after construction began. None were within three miles of the nearest wind turbine except one, which was 0.6 miles from the nearest turbine and had a MINOR view of the wind facility. The other two had no views of the turbines. Although there was hesitancy in removing any cases from the model, these transactions were considered appropriately influential and keeping them in the model would bias the results inappropriately. Further, the one home that was situated inside of one mile was surrounded by five other transactions in the same study area that also occurred after construction began and were a similar distance from the turbines, but that were not flagged by the outliers screen. Therefore, its removal was considered appropriate given that other homes in the sample would likely experience similar effects.

After removing these five cases, the sensitivity of the model results were tested to the inclusion or exclusion of the “greater than five” and “greater than four” Standardized Residuals observations and the cases flagged by the M Distance screen, finding that parameter estimates for the variables of interest moved slightly with these cases removed but not enough to change the results significantly. Because they did not show a unique grouping across the variables of interest, nor any unusual potentially inappropriate coding, and, more importantly, did not substantially influence the results, no substantive reason was found to remove any additional transactions from the sample. Therefore, the final dataset included a total of 7,459 cases, of which 4,937 occurred post-construction.

Homoskedasticity: A standard formal test for the presence of homoskedastic error terms is the White's statistic (White, 1980). However, the requirements to perform this test were overly burdensome for the computing power available. Instead, an informal test was applied, which plots the regression errors against predicted values and various independent variables to observe whether a "heteroskedastic pattern" is in evidence (Gujarati, 2003). Although no evidence of heteroskedasticity was found using this method, to be conservative, nonetheless all models were

run with White's heteroskedasticity correction to the parameter estimates' standard errors (which will not adversely influence the errors if they are homoskedastic).

Serial Autocorrelation: A standard formal test for the presence of serial autocorrelation in the error term is the Durbin-Watson statistic (Durbin and Watson, 1951). Applying this test as proposed by Durbin and Watson to the full panel dataset was problematic because the test looks at the error structure based on the order that observations are included in the statistical regression model. Any ordering choice over the entire panel data set invariably involves mixing home transactions from various study areas. Ideally, one would segment the data by study area for purposes of calculating this test, but that method was not easily implemented with the statistical software package used for this analysis (i.e., SAS). Instead, study area specific regression models were run with the data chronologically ordered in each to produce twelve different Durbin-Watson statistics, one for each study area specific model. The Durbin-Watson test statistics ranged from 1.98–2.16, which are all within the acceptable range.[126] Given that serial autocorrelation was not found to be a significant concern for each study area specific model, it is assumed that the same holds for the full dataset used in the analysis presented in this report.

Spatial Autocorrelation: It is well known that the sales price of a home can be systematically influenced by the sales prices of those homes that have sold nearby (Dubin, 1998; LeSage, 1999). Both the seller and the buyer use information from comparable surrounding sales to inform them of the appropriate transaction price, and nearby homes often experience similar amenities and disamenities. Therefore, the price for any single home is likely to be weakly dependent of the prices of homes in close temporal and spatial proximity. This lack of independence of home sale prices could bias the hedonic results (Dubin, 1998; LeSage, 1999), if not adequately addressed. A number of techniques are available to address this concern (Case et al., 2004; Espey et al., 2007), but because of the large sample and computing limits, a variation of the Spatial Auto Regressive Model (SAR) was chosen (Espey et al., 2007).

Specifically, an independent variable is included in the models: the predicted values of the weighted nearest neighbor's natural log of sales price in 1996 dollars.[127] To construct this vector of predicted prices, an auxiliary regression is developed using the spatially weighted average natural log of sales price in 1996 dollars as the independent variable and the spatially weighted average set of home characteristics as the dependent variables. This regression was used to produce the <u>predicted</u> weighted nearest neighbor's natural log of sales price in 1996 dollars that is then included in the Base and Alternative Models. This process required the following steps:

1) Selecting the neighbors for inclusion in the calculation;
2) Calculating a weighted sales price from these neighbors' transactions;
3) Selecting and calculating the weighted neighbors home characteristics; and
4) Forecasting the weighted average neighbor's sales price.

- **Selecting the neighbors**: To select the neighbors whose home transactions would most likely have affected the sales price of the subject home under review, all of the homes that

[126] The critical values for the models were between 1.89 and 2.53, assuming 5% significance, greater than 20 variables, and more than 200 cases (Gujarati, 2003).

[127] The predicted value was used, instead of the actual value, to help correct for simultaneity or endogeneity problems that might otherwise exist.

sold within the preceding six months of a subject home's sale date in the same study area are identified and, from those, the five nearest neighbors based on Euclidian distance are selected. The inverse of each selected nearest neighbors' distance (in quarter miles) to the subject home was then calculated. Each of these values was then divided by the sum of the five nearest neighbor's inverse distance values to create a neighbor's distance weight (NDW) for each of the five nearest neighbors.[128]

- **Creating the weighted sales price**: Each of the neighbor's natural log of sales price in 1996 dollars (LN_Saleprice96) is multiplied by its distance weight (NDW). Then, each weighted neighbor's LN_Saleprice96 is summed to create a weighted nearest neighbor LN_Saleprice96 (Nbr_LN_Saleprice96).

- **Selecting and calculating the weighted neighbors home characteristics**: Nine independent variables are used from each of the neighbor's homes: square feet, age of the home at the time of sale, age of the home at the time of sale squared, acres, number of full baths, and condition (1-5, with Poor = 1, Below Average = 2, etc.). A weighted average is created of each of the characteristics by multiplying each of the neighbor's individual characteristics by their NDW, and then summing those values across the five neighbors to create the weighted average nearest neighbors' home characteristic.[129] Then each of the independent variables is interacted with the study area to allow each one to be independently estimated for each study area.

- **Forecasting the weighted average neighbors sales price**: To create the final predicted neighbor's price, the weighted nearest neighbor LN_Saleprice96 is regressed on the weighted average nearest neighbors' home characteristics to produce a predicted weighted nearest neighbor LN_Saleprice96 (Nbr_LN_SalePrice96_hat). These predicted values are then included in the Base and Alternative Models as independent variables to account for the spatial and temporal influence of the neighbors' home transactions.

In all models, the coefficient for this spatial adjustment parameter meets the expectations for sign and magnitude and is significant well above the 99% level, indicating both the presence of spatial autocorrelation and the appropriateness of the control for it.

Multicollinearity: There are several standard formal tests for detecting multicollinearity within the independent variables of a regression model. The Variance-Inflation Factor and Condition Index is applied to test for this violation of OLS assumptions. Specifically, a Variance-Inflation Factor (VIF) greater than 4 and/or a Condition Index of greater than 30 (Kleinbaum et al., 1988) are strong indicators that multicollinearity may exist. Multicollinearity is found in the model using both tests. Such a result is not uncommon in hedonic models because a number of characteristics, such as square feet or age of a home, are often correlated with other characteristics, such as the number of acres, bathrooms, and fireplaces. Not surprisingly, age of the home at the time of sale (AgeofHome) and the age of the home squared (AgeatHome_Sqrd)

[128] Put differently, the weight is the contribution of that home's inverse distance to the total sum of the five nearest neighbors' inverse distances.

[129] Condition requires rounding to the nearest integer and then creating a dummy from the 1-5 integers.

exhibited some multicollinearity (VIF equaled 11.8 and 10.6, respectively). Additionally, the home condition shows a fairly high Condition Index with square feet, indicating collinearity. More importantly, though, are the collinearity statistics for the variables of interest. The VIF for the VIEW variables range from 1.17 to 1.18 and for the DISTANCE variables they range from 1.2 to 3.6, indicating little collinearity with the other variables in the model. To test for this in another way, a number of models are compared with various identified highly collinear variables removed (e.g., AgeatSale, Sqft) and found that the removal of these variables had little influence on the variables of interest. Therefore, despite the presence of multicollinearity in the model, it is not believed that the variables of interest are inappropriately influenced. Further, any corrections for these issues might cause more harm to the model's estimating efficiency than taking no further action (Gujarati, 2003); as such, no specific adjustments to address the presence of multicollinearity are pursued further.

Appendix H: Alternative Models: Full Hedonic Regression Results

Table A - 6: Full Results for the Distance Stability Model

	Coef.	SE	p Value	*n*
Intercept	7.61	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.33	0.04	0.00	87
Cnd_Low	-0.45	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.13	0.01	0.00	1,445
Cnd_High	0.23	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.03	0.00	1,071
OKCC	-0.44	0.02	0.00	476
IABV	-0.24	0.02	0.00	605
ILLC	-0.08	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.30	0.03	0.00	291
PAWC	-0.07	0.03	0.01	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
Mile_Less_0_57	-0.04	0.04	0.29	67
Mile_0_57to1	-0.06	0.05	0.27	58
Mile_1to3	-0.01	0.02	0.71	2,019
Mile_3to5	0.01	0.01	0.26	1,923
Mile_Gtr5	Omitted	Omitted	Omitted	870

"Omitted" = reference category for fixed effects variables

"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**2**
Model Name	**Distance Stability**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**33**
F Statistic	**496.7**
Adjusted R Squared	**0.77**

Table A - 7: Full Results for the View Stability Model

	Coef.	SE	Sig	*n*
Intercept	7.64	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.34	0.04	0.00	87
Cnd_Low	-0.45	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.13	0.01	0.00	1,445
Cnd_High	0.23	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.02	0.00	1,071
OKCC	-0.45	0.02	0.00	476
IABV	-0.25	0.02	0.00	605
ILLC	-0.09	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.31	0.03	0.00	291
PAWC	-0.08	0.03	0.00	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
Post_Con_NoView	Omitted	Omitted	Omitted	4,207
View_Minor	-0.02	0.01	0.25	561
View_Mod	0.00	0.03	0.90	106
View_Sub	-0.04	0.06	0.56	35
View_Extrm	-0.03	0.06	0.61	28

"Omitted" = reference category for fixed effects variables

"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**3**
Model Name	**View Stability**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**33**
F Statistic	**495.9**
Adjusted R Squared	**0.77**

Table A - 8: Full Results for the Continuous Distance Model

	Coef.	SE	p Value	*n*
Intercept	7.64	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.34	0.04	0.00	87
Cnd_Low	-0.45	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.13	0.01	0.00	1,445
Cnd_High	0.23	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.02	0.00	1,071
OKCC	-0.44	0.02	0.00	476
IABV	-0.25	0.02	0.00	605
ILLC	-0.09	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.31	0.03	0.00	291
PAWC	-0.07	0.03	0.00	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
No View	Omitted	Omitted	Omitted	4,207
Minor View	-0.01	0.01	0.33	561
Moderate View	0.01	0.03	0.77	106
Substantial View	-0.02	0.07	0.72	35
Extreme View	0.01	0.10	0.88	28
InvDISTANCE	-0.01	0.02	0.46	4,937

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**5**
Model Name	**Continuous Distance Model**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**34**
F Statistic	**481.3**
Adjusted R Squared	**0.77**

Table A - 9: Full Results for the All Sales Model

	Coef.	SE	p Value	*n*
Intercept	9.08	0.14	0.00	
Nbr_LN_SP96_hat_All_OI	0.16	0.01	0.00	7,459
AgeatSale	-0.007	0.0003	0.00	7,459
AgeatSale_Sqrd	0.00003	0.000002	0.00	7,459
Sqft_1000	0.28	0.01	0.00	7,459
Acres	0.02	0.00	0.00	7,459
Baths	0.08	0.01	0.00	7,459
ExtWalls_Stone	0.21	0.01	0.00	2,287
CentralAC	0.12	0.01	0.00	3,785
Fireplace	0.11	0.01	0.00	2,708
FinBsmt	0.09	0.01	0.00	990
Cul_De_Sac	0.09	0.01	0.00	1,472
Water_Front	0.35	0.03	0.00	107
Cnd_Low	-0.43	0.04	0.00	101
Cnd_BAvg	-0.21	0.02	0.00	519
Cnd_Avg	Omitted	Omitted	Omitted	4,357
Cnd_AAvg	0.13	0.01	0.00	2,042
Cnd_High	0.22	0.02	0.00	440
Vista_Poor	-0.25	0.02	0.00	470
Vista_BAvg	-0.09	0.01	0.00	4,301
Vista_Avg	Omitted	Omitted	Omitted	1,912
Vista_AAvg	0.10	0.01	0.00	659
Vista_Prem	0.09	0.03	0.00	117
WAOR	Omitted	Omitted	Omitted	790
TXHC	-0.82	0.02	0.00	1,311
OKCC	-0.53	0.02	0.00	1,113
IABV	-0.31	0.02	0.00	822
ILLC	-0.05	0.02	0.02	412
WIKCDC	-0.17	0.01	0.00	810
PASC	-0.37	0.03	0.00	494
PAWC	-0.15	0.02	0.00	551
NYMCOC	-0.25	0.02	0.00	463
NYMC	-0.15	0.02	0.00	693
Pre-Construction Sales	Omitted	Omitted	Omitted	2,522
No View	0.02	0.01	0.06	4,207
Minor View	0.00	0.02	0.76	561
Moderate View	0.03	0.03	0.38	106
Substantial View	0.03	0.07	0.63	35
Extreme View	0.06	0.08	0.43	28
Inside 3000 Feet	-0.06	0.05	0.23	80
Between 3000 Feet and 1 Mile	-0.08	0.05	0.08	65
Between 1 and 3 Miles	0.00	0.01	0.79	2,359
Between 3 and 5 Miles	0.01	0.01	0.58	2,200
Outside 5 Miles	0.00	0.02	0.76	1,000
Pre-Announcement Sales	Omitted	Omitted	Omitted	1,755

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**6**
Model Name	**All Sales Model**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**7459**
Number of Predictors (k)	**39**
F Statistic	**579.9**
Adjusted R Squared	**0.75**

Table A - 10: Full Results for the Temporal Aspects Model

	Coef.	SE	p Value	*n*
Intercept	9.11	0.14	0.00	
Nbr_LN_SP96_hat_All_OI	0.16	0.01	0.00	7,459
AgeatSale	-0.007	0.0003	0.00	7,459
AgeatSale_Sqrd	0.00003	0.000002	0.00	7,459
Sqft_1000	0.28	0.01	0.00	7,459
Acres	0.02	0.00	0.00	7,459
Baths	0.08	0.01	0.00	7,459
ExtWalls_Stone	0.21	0.01	0.00	2,287
CentralAC	0.12	0.01	0.00	3,785
Fireplace	0.12	0.01	0.00	2,708
FinBsmt	0.09	0.01	0.00	990
Cul_De_Sac	0.09	0.01	0.00	1,472
Water_Front	0.35	0.03	0.00	107
Cnd_Low	-0.43	0.04	0.00	101
Cnd_BAvg	-0.21	0.02	0.00	519
Cnd_Avg	Omitted	Omitted	Omitted	4,357
Cnd_AAvg	0.13	0.01	0.00	2,042
Cnd_High	0.22	0.02	0.00	440
Vista_Poor	-0.25	0.02	0.00	470
Vista_BAvg	-0.09	0.01	0.00	4,301
Vista_Avg	Omitted	Omitted	Omitted	1,912
Vista_AAvg	0.10	0.01	0.00	659
Vista_Prem	0.09	0.03	0.00	117
WAOR	Omitted	Omitted	Omitted	790
TXHC	-0.82	0.02	0.00	1,311
OKCC	-0.52	0.02	0.00	1,113
IABV	-0.30	0.02	0.00	822
ILLC	-0.04	0.02	0.05	412
WIKCDC	-0.17	0.02	0.00	810
PASC	-0.37	0.03	0.00	494
PAWC	-0.14	0.02	0.00	551
NYMCOC	-0.25	0.02	0.00	463
NYMC	-0.15	0.02	0.00	693

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Note: Results for variables of interest shown on following page

	Coef.	SE	p Value	*n*
No View	Omitted	Omitted	Omitted	6,729
Minor View	-0.02	0.01	0.20	561
Moderate View	0.00	0.03	0.97	106
Substantial View	0.01	0.07	0.87	35
Extreme View	0.04	0.07	0.59	28
Pre_Anc_Gtr2Yr_Lt1Mile	-0.13	0.06	0.02	38
Pre_Anc_2Yr_Lt1Mile	-0.10	0.05	0.06	40
Post_Anc_Pre_Con_Lt1Mile	-0.14	0.06	0.02	21
Post_Con_2Yr_Lt1Mile	-0.09	0.07	0.15	39
Post_Con_2_4Yr_Lt1Mile	-0.01	0.06	0.86	44
Post_Con_Gtr5Yr_Lt1Mile	-0.07	0.08	0.37	42
Pre_Anc_Gtr2Yr_1_3Mile	-0.04	0.03	0.19	283
Pre_Anc_2Yr_1_3Mile	0.00	0.03	0.91	592
Post_Anc_Pre_Con_1_3Mile	-0.02	0.03	0.53	342
Post_Con_2Yr_1_3Mile	0.00	0.03	0.90	807
Post_Con_2_4Yr_1_3Mile	0.01	0.03	0.78	503
Post_Con_Gtr5Yr_1_3Mile	0.00	0.03	0.93	710
Pre_Anc_Gtr2Yr_3_5Mile	0.00	0.04	0.93	157
Pre_Anc_2Yr_3_5Mile	0.00	0.03	0.98	380
Post_Anc_Pre_Con_3_5Mile	0.00	0.03	0.93	299
Post_Con_2Yr_3_5Mile	0.02	0.03	0.56	574
Post_Con_2_4Yr_3_5Mile	0.01	0.03	0.66	594
Post_Con_Gtr5Yr_3_5Mile	0.01	0.03	0.68	758
Pre_Anc_Gtr2Yr_Gtr5Mile	Omitted	Omitted	Omitted	132
Pre_Anc_2Yr_Gtr5Mile	-0.03	0.04	0.39	133
Post_Anc_Pre_Con_Gtr5Mile	-0.03	0.03	0.36	105
Post_Con_2Yr_Gtr5Mile	-0.03	0.03	0.44	215
Post_Con_2_4Yr_Gtr5Mile	0.03	0.03	0.42	227
Post_Con_Gtr5Yr_Gtr5Mile	0.01	0.03	0.72	424

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**7**
Model Name	**Temporal Aspects Model**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**7459**
Number of Predictors (k)	**56**
F Statistic	**404.5**
Adjusted R2	**0.75**

Table A - 11: Full Results for the Orientation Model

	Coef.	SE	p Value	*n*
Intercept	7.62	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.33	0.04	0.00	87
Cnd_Low	-0.44	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.13	0.01	0.00	1,445
Cnd_High	0.24	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.03	0.00	1,071
OKCC	-0.44	0.02	0.00	476
IABV	-0.24	0.02	0.00	605
ILLC	-0.08	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.31	0.03	0.00	291
PAWC	-0.07	0.03	0.01	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
No View	Omitted	Omitted	Omitted	4,207
Minor View	-0.01	0.06	0.92	561
Moderate View	0.00	0.06	0.97	106
Substantial View	-0.01	0.09	0.87	35
Extreme View	0.02	0.17	0.89	28
Inside 3000 Feet	-0.04	0.07	0.55	67
Between 3000 Feet and 1 Mile	-0.05	0.05	0.37	58
Between 1 and 3 Miles	0.00	0.02	0.83	2,019
Between 3 and 5 Miles	0.02	0.01	0.22	1,923
Outside 5 Miles	Omitted	Omitted	Omitted	870
Front Orientation	-0.01	0.06	0.82	294
Back Orientation	0.03	0.06	0.55	280
Side Orientation	-0.03	0.06	0.55	253

"Omitted" = reference category for fixed effects variables

"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**8**
Model Name	**Orientation Model**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**40**
F Statistic	**410.0**
Adjusted R Squared	**0.77**

Table A - 12: Full Results for the Overlap Model

	Coef.	SE	p Value	*n*
Intercept	7.61	0.18	0.00	
Nbr_LN_SalePrice96_hat	0.29	0.02	0.00	4,937
AgeatSale	-0.006	0.0004	0.00	4,937
AgeatSale_Sqrd	0.00002	0.000003	0.00	4,937
Sqft_1000	0.28	0.01	0.00	4,937
Acres	0.02	0.00	0.00	4,937
Baths	0.09	0.01	0.00	4,937
ExtWalls_Stone	0.21	0.02	0.00	1,486
CentralAC	0.09	0.01	0.00	2,575
Fireplace	0.11	0.01	0.00	1,834
FinBsmt	0.08	0.02	0.00	673
Cul_De_Sac	0.10	0.01	0.00	992
Water_Front	0.34	0.04	0.00	87
Cnd_Low	-0.45	0.05	0.00	69
Cnd_BAvg	-0.24	0.02	0.00	350
Cnd_Avg	Omitted	Omitted	Omitted	2,727
Cnd_AAvg	0.13	0.01	0.00	1,445
Cnd_High	0.24	0.02	0.00	337
Vista_Poor	-0.21	0.02	0.00	310
Vista_BAvg	-0.08	0.01	0.00	2,857
Vista_Avg	Omitted	Omitted	Omitted	1,247
Vista_AAvg	0.10	0.02	0.00	448
Vista_Prem	0.13	0.04	0.00	75
WAOR	Omitted	Omitted	Omitted	519
TXHC	-0.75	0.03	0.00	1,071
OKCC	-0.44	0.02	0.00	476
IABV	-0.24	0.02	0.00	605
ILLC	-0.09	0.03	0.00	213
WIKCDC	-0.14	0.02	0.00	725
PASC	-0.31	0.03	0.00	291
PAWC	-0.07	0.03	0.00	222
NYMCOC	-0.20	0.03	0.00	346
NYMC	-0.15	0.02	0.00	469
No View	Omitted	Omitted	Omitted	4,207
Minor View	-0.03	0.02	0.10	561
Moderate View	-0.02	0.04	0.67	106
Substantial View	-0.05	0.09	0.57	35
Extreme View	-0.03	0.10	0.77	28
Inside 3000 Feet	-0.05	0.06	0.41	67
Between 3000 Feet and 1 Mile	-0.05	0.05	0.38	58
Between 1 and 3 Miles	0.00	0.02	0.82	2,019
Between 3 and 5 Miles	0.02	0.01	0.22	1,923
Outside 5 Miles	Omitted	Omitted	Omitted	870
View Does Not Overlap Vista	Omitted	Omitted	Omitted	320
View Barely Overlaps Vista	0.05	0.03	0.09	150
View Somewhat Overlaps Vista	0.01	0.03	0.67	132
View Strongly Overlaps Vista	0.05	0.05	0.31	128

"Omitted" = reference category for fixed effects variables
"n" indicates number of cases in category when category = "1"

Model Information

Model Equation Number	**9**
Model Name	**Overlap Model**
Dependent Variable	**LN_SalePrice96**
Number of Cases	**4937**
Number of Predictors (k)	**40**
F Statistic	**409.7**
Adjusted R Squared	**0.77**

PUBLIC LAW 109–58—AUG. 8, 2005

ENERGY POLICY ACT OF 2005

Public Law 109–58
109th Congress

An Act

Aug. 8, 2005
[H.R. 6]

To ensure jobs for our future with secure, affordable, and reliable energy.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Energy Policy Act of 2005.
42 USC 15801 note.

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Energy Policy Act of 2005".

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.

TITLE I—ENERGY EFFICIENCY

Subtitle A—Federal Programs

Sec. 101. Energy and water saving measures in congressional buildings.
Sec. 102. Energy management requirements.
Sec. 103. Energy use measurement and accountability.
Sec. 104. Procurement of energy efficient products.
Sec. 105. Energy savings performance contracts.
Sec. 106. Voluntary commitments to reduce industrial energy intensity.
Sec. 107. Advanced Building Efficiency Testbed.
Sec. 108. Increased use of recovered mineral component in federally funded projects involving procurement of cement or concrete.
Sec. 109. Federal building performance standards.
Sec. 110. Daylight savings.
Sec. 111. Enhancing energy efficiency in management of Federal lands.

Subtitle B—Energy Assistance and State Programs

Sec. 121. Low-income home energy assistance program.
Sec. 122. Weatherization assistance.
Sec. 123. State energy programs.
Sec. 124. Energy efficient appliance rebate programs.
Sec. 125. Energy efficient public buildings.
Sec. 126. Low income community energy efficiency pilot program.
Sec. 127. State Technologies Advancement Collaborative.
Sec. 128. State building energy efficiency codes incentives.

Subtitle C—Energy Efficient Products

Sec. 131. Energy Star program.
Sec. 132. HVAC maintenance consumer education program.
Sec. 133. Public energy education program.
Sec. 134. Energy efficiency public information initiative.
Sec. 135. Energy conservation standards for additional products.
Sec. 136. Energy conservation standards for commercial equipment.
Sec. 137. Energy labeling.
Sec. 138. Intermittent escalator study.
Sec. 139. Energy efficient electric and natural gas utilities study.
Sec. 140. Energy efficiency pilot program.
Sec. 141. Report on failure to comply with deadlines for new or revised energy conservation standards.

Subtitle D—Public Housing

Sec. 151. Public housing capital fund.

Sec. 152. Energy-efficient appliances.
Sec. 153. Energy efficiency standards.
Sec. 154. Energy strategy for HUD.

TITLE II—RENEWABLE ENERGY

Subtitle A—General Provisions

Sec. 201. Assessment of renewable energy resources.
Sec. 202. Renewable energy production incentive.
Sec. 203. Federal purchase requirement.
Sec. 204. Use of photovoltaic energy in public buildings.
Sec. 205. Biobased products.
Sec. 206. Renewable energy security.
Sec. 207. Installation of photovoltaic system.
Sec. 208. Sugar cane ethanol program.
Sec. 209. Rural and remote community electrification grants.
Sec. 210. Grants to improve the commercial value of forest biomass for electric energy, useful heat, transportation fuels, and other commercial purposes.
Sec. 211. Sense of Congress regarding generation capacity of electricity from renewable energy resources on public lands.

Subtitle B—Geothermal Energy

Sec. 221. Short title.
Sec. 222. Competitive lease sale requirements.
Sec. 223. Direct use.
Sec. 224. Royalties and near-term production incentives.
Sec. 225. Coordination of geothermal leasing and permitting on Federal lands.
Sec. 226. Assessment of geothermal energy potential.
Sec. 227. Cooperative or unit plans.
Sec. 228. Royalty on byproducts.
Sec. 229. Authorities of Secretary to readjust terms, conditions, rentals, and royalties.
Sec. 230. Crediting of rental toward royalty.
Sec. 231. Lease duration and work commitment requirements.
Sec. 232. Advanced royalties required for cessation of production.
Sec. 233. Annual rental.
Sec. 234. Deposit and use of geothermal lease revenues for 5 fiscal years.
Sec. 235. Acreage limitations.
Sec. 236. Technical amendments.
Sec. 237. Intermountain West Geothermal Consortium.

Subtitle C—Hydroelectric

Sec. 241. Alternative conditions and fishways.
Sec. 242. Hydroelectric production incentives.
Sec. 243. Hydroelectric efficiency improvement.
Sec. 244. Alaska State jurisdiction over small hydroelectric projects.
Sec. 245. Flint Creek hydroelectric project.
Sec. 246. Small hydroelectric power projects.

Subtitle D—Insular Energy

Sec. 251. Insular areas energy security.
Sec. 252. Projects enhancing insular energy independence.

TITLE III—OIL AND GAS

Subtitle A—Petroleum Reserve and Home Heating Oil

Sec. 301. Permanent authority to operate the Strategic Petroleum Reserve and other energy programs.
Sec. 302. National Oilheat Research Alliance.
Sec. 303. Site selection.

Subtitle B—Natural Gas

Sec. 311. Exportation or importation of natural gas.
Sec. 312. New natural gas storage facilities.
Sec. 313. Process coordination; hearings; rules of procedure.
Sec. 314. Penalties.
Sec. 315. Market manipulation.
Sec. 316. Natural gas market transparency rules.
Sec. 317. Federal-State liquefied natural gas forums.
Sec. 318. Prohibition of trading and serving by certain individuals.

Subtitle C—Production

Sec. 321. Outer Continental Shelf provisions.

Sec. 322. Hydraulic fracturing.
Sec. 323. Oil and gas exploration and production defined.

Subtitle D—Naval Petroleum Reserve

Sec. 331. Transfer of administrative jurisdiction and environmental remediation, Naval Petroleum Reserve Numbered 2, Kern County, California.
Sec. 332. Naval Petroleum Reserve Numbered 2 Lease Revenue Account.
Sec. 333. Land conveyance, portion of Naval Petroleum Reserve Numbered 2, to City of Taft, California.
Sec. 334. Revocation of land withdrawal.

Subtitle E—Production Incentives

Sec. 341. Definition of Secretary.
Sec. 342. Program on oil and gas royalties in-kind.
Sec. 343. Marginal property production incentives.
Sec. 344. Incentives for natural gas production from deep wells in the shallow waters of the Gulf of Mexico.
Sec. 345. Royalty relief for deep water production.
Sec. 346. Alaska offshore royalty suspension.
Sec. 347. Oil and gas leasing in the National Petroleum Reserve in Alaska.
Sec. 348. North Slope Science Initiative.
Sec. 349. Orphaned, abandoned, or idled wells on Federal land.
Sec. 350. Combined hydrocarbon leasing.
Sec. 351. Preservation of geological and geophysical data.
Sec. 352. Oil and gas lease acreage limitations.
Sec. 353. Gas hydrate production incentive.
Sec. 354. Enhanced oil and natural gas production through carbon dioxide injection.
Sec. 355. Assessment of dependence of State of Hawaii on oil.
Sec. 356. Denali Commission.
Sec. 357. Comprehensive inventory of OCS oil and natural gas resources.

Subtitle F—Access to Federal Lands

Sec. 361. Federal onshore oil and gas leasing and permitting practices.
Sec. 362. Management of Federal oil and gas leasing programs.
Sec. 363. Consultation regarding oil and gas leasing on public land.
Sec. 364. Estimates of oil and gas resources underlying onshore Federal land.
Sec. 365. Pilot project to improve Federal permit coordination.
Sec. 366. Deadline for consideration of applications for permits.
Sec. 367. Fair market value determinations for linear rights-of-way across public lands and National Forests.
Sec. 368. Energy right-of-way corridors on Federal land.
Sec. 369. Oil shale, tar sands, and other strategic unconventional fuels.
Sec. 370. Finger Lakes withdrawal.
Sec. 371. Reinstatement of leases.
Sec. 372. Consultation regarding energy rights-of-way on public land.
Sec. 373. Sense of Congress regarding development of minerals under Padre Island National Seashore.
Sec. 374. Livingston Parish mineral rights transfer.

Subtitle G—Miscellaneous

Sec. 381. Deadline for decision on appeals of consistency determination under the Coastal Zone Management Act of 1972.
Sec. 382. Appeals relating to offshore mineral development.
Sec. 383. Royalty payments under leases under the Outer Continental Shelf Lands Act.
Sec. 384. Coastal impact assistance program.
Sec. 385. Study of availability of skilled workers.
Sec. 386. Great Lakes oil and gas drilling ban.
Sec. 387. Federal coalbed methane regulation.
Sec. 388. Alternate energy-related uses on the Outer Continental Shelf.
Sec. 389. Oil Spill Recovery Institute.
Sec. 390. NEPA review.

Subtitle H—Refinery Revitalization

Sec. 391. Findings and definitions.
Sec. 392. Federal-State regulatory coordination and assistance.

TITLE IV—COAL

Subtitle A—Clean Coal Power Initiative

Sec. 401. Authorization of appropriations.

Sec. 402. Project criteria.
Sec. 403. Report.
Sec. 404. Clean coal centers of excellence.

Subtitle B—Clean Power Projects

Sec. 411. Integrated coal/renewable energy system.
Sec. 412. Loan to place Alaska clean coal technology facility in service.
Sec. 413. Western integrated coal gasification demonstration project.
Sec. 414. Coal gasification.
Sec. 415. Petroleum coke gasification.
Sec. 416. Electron scrubbing demonstration.
Sec. 417. Department of Energy transportation fuels from Illinois basin coal.

Subtitle C—Coal and Related Programs

Sec. 421. Amendment of the Energy Policy Act of 1992.

Subtitle D—Federal Coal Leases

Sec. 431. Short title.
Sec. 432. Repeal of the 160-acre limitation for coal leases.
Sec. 433. Approval of logical mining units.
Sec. 434. Payment of advance royalties under coal leases.
Sec. 435. Elimination of deadline for submission of coal lease operation and reclamation plan.
Sec. 436. Amendment relating to financial assurances with respect to bonus bids.
Sec. 437. Inventory requirement.
Sec. 438. Application of amendments.

TITLE V—INDIAN ENERGY

Sec. 501. Short title.
Sec. 502. Office of Indian Energy Policy and Programs.
Sec. 503. Indian energy.
Sec. 504. Consultation with Indian tribes.
Sec. 505. Four Corners transmission line project and electrification.
Sec. 506. Energy efficiency in federally assisted housing.

TITLE VI—NUCLEAR MATTERS

Subtitle A—Price-Anderson Act Amendments

Sec. 601. Short title.
Sec. 602. Extension of indemnification authority.
Sec. 603. Maximum assessment.
Sec. 604. Department liability limit.
Sec. 605. Incidents outside the United States.
Sec. 606. Reports.
Sec. 607. Inflation adjustment.
Sec. 608. Treatment of modular reactors.
Sec. 609. Applicability.
Sec. 610. Civil penalties.

Subtitle B—General Nuclear Matters

Sec. 621. Licenses.
Sec. 622. Nuclear Regulatory Commission scholarship and fellowship program.
Sec. 623. Cost recovery from Government agencies.
Sec. 624. Elimination of pension offset for certain rehired Federal retirees.
Sec. 625. Antitrust review.
Sec. 626. Decommissioning.
Sec. 627. Limitation on legal fee reimbursement.
Sec. 628. Decommissioning pilot program.
Sec. 629. Whistleblower protection.
Sec. 630. Medical isotope production.
Sec. 631. Safe disposal of greater-than-Class C radioactive waste.
Sec. 632. Prohibition on nuclear exports to countries that sponsor terrorism.
Sec. 633. Employee benefits.
Sec. 634. Demonstration hydrogen production at existing nuclear power plants.
Sec. 635. Prohibition on assumption by United States Government of liability for certain foreign incidents.
Sec. 636. Authorization of appropriations.
Sec. 637. Nuclear Regulatory Commission user fees and annual charges.
Sec. 638. Standby support for certain nuclear plant delays.
Sec. 639. Conflicts of interest relating to contracts and other arrangements.

Subtitle C—Next Generation Nuclear Plant Project

Sec. 641. Project establishment.
Sec. 642. Project management.
Sec. 643. Project organization.
Sec. 644. Nuclear Regulatory Commission.
Sec. 645. Project timelines and authorization of appropriations.

Subtitle D—Nuclear Security

Sec. 651. Nuclear facility and materials security.
Sec. 652. Fingerprinting and criminal history record checks.
Sec. 653. Use of firearms by security personnel.
Sec. 654. Unauthorized introduction of dangerous weapons.
Sec. 655. Sabotage of nuclear facilities, fuel, or designated material.
Sec. 656. Secure transfer of nuclear materials.
Sec. 657. Department of Homeland Security consultation.

TITLE VII—VEHICLES AND FUELS

Subtitle A—Existing Programs

Sec. 701. Use of alternative fuels by dual fueled vehicles.
Sec. 702. Incremental cost allocation.
Sec. 703. Alternative compliance and flexibility.
Sec. 704. Review of Energy Policy Act of 1992 programs.
Sec. 705. Report concerning compliance with alternative fueled vehicle purchasing requirements.
Sec. 706. Joint flexible fuel/hybrid vehicle commercialization initiative.
Sec. 707. Emergency exemption.

Subtitle B—Hybrid Vehicles, Advanced Vehicles, and Fuel Cell Buses

PART 1—HYBRID VEHICLES

Sec. 711. Hybrid vehicles.
Sec. 712. Efficient hybrid and advanced diesel vehicles.

PART 2—ADVANCED VEHICLES

Sec. 721. Pilot program.
Sec. 722. Reports to Congress.
Sec. 723. Authorization of appropriations.

PART 3—FUEL CELL BUSES

Sec. 731. Fuel cell transit bus demonstration.

Subtitle C—Clean School Buses

Sec. 741. Clean school bus program.
Sec. 742. Diesel truck retrofit and fleet modernization program.
Sec. 743. Fuel cell school buses.

Subtitle D—Miscellaneous

Sec. 751. Railroad efficiency.
Sec. 752. Mobile emission reductions trading and crediting.
Sec. 753. Aviation fuel conservation and emissions.
Sec. 754. Diesel fueled vehicles.
Sec. 755. Conserve by Bicycling Program.
Sec. 756. Reduction of engine idling.
Sec. 757. Biodiesel engine testing program.
Sec. 758. Ultra-efficient engine technology for aircraft.
Sec. 759. Fuel economy incentive requirements.

Subtitle E—Automobile Efficiency

Sec. 771. Authorization of appropriations for implementation and enforcement of fuel economy standards.
Sec. 772. Extension of maximum fuel economy increase for alternative fueled vehicles.
Sec. 773. Study of feasibility and effects of reducing use of fuel for automobiles.
Sec. 774. Update testing procedures.

Subtitle F—Federal and State Procurement

Sec. 781. Definitions.
Sec. 782. Federal and State procurement of fuel cell vehicles and hydrogen energy systems.

Sec. 783. Federal procurement of stationary, portable, and micro fuel cells.

Subtitle G—Diesel Emissions Reduction

Sec. 791. Definitions.
Sec. 792. National grant and loan programs.
Sec. 793. State grant and loan programs.
Sec. 794. Evaluation and report.
Sec. 795. Outreach and incentives.
Sec. 796. Effect of subtitle.
Sec. 797. Authorization of appropriations.

TITLE VIII—HYDROGEN

Sec. 801. Hydrogen and fuel cell program.
Sec. 802. Purposes.
Sec. 803. Definitions.
Sec. 804. Plan.
Sec. 805. Programs.
Sec. 806. Hydrogen and Fuel Cell Technical Task Force.
Sec. 807. Technical Advisory Committee.
Sec. 808. Demonstration.
Sec. 809. Codes and standards.
Sec. 810. Disclosure.
Sec. 811. Reports.
Sec. 812. Solar and wind technologies.
Sec. 813. Technology transfer.
Sec. 814. Miscellaneous provisions.
Sec. 815. Cost sharing.
Sec. 816. Savings clause.

TITLE IX—RESEARCH AND DEVELOPMENT

Sec. 901. Short title.
Sec. 902. Goals.
Sec. 903. Definitions.

Subtitle A—Energy Efficiency

Sec. 911. Energy efficiency.
Sec. 912. Next Generation Lighting Initiative.
Sec. 913. National Building Performance Initiative.
Sec. 914. Building standards.
Sec. 915. Secondary electric vehicle battery use program.
Sec. 916. Energy Efficiency Science Initiative.
Sec. 917. Advanced Energy Efficiency Technology Transfer Centers.

Subtitle B—Distributed Energy and Electric Energy Systems

Sec. 921. Distributed energy and electric energy systems.
Sec. 922. High power density industry program.
Sec. 923. Micro-cogeneration energy technology.
Sec. 924. Distributed energy technology demonstration programs.
Sec. 925. Electric transmission and distribution programs.

Subtitle C—Renewable Energy

Sec. 931. Renewable energy.
Sec. 932. Bioenergy program.
Sec. 933. Low-cost renewable hydrogen and infrastructure for vehicle propulsion.
Sec. 934. Concentrating solar power research program.
Sec. 935. Renewable energy in public buildings.

Subtitle D—Agricultural Biomass Research and Development Programs

Sec. 941. Amendments to the Biomass Research and Development Act of 2000.
Sec. 942. Production incentives for cellulosic biofuels.
Sec. 943. Procurement of biobased products.
Sec. 944. Small business bioproduct marketing and certification grants.
Sec. 945. Regional bioeconomy development grants.
Sec. 946. Preprocessing and harvesting demonstration grants.
Sec. 947. Education and outreach.
Sec. 948. Reports.

Subtitle E—Nuclear Energy

Sec. 951. Nuclear energy.
Sec. 952. Nuclear energy research programs.

Sec. 953. Advanced fuel cycle initiative.
Sec. 954. University nuclear science and engineering support.
Sec. 955. Department of Energy civilian nuclear infrastructure and facilities.
Sec. 956. Security of nuclear facilities.
Sec. 957. Alternatives to industrial radioactive sources.

Subtitle F—Fossil Energy

Sec. 961. Fossil energy.
Sec. 962. Coal and related technologies program.
Sec. 963. Carbon capture research and development program.
Sec. 964. Research and development for coal mining technologies.
Sec. 965. Oil and gas research programs.
Sec. 966. Low-volume oil and gas reservoir research program.
Sec. 967. Complex well technology testing facility.
Sec. 968. Methane hydrate research.

Subtitle G—Science

Sec. 971. Science.
Sec. 972. Fusion energy sciences program.
Sec. 973. Catalysis research program.
Sec. 974. Hydrogen.
Sec. 975. Solid state lighting.
Sec. 976. Advanced scientific computing for energy missions.
Sec. 977. Systems biology program.
Sec. 978. Fission and fusion energy materials research program.
Sec. 979. Energy and water supplies.
Sec. 980. Spallation Neutron Source.
Sec. 981. Rare isotope accelerator.
Sec. 982. Office of Scientific and Technical Information.
Sec. 983. Science and engineering education pilot program.
Sec. 984. Energy research fellowships.
Sec. 984A. Science and technology scholarship program.

Subtitle H—International Cooperation

Sec. 985. Western Hemisphere energy cooperation.
Sec. 986. Cooperation between United States and Israel.
Sec. 986A. International energy training.

Subtitle I—Research Administration and Operations

Sec. 987. Availability of funds.
Sec. 988. Cost sharing.
Sec. 989. Merit review of proposals.
Sec. 990. External technical review of Departmental programs.
Sec. 991. National Laboratory designation.
Sec. 992. Report on equal employment opportunity practices.
Sec. 993. Strategy and plan for science and energy facilities and infrastructure.
Sec. 994. Strategic research portfolio analysis and coordination plan.
Sec. 995. Competitive award of management contracts.
Sec. 996. Western Michigan demonstration project.
Sec. 997. Arctic Engineering Research Center.
Sec. 998. Barrow Geophysical Research Facility.

Subtitle J—Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources

Sec. 999A. Program authority.
Sec. 999B. Ultra-deepwater and unconventional onshore natural gas and other petroleum research and development program.
Sec. 999C. Additional requirements for awards.
Sec. 999D. Advisory committees.
Sec. 999E. Limits on participation.
Sec. 999F. Sunset.
Sec. 999G. Definitions.
Sec. 999H. Funding.

TITLE X—DEPARTMENT OF ENERGY MANAGEMENT

Sec. 1001. Improved technology transfer of energy technologies.
Sec. 1002. Technology Infrastructure Program.
Sec. 1003. Small business advocacy and assistance.
Sec. 1004. Outreach.
Sec. 1005. Relationship to other laws.

Sec. 1006. Improved coordination and management of civilian science and technology programs.
Sec. 1007. Other transactions authority.
Sec. 1008. Prizes for achievement in grand challenges of science and technology.
Sec. 1009. Technical corrections.
Sec. 1010. University collaboration.
Sec. 1011. Sense of Congress.

TITLE XI—PERSONNEL AND TRAINING

Sec. 1101. Workforce trends and traineeship grants.
Sec. 1102. Educational programs in science and mathematics.
Sec. 1103. Training guidelines for nonnuclear electric energy industry personnel.
Sec. 1104. National Center for Energy Management and Building Technologies.
Sec. 1105. Improved access to energy-related scientific and technical careers.
Sec. 1106. National Power Plant Operations Technology and Educational Center.

TITLE XII—ELECTRICITY

Sec. 1201. Short title.

Subtitle A—Reliability Standards

Sec. 1211. Electric reliability standards.

Subtitle B—Transmission Infrastructure Modernization

Sec. 1221. Siting of interstate electric transmission facilities.
Sec. 1222. Third-party finance.
Sec. 1223. Advanced transmission technologies.
Sec. 1224. Advanced Power System Technology Incentive Program.

Subtitle C—Transmission Operation Improvements

Sec. 1231. Open nondiscriminatory access.
Sec. 1232. Federal utility participation in Transmission Organizations.
Sec. 1233. Native load service obligation.
Sec. 1234. Study on the benefits of economic dispatch.
Sec. 1235. Protection of transmission contracts in the Pacific Northwest.
Sec. 1236. Sense of Congress regarding locational installed capacity mechanism.

Subtitle D—Transmission Rate Reform

Sec. 1241. Transmission infrastructure investment.
Sec. 1242. Funding new interconnection and transmission upgrades.

Subtitle E—Amendments to PURPA

Sec. 1251. Net metering and additional standards.
Sec. 1252. Smart metering.
Sec. 1253. Cogeneration and small power production purchase and sale requirements.
Sec. 1254. Interconnection.

Subtitle F—Repeal of PUHCA

Sec. 1261. Short title.
Sec. 1262. Definitions.
Sec. 1263. Repeal of the Public Utility Holding Company Act of 1935.
Sec. 1264. Federal access to books and records.
Sec. 1265. State access to books and records.
Sec. 1266. Exemption authority.
Sec. 1267. Affiliate transactions.
Sec. 1268. Applicability.
Sec. 1269. Effect on other regulations.
Sec. 1270. Enforcement.
Sec. 1271. Savings provisions.
Sec. 1272. Implementation.
Sec. 1273. Transfer of resources.
Sec. 1274. Effective date.
Sec. 1275. Service allocation.
Sec. 1276. Authorization of appropriations.
Sec. 1277. Conforming amendments to the Federal Power Act.

Subtitle G—Market Transparency, Enforcement, and Consumer Protection

Sec. 1281. Electricity market transparency.
Sec. 1282. False statements.

Sec. 1283. Market manipulation.
Sec. 1284. Enforcement.
Sec. 1285. Refund effective date.
Sec. 1286. Refund authority.
Sec. 1287. Consumer privacy and unfair trade practices.
Sec. 1288. Authority of court to prohibit individuals from serving as officers, directors, and energy traders.
Sec. 1289. Merger review reform.
Sec. 1290. Relief for extraordinary violations.

Subtitle H—Definitions

Sec. 1291. Definitions.

Subtitle I—Technical and Conforming Amendments

Sec. 1295. Conforming amendments.

Subtitle J—Economic Dispatch

Sec. 1298. Economic dispatch.

TITLE XIII—ENERGY POLICY TAX INCENTIVES

Sec. 1300. Short title; amendment to 1986 Code.

Subtitle A—Electricity Infrastructure

Sec. 1301. Extension and modification of renewable electricity production credit.
Sec. 1302. Application of section 45 credit to agricultural cooperatives.
Sec. 1303. Clean renewable energy bonds.
Sec. 1304. Treatment of income of certain electric cooperatives.
Sec. 1305. Dispositions of transmission property to implement FERC restructuring policy.
Sec. 1306. Credit for production from advanced nuclear power facilities.
Sec. 1307. Credit for investment in clean coal facilities.
Sec. 1308. Electric transmission property treated as 15-year property.
Sec. 1309. Expansion of amortization for certain atmospheric pollution control facilities in connection with plants first placed in service after 1975.
Sec. 1310. Modifications to special rules for nuclear decommissioning costs.
Sec. 1311. Five-year net operating loss carryover for certain losses.

Subtitle B—Domestic Fossil Fuel Security

Sec. 1321. Extension of credit for producing fuel from a nonconventional source for facilities producing coke or coke gas.
Sec. 1322. Modification of credit for producing fuel from a nonconventional source.
Sec. 1323. Temporary expensing for equipment used in refining of liquid fuels.
Sec. 1324. Pass through to owners of deduction for capital costs incurred by small refiner cooperatives in complying with Environmental Protection Agency sulfur regulations.
Sec. 1325. Natural gas distribution lines treated as 15-year property.
Sec. 1326. Natural gas gathering lines treated as 7-year property.
Sec. 1327. Arbitrage rules not to apply to prepayments for natural gas.
Sec. 1328. Determination of small refiner exception to oil depletion deduction.
Sec. 1329. Amortization of geological and geophysical expenditures.

Subtitle C—Conservation and Energy Efficiency Provisions

Sec. 1331. Energy efficient commercial buildings deduction.
Sec. 1332. Credit for construction of new energy efficient homes.
Sec. 1333. Credit for certain nonbusiness energy property.
Sec. 1334. Credit for energy efficient appliances.
Sec. 1335. Credit for residential energy efficient property.
Sec. 1336. Credit for business installation of qualified fuel cells and stationary microturbine power plants.
Sec. 1337. Business solar investment tax credit.

Subtitle D—Alternative Motor Vehicles and Fuels Incentives

Sec. 1341. Alternative motor vehicle credit.
Sec. 1342. Credit for installation of alternative fueling stations.
Sec. 1343. Reduced motor fuel excise tax on certain mixtures of diesel fuel.
Sec. 1344. Extension of excise tax provisions and income tax credit for biodiesel.
Sec. 1345. Small agri-biodiesel producer credit.
Sec. 1346. Renewable diesel.
Sec. 1347. Modification of small ethanol producer credit.
Sec. 1348. Sunset of deduction for clean-fuel vehicles and certain refueling property.

Subtitle E—Additional Energy Tax Incentives

Sec. 1351. Expansion of research credit.
Sec. 1352. National Academy of Sciences study and report.
Sec. 1353. Recycling study.

Subtitle F—Revenue Raising Provisions

Sec. 1361. Oil Spill Liability Trust Fund financing rate.
Sec. 1362. Extension of Leaking Underground Storage Tank Trust Fund financing rate.
Sec. 1363. Modification of recapture rules for amortizable section 197 intangibles.
Sec. 1364. Clarification of tire excise tax.

TITLE XIV—MISCELLANEOUS

Subtitle A—In General

Sec. 1401. Sense of Congress on risk assessments.
Sec. 1402. Energy production incentives.
Sec. 1403. Regulation of certain oil used in transformers.
Sec. 1404. Petrochemical and oil refinery facility health assessment.
Sec. 1405. National Priority Project Designation.
Sec. 1406. Cold cracking.
Sec. 1407. Oxygen-fuel.

Subtitle B—Set America Free

Sec. 1421. Short title.
Sec. 1422. Purpose.
Sec. 1423. United States Commission on North American Energy Freedom.
Sec. 1424. North American energy freedom policy.

TITLE XV—ETHANOL AND MOTOR FUELS

Subtitle A—General Provisions

Sec. 1501. Renewable content of gasoline.
Sec. 1502. Findings.
Sec. 1503. Claims filed after enactment.
Sec. 1504. Elimination of oxygen content requirement for reformulated gasoline.
Sec. 1505. Public health and environmental impacts of fuels and fuel additives.
Sec. 1506. Analyses of motor vehicle fuel changes.
Sec. 1507. Additional opt-in areas under reformulated gasoline program.
Sec. 1508. Data collection.
Sec. 1509. Fuel system requirements harmonization study.
Sec. 1510. Commercial byproducts from municipal solid waste and cellulosic biomass loan guarantee program.
Sec. 1511. Renewable fuel.
Sec. 1512. Conversion assistance for cellulosic biomass, waste-derived ethanol, approved renewable fuels.
Sec. 1513. Blending of compliant reformulated gasolines.
Sec. 1514. Advanced biofuel technologies program.
Sec. 1515. Waste-derived ethanol and biodiesel.
Sec. 1516. Sugar ethanol loan guarantee program.

Subtitle B—Underground Storage Tank Compliance

Sec. 1521. Short title.
Sec. 1522. Leaking underground storage tanks.
Sec. 1523. Inspection of underground storage tanks.
Sec. 1524. Operator training.
Sec. 1525. Remediation from oxygenated fuel additives.
Sec. 1526. Release prevention, compliance, and enforcement.
Sec. 1527. Delivery prohibition.
Sec. 1528. Federal facilities.
Sec. 1529. Tanks on tribal lands.
Sec. 1530. Additional measures to protect groundwater.
Sec. 1531. Authorization of appropriations.
Sec. 1532. Conforming amendments.
Sec. 1533. Technical amendments.

Subtitle C—Boutique Fuels

Sec. 1541. Reducing the proliferation of boutique fuels.

TITLE XVI—CLIMATE CHANGE

Subtitle A—National Climate Change Technology Deployment

Sec. 1601. Greenhouse gas intensity reducing technology strategies.

Subtitle B—Climate Change Technology Deployment in Developing Countries

Sec. 1611. Climate change technology deployment in developing countries.

TITLE XVII—INCENTIVES FOR INNOVATIVE TECHNOLOGIES

Sec. 1701. Definitions.
Sec. 1702. Terms and conditions.
Sec. 1703. Eligible projects.
Sec. 1704. Authorization of appropriations.

TITLE XVIII—STUDIES

Sec. 1801. Study on inventory of petroleum and natural gas storage.
Sec. 1802. Study of energy efficiency standards.
Sec. 1803. Telecommuting study.
Sec. 1804. LIHEAP Report.
Sec. 1805. Oil bypass filtration technology.
Sec. 1806. Total integrated thermal systems.
Sec. 1807. Report on energy integration with Latin America.
Sec. 1808. Low-volume gas reservoir study.
Sec. 1809. Investigation of gasoline prices.
Sec. 1810. Alaska natural gas pipeline.
Sec. 1811. Coal bed methane study.
Sec. 1812. Backup fuel capability study.
Sec. 1813. Indian land rights-of-way.
Sec. 1814. Mobility of scientific and technical personnel.
Sec. 1815. Interagency review of competition in the wholesale and retail markets for electric energy.
Sec. 1816. Study of rapid electrical grid restoration.
Sec. 1817. Study of distributed generation.
Sec. 1818. Natural gas supply shortage report.
Sec. 1819. Hydrogen participation study.
Sec. 1820. Overall employment in a hydrogen economy.
Sec. 1821. Study of best management practices for energy research and development programs.
Sec. 1822. Effect of electrical contaminants on reliability of energy production systems.
Sec. 1823. Alternative fuels reports.
Sec. 1824. Final action on refunds for excessive charges.
Sec. 1825. Fuel cell and hydrogen technology study.
Sec. 1826. Passive solar technologies.
Sec. 1827. Study of link between energy security and increases in vehicle miles traveled.
Sec. 1828. Science study on cumulative impacts of multiple offshore liquefied natural gas facilities.
Sec. 1829. Energy and water saving measures in congressional buildings.
Sec. 1830. Study of availability of skilled workers.
Sec. 1831. Review of Energy Policy Act of 1992 programs.
Sec. 1832. Study on the benefits of economic dispatch.
Sec. 1833. Renewable energy on Federal land.
Sec. 1834. Increased hydroelectric generation at existing Federal facilities.
Sec. 1835. Split-estate Federal oil and gas leasing and development practices.
Sec. 1836. Resolution of Federal resource development conflicts in the Powder River Basin.
Sec. 1837. National security review of international energy requirements.
Sec. 1838. Used oil re-refining study.
Sec. 1839. Transmission system monitoring.
Sec. 1840. Report identifying and describing the status of potential hydropower facilities.

42 USC 15801.

SEC. 2. DEFINITIONS.

Except as otherwise provided, in this Act:

(1) DEPARTMENT.—The term "Department" means the Department of Energy.

(2) INSTITUTION OF HIGHER EDUCATION.—

(A) IN GENERAL.—The term "institution of higher education" has the meaning given the term in section 101(a) of the Higher Education Act of 1065 (20 U.S.C. 1001(a)).

(B) INCLUSION.—The term "institution of higher education" includes an organization that—

(i) is organized, and at all times thereafter operated, exclusively for the benefit of, to perform the functions of, or to carry out the functions of one or more organizations referred to in subparagraph (A); and

(ii) is operated, supervised, or controlled by or in connection with one or more of those organizations.

(3) NATIONAL LABORATORY.—The term "National Laboratory" means any of the following laboratories owned by the Department:

(A) Ames Laboratory.
(B) Argonne National Laboratory.
(C) Brookhaven National Laboratory.
(D) Fermi National Accelerator Laboratory.
(E) Idaho National Laboratory.
(F) Lawrence Berkeley National Laboratory.
(G) Lawrence Livermore National Laboratory.
(H) Los Alamos National Laboratory.
(I) National Energy Technology Laboratory.
(J) National Renewable Energy Laboratory.
(K) Oak Ridge National Laboratory.
(L) Pacific Northwest National Laboratory.
(M) Princeton Plasma Physics Laboratory.
(N) Sandia National Laboratories.
(O) Savannah River National Laboratory.
(P) Stanford Linear Accelerator Center.
(Q) Thomas Jefferson National Accelerator Facility.

(4) SECRETARY.—The term "Secretary" means the Secretary of Energy.

(5) SMALL BUSINESS CONCERN.—The term "small business concern" has the meaning given the term in section 3 of the Small Business Act (15 U.S.C. 632).

TITLE I—ENERGY EFFICIENCY

Subtitle A—Federal Programs

SEC. 101. ENERGY AND WATER SAVING MEASURES IN CONGRESSIONAL BUILDINGS.

(a) IN GENERAL.—Part 3 of title V of the National Energy Conservation Policy Act (42 U.S.C. 8251 et seq.) is amended by adding at the end the following:

"SEC. 552. ENERGY AND WATER SAVINGS MEASURES IN CONGRESSIONAL BUILDINGS. 42 USC 8259a.

"(a) IN GENERAL.—The Architect of the Capitol—

"(1) shall develop, update, and implement a cost-effective energy conservation and management plan (referred to in this section as the 'plan') for all facilities administered by Congress (referred to in this section as 'congressional buildings') to meet the energy performance requirements for Federal buildings established under section 543(a)(1); and

"(2) shall submit the plan to Congress, not later than 180 days after the date of enactment of this section. Deadline.

"(b) PLAN REQUIREMENTS.—The plan shall include—

"(1) a description of the life cycle cost analysis used to determine the cost-effectiveness of proposed energy efficiency projects;

"(2) a schedule of energy surveys to ensure complete surveys of all congressional buildings every 5 years to determine the cost and payback period of energy and water conservation measures;

"(3) a strategy for installation of life cycle cost-effective energy and water conservation measures;

"(4) the results of a study of the costs and benefits of installation of submetering in congressional buildings; and

"(5) information packages and 'how-to' guides for each Member and employing authority of Congress that detail simple, cost-effective methods to save energy and taxpayer dollars in the workplace.

"(c) ANNUAL REPORT.—The Architect of the Capitol shall submit to Congress annually a report on congressional energy management and conservation programs required under this section that describes in detail—

"(1) energy expenditures and savings estimates for each facility;

"(2) energy management and conservation projects; and

"(3) future priorities to ensure compliance with this section.".

(b) TABLE OF CONTENTS AMENDMENT.—The table of contents of the National Energy Conservation Policy Act is amended by adding at the end of the items relating to part 3 of title V the following new item:

"Sec. 552. Energy and water savings measures in congressional buildings.".

(c) REPEAL.—Section 310 of the Legislative Branch Appropriations Act, 1999 (2 U.S.C. 1815), is repealed.

SEC. 102. ENERGY MANAGEMENT REQUIREMENTS.

(a) ENERGY REDUCTION GOALS.—

(1) AMENDMENT.—Section 543(a)(1) of the National Energy Conservation Policy Act (42 U.S.C. 8253(a)(1)) is amended by striking "its Federal buildings so that" and all that follows through the end and inserting "the Federal buildings of the agency (including each industrial or laboratory facility) so that the energy consumption per gross square foot of the Federal buildings of the agency in fiscal years 2006 through 2015 is reduced, as compared with the energy consumption per gross square foot of the Federal buildings of the agency in fiscal year 2003, by the percentage specified in the following table:

"Fiscal Year	Percentage reduction
2006	2
2007	4
2008	6
2009	8
2010	10
2011	12
2012	14
2013	16
2014	18
2015	20.".

42 USC 8253 note.

(2) REPORTING BASELINE.—The energy reduction goals and baseline established in paragraph (1) of section 543(a) of the

National Energy Conservation Policy Act (42 U.S.C. 8253(a)(1)), as amended by this subsection, supersede all previous goals and baselines under such paragraph, and related reporting requirements.

(b) REVIEW AND REVISION OF ENERGY PERFORMANCE REQUIREMENT.—Section 543(a) of the National Energy Conservation Policy Act (42 U.S.C. 8253(a)) is further amended by adding at the end the following:

"(3) Not later than December 31, 2014, the Secretary shall review the results of the implementation of the energy performance requirement established under paragraph (1) and submit to Congress recommendations concerning energy performance requirements for fiscal years 2016 through 2025.". Deadline.

(c) EXCLUSIONS.—Section 543(c)(1) of the National Energy Conservation Policy Act (42 U.S.C. 8253(c)(1)) is amended by striking "An agency may exclude" and all that follows through the end and inserting "(A) An agency may exclude, from the energy performance requirement for a fiscal year established under subsection (a) and the energy management requirement established under subsection (b), any Federal building or collection of Federal buildings, if the head of the agency finds that—

"(i) compliance with those requirements would be impracticable;

"(ii) the agency has completed and submitted all federally required energy management reports;

"(iii) the agency has achieved compliance with the energy efficiency requirements of this Act, the Energy Policy Act of 1992, Executive orders, and other Federal law; and

"(iv) the agency has implemented all practicable, life cycle cost-effective projects with respect to the Federal building or collection of Federal buildings to be excluded.

"(B) A finding of impracticability under subparagraph (A)(i) shall be based on—

"(i) the energy intensiveness of activities carried out in the Federal building or collection of Federal buildings; or

"(ii) the fact that the Federal building or collection of Federal buildings is used in the performance of a national security function.".

(d) REVIEW BY SECRETARY.—Section 543(c)(2) of the National Energy Conservation Policy Act (42 U.S.C. 8253(c)(2)) is amended—

(1) by striking "impracticability standards" and inserting "standards for exclusion";

(2) by striking "a finding of impracticability" and inserting "the exclusion"; and

(3) by striking "energy consumption requirements" and inserting "requirements of subsections (a) and (b)(1)".

(e) CRITERIA.—Section 543(c) of the National Energy Conservation Policy Act (42 U.S.C. 8253(c)) is further amended by adding at the end the following:

"(3) Not later than 180 days after the date of enactment of this paragraph, the Secretary shall issue guidelines that establish criteria for exclusions under paragraph (1).". Deadline. Guidelines.

(f) RETENTION OF ENERGY AND WATER SAVINGS.—Section 546 of the National Energy Conservation Policy Act (42 U.S.C. 8256) is amended by adding at the end the following new subsection:

"(e) RETENTION OF ENERGY AND WATER SAVINGS.—An agency may retain any funds appropriated to that agency for energy

expenditures, water expenditures, or wastewater treatment expenditures, at buildings subject to the requirements of section 543(a) and (b), that are not made because of energy savings or water savings. Except as otherwise provided by law, such funds may be used only for energy efficiency, water conservation, or unconventional and renewable energy resources projects. Such projects shall be subject to the requirements of section 3307 of title 40, United States Code.".

(g) REPORTS.—Section 548(b) of the National Energy Conservation Policy Act (42 U.S.C. 8258(b)) is amended—

(1) in the subsection heading, by inserting "THE PRESIDENT AND" before "CONGRESS"; and

(2) by inserting "President and" before "Congress".

(h) CONFORMING AMENDMENT.—Section 550(d) of the National Energy Conservation Policy Act (42 U.S.C. 8258b(d)) is amended in the second sentence by striking "the 20 percent reduction goal established under section 543(a) of the National Energy Conservation Policy Act (42 U.S.C. 8253(a))." and inserting "each of the energy reduction goals established under section 543(a).".

SEC. 103. ENERGY USE MEASUREMENT AND ACCOUNTABILITY.

Section 543 of the National Energy Conservation Policy Act (42 U.S.C. 8253) is further amended by adding at the end the following:

"(e) METERING OF ENERGY USE.—

"(1) DEADLINE.—By October 1, 2012, in accordance with guidelines established by the Secretary under paragraph (2), all Federal buildings shall, for the purposes of efficient use of energy and reduction in the cost of electricity used in such buildings, be metered. Each agency shall use, to the maximum extent practicable, advanced meters or advanced metering devices that provide data at least daily and that measure at least hourly consumption of electricity in the Federal buildings of the agency. Such data shall be incorporated into existing Federal energy tracking systems and made available to Federal facility managers.

"(2) GUIDELINES.—

Deadline.

"(A) IN GENERAL.—Not later than 180 days after the date of enactment of this subsection, the Secretary, in consultation with the Department of Defense, the General Services Administration, representatives from the metering industry, utility industry, energy services industry, energy efficiency industry, energy efficiency advocacy organizations, national laboratories, universities, and Federal facility managers, shall establish guidelines for agencies to carry out paragraph (1).

"(B) REQUIREMENTS FOR GUIDELINES.—The guidelines shall—

"(i) take into consideration—

"(I) the cost of metering and the reduced cost of operation and maintenance expected to result from metering;

"(II) the extent to which metering is expected to result in increased potential for energy management, increased potential for energy savings and energy efficiency improvement, and cost and

energy savings due to utility contract aggregation; and

"(III) the measurement and verification protocols of the Department of Energy;

"(ii) include recommendations concerning the amount of funds and the number of trained personnel necessary to gather and use the metering information to track and reduce energy use;

"(iii) establish priorities for types and locations of buildings to be metered based on cost-effectiveness and a schedule of one or more dates, not later than 1 year after the date of issuance of the guidelines, on which the requirements specified in paragraph (1) shall take effect; and

"(iv) establish exclusions from the requirements specified in paragraph (1) based on the de minimis quantity of energy use of a Federal building, industrial process, or structure.

"(3) PLAN.—Not later than 6 months after the date guidelines are established under paragraph (2), in a report submitted by the agency under section 548(a), each agency shall submit to the Secretary a plan describing how the agency will implement the requirements of paragraph (1), including (A) how the agency will designate personnel primarily responsible for achieving the requirements and (B) demonstration by the agency, complete with documentation, of any finding that advanced meters or advanced metering devices, as defined in paragraph (1), are not practicable.". Deadline.

SEC. 104. PROCUREMENT OF ENERGY EFFICIENT PRODUCTS.

(a) REQUIREMENTS.—Part 3 of title V of the National Energy Conservation Policy Act (42 U.S.C. 8251 et seq.), as amended by section 101, is amended by adding at the end the following:

"SEC. 553. FEDERAL PROCUREMENT OF ENERGY EFFICIENT PRODUCTS. 42 USC 8259b.

"(a) DEFINITIONS.—In this section:

"(1) AGENCY.—The term 'agency' has the meaning given that term in section 7902(a) of title 5, United States Code.

"(2) ENERGY STAR PRODUCT.—The term 'Energy Star product' means a product that is rated for energy efficiency under an Energy Star program.

"(3) ENERGY STAR PROGRAM.—The term 'Energy Star program' means the program established by section 324A of the Energy Policy and Conservation Act.

"(4) FEMP DESIGNATED PRODUCT.—The term 'FEMP designated product' means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency.

"(5) PRODUCT.—The term 'product' does not include any energy consuming product or system designed or procured for combat or combat-related missions.

"(b) PROCUREMENT OF ENERGY EFFICIENT PRODUCTS.—

"(1) REQUIREMENT.—To meet the requirements of an agency for an energy consuming product, the head of the agency shall, except as provided in paragraph (2), procure—

"(A) an Energy Star product; or

"(B) a FEMP designated product.

"(2) EXCEPTIONS.—The head of an agency is not required to procure an Energy Star product or FEMP designated product under paragraph (1) if the head of the agency finds in writing that—

"(A) an Energy Star product or FEMP designated product is not cost-effective over the life of the product taking energy cost savings into account; or

"(B) no Energy Star product or FEMP designated product is reasonably available that meets the functional requirements of the agency.

"(3) PROCUREMENT PLANNING.—The head of an agency shall incorporate into the specifications for all procurements involving energy consuming products and systems, including guide specifications, project specifications, and construction, renovation, and services contracts that include provision of energy consuming products and systems, and into the factors for the evaluation of offers received for the procurement, criteria for energy efficiency that are consistent with the criteria used for rating Energy Star products and for rating FEMP designated products.

"(c) LISTING OF ENERGY EFFICIENT PRODUCTS IN FEDERAL CATALOGS.—Energy Star products and FEMP designated products shall be clearly identified and prominently displayed in any inventory or listing of products by the General Services Administration or the Defense Logistics Agency. The General Services Administration or the Defense Logistics Agency shall supply only Energy Star products or FEMP designated products for all product categories covered by the Energy Star program or the Federal Energy Management Program, except in cases where the agency ordering a product specifies in writing that no Energy Star product or FEMP designated product is available to meet the buyer's functional requirements, or that no Energy Star product or FEMP designated product is cost-effective for the intended application over the life of the product, taking energy cost savings into account.

Standards.

Deadline.

"(d) SPECIFIC PRODUCTS.—(1) In the case of electric motors of 1 to 500 horsepower, agencies shall select only premium efficient motors that meet a standard designated by the Secretary. The Secretary shall designate such a standard not later than 120 days after the date of the enactment of this section, after considering the recommendations of associated electric motor manufacturers and energy efficiency groups.

"(2) All Federal agencies are encouraged to take actions to maximize the efficiency of air conditioning and refrigeration equipment, including appropriate cleaning and maintenance, including the use of any system treatment or additive that will reduce the electricity consumed by air conditioning and refrigeration equipment. Any such treatment or additive must be—

"(A) determined by the Secretary to be effective in increasing the efficiency of air conditioning and refrigeration equipment without having an adverse impact on air conditioning performance (including cooling capacity) or equipment useful life;

"(B) determined by the Administrator of the Environmental Protection Agency to be environmentally safe; and

"(C) shown to increase seasonal energy efficiency ratio (SEER) or energy efficiency ratio (EER) when tested by the

National Institute of Standards and Technology according to Department of Energy test procedures without causing any adverse impact on the system, system components, the refrigerant or lubricant, or other materials in the system.

Results of testing described in subparagraph (C) shall be published in the Federal Register for public review and comment. For purposes of this section, a hardware device or primary refrigerant shall not be considered an additive.

Federal Register, publication.

"(e) REGULATIONS.—Not later than 180 days after the date of the enactment of this section, the Secretary shall issue guidelines to carry out this section.".

(b) CONFORMING AMENDMENT.—The table of contents of the National Energy Conservation Policy Act is further amended by inserting after the item relating to section 552 the following new item:

"Sec. 553. Federal procurement of energy efficient products.".

SEC. 105. ENERGY SAVINGS PERFORMANCE CONTRACTS.

(a) EXTENSION.—Section 801(c) of the National Energy Conservation Policy Act (42 U.S.C. 8287(c)) is amended by striking "2006" and inserting "2016".

(b) EXTENSION OF AUTHORITY.—Any energy savings performance contract entered into under section 801 of the National Energy Conservation Policy Act (42 U.S.C. 8287) after October 1, 2003, and before the date of enactment of this Act, shall be considered to have been entered into under that section.

42 USC 8257 note.

SEC. 106. VOLUNTARY COMMITMENTS TO REDUCE INDUSTRIAL ENERGY INTENSITY.

42 USC 15811.

(a) DEFINITION OF ENERGY INTENSITY.—In this section, the term "energy intensity" means the primary energy consumed for each unit of physical output in an industrial process.

(b) VOLUNTARY AGREEMENTS.—The Secretary may enter into voluntary agreements with one or more persons in industrial sectors that consume significant quantities of primary energy for each unit of physical output to reduce the energy intensity of the production activities of the persons.

(c) GOAL.—Voluntary agreements under this section shall have as a goal the reduction of energy intensity by not less than 2.5 percent each year during the period of calendar years 2007 through 2016.

(d) RECOGNITION.—The Secretary, in cooperation with other appropriate Federal agencies, shall develop mechanisms to recognize and publicize the achievements of participants in voluntary agreements under this section.

(e) TECHNICAL ASSISTANCE.—A person that enters into an agreement under this section and continues to make a good faith effort to achieve the energy efficiency goals specified in the agreement shall be eligible to receive from the Secretary a grant or technical assistance, as appropriate, to assist in the achievement of those goals.

(f) REPORT.—Not later than each of June 30, 2012, and June 30, 2017, the Secretary shall submit to Congress a report that—

(1) evaluates the success of the voluntary agreements under this section; and

(2) provides independent verification of a sample of the energy savings estimates provided by participating firms.

42 USC 15812.

SEC. 107. ADVANCED BUILDING EFFICIENCY TESTBED.

(a) ESTABLISHMENT.—The Secretary, in consultation with the Administrator of General Services, shall establish an Advanced Building Efficiency Testbed program for the development, testing, and demonstration of advanced engineering systems, components, and materials to enable innovations in building technologies. The program shall evaluate efficiency concepts for government and industry buildings, and demonstrate the ability of next generation buildings to support individual and organizational productivity and health (including by improving indoor air quality) as well as flexibility and technological change to improve environmental sustainability. Such program shall complement and not duplicate existing national programs.

(b) PARTICIPANTS.—The program established under subsection (a) shall be led by a university with the ability to combine the expertise from numerous academic fields including, at a minimum, intelligent workplaces and advanced building systems and engineering, electrical and computer engineering, computer science, architecture, urban design, and environmental and mechanical engineering. Such university shall partner with other universities and entities who have established programs and the capability of advancing innovative building efficiency technologies.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section $6,000,000 for each of the fiscal years 2006 through 2008, to remain available until expended. For any fiscal year in which funds are expended under this section, the Secretary shall provide one-third of the total amount to the lead university described in subsection (b), and provide the remaining two-thirds to the other participants referred to in subsection (b) on an equal basis.

SEC. 108. INCREASED USE OF RECOVERED MINERAL COMPONENT IN FEDERALLY FUNDED PROJECTS INVOLVING PROCUREMENT OF CEMENT OR CONCRETE.

(a) AMENDMENT.—Subtitle F of the Solid Waste Disposal Act (42 U.S.C. 6961 et seq.) is amended by adding at the end the following:

42 USC 6966.

"INCREASED USE OF RECOVERED MINERAL COMPONENT IN FEDERALLY FUNDED PROJECTS INVOLVING PROCUREMENT OF CEMENT OR CONCRETE

"SEC. 6005. (a) DEFINITIONS.—In this section:

"(1) AGENCY HEAD.—The term 'agency head' means—

"(A) the Secretary of Transportation; and

"(B) the head of any other Federal agency that, on a regular basis, procures, or provides Federal funds to pay or assist in paying the cost of procuring, material for cement or concrete projects.

"(2) CEMENT OR CONCRETE PROJECT.—The term 'cement or concrete project' means a project for the construction or maintenance of a highway or other transportation facility or a Federal, State, or local government building or other public facility that—

"(A) involves the procurement of cement or concrete; and

"(B) is carried out, in whole or in part, using Federal funds.

"(3) RECOVERED MINERAL COMPONENT.—The term 'recovered mineral component' means—

"(A) ground granulated blast furnace slag, excluding lead slag;

"(B) coal combustion fly ash; and

"(C) any other waste material or byproduct recovered or diverted from solid waste that the Administrator, in consultation with an agency head, determines should be treated as recovered mineral component under this section for use in cement or concrete projects paid for, in whole or in part, by the agency head.

"(b) IMPLEMENTATION OF REQUIREMENTS.—

"(1) IN GENERAL.—Not later than 1 year after the date of enactment of this section, the Administrator and each agency head shall take such actions as are necessary to implement fully all procurement requirements and incentives in effect as of the date of enactment of this section (including guidelines under section 6002) that provide for the use of cement and concrete incorporating recovered mineral component in cement or concrete projects. Deadline.

"(2) PRIORITY.—In carrying out paragraph (1), an agency head shall give priority to achieving greater use of recovered mineral component in cement or concrete projects for which recovered mineral components historically have not been used or have been used only minimally.

"(3) FEDERAL PROCUREMENT REQUIREMENTS.—The Administrator and each agency head shall carry out this subsection in accordance with section 6002.

"(c) FULL IMPLEMENTATION STUDY.—

"(1) IN GENERAL.—The Administrator, in cooperation with the Secretary of Transportation and the Secretary of Energy, shall conduct a study to determine the extent to which procurement requirements, when fully implemented in accordance with subsection (b), may realize energy savings and environmental benefits attainable with substitution of recovered mineral component in cement used in cement or concrete projects.

"(2) MATTERS TO BE ADDRESSED.—The study shall—

"(A) quantify—

"(i) the extent to which recovered mineral components are being substituted for Portland cement, particularly as a result of procurement requirements; and

"(ii) the energy savings and environmental benefits associated with the substitution;

"(B) identify all barriers in procurement requirements to greater realization of energy savings and environmental benefits, including barriers resulting from exceptions from the law; and

"(C)(i) identify potential mechanisms to achieve greater substitution of recovered mineral component in types of cement or concrete projects for which recovered mineral components historically have not been used or have been used only minimally;

"(ii) evaluate the feasibility of establishing guidelines or standards for optimized substitution rates of recovered mineral component in those cement or concrete projects; and

"(iii) identify any potential environmental or economic effects that may result from greater substitution of recovered mineral component in those cement or concrete projects.

"(3) REPORT.—Not later than 30 months after the date of enactment of this section, the Administrator shall submit to Congress a report on the study.

Deadline.

"(d) ADDITIONAL PROCUREMENT REQUIREMENTS.—Unless the study conducted under subsection (c) identifies any effects or other problems described in subsection (c)(2)(C)(iii) that warrant further review or delay, the Administrator and each agency head shall, not later than 1 year after the date on which the report under subsection (c)(3) is submitted, take additional actions under this Act to establish procurement requirements and incentives that provide for the use of cement and concrete with increased substitution of recovered mineral component in the construction and maintenance of cement or concrete projects—

"(1) to realize more fully the energy savings and environmental benefits associated with increased substitution; and

"(2) to eliminate barriers identified under subsection (c)(2)(B).

"(e) EFFECT OF SECTION.—Nothing in this section affects the requirements of section 6002 (including the guidelines and specifications for implementing those requirements).".

(b) CONFORMING AMENDMENT.—The table of contents of the Solid Waste Disposal Act is amended by adding after the item relating to section 6004 the following:

"Sec. 6005. Increased use of recovered mineral component in federally funded projects involving procurement of cement or concrete.".

SEC. 109. FEDERAL BUILDING PERFORMANCE STANDARDS.

Section 305(a) of the Energy Conservation and Production Act (42 U.S.C. 6834(a)) is amended—

(1) in paragraph (2)(A), by striking "CABO Model Energy Code, 1992 (in the case of residential buildings) or ASHRAE Standard 90.1–1989" and inserting "the 2004 International Energy Conservation Code (in the case of residential buildings) or ASHRAE Standard 90.1–2004"; and

(2) by adding at the end the following:

Deadline.
Regulations.

"(3)(A) Not later than 1 year after the date of enactment of this paragraph, the Secretary shall establish, by rule, revised Federal building energy efficiency performance standards that require that—

"(i) if life-cycle cost-effective for new Federal buildings—

"(I) the buildings be designed to achieve energy consumption levels that are at least 30 percent below the levels established in the version of the ASHRAE Standard or the International Energy Conservation Code, as appropriate, that is in effect as of the date of enactment of this paragraph; and

"(II) sustainable design principles are applied to the siting, design, and construction of all new and replacement buildings; and

"(ii) if water is used to achieve energy efficiency, water conservation technologies shall be applied to the extent that the technologies are life-cycle cost-effective.

"(B) Not later than 1 year after the date of approval of each subsequent revision of the ASHRAE Standard or the International Energy Conservation Code, as appropriate, the Secretary shall determine, based on the cost-effectiveness of the requirements under the amendment, whether the revised standards established under this paragraph should be updated to reflect the amendment. Deadline.

"(C) In the budget request of the Federal agency for each fiscal year and each report submitted by the Federal agency under section 548(a) of the National Energy Conservation Policy Act (42 U.S.C. 8258(a)), the head of each Federal agency shall include—

"(i) a list of all new Federal buildings owned, operated, or controlled by the Federal agency; and

"(ii) a statement specifying whether the Federal buildings meet or exceed the revised standards established under this paragraph.".

SEC. 110. DAYLIGHT SAVINGS.

(a) AMENDMENT.—Section 3(a) of the Uniform Time Act of 1966 (15 U.S.C. 260a(a)) is amended—

(1) by striking "first Sunday of April" and inserting "second Sunday of March"; and

(2) by striking "last Sunday of October" and inserting "first Sunday of November".

(b) EFFECTIVE DATE.—Subsection (a) shall take effect 1 year after the date of enactment of this Act or March 1, 2007, whichever is later. 15 USC 260a note.

(c) REPORT TO CONGRESS.—Not later than 9 months after the effective date stated in subsection (b), the Secretary shall report to Congress on the impact of this section on energy consumption in the United States. 15 USC 260a note.

(d) RIGHT TO REVERT.—Congress retains the right to revert the Daylight Saving Time back to the 2005 time schedules once the Department study is complete.

SEC. 111. ENHANCING ENERGY EFFICIENCY IN MANAGEMENT OF FEDERAL LANDS. 42 USC 15813.

(a) SENSE OF THE CONGRESS.—It is the sense of the Congress that Federal agencies should enhance the use of energy efficient technologies in the management of natural resources.

(b) ENERGY EFFICIENT BUILDINGS.—To the extent practicable, the Secretary of the Interior, the Secretary of Commerce, and the Secretary of Agriculture shall seek to incorporate energy efficient technologies in public and administrative buildings associated with management of the National Park System, National Wildlife Refuge System, National Forest System, National Marine Sanctuaries System, and other public lands and resources managed by the Secretaries.

(c) ENERGY EFFICIENT VEHICLES.—To the extent practicable, the Secretary of the Interior, the Secretary of Commerce, and the Secretary of Agriculture shall seek to use energy efficient motor vehicles, including vehicles equipped with biodiesel or hybrid engine technologies, in the management of the National Park System, National Wildlife Refuge System, National Forest System, National Marine Sanctuaries System, and other public lands and resources managed by the Secretaries.

Subtitle B—Energy Assistance and State Programs

SEC. 121. LOW-INCOME HOME ENERGY ASSISTANCE PROGRAM.

(a) AUTHORIZATION OF APPROPRIATIONS.—Section 2602(b) of the Low-Income Home Energy Assistance Act of 1981 (42 U.S.C. 8621(b)) is amended by striking "and $2,000,000,000 for each of fiscal years 2002 through 2004" and inserting "and $5,100,000,000 for each of fiscal years 2005 through 2007".

(b) RENEWABLE FUELS.—The Low-Income Home Energy Assistance Act of 1981 (42 U.S.C. 8621 et seq.) is amended by adding at the end the following new section:

"RENEWABLE FUELS

42 USC 8630.

"SEC. 2612. In providing assistance pursuant to this title, a State, or any other person with which the State makes arrangements to carry out the purposes of this title, may purchase renewable fuels, including biomass.".

42 USC 8630 note.

(c) REPORT TO CONGRESS.—The Secretary shall report to Congress on the use of renewable fuels in providing assistance under the Low-Income Home Energy Assistance Act of 1981 (42 U.S.C. 8621 et seq.).

SEC. 122. WEATHERIZATION ASSISTANCE.

(a) AUTHORIZATION OF APPROPRIATIONS.—Section 422 of the Energy Conservation and Production Act (42 U.S.C. 6872) is amended by striking "for fiscal years 1999 through 2003 such sums as may be necessary" and inserting "$500,000,000 for fiscal year 2006, $600,000,000 for fiscal year 2007, and $700,000,000 for fiscal year 2008".

(b) ELIGIBILITY.—Section 412(7) of the Energy Conservation and Production Act (42 U.S.C. 6862(7)) is amended by striking "125 percent" both places it appears and inserting "150 percent".

SEC. 123. STATE ENERGY PROGRAMS.

(a) STATE ENERGY CONSERVATION PLANS.—Section 362 of the Energy Policy and Conservation Act (42 U.S.C. 6322) is amended by inserting at the end the following new subsection:

"(g) The Secretary shall, at least once every 3 years, invite the Governor of each State to review and, if necessary, revise the energy conservation plan of such State submitted under subsection (b) or (e). Such reviews should consider the energy conservation plans of other States within the region, and identify opportunities and actions carried out in pursuit of common energy conservation goals.".

(b) STATE ENERGY EFFICIENCY GOALS.—Section 364 of the Energy Policy and Conservation Act (42 U.S.C. 6324) is amended to read as follows:

"STATE ENERGY EFFICIENCY GOALS

"SEC. 364. Each State energy conservation plan with respect to which assistance is made available under this part on or after the date of enactment of the Energy Policy Act of 2005 shall contain a goal, consisting of an improvement of 25 percent or more in the efficiency of use of energy in the State concerned

in calendar year 2012 as compared to calendar year 1990, and may contain interim goals.".

(c) AUTHORIZATION OF APPROPRIATIONS.—Section 365(f) of the Energy Policy and Conservation Act (42 U.S.C. 6325(f)) is amended by striking "for fiscal years 1999 through 2003 such sums as may be necessary" and inserting "$100,000,000 for each of the fiscal years 2006 and 2007 and $125,000,000 for fiscal year 2008".

SEC. 124. ENERGY EFFICIENT APPLIANCE REBATE PROGRAMS. 42 USC 15821.

(a) DEFINITIONS.—In this section:

(1) ELIGIBLE STATE.—The term "eligible State" means a State that meets the requirements of subsection (b).

(2) ENERGY STAR PROGRAM.—The term "Energy Star program" means the program established by section 324A of the Energy Policy and Conservation Act.

(3) RESIDENTIAL ENERGY STAR PRODUCT.—The term "residential Energy Star product" means a product for a residence that is rated for energy efficiency under the Energy Star program.

(4) STATE ENERGY OFFICE.—The term "State energy office" means the State agency responsible for developing State energy conservation plans under section 362 of the Energy Policy and Conservation Act (42 U.S.C. 6322).

(5) STATE PROGRAM.—The term "State program" means a State energy efficient appliance rebate program described in subsection (b)(1).

(b) ELIGIBLE STATES.—A State shall be eligible to receive an allocation under subsection (c) if the State—

(1) establishes (or has established) a State energy efficient appliance rebate program to provide rebates to residential consumers for the purchase of residential Energy Star products to replace used appliances of the same type;

(2) submits an application for the allocation at such time, in such form, and containing such information as the Secretary may require; and

(3) provides assurances satisfactory to the Secretary that the State will use the allocation to supplement, but not supplant, funds made available to carry out the State program.

(c) AMOUNT OF ALLOCATIONS.—

(1) IN GENERAL.—Subject to paragraph (2), for each fiscal year, the Secretary shall allocate to the State energy office of each eligible State to carry out subsection (d) an amount equal to the product obtained by multiplying the amount made available under subsection (f) for the fiscal year by the ratio that the population of the State in the most recent calendar year for which data are available bears to the total population of all eligible States in that calendar year.

(2) MINIMUM ALLOCATIONS.—For each fiscal year, the amounts allocated under this subsection shall be adjusted proportionately so that no eligible State is allocated a sum that is less than an amount determined by the Secretary.

(d) USE OF ALLOCATED FUNDS.—The allocation to a State energy office under subsection (c) may be used to pay up to 50 percent of the cost of establishing and carrying out a State program.

(e) ISSUANCE OF REBATES.—Rebates may be provided to residential consumers that meet the requirements of the State program.

The amount of a rebate shall be determined by the State energy office, taking into consideration—

(1) the amount of the allocation to the State energy office under subsection (c);

(2) the amount of any Federal or State tax incentive available for the purchase of the residential Energy Star product; and

(3) the difference between the cost of the residential Energy Star product and the cost of an appliance that is not a residential Energy Star product, but is of the same type as, and is the nearest capacity, performance, and other relevant characteristics (as determined by the State energy office) to, the residential Energy Star product.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section $50,000,000 for each of the fiscal years 2006 through 2010.

42 USC 15822.

SEC. 125. ENERGY EFFICIENT PUBLIC BUILDINGS.

(a) GRANTS.—The Secretary may make grants to the State agency responsible for developing State energy conservation plans under section 362 of the Energy Policy and Conservation Act (42 U.S.C. 6322), or, if no such agency exists, a State agency designated by the Governor of the State, to assist units of local government in the State in improving the energy efficiency of public buildings and facilities—

(1) through construction of new energy efficient public buildings that use at least 30 percent less energy than a comparable public building constructed in compliance with standards prescribed in the most recent version of the International Energy Conservation Code, or a similar State code intended to achieve substantially equivalent efficiency levels; or

(2) through renovation of existing public buildings to achieve reductions in energy use of at least 30 percent as compared to the baseline energy use in such buildings prior to renovation, assuming a 3-year, weather-normalized average for calculating such baseline.

(b) ADMINISTRATION.—State energy offices receiving grants under this section shall—

Records.

(1) maintain such records and evidence of compliance as the Secretary may require; and

(2) develop and distribute information and materials and conduct programs to provide technical services and assistance to encourage planning, financing, and design of energy efficient public buildings by units of local government.

(c) AUTHORIZATION OF APPROPRIATIONS.—For the purposes of this section, there are authorized to be appropriated to the Secretary $30,000,000 for each of fiscal years 2006 through 2010. Not more than 10 percent of appropriated funds shall be used for administration.

42 USC 15823.

SEC. 126. LOW INCOME COMMUNITY ENERGY EFFICIENCY PILOT PROGRAM.

(a) GRANTS.—The Secretary is authorized to make grants to units of local government, private, non-profit community development organizations, and Indian tribe economic development entities to improve energy efficiency; identify and develop alternative, renewable, and distributed energy supplies; and increase energy conservation in low income rural and urban communities.

(b) PURPOSE OF GRANTS.—The Secretary may make grants on a competitive basis for—

(1) investments that develop alternative, renewable, and distributed energy supplies;

(2) energy efficiency projects and energy conservation programs;

(3) studies and other activities that improve energy efficiency in low income rural and urban communities;

(4) planning and development assistance for increasing the energy efficiency of buildings and facilities; and

(5) technical and financial assistance to local government and private entities on developing new renewable and distributed sources of power or combined heat and power generation.

(c) DEFINITION.—For purposes of this section, the term "Indian tribe" means any Indian tribe, band, nation, or other organized group or community, including any Alaskan Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.), that is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

(d) AUTHORIZATION OF APPROPRIATIONS.—For the purposes of this section there are authorized to be appropriated to the Secretary $20,000,000 for each of fiscal years 2006 through 2008.

SEC. 127. STATE TECHNOLOGIES ADVANCEMENT COLLABORATIVE. 42 USC 15824.

(a) IN GENERAL.—The Secretary, in cooperation with the States, shall establish a cooperative program for research, development, demonstration, and deployment of technologies in which there is a common Federal and State energy efficiency, renewable energy, and fossil energy interest, to be known as the "State Technologies Advancement Collaborative" (referred to in this section as the "Collaborative").

(b) DUTIES.—The Collaborative shall—

(1) leverage Federal and State funding through cost-shared activity;

(2) reduce redundancies in Federal and State funding; and

(3) create multistate projects to be awarded through a competitive process.

(c) ADMINISTRATION.—The Collaborative shall be administered through an agreement between the Department and appropriate State-based organizations.

(d) FUNDING SOURCES.—Funding for the Collaborative may be provided from—

(1) amounts specifically appropriated for the Collaborative; or

(2) amounts that may be allocated from other appropriations without changing the purpose for which the amounts are appropriated.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to carry out this section such sums as are necessary for each of fiscal years 2006 through 2010.

SEC. 128. STATE BUILDING ENERGY EFFICIENCY CODES INCENTIVES.

Section 304(e) of the Energy Conservation and Production Act (42 U.S.C. 6833(e)) is amended—

(1) in paragraph (1), by inserting before the period at the end of the first sentence the following: ", including increasing and verifying compliance with such codes"; and

(2) by striking paragraph (2) and inserting the following:

"(2) Additional funding shall be provided under this subsection for implementation of a plan to achieve and document at least a 90 percent rate of compliance with residential and commercial building energy efficiency codes, based on energy performance—

"(A) to a State that has adopted and is implementing, on a statewide basis—

"(i) a residential building energy efficiency code that meets or exceeds the requirements of the 2004 International Energy Conservation Code, or any succeeding version of that code that has received an affirmative determination from the Secretary under subsection (a)(5)(A); and

"(ii) a commercial building energy efficiency code that meets or exceeds the requirements of the ASHRAE Standard 90.1–2004, or any succeeding version of that standard that has received an affirmative determination from the Secretary under subsection (b)(2)(A); or

"(B) in a State in which there is no statewide energy code either for residential buildings or for commercial buildings, to a local government that has adopted and is implementing residential and commercial building energy efficiency codes, as described in subparagraph (A).

"(3) Of the amounts made available under this subsection, the Secretary may use $500,000 for each fiscal year to train State and local officials to implement codes described in paragraph (2).

Appropriation authorization.

"(4)(A) There are authorized to be appropriated to carry out this subsection—

"(i) $25,000,000 for each of fiscal years 2006 through 2010; and

"(ii) such sums as are necessary for fiscal year 2011 and each fiscal year thereafter.

"(B) Funding provided to States under paragraph (2) for each fiscal year shall not exceed one-half of the excess of funding under this subsection over $5,000,000 for the fiscal year.".

Subtitle C—Energy Efficient Products

SEC. 131. ENERGY STAR PROGRAM.

(a) IN GENERAL.—The Energy Policy and Conservation Act is amended by inserting after section 324 (42 U.S.C. 6294) the following:

"ENERGY STAR PROGRAM

42 USC 6294a.

"SEC. 324A. (a) IN GENERAL.—There is established within the Department of Energy and the Environmental Protection Agency a voluntary program to identify and promote energy-efficient products and buildings in order to reduce energy consumption, improve energy security, and reduce pollution through voluntary labeling of, or other forms of communication about, products and buildings that meet the highest energy conservation standards.

"(b) DIVISION OF RESPONSIBILITIES.—Responsibilities under the program shall be divided between the Department of Energy and

the Environmental Protection Agency in accordance with the terms of applicable agreements between those agencies.

"(c) DUTIES.—The Administrator and the Secretary shall—

"(1) promote Energy Star compliant technologies as the preferred technologies in the marketplace for—

"(A) achieving energy efficiency; and

"(B) reducing pollution;

"(2) work to enhance public awareness of the Energy Star label, including by providing special outreach to small businesses;

"(3) preserve the integrity of the Energy Star label;

"(4) regularly update Energy Star product criteria for product categories;

"(5) solicit comments from interested parties prior to establishing or revising an Energy Star product category, specification, or criterion (or prior to effective dates for any such product category, specification, or criterion);

"(6) on adoption of a new or revised product category, specification, or criterion, provide reasonable notice to interested parties of any changes (including effective dates) in product categories, specifications, or criteria, along with—

"(A) an explanation of the changes; and

"(B) as appropriate, responses to comments submitted by interested parties; and

"(7) provide appropriate lead time (which shall be 270 days, unless the Agency or Department specifies otherwise) prior to the applicable effective date for a new or a significant revision to a product category, specification, or criterion, taking into account the timing requirements of the manufacturing, product marketing, and distribution process for the specific product addressed.

"(d) DEADLINES.—The Secretary shall establish new qualifying levels—

"(1) not later than January 1, 2006, for clothes washers and dishwashers, effective beginning January 1, 2007; and

"(2) not later than January 1, 2008, for clothes washers, effective beginning January 1, 2010.".

(b) TABLE OF CONTENTS AMENDMENT.—The table of contents of the Energy Policy and Conservation Act (42 U.S.C. prec. 6201) is amended by inserting after the item relating to section 324 the following:

"Sec. 324A. Energy Star program.".

SEC. 132. HVAC MAINTENANCE CONSUMER EDUCATION PROGRAM.

Section 337 of the Energy Policy and Conservation Act (42 U.S.C. 6307) is amended by adding at the end the following:

"(c) HVAC MAINTENANCE.—(1) To ensure that installed air conditioning and heating systems operate at maximum rated efficiency levels, the Secretary shall, not later than 180 days after the date of enactment of this subsection, carry out a program to educate homeowners and small business owners concerning the energy savings from properly conducted maintenance of air conditioning, heating, and ventilating systems. Deadline.

"(2) The Secretary shall carry out the program under paragraph (1), on a cost-shared basis, in cooperation with the Administrator of the Environmental Protection Agency and any other entities that the Secretary determines to be appropriate, including industry

trade associations, industry members, and energy efficiency organizations.

"(d) SMALL BUSINESS EDUCATION AND ASSISTANCE.—(1) The Administrator of the Small Business Administration, in consultation with the Secretary and the Administrator of the Environmental Protection Agency, shall develop and coordinate a Government-wide program, building on the Energy Star for Small Business Program, to assist small businesses in—

"(A) becoming more energy efficient;

"(B) understanding the cost savings from improved energy efficiency;

"(C) understanding and accessing Federal procurement opportunities with regard to Energy Star technologies and products; and

"(D) identifying financing options for energy efficiency upgrades.

"(2) The Secretary, the Administrator of the Environmental Protection Agency, and the Administrator of the Small Business Administration shall—

"(A) make program information available to small business concerns directly through the district offices and resource partners of the Small Business Administration, including small business development centers, women's business centers, and the Service Corps of Retired Executives (SCORE), and through other Federal agencies, including the Federal Emergency Management Agency and the Department of Agriculture; and

"(B) coordinate assistance with the Secretary of Commerce for manufacturing-related efforts, including the Manufacturing Extension Partnership Program.

"(3) The Secretary, on a cost shared basis in cooperation with the Administrator of the Environmental Protection Agency, shall provide to the Small Business Administration all advertising, marketing, and other written materials necessary for the dissemination of information under paragraph (2).

"(4) The Secretary, the Administrator of the Environmental Protection Agency, and the Administrator of the Small Business Administration, as part of the outreach to small business concerns under the Energy Star Program for Small Business Program, may enter into cooperative agreements with qualified resources partners (including the National Center for Appropriate Technology) to establish, maintain, and promote a Small Business Energy Clearinghouse (in this subsection referred to as the 'Clearinghouse').

"(5) The Secretary, the Administrator of the Environmental Protection Agency, and the Administrator of the Small Business Administration shall ensure that the Clearinghouse provides a centralized resource where small business concerns may access, telephonically and electronically, technical information and advice to help increase energy efficiency and reduce energy costs.

Appropriation authorization.

"(6) There are authorized to be appropriated such sums as are necessary to carry out this subsection, to remain available until expended.".

42 USC 15831.

SEC. 133. PUBLIC ENERGY EDUCATION PROGRAM.

Deadline.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall convene an organizational conference for the purpose of establishing an ongoing, self-sustaining national public energy education program.

(b) PARTICIPANTS.—The Secretary shall invite to participate in the conference individuals and entities representing all aspects of energy production and distribution, including—

(1) industrial firms;

(2) professional societies;

(3) educational organizations;

(4) trade associations; and

(5) governmental agencies.

(c) PURPOSE, SCOPE, AND STRUCTURE.—

(1) PURPOSE.—The purpose of the conference shall be to establish an ongoing, self-sustaining national public energy education program to examine and recognize interrelationships between energy sources in all forms, including—

(A) conservation and energy efficiency;

(B) the role of energy use in the economy; and

(C) the impact of energy use on the environment.

(2) SCOPE AND STRUCTURE.—Taking into consideration the purpose described in paragraph (1), the participants in the conference invited under subsection (b) shall design the scope and structure of the program described in subsection (a).

(d) TECHNICAL ASSISTANCE.—The Secretary shall provide technical assistance and other guidance necessary to carry out the program described in subsection (a).

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 134. ENERGY EFFICIENCY PUBLIC INFORMATION INITIATIVE. 42 USC 15832.

(a) IN GENERAL.—The Secretary shall carry out a comprehensive national program, including advertising and media awareness, to inform consumers about—

(1) the need to reduce energy consumption during the 4-year period beginning on the date of enactment of this Act;

(2) the benefits to consumers of reducing consumption of electricity, natural gas, and petroleum, particularly during peak use periods;

(3) the importance of low energy costs to economic growth and preserving manufacturing jobs in the United States; and

(4) practical, cost-effective measures that consumers can take to reduce consumption of electricity, natural gas, and gasoline, including—

(A) maintaining and repairing heating and cooling ducts and equipment;

(B) weatherizing homes and buildings;

(C) purchasing energy efficient products; and

(D) proper tire maintenance.

(b) COOPERATION.—The program carried out under subsection (a) shall—

(1) include collaborative efforts with State and local government officials and the private sector; and

(2) incorporate, to the maximum extent practicable, successful State and local public education programs.

(c) REPORT.—Not later than July 1, 2009, the Secretary shall submit to Congress a report describing the effectiveness of the program under this section.

(d) TERMINATION OF AUTHORITY.—The program carried out under this section shall terminate on December 31, 2010.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $90,000,000 for each of fiscal years 2006 through 2010.

SEC. 135. ENERGY CONSERVATION STANDARDS FOR ADDITIONAL PRODUCTS.

(a) DEFINITIONS.—Section 321 of the Energy Policy and Conservation Act (42 U.S.C. 6291) is amended—

(1) in paragraph (29)—

(A) in subparagraph (D)—

(i) in clause (i), by striking "C78.1–1978(R1984)" and inserting "C78.81–2003 (Data Sheet 7881–ANSI–1010–1)";

(ii) in clause (ii), by striking "C78.1–1978(R1984)" and inserting "C78.81–2003 (Data Sheet 7881–ANSI–3007–1)"; and

(iii) in clause (iii), by striking "C78.1–1978(R1984)" and inserting "C78.81–2003 (Data Sheet 7881–ANSI–1019–1)"; and

(B) by adding at the end the following:

"(M) The term 'F34T12 lamp' (also known as a 'F40T12/ES lamp') means a nominal 34 watt tubular fluorescent lamp that is 48 inches in length and 1½ inches in diameter, and conforms to ANSI standard C78.81–2003 (Data Sheet 7881–ANSI–1006–1).

"(N) The term 'F96T12/ES lamp' means a nominal 60 watt tubular fluorescent lamp that is 96 inches in length and 1½ inches in diameter, and conforms to ANSI standard C78.81–2003 (Data Sheet 7881–ANSI–3006–1).

"(O) The term 'F96T12HO/ES lamp' means a nominal 95 watt tubular fluorescent lamp that is 96 inches in length and 1½ inches in diameter, and conforms to ANSI standard C78.81–2003 (Data Sheet 7881–ANSI–1017–1).

"(P) The term 'replacement ballast' means a ballast that—

"(i) is designed for use to replace an existing ballast in a previously installed luminaire;

"(ii) is marked 'FOR REPLACEMENT USE ONLY';

"(iii) is shipped by the manufacturer in packages containing not more than 10 ballasts; and

"(iv) has output leads that when fully extended are a total length that is less than the length of the lamp with which the ballast is intended to be operated.";

(2) in paragraph (30)(S)—

(A) by inserting "(i)" before "The term"; and

(B) by adding at the end the following:

"(ii) The term 'medium base compact fluorescent lamp' does not include—

"(I) any lamp that is—

"(aa) specifically designed to be used for special purpose applications; and

"(bb) unlikely to be used in general purpose applications, such as the applications described in subparagraph (D); or

"(II) any lamp not described in subparagraph (D) that is excluded by the Secretary, by rule, because the lamp is—

"(aa) designed for special applications; and

"(bb) unlikely to be used in general purpose applications."; and

(3) by adding at the end the following:

"(32) The term 'battery charger' means a device that charges batteries for consumer products, including battery chargers embedded in other consumer products.

"(33)(A) The term 'commercial prerinse spray valve' means a handheld device designed and marketed for use with commercial dishwashing and ware washing equipment that sprays water on dishes, flatware, and other food service items for the purpose of removing food residue before cleaning the items.

"(B) The Secretary may modify the definition of 'commercial prerinse spray valve' by rule—

"(i) to include products—

"(I) that are extensively used in conjunction with commercial dishwashing and ware washing equipment;

"(II) the application of standards to which would result in significant energy savings; and

"(III) the application of standards to which would meet the criteria specified in section 325(o)(4); and

"(ii) to exclude products—

"(I) that are used for special food service applications;

"(II) that are unlikely to be widely used in conjunction with commercial dishwashing and ware washing equipment; and

"(III) the application of standards to which would not result in significant energy savings.

"(34) The term 'dehumidifier' means a self-contained, electrically operated, and mechanically encased assembly consisting of—

"(A) a refrigerated surface (evaporator) that condenses moisture from the atmosphere;

"(B) a refrigerating system, including an electric motor;

"(C) an air-circulating fan; and

"(D) means for collecting or disposing of the condensate.

"(35)(A) The term 'distribution transformer' means a transformer that—

"(i) has an input voltage of 34.5 kilovolts or less;

"(ii) has an output voltage of 600 volts or less; and

"(iii) is rated for operation at a frequency of 60 Hertz.

"(B) The term 'distribution transformer' does not include—

"(i) a transformer with multiple voltage taps, the highest of which equals at least 20 percent more than the lowest;

"(ii) a transformer that is designed to be used in a special purpose application and is unlikely to be used in general purpose applications, such as a drive transformer, rectifier transformer, auto-transformer, Uninterruptible Power System transformer, impedance transformer, regulating transformer, sealed and nonventilating transformer, machine tool transformer, welding transformer, grounding transformer, or testing transformer; or

"(iii) any transformer not listed in clause (ii) that is excluded by the Secretary by rule because—

"(I) the transformer is designed for a special application;

"(II) the transformer is unlikely to be used in general purpose applications; and

"(III) the application of standards to the transformer would not result in significant energy savings.

"(36) The term 'external power supply' means an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product.

"(37) The term 'illuminated exit sign' means a sign that—

"(A) is designed to be permanently fixed in place to identify an exit; and

"(B) consists of an electrically powered integral light source that—

"(i) illuminates the legend 'EXIT' and any directional indicators; and

"(ii) provides contrast between the legend, any directional indicators, and the background.

"(38) The term 'low-voltage dry-type distribution transformer' means a distribution transformer that—

"(A) has an input voltage of 600 volts or less;

"(B) is air-cooled; and

"(C) does not use oil as a coolant.

"(39) The term 'pedestrian module' means a light signal used to convey movement information to pedestrians.

"(40) The term 'refrigerated bottled or canned beverage vending machine' means a commercial refrigerator that cools bottled or canned beverages and dispenses the bottled or canned beverages on payment.

"(41) The term 'standby mode' means the lowest power consumption mode, as established on an individual product basis by the Secretary, that—

"(A) cannot be switched off or influenced by the user; and

"(B) may persist for an indefinite time when an appliance is—

"(i) connected to the main electricity supply; and

"(ii) used in accordance with the instructions of the manufacturer.

"(42) The term 'torchiere' means a portable electric lamp with a reflector bowl that directs light upward to give indirect illumination.

"(43) The term 'traffic signal module' means a standard 8-inch (200mm) or 12-inch (300mm) traffic signal indication that—

"(A) consists of a light source, a lens, and all other parts necessary for operation; and

"(B) communicates movement messages to drivers through red, amber, and green colors.

"(44) The term 'transformer' means a device consisting of 2 or more coils of insulated wire that transfers alternating current by electromagnetic induction from 1 coil to another to change the original voltage or current value.

"(45)(A) The term 'unit heater' means a self-contained fan-type heater designed to be installed within the heated space.

"(B) The term 'unit heater' does not include a warm air furnace.

"(46)(A) The term 'high intensity discharge lamp' means an electric-discharge lamp in which—

"(i) the light-producing arc is stabilized by bulb wall temperature; and

"(ii) the arc tube has a bulb wall loading in excess of 3 Watts/cm^2.

"(B) The term 'high intensity discharge lamp' includes mercury vapor, metal halide, and high-pressure sodium lamps described in subparagraph (A).

"(47)(A) The term 'mercury vapor lamp' means a high intensity discharge lamp in which the major portion of the light is produced by radiation from mercury operating at a partial pressure in excess of 100,000 Pa (approximately 1 atm).

"(B) The term 'mercury vapor lamp' includes clear, phosphor-coated, and self-ballasted lamps described in subparagraph (A).

"(48) The term 'mercury vapor lamp ballast' means a device that is designed and marketed to start and operate mercury vapor lamps by providing the necessary voltage and current.

"(49) The term 'ceiling fan' means a nonportable device that is suspended from a ceiling for circulating air via the rotation of fan blades.

"(50) The term 'ceiling fan light kit' means equipment designed to provide light from a ceiling fan that can be—

"(A) integral, such that the equipment is attached to the ceiling fan prior to the time of retail sale; or

"(B) attachable, such that at the time of retail sale the equipment is not physically attached to the ceiling fan, but may be included inside the ceiling fan at the time of sale or sold separately for subsequent attachment to the fan.

"(51) The term 'medium screw base' means an Edison screw base identified with the prefix E–26 in the 'American National Standard for Electric Lamp Bases', ANSI/IEC C81.61–2003, published by the American National Standards Institute.".

(b) TEST PROCEDURES.—Section 323 of the Energy Policy and Conservation Act (42 U.S.C. 6293) is amended—

(1) in subsection (b), by adding at the end the following:

"(9) Test procedures for illuminated exit signs shall be based on the test method used under version 2.0 of the Energy Star program of the Environmental Protection Agency for illuminated exit signs.

"(10)(A) Test procedures for distribution transformers and low voltage dry-type distribution transformers shall be based on the 'Standard Test Method for Measuring the Energy Consumption of Distribution Transformers' prescribed by the National Electrical Manufacturers Association (NEMA TP 2–1998).

"(B) The Secretary may review and revise the test procedures established under subparagraph (A).

"(C) For purposes of section 346(a), the test procedures established under subparagraph (A) shall be considered to be the testing requirements prescribed by the Secretary under section 346(a)(1) for distribution transformers for which the Secretary makes a determination that energy conservation standards would—

"(i) be technologically feasible and economically justified; and

"(ii) result in significant energy savings.

"(11) Test procedures for traffic signal modules and pedestrian modules shall be based on the test method used under the Energy Star program of the Environmental Protection Agency for traffic signal modules, as in effect on the date of enactment of this paragraph.

"(12)(A) Test procedures for medium base compact fluorescent lamps shall be based on the test methods for compact fluorescent lamps used under the August 9, 2001, version of the Energy Star program of the Environmental Protection Agency and the Department of Energy.

"(B) Except as provided in subparagraph (C), medium base compact fluorescent lamps shall meet all test requirements for regulated parameters of section 325(cc).

"(C) Notwithstanding subparagraph (B), if manufacturers document engineering predictions and analysis that support expected attainment of lumen maintenance at 40 percent rated life and lamp lifetime, medium base compact fluorescent lamps may be marketed before completion of the testing of lamp life and lumen maintenance at 40 percent of rated life.

"(13) Test procedures for dehumidifiers shall be based on the test criteria used under the Energy Star Program Requirements for Dehumidifiers developed by the Environmental Protection Agency, as in effect on the date of enactment of this paragraph unless revised by the Secretary pursuant to this section.

"(14) The test procedure for measuring flow rate for commercial prerinse spray valves shall be based on American Society for Testing and Materials Standard F2324, entitled 'Standard Test Method for Pre-Rinse Spray Valves'.

"(15) The test procedure for refrigerated bottled or canned beverage vending machines shall be based on American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers Standard 32.1–2004, entitled 'Methods of Testing for Rating Vending Machines for Bottled, Canned or Other Sealed Beverages'.

"(16)(A)(i) Test procedures for ceiling fans shall be based on the 'Energy Star Testing Facility Guidance Manual: Building a Testing Facility and Performing the Solid State Test Method for ENERGY STAR Qualified Ceiling Fans, Version 1.1' published by the Environmental Protection Agency.

"(ii) Test procedures for ceiling fan light kits shall be based on the test procedures referenced in the Energy Star specifications for Residential Light Fixtures and Compact Fluorescent Light Bulbs, as in effect on the date of enactment of this paragraph.

"(B) The Secretary may review and revise the test procedures established under subparagraph (A)."; and

(2) by adding at the end the following:

Deadline.
Requirements.

"(f) ADDITIONAL CONSUMER AND COMMERCIAL PRODUCTS.—(1) Not later than 2 years after the date of enactment of this subsection, the Secretary shall prescribe testing requirements for refrigerated bottled or canned beverage vending machines.

"(2) To the maximum extent practicable, the testing requirements prescribed under paragraph (1) shall be based on existing test procedures used in industry.".

(c) STANDARD SETTING AUTHORITY.—Section 325 of the Energy Policy and Conservation Act (42 U.S.C. 6295) is amended—

(1) in subsection (f)(3), by adding at the end the following:

"(D) Notwithstanding any other provision of this Act, if the requirements of subsection (o) are met, the Secretary may consider and prescribe energy conservation standards or energy use standards for electricity used for purposes of circulating air through duct work.";

(2) in subsection (g)—

(A) in paragraph (6)(B), by inserting "and labeled" after "designed"; and

(B) by adding at the end the following:

"(8)(A) Each fluorescent lamp ballast (other than replacement ballasts or ballasts described in subparagraph (C))—

"(i)(I) manufactured on or after July 1, 2009;

"(II) sold by the manufacturer on or after October 1, 2009; or

"(III) incorporated into a luminaire by a luminaire manufacturer on or after July 1, 2010; and

"(ii) designed—

"(I) to operate at nominal input voltages of 120 or 277 volts;

"(II) to operate with an input current frequency of 60 Hertz; and

"(III) for use in connection with F34T12 lamps, F96T12/ES lamps, or F96T12HO/ES lamps;

shall have a power factor of 0.90 or greater and shall have a ballast efficacy factor of not less than the following:

"Application for operation of	Ballast input voltage	Total nominal lamp watts	Ballast efficacy factor
One F34T12 lamp	120/277	34	2.61
Two F34T12 lamps	120/277	68	1.35
Two F96T12/ES lamps	120/277	120	0.77
Two F96T12HO/ES lamps	120/277	190	0.42.

"(B) The standards described in subparagraph (A) shall apply to all ballasts covered by subparagraph (A)(ii) that are manufactured on or after July 1, 2010, or sold by the manufacturer on or after October 1, 2010. Applicability.

"(C) The standards described in subparagraph (A) do not apply to—

"(i) a ballast that is designed for dimming to 50 percent or less of the maximum output of the ballast;

"(ii) a ballast that is designed for use with 2 F96T12HO lamps at ambient temperatures of 20°F or less and for use in an outdoor sign; or

"(iii) a ballast that has a power factor of less than 0.90 and is designed and labeled for use only in residential applications.";

(3) in subsection (o), by adding at the end the following:

"(5) The Secretary may set more than 1 energy conservation standard for products that serve more than 1 major function by setting 1 energy conservation standard for each major function."; and

(4) by adding at the end the following:

"(u) BATTERY CHARGER AND EXTERNAL POWER SUPPLY ELECTRIC ENERGY CONSUMPTION.—(1)(A) Not later than 18 months after the date of enactment of this subsection, the Secretary shall, after providing notice and an opportunity for comment, prescribe, by Deadline. Notice. Regulations.

rule, definitions and test procedures for the power use of battery chargers and external power supplies.

"(B) In establishing the test procedures under subparagraph (A), the Secretary shall—

"(i) consider existing definitions and test procedures used for measuring energy consumption in standby mode and other modes; and

"(ii) assess the current and projected future market for battery chargers and external power supplies.

"(C) The assessment under subparagraph (B)(ii) shall include—

"(i) estimates of the significance of potential energy savings from technical improvements to battery chargers and external power supplies; and

"(ii) suggested product classes for energy conservation standards.

Deadline.

"(D) Not later than 18 months after the date of enactment of this subsection, the Secretary shall hold a scoping workshop to discuss and receive comments on plans for developing energy conservation standards for energy use for battery chargers and external power supplies.

Deadline. Regultions.

"(E)(i) Not later than 3 years after the date of enactment of this subsection, the Secretary shall issue a final rule that determines whether energy conservation standards shall be issued for battery chargers and external power supplies or classes of battery chargers and external power supplies.

"(ii) For each product class, any energy conservation standards issued under clause (i) shall be set at the lowest level of energy use that—

"(I) meets the criteria and procedures of subsections (o), (p), (q), (r), (s), and (t); and

"(II) would result in significant overall annual energy savings, considering standby mode and other operating modes.

"(2) In determining under section 323 whether test procedures and energy conservation standards under this section should be revised with respect to covered products that are major sources of standby mode energy consumption, the Secretary shall consider whether to incorporate standby mode into the test procedures and energy conservation standards, taking into account standby mode power consumption compared to overall product energy consumption.

"(3) The Secretary shall not propose an energy conservation standard under this section, unless the Secretary has issued applicable test procedures for each product under section 323.

Applicability. Effective date.

"(4) Any energy conservation standard issued under this subsection shall be applicable to products manufactured or imported beginning on the date that is 3 years after the date of issuance.

"(5) The Secretary and the Administrator shall collaborate and develop programs (including programs under section 324A and other voluntary industry agreements or codes of conduct) that are designed to reduce standby mode energy use.

Deadline. Regulations.

"(v) CEILING FANS AND REFRIGERATED BEVERAGE VENDING MACHINES.—(1) Not later than 1 year after the date of enactment of this subsection, the Secretary shall prescribe, by rule, test procedures and energy conservation standards for ceiling fans and ceiling fan light kits. If the Secretary sets such standards, the Secretary shall consider exempting or setting different standards for certain product classes for which the primary standards are not technically

feasible or economically justified, and establishing separate or exempted product classes for highly decorative fans for which air movement performance is a secondary design feature.

"(2) Not later than 4 years after the date of enactment of this subsection, the Secretary shall prescribe, by rule, energy conservation standards for refrigerated bottle or canned beverage vending machines.

Deadline. Regulations.

"(3) In establishing energy conservation standards under this subsection, the Secretary shall use the criteria and procedures prescribed under subsections (o) and (p).

"(4) Any energy conservation standard prescribed under this subsection shall apply to products manufactured 3 years after the date of publication of a final rule establishing the energy conservation standard.

Applicability.

"(w) ILLUMINATED EXIT SIGNS.—An illuminated exit sign manufactured on or after January 1, 2006, shall meet the version 2.0 Energy Star Program performance requirements for illuminated exit signs prescribed by the Environmental Protection Agency.

"(x) TORCHIERES.—A torchiere manufactured on or after January 1, 2006—

"(1) shall consume not more than 190 watts of power; and

"(2) shall not be capable of operating with lamps that total more than 190 watts.

"(y) LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS.—The efficiency of a low voltage dry-type distribution transformer manufactured on or after January 1, 2007, shall be the Class I Efficiency Levels for distribution transformers specified in table 4–2 of the 'Guide for Determining Energy Efficiency for Distribution Transformers' published by the National Electrical Manufacturers Association (NEMA TP–1–2002).

"(z) TRAFFIC SIGNAL MODULES AND PEDESTRIAN MODULES.—Any traffic signal module or pedestrian module manufactured on or after January 1, 2006, shall—

"(1) meet the performance requirements used under the Energy Star program of the Environmental Protection Agency for traffic signals, as in effect on the date of enactment of this subsection; and

"(2) be installed with compatible, electrically connected signal control interface devices and conflict monitoring systems.

"(aa) UNIT HEATERS.—A unit heater manufactured on or after the date that is 3 years after the date of enactment of this subsection shall—

"(1) be equipped with an intermittent ignition device; and

"(2) have power venting or an automatic flue damper.

"(bb) MEDIUM BASE COMPACT FLUORESCENT LAMPS.—(1) A bare lamp and covered lamp (no reflector) medium base compact fluorescent lamp manufactured on or after January 1, 2006, shall meet the following requirements prescribed by the August 9, 2001, version of the Energy Star Program Requirements for Compact Fluorescent Lamps, Energy Star Eligibility Criteria, Energy-Efficiency Specification issued by the Environmental Protection Agency and Department of Energy:

"(A) Minimum initial efficacy.

"(B) Lumen maintenance at 1000 hours.

"(C) Lumen maintenance at 40 percent of rated life.

"(D) Rapid cycle stress test.

"(E) Lamp life.

"(2) The Secretary may, by rule, establish requirements for color quality (CRI), power factor, operating frequency, and maximum allowable start time based on the requirements prescribed by the August 9, 2001, version of the Energy Star Program Requirements for Compact Fluorescent Lamps.

"(3) The Secretary may, by rule—

"(A) revise the requirements established under paragraph (2); or

"(B) establish other requirements, after considering energy savings, cost effectiveness, and consumer satisfaction.

"(cc) DEHUMIDIFIERS.—(1) Dehumidifiers manufactured on or after October 1, 2007, shall have an Energy Factor that meets or exceeds the following values:

"Product Capacity (pints/day):	**Minimum Energy Factor (Liters/kWh)**
25.00 or less	1.00
25.01 – 35.00	1.20
35.01 – 54.00	1.30
54.01 – 74.99	1.50
75.00 or more	2.25.

Deadline. Publication. Regulations.

"(2)(A) Not later than October 1, 2009, the Secretary shall publish a final rule in accordance with subsections (o) and (p), to determine whether the energy conservation standards established under paragraph (1) should be amended.

"(B) The final rule published under subparagraph (A) shall—

"(i) contain any amendment by the Secretary; and

Applicability.

"(ii) provide that the amendment applies to products manufactured on or after October 1, 2012.

"(C) If the Secretary does not publish an amendment that takes effect by October 1, 2012, dehumidifiers manufactured on or after October 1, 2012, shall have an Energy Factor that meets or exceeds the following values:

"Product Capacity (pints/day):	**Minimum Energy Factor (Liters/kWh)**
25.00 or less	1.20
25.01 – 35.00	1.30
35.01 – 45.00	1.40
45.01 – 54.00	1.50
54.01 – 74.99	1.60
75.00 or more	2.5.

"(dd) COMMERCIAL PRERINSE SPRAY VALVES.—Commercial prerinse spray valves manufactured on or after January 1, 2006, shall have a flow rate of not more than 1.6 gallons per minute.

"(ee) MERCURY VAPOR LAMP BALLASTS.—Mercury vapor lamp ballasts shall not be manufactured or imported after January 1, 2008.

"(ff) CEILING FANS AND CEILING FAN LIGHT KITS.—(1)(A) All ceiling fans manufactured on or after January 1, 2007, shall have the following features:

"(i) Fan speed controls separate from any lighting controls.

"(ii) Adjustable speed controls (either more than 1 speed or variable speed).

"(iii) Adjustable speed controls (either more than 1 speed or variable speed).

"(iv) The capability of reversible fan action, except for—

"(I) fans sold for industrial applications;

"(II) outdoor applications; and

"(III) cases in which safety standards would be violated by the use of the reversible mode.

"(B) The Secretary may define the exceptions described in clause (iv) in greater detail, but shall not substantively expand the exceptions.

"(2)(A) Ceiling fan light kits with medium screw base sockets manufactured on or after January 1, 2007, shall be packaged with screw-based lamps to fill all screw base sockets.

"(B) The screw-based lamps required under subparagraph (A) shall—

"(i) meet the Energy Star Program Requirements for Compact Fluorescent Lamps, version 3.0, issued by the Department of Energy; or

"(ii) use light sources other than compact fluorescent lamps that have lumens per watt performance at least equivalent to comparably configured compact fluorescent lamps meeting the Energy Star Program Requirements described in clause (i).

"(3) Ceiling fan light kits with pin-based sockets for fluorescent lamps manufactured on or after January 1, 2007 shall—

"(A) meet the Energy Star Program Requirements for Residential Light Fixtures version 4.0 issued by the Environmental Protection Agency; and

"(B) be packaged with lamps to fill all sockets.

"(4)(A) By January 1, 2007, the Secretary shall consider and issue requirements for any ceiling fan lighting kits other than those covered in paragraphs (2) and (3), including candelabra screw base sockets. Deadline. Requirements.

"(B) The requirements issued under subparagraph (A) shall be effective for products manufactured 2 years after the date of the final rule.

"(C) If the Secretary fails to issue a final rule by the date specified in subparagraph (B), any type of ceiling fan lighting kit described in subparagraph (A) that is manufactured after January 1, 2009—

"(i) shall not be capable of operating with lamps that total more than 190 watts; and

"(ii) shall include the lamps described in clause (i) in the ceiling fan lighting kits.

"(5)(A) After January 1, 2010, the Secretary may consider, and issue, if the requirements of subsections (o) and (p) are met, amended energy efficiency standards for ceiling fan light kits.

"(B) Any amended standards issued under subparagraph (A) shall apply to products manufactured not earlier than 2 years after the date of publication of the final rule establishing the amended standard. Applicability.

"(6)(A) Notwithstanding any other provision of this Act, the Secretary may consider, and issue, if the requirements of subsections (o) and (p) are met, energy efficiency or energy use standards for electricity used by ceiling fans to circulate air in a room.

"(B) In issuing the standards under subparagraph (A), the Secretary shall consider—

"(C) exempting, or setting different standards for, certain product classes for which the primary standards are not technically feasible or economically justified; and

"(D) establishing separate exempted product classes for highly decorative fans for which air movement performance is a secondary design feature.

Applicability.

"(7) Section 327 shall apply to the products covered in paragraphs (1) through (4) beginning on the date of enactment of this subsection, except that any State or local labeling requirement for ceiling fans prescribed or enacted before the date of enactment of this subsection shall not be preempted until the labeling requirements applicable to ceiling fans established under section 327 take effect.

"(gg) APPLICATION DATE.—Section 327 applies—

"(1) to products for which energy conservation standards are to be established under subsection (l), (u), or (v) beginning on the date on which a final rule is issued by the Secretary, except that any State or local standard prescribed or enacted for the product before the date on which the final rule is issued shall not be preempted until the energy conservation standard established under subsection (l), (u), or (v) for the product takes effect; and

"(2) to products for which energy conservation standards are established under subsections (w) through (ff) on the date of enactment of those subsections, except that any State or local standard prescribed or enacted before the date of enactment of those subsections shall not be preempted until the energy conservation standards established under subsections (w) through (ff) take effect.".

(d) GENERAL RULE OF PREEMPTION.—Section 327(c) of the Energy Policy and Conservation Act (42 U.S.C. 6297(c)) is amended—

(1) in paragraph (5), by striking "or" at the end;

(2) in paragraph (6), by striking the period at the end and inserting "; or"; and

(3) by adding at the end the following:

"(7)(A) is a regulation concerning standards for commercial prerinse spray valves adopted by the California Energy Commission before January 1, 2005; or

"(B) is an amendment to a regulation described in subparagraph (A) that was developed to align California regulations with changes in American Society for Testing and Materials Standard F2324;

"(8)(A) is a regulation concerning standards for pedestrian modules adopted by the California Energy Commission before January 1, 2005; or

"(B) is an amendment to a regulation described in subparagraph (A) that was developed to align California regulations to changes in the Institute for Transportation Engineers standards, entitled 'Performance Specification: Pedestrian Traffic Control Signal Indications'.".

SEC. 136. ENERGY CONSERVATION STANDARDS FOR COMMERCIAL EQUIPMENT.

(a) DEFINITIONS.—Section 340 of the Energy Policy and Conservation Act (42 U.S.C. 6311) is amended—

(1) in paragraph (1)—

(A) by redesignating subparagraphs (D) through (G) as subparagraphs (H) through (K), respectively; and

(B) by inserting after subparagraph (C) the following:

"(D) Very large commercial package air conditioning and heating equipment.

"(E) Commercial refrigerators, freezers, and refrigerator-freezers.

"(F) Automatic commercial ice makers.

"(G) Commercial clothes washers.";

(2) in paragraph (2)(B), by striking "small and large commercial package air conditioning and heating equipment" and inserting "commercial package air conditioning and heating equipment, commercial refrigerators, freezers, and refrigerator-freezers, automatic commercial ice makers, commercial clothes washers";

(3) by striking paragraphs (8) and (9) and inserting the following:

"(8)(A) The term 'commercial package air conditioning and heating equipment' means air-cooled, water-cooled, evaporatively-cooled, or water source (not including ground water source) electrically operated, unitary central air conditioners and central air conditioning heat pumps for commercial application.

"(B) The term 'small commercial package air conditioning and heating equipment' means commercial package air conditioning and heating equipment that is rated below 135,000 Btu per hour (cooling capacity).

"(C) The term 'large commercial package air conditioning and heating equipment' means commercial package air conditioning and heating equipment that is rated—

"(i) at or above 135,000 Btu per hour; and

"(ii) below 240,000 Btu per hour (cooling capacity).

"(D) The term 'very large commercial package air conditioning and heating equipment' means commercial package air conditioning and heating equipment that is rated—

"(i) at or above 240,000 Btu per hour; and

"(ii) below 760,000 Btu per hour (cooling capacity).

"(9)(A) The term 'commercial refrigerator, freezer, and refrigerator-freezer' means refrigeration equipment that—

"(i) is not a consumer product (as defined in section 321);

"(ii) is not designed and marketed exclusively for medical, scientific, or research purposes;

"(iii) operates at a chilled, frozen, combination chilled and frozen, or variable temperature;

"(iv) displays or stores merchandise and other perishable materials horizontally, semivertically, or vertically;

"(v) has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors;

"(vi) is designed for pull-down temperature applications or holding temperature applications; and

"(vii) is connected to a self-contained condensing unit or to a remote condensing unit.

"(B) The term 'holding temperature application' means a use of commercial refrigeration equipment other than a pull-down temperature application, except a blast chiller or freezer.

"(C) The term 'integrated average temperature' means the average temperature of all test package measurements taken during the test.

"(D) The term 'pull-down temperature application' means a commercial refrigerator with doors that, when fully loaded with 12 ounce beverage cans at 90 degrees F, can cool those beverages to an average stable temperature of 38 degrees F in 12 hours or less.

"(E) The term 'remote condensing unit' means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is remotely located from the refrigerated equipment and consists of one or more refrigerant compressors, refrigerant condensers, condenser fans and motors, and factory supplied accessories.

"(F) The term 'self-contained condensing unit' means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is an integral part of the refrigerated equipment and consists of one or more refrigerant compressors, refrigerant condensers, condenser fans and motors, and factory supplied accessories."; and

(4) by adding at the end the following:

"(19) The term 'automatic commercial ice maker' means a factory-made assembly (not necessarily shipped in one package) that—

"(A) consists of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice; and

"(B) may include means for storing ice, dispensing ice, or storing and dispensing ice.

"(20) The term 'commercial clothes washer' means a soft-mount front-loading or soft-mount top-loading clothes washer that—

"(A) has a clothes container compartment that—

"(i) for horizontal-axis clothes washers, is not more than 3.5 cubic feet; and

"(ii) for vertical-axis clothes washers, is not more than 4.0 cubic feet; and

"(B) is designed for use in—

"(i) applications in which the occupants of more than one household will be using the clothes washer, such as multi-family housing common areas and coin laundries; or

"(ii) other commercial applications.

"(21) The term 'harvest rate' means the amount of ice (at 32 degrees F) in pounds produced per 24 hours.".

(b) STANDARDS FOR COMMERCIAL PACKAGE AIR CONDITIONING AND HEATING EQUIPMENT.—Section 342(a) of the Energy Policy and Conservation Act (42 U.S.C. 6313(a)) is amended—

(1) in the subsection heading, by striking "SMALL AND LARGE" and inserting "SMALL, LARGE, AND VERY LARGE";

(2) in paragraph (1), by inserting "but before January 1, 2010," after "January 1, 1994,";

(3) in paragraph (2), by inserting "but before January 1, 2010," after "January 1, 1995,"; and

(4) in paragraph (6)—

(A) in subparagraph (A)—

(i) by inserting "(i)" after "(A)";

(ii) by striking "the date of enactment of the Energy Policy Act of 1992" and inserting "January 1, 2010";

(iii) by inserting after "large commercial package air conditioning and heating equipment," the following: "and very large commercial package air conditioning and heating equipment, or if ASHRAE/IES Standard 90.1, as in effect on October 24, 1992, is amended with respect to any"; and

(iv) by adding at the end the following:

"(ii) If ASHRAE/IES Standard 90.1 is not amended with respect to small commercial package air conditioning and heating equipment, large commercial package air conditioning and heating equipment, and very large commercial package air conditioning and heating equipment during the 5-year period beginning on the effective date of a standard, the Secretary may initiate a rulemaking to determine whether a more stringent standard—

"(I) would result in significant additional conservation of energy; and

"(II) is technologically feasible and economically justified."; and

(B) in subparagraph (C)(ii), by inserting "and very large commercial package air conditioning and heating equipment" after "large commercial package air conditioning and heating equipment"; and

(5) by adding at the end the following:

"(7) Small commercial package air conditioning and heating equipment manufactured on or after January 1, 2010, shall meet the following standards:

"(A) The minimum energy efficiency ratio of air-cooled central air conditioners at or above 65,000 Btu per hour (cooling capacity) and less than 135,000 Btu per hour (cooling capacity) shall be—

"(i) 11.2 for equipment with no heating or electric resistance heating; and

"(ii) 11.0 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(B) The minimum energy efficiency ratio of air-cooled central air conditioner heat pumps at or above 65,000 Btu per hour (cooling capacity) and less than 135,000 Btu per hour (cooling capacity) shall be—

"(i) 11.0 for equipment with no heating or electric resistance heating; and

"(ii) 10.8 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(C) The minimum coefficient of performance in the heating mode of air-cooled central air conditioning heat pumps at or above 65,000 Btu per hour (cooling capacity) and less than 135,000 Btu per hour (cooling capacity) shall be 3.3 (at a high temperature rating of 47 degrees F db).

"(8) Large commercial package air conditioning and heating equipment manufactured on or after January 1, 2010, shall meet the following standards:

"(A) The minimum energy efficiency ratio of air-cooled central air conditioners at or above 135,000 Btu per hour (cooling capacity) and less than 240,000 Btu per hour (cooling capacity) shall be—

"(i) 11.0 for equipment with no heating or electric resistance heating; and

"(ii) 10.8 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(B) The minimum energy efficiency ratio of air-cooled central air conditioner heat pumps at or above 135,000 Btu per hour (cooling capacity) and less than 240,000 Btu per hour (cooling capacity) shall be—

"(i) 10.6 for equipment with no heating or electric resistance heating; and

"(ii) 10.4 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(C) The minimum coefficient of performance in the heating mode of air-cooled central air conditioning heat pumps at or above 135,000 Btu per hour (cooling capacity) and less than 240,000 Btu per hour (cooling capacity) shall be 3.2 (at a high temperature rating of 47 degrees F db).

"(9) Very large commercial package air conditioning and heating equipment manufactured on or after January 1, 2010, shall meet the following standards:

"(A) The minimum energy efficiency ratio of air-cooled central air conditioners at or above 240,000 Btu per hour (cooling capacity) and less than 760,000 Btu per hour (cooling capacity) shall be—

"(i) 10.0 for equipment with no heating or electric resistance heating; and

"(ii) 9.8 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(B) The minimum energy efficiency ratio of air-cooled central air conditioner heat pumps at or above 240,000 Btu per hour (cooling capacity) and less than 760,000 Btu per hour (cooling capacity) shall be—

"(i) 9.5 for equipment with no heating or electric resistance heating; and

"(ii) 9.3 for equipment with all other heating system types that are integrated into the equipment (at a standard rating of 95 degrees F db).

"(C) The minimum coefficient of performance in the heating mode of air-cooled central air conditioning heat pumps at or above 240,000 Btu per hour (cooling capacity) and less than 760,000 Btu per hour (cooling capacity) shall be 3.2 (at a high temperature rating of 47 degrees F db).".

(c) STANDARDS FOR COMMERCIAL REFRIGERATORS, FREEZERS, AND REFRIGERATOR-FREEZERS.—Section 342 of the Energy Policy and Conservation Act (42 U.S.C. 6313) is amended by adding at the end the following:

"(c) COMMERCIAL REFRIGERATORS, FREEZERS, AND REFRIGERATOR-FREEZERS.—(1) In this subsection:

"(A) The term 'AV' means the adjusted volume (ft^3) (defined as 1.63 x frozen temperature compartment volume (ft^3) + chilled temperature compartment volume (ft^3)) with compartment volumes measured in accordance with the Association of Home Appliance Manufacturers Standard HRF1–1979.

"(B) The term 'V' means the chilled or frozen compartment volume (ft^3) (as defined in the Association of Home Appliance Manufacturers Standard HRF1–1979).

"(C) Other terms have such meanings as may be established by the Secretary, based on industry-accepted definitions and practice.

"(2) Each commercial refrigerator, freezer, and refrigerator-freezer with a self-contained condensing unit designed for holding temperature applications manufactured on or after January 1, 2010, shall have a daily energy consumption (in kilowatt hours per day) that does not exceed the following:

Refrigerators with solid doors	0.10 V + 2.04
Refrigerators with transparent doors	0.12 V + 3.34
Freezers with solid doors	0.40 V + 1.38
Freezers with transparent doors	0.75 V + 4.10
Refrigerators/freezers with solid doors the greater of.	0.27 AV – 0.71 or 0.70.

"(3) Each commercial refrigerator with a self-contained condensing unit designed for pull-down temperature applications and transparent doors manufactured on or after January 1, 2010, shall have a daily energy consumption (in kilowatt hours per day) of not more than 0.126 V + 3.51.

"(4)(A) Not later than January 1, 2009, the Secretary shall issue, by rule, standard levels for ice-cream freezers, self-contained commercial refrigerators, freezers, and refrigerator-freezers without doors, and remote condensing commercial refrigerators, freezers, and refrigerator-freezers, with the standard levels effective for equipment manufactured on or after January 1, 2012. Deadline. Regulations.

"(B) The Secretary may issue, by rule, standard levels for other types of commercial refrigerators, freezers, and refrigerator-freezers not covered by paragraph (2)(A) with the standard levels effective for equipment manufactured 3 or more years after the date on which the final rule is published.

"(5)(A) Not later than January 1, 2013, the Secretary shall issue a final rule to determine whether the standards established under this subsection should be amended. Deadlines. Regulations.

"(B) Not later than 3 years after the effective date of any amended standards under subparagraph (A) or the publication of a final rule determining that the standards should not be amended, the Secretary shall issue a final rule to determine whether the standards established under this subsection or the amended standards, as applicable, should be amended.

"(C) If the Secretary issues a final rule under subparagraph (A) or (B) establishing amended standards, the final rule shall provide that the amended standards apply to products manufactured on or after the date that is— Applicability.

"(i) 3 years after the date on which the final amended standard is published; or

"(ii) if the Secretary determines, by rule, that 3 years is inadequate, not later than 5 years after the date on which the final rule is published.".

(d) STANDARDS FOR AUTOMATIC COMMERCIAL ICE MAKERS.—Section 342 of the Energy Policy and Conservation Act (42 U.S.C.

6313) (as amended by subsection (c)) is amended by adding at the end the following:

"(d) AUTOMATIC COMMERCIAL ICE MAKERS.—(1) Each automatic commercial ice maker that produces cube type ice with capacities between 50 and 2500 pounds per 24-hour period when tested according to the test standard established in section 343(a)(7) and is manufactured on or after January 1, 2010, shall meet the following standard levels:

Equipment Type	Type of Cooling	Harvest Rate (lbs ice/24 hours)	Maximum Energy Use (kWh/100 lbs Ice)	Maximum Condenser Water Use (gal/100 lbs Ice)
Ice Making Head	Water	<500	7.80–0.0055H	200–0.022H
		≥500 and <1436	5.58–0.0011H	200–0.022H
		≥1436	4.0	200–0.022H
Ice Making Head	Air	<450	10.26–0.0086H	Not Applicable
		≥450	6.89–0.0011H	Not Applicable
Remote Condensing (but not remote compressor)	Air	<1000	8.85–0.0038H	Not Applicable
		≥1000	5.10	Not Applicable
Remote Condensing and Remote Compressor	Air	<934	8.85–0.0038H	Not Applicable
		≥934	5.3	Not Applicable
Self Contained	Water	<200	11.40–0.019H	191–0.0315H
		≥200	7.60	191–0.0315H
Self Contained	Air	<175	18.0–0.0469H	Not Applicable
		≥175	9.80	Not Applicable

H = Harvest rate in pounds per 24 hours.
Water use is for the condenser only and does not include potable water used to make ice.

"(2)(A) The Secretary may issue, by rule, standard levels for types of automatic commercial ice makers that are not covered by paragraph (1).

Applicability.

"(B) The standards established under subparagraph (A) shall apply to products manufactured on or after the date that is—

"(i) 3 years after the date on which the rule is published under subparagraph (A); or

"(ii) if the Secretary determines, by rule, that 3 years is inadequate, not later than 5 years after the date on which the final rule is published. Deadline.

"(3)(A) Not later than January 1, 2015, with respect to the standards established under paragraph (1), and, with respect to the standards established under paragraph (2), not later than 5 years after the date on which the standards take effect, the Secretary shall issue a final rule to determine whether amending the applicable standards is technologically feasible and economically justified. Deadlines. Regulations.

"(B) Not later than 5 years after the effective date of any amended standards under subparagraph (A) or the publication of a final rule determining that amending the standards is not technologically feasible or economically justified, the Secretary shall issue a final rule to determine whether amending the standards established under paragraph (1) or the amended standards, as applicable, is technologically feasible or economically justified.

"(C) If the Secretary issues a final rule under subparagraph (A) or (B) establishing amended standards, the final rule shall provide that the amended standards apply to products manufactured on or after the date that is— Applicability.

"(i) 3 years after the date on which the final amended standard is published; or

"(ii) if the Secretary determines, by rule, that 3 years is inadequate, not later than 5 years after the date on which the final amended standard is published.

"(4) A final rule issued under paragraph (2) or (3) shall establish standards at the maximum level that is technically feasible and economically justified, as provided in subsections (o) and (p) of section 325.".

(e) STANDARDS FOR COMMERCIAL CLOTHES WASHERS.—Section 342 of the Energy Policy and Conservation Act (42 U.S.C. 6313) (as amended by subsection (d)) is amended by adding at the end the following:

"(e) COMMERCIAL CLOTHES WASHERS.—(1) Each commercial clothes washer manufactured on or after January 1, 2007, shall have—

"(A) a Modified Energy Factor of at least 1.26; and

"(B) a Water Factor of not more than 9.5.

"(2)(A)(i) Not later than January 1, 2010, the Secretary shall publish a final rule to determine whether the standards established under paragraph (1) should be amended. Deadlines. Publication. Regulations.

"(ii) The rule published under clause (i) shall provide that any amended standard shall apply to products manufactured 3 years after the date on which the final amended standard is published. Applicability.

"(B)(i) Not later than January 1, 2015, the Secretary shall publish a final rule to determine whether the standards established under paragraph (1) should be amended.

"(ii) The rule published under clause (i) shall provide that any amended standard shall apply to products manufactured 3 years after the date on which the final amended standard is published.". Applicability.

(f) TEST PROCEDURES.—Section 343 of the Energy Policy and Conservation Act (42 U.S.C. 6314) is amended—

(1) in subsection (a)—

(A) in paragraph (4)—

(i) in subparagraph (A), by inserting "very large commercial package air conditioning and heating equipment," after "large commercial package air conditioning and heating equipment,"; and

(ii) in subparagraph (B), by inserting "very large commercial package air conditioning and heating equipment," after "large commercial package air conditioning and heating equipment,"; and

(B) by adding at the end the following:

"(6)(A)(i) In the case of commercial refrigerators, freezers, and refrigerator-freezers, the test procedures shall be—

"(I) the test procedures determined by the Secretary to be generally accepted industry testing procedures; or

"(II) rating procedures developed or recognized by the ASHRAE or by the American National Standards Institute.

"(ii) In the case of self-contained refrigerators, freezers, and refrigerator-freezers to which standards are applicable under paragraphs (2) and (3) of section 342(c), the initial test procedures shall be the ASHRAE 117 test procedure that is in effect on January 1, 2005.

"(B)(i) In the case of commercial refrigerators, freezers, and refrigerator-freezers with doors covered by the standards adopted in February 2002, by the California Energy Commission, the rating temperatures shall be the integrated average temperature of 38 degrees F (± 2 degrees F) for refrigerator compartments and 0 degrees F (± 2 degrees F) for freezer compartments.

Regulations.

"(C) The Secretary shall issue a rule in accordance with paragraphs (2) and (3) to establish the appropriate rating temperatures for the other products for which standards will be established under section 342(c)(4).

"(D) In establishing the appropriate test temperatures under this subparagraph, the Secretary shall follow the procedures and meet the requirements under section 323(e).

Deadline.
Regulations.

"(E)(i) Not later than 180 days after the publication of the new ASHRAE 117 test procedure, if the ASHRAE 117 test procedure for commercial refrigerators, freezers, and refrigerator-freezers is amended, the Secretary shall, by rule, amend the test procedure for the product as necessary to ensure that the test procedure is consistent with the amended ASHRAE 117 test procedure, unless the Secretary makes a determination, by rule, and supported by clear and convincing evidence, that to do so would not meet the requirements for test procedures under paragraphs (2) and (3).

Notice.
Federal Register, publication.

"(ii) If the Secretary determines that 180 days is an insufficient period during which to review and adopt the amended test procedure or rating procedure under clause (i), the Secretary shall publish a notice in the Federal Register stating the intent of the Secretary to wait not longer than 1 additional year before putting into effect an amended test procedure or rating procedure.

Regulations.

"(F)(i) If a test procedure other than the ASHRAE 117 test procedure is approved by the American National Standards Institute, the Secretary shall, by rule—

"(I) review the relative strengths and weaknesses of the new test procedure relative to the ASHRAE 117 test procedure; and

"(II) based on that review, adopt one new test procedure for use in the standards program.

Applicability.

"(ii) If a new test procedure is adopted under clause (i)—

"(I) section 323(e) shall apply; and

"(II) subparagraph (B) shall apply to the adopted test procedure.

"(7)(A) In the case of automatic commercial ice makers, the test procedures shall be the test procedures specified in Air-Conditioning and Refrigeration Institute Standard 810–2003, as in effect on January 1, 2005.

"(B)(i) If Air-Conditioning and Refrigeration Institute Standard 810–2003 is amended, the Secretary shall amend the test procedures established in subparagraph (A) as necessary to be consistent with the amended Air-Conditioning and Refrigeration Institute Standard, unless the Secretary determines, by rule, published in the Federal Register and supported by clear and convincing evidence, that to do so would not meet the requirements for test procedures under paragraphs (2) and (3). Regulations. Federal Register, publication.

"(ii) If the Secretary issues a rule under clause (i) containing a determination described in clause (ii), the rule may establish an amended test procedure for the product that meets the requirements of paragraphs (2) and (3).

"(C) The Secretary shall comply with section 323(e) in establishing any amended test procedure under this paragraph.

"(8) With respect to commercial clothes washers, the test procedures shall be the same as the test procedures established by the Secretary for residential clothes washers under section 325(g)."; and

(2) in subsection (d)(1), by inserting "very large commercial package air conditioning and heating equipment, commercial refrigerators, freezers, and refrigerator-freezers, automatic commercial ice makers, commercial clothes washers," after "large commercial package air conditioning and heating equipment,".

(g) LABELING.—Section 344(e) of the Energy Policy and Conservation Act (42 U.S.C. 6315(e)) is amended by inserting "very large commercial package air conditioning and heating equipment, commercial refrigerators, freezers, and refrigerator-freezers, automatic commercial ice makers, commercial clothes washers," after "large commercial package air conditioning and heating equipment," each place it appears.

(h) ADMINISTRATION, PENALTIES, ENFORCEMENT, AND PREEMPTION.—Section 345 of the Energy Policy and Conservation Act (42 U.S.C. 6316) is amended— Applicability.

(1) in subsection (a)—

(A) in paragraph (7), by striking "and" at the end;

(B) in paragraph (8), by striking the period at the end and inserting "; and"; and

(C) by adding at the end the following:

"(9) in the case of commercial clothes washers, section 327(b)(1) shall be applied as if the National Appliance Energy Conservation Act of 1987 was the Energy Policy Act of 2005.";

(2) in the first sentence of subsection (b)(1), by striking "part B" and inserting "part A"; and

(3) by adding at the end the following:

"(d)(1) Except as provided in paragraphs (2) and (3), section 327 shall apply with respect to very large commercial package air conditioning and heating equipment to the same extent and in the same manner as section 327 applies under part A on the date of enactment of this subsection.

Effective date.

"(2) Any State or local standard issued before the date of enactment of this subsection shall not be preempted until the standards established under section 342(a)(9) take effect on January 1, 2010.

Applicability.

"(e)(1)(A) Subsections (a), (b), and (d) of section 326, subsections (m) through (s) of section 325, and sections 328 through 336 shall apply with respect to commercial refrigerators, freezers, and refrigerator-freezers to the same extent and in the same manner as those provisions apply under part A.

"(B) In applying those provisions to commercial refrigerators, freezers, and refrigerator-freezers, paragraphs (1), (2), (3), and (4) of subsection (a) shall apply.

"(2)(A) Section 327 shall apply to commercial refrigerators, freezers, and refrigerator-freezers for which standards are established under paragraphs (2) and (3) of section 342(c) to the same extent and in the same manner as those provisions apply under part A on the date of enactment of this subsection, except that any State or local standard issued before the date of enactment of this subsection shall not be preempted until the standards established under paragraphs (2) and (3) of section 342(c) take effect.

"(B) In applying section 327 in accordance with subparagraph (A), paragraphs (1), (2), and (3) of subsection (a) shall apply.

"(3)(A) Section 327 shall apply to commercial refrigerators, freezers, and refrigerator-freezers for which standards are established under section 342(c)(4) to the same extent and in the same manner as the provisions apply under part A on the date of publication of the final rule by the Secretary, except that any State or local standard issued before the date of publication of the final rule by the Secretary shall not be preempted until the standards take effect.

"(B) In applying section 327 in accordance with subparagraph (A), paragraphs (1), (2), and (3) of subsection (a) shall apply.

"(4)(A) If the Secretary does not issue a final rule for a specific type of commercial refrigerator, freezer, or refrigerator-freezer within the time frame specified in section 342(c)(5), subsections (b) and (c) of section 327 shall not apply to that specific type of refrigerator, freezer, or refrigerator-freezer for the period beginning on the date that is 2 years after the scheduled date for a final rule and ending on the date on which the Secretary publishes a final rule covering the specific type of refrigerator, freezer, or refrigerator-freezer.

"(B) Any State or local standard issued before the date of publication of the final rule shall not be preempted until the final rule takes effect.

Certification.

"(5)(A) In the case of any commercial refrigerator, freezer, or refrigerator-freezer to which standards are applicable under paragraphs (2) and (3) of section 342(c), the Secretary shall require manufacturers to certify, through an independent, nationally recognized testing or certification program, that the commercial refrigerator, freezer, or refrigerator-freezer meets the applicable standard.

"(B) The Secretary shall, to the maximum extent practicable, encourage the establishment of at least 2 independent testing and certification programs.

Records.

"(C) As part of certification, information on equipment energy use and interior volume shall be made available to the Secretary.

Applicability.

"(f)(1)(A)(i) Except as provided in clause (ii), section 327 shall apply to automatic commercial ice makers for which standards

have been established under section 342(d)(1) to the same extent and in the same manner as the section applies under part A on the date of enactment of this subsection.

"(ii) Any State standard issued before the date of enactment of this subsection shall not be preempted until the standards established under section 342(d)(1) take effect.

"(B) In applying section 327 to the equipment under subparagraph (A), paragraphs (1), (2), and (3) of subsection (a) shall apply.

"(2)(A)(i) Except as provided in clause (ii), section 327 shall apply to automatic commercial ice makers for which standards have been established under section 342(d)(2) to the same extent and in the same manner as the section applies under part A on the date of publication of the final rule by the Secretary.

"(ii) Any State standard issued before the date of publication of the final rule by the Secretary shall not be preempted until the standards established under section 342(d)(2) take effect.

"(B) In applying section 327 in accordance with subparagraph (A), paragraphs (1), (2), and (3) of subsection (a) shall apply.

"(3)(A) If the Secretary does not issue a final rule for a specific type of automatic commercial ice maker within the time frame specified in section 342(d), subsections (b) and (c) of section 327 shall no longer apply to the specific type of automatic commercial ice maker for the period beginning on the day after the scheduled date for a final rule and ending on the date on which the Secretary publishes a final rule covering the specific type of automatic commercial ice maker.

"(B) Any State standard issued before the publication of the final rule shall not be preempted until the standards established in the final rule take effect.

"(4)(A) The Secretary shall monitor whether manufacturers are reducing harvest rates below tested values for the purpose of bringing non-complying equipment into compliance.

"(B) If the Secretary finds that there has been a substantial amount of manipulation with respect to harvest rates under subparagraph (A), the Secretary shall take steps to minimize the manipulation, such as requiring harvest rates to be within 5 percent of tested values.

"(g)(1)(A) If the Secretary does not issue a final rule for commercial clothes washers within the timeframe specified in section 342(e)(2), subsections (b) and (c) of section 327 shall not apply to commercial clothes washers for the period beginning on the day after the scheduled date for a final rule and ending on the date on which the Secretary publishes a final rule covering commercial clothes washers.

"(B) Any State or local standard issued before the date on which the Secretary publishes a final rule shall not be preempted until the standards established under section 342(e)(2) take effect.

"(2) The Secretary shall undertake an educational program to inform owners of laundromats, multifamily housing, and other sites where commercial clothes washers are located about the new standard, including impacts on washer purchase costs and options for recovering those costs through coin collection.".

SEC. 137. ENERGY LABELING.

(a) RULEMAKING ON EFFECTIVENESS OF CONSUMER PRODUCT LABELING.—Section 324(a)(2) of the Energy Policy and Conservation

Act (42 U.S.C. 6294(a)(2)) is amended by adding at the end the following:

Deadlines.

"(F)(i) Not later than 90 days after the date of enactment of this subparagraph, the Commission shall initiate a rulemaking to consider—

"(I) the effectiveness of the consumer products labeling program in assisting consumers in making purchasing decisions and improving energy efficiency; and

"(II) changes to the labeling rules (including categorical labeling) that would improve the effectiveness of consumer product labels.

"(ii) Not later than 2 years after the date of enactment of this subparagraph, the Commission shall complete the rulemaking initiated under clause (i).

Deadline.

"(G)(i) Not later than 18 months after the date of enactment of this subparagraph, the Commission shall issue by rule, in accordance with this section, labeling requirements for the electricity used by ceiling fans to circulate air in a room.

Applicability.

"(ii) The rule issued under clause (i) shall apply to products manufactured after the later of—

"(I) January 1, 2009; or

"(II) the date that is 60 days after the final rule is issued.".

(b) RULEMAKING ON LABELING FOR ADDITIONAL PRODUCTS.—Section 324(a) of the Energy Policy and Conservation Act (42 U.S.C. 6294(a)) is amended by adding at the end the following:

"(5)(A) For covered products described in subsections (u) through (ff) of section 325, after a test procedure has been prescribed under section 323, the Secretary or the Commission, as appropriate, may prescribe, by rule, under this section labeling requirements for the products.

"(B) In the case of products to which TP–1 standards under section 325(y) apply, labeling requirements shall be based on the 'Standard for the Labeling of Distribution Transformer Efficiency' prescribed by the National Electrical Manufacturers Association (NEMA TP–3) as in effect on the date of enactment of this paragraph.

"(C) In the case of dehumidifiers covered under section 325(dd), the Commission shall not require an 'Energy Guide' label.".

SEC. 138. INTERMITTENT ESCALATOR STUDY.

(a) IN GENERAL.—The Administrator of General Services shall conduct a study on the advantages and disadvantages of employing intermittent escalators in the United States.

(b) CONTENTS.—Such study shall include an analysis of—

(1) the energy end-cost savings derived from the use of intermittent escalators;

(2) the cost savings derived from reduced maintenance requirements; and

(3) such other issues as the Administrator considers appropriate.

(c) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit to Congress a report on the results of the study.

(d) DEFINITION.—For purposes of this section, the term "intermittent escalator" means an escalator that remains in a stationary

position until it automatically operates at the approach of a passenger, returning to a stationary position after the passenger completes passage.

SEC. 139. ENERGY EFFICIENT ELECTRIC AND NATURAL GAS UTILITIES STUDY.

Deadline.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with the National Association of Regulatory Utility Commissioners and the National Association of State Energy Officials, shall conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by—

(1) utilities that are subject to State regulation; and

(2) nonregulated utilities.

(b) CONSIDERATION.—In conducting the study under subsection (a), the Secretary shall take into consideration—

(1) performance standards for achieving energy use and demand reduction targets;

(2) funding sources, including rate surcharges;

(3) infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements;

(4) the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures; and

(5) methods of—

(A) removing disincentives for utilities to implement energy efficiency programs;

(B) encouraging utilities to undertake voluntary energy efficiency programs; and

(C) ensuring appropriate returns on energy efficiency programs.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report that includes—

(1) the findings of the study; and

(2) any recommendations of the Secretary, including recommendations on model policies to promote energy efficiency programs.

SEC. 140. ENERGY EFFICIENCY PILOT PROGRAM.

42 USC 15833.

(a) IN GENERAL.—The Secretary shall establish a pilot program under which the Secretary provides financial assistance to at least 3, but not more than 7, States to carry out pilot projects in the States for—

(1) planning and adopting statewide programs that encourage, for each year in which the pilot project is carried out—

(A) energy efficiency; and

(B) reduction of consumption of electricity or natural gas in the State by at least 0.75 percent, as compared to a baseline determined by the Secretary for the period preceding the implementation of the program; or

(2) for any State that has adopted a statewide program as of the date of enactment of this Act, activities that reduce energy consumption in the State by expanding and improving the program.

(b) VERIFICATION.—A State that receives financial assistance under subsection (a)(1) shall submit to the Secretary independent verification of any energy savings achieved through the statewide program.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $5,000,000 for each of fiscal years 2006 through 2010, to remain available until expended.

42 USC 15834.

SEC. 141. REPORT ON FAILURE TO COMPLY WITH DEADLINES FOR NEW OR REVISED ENERGY CONSERVATION STANDARDS.

(a) INITIAL REPORT.—The Secretary shall submit a report to Congress regarding each new or revised energy conservation or water use standard which the Secretary has failed to issue in conformance with the deadlines established in the Energy Policy and Conservation Act. Such report shall state the reasons why the Secretary has failed to comply with the deadline for issuances of the new or revised standard and set forth the Secretary's plan for expeditiously prescribing such new or revised standard. The Secretary's initial report shall be submitted not later than 6 months following enactment of this Act and subsequent reports shall be submitted whenever the Secretary determines that additional deadlines for issuance of new or revised standards have been missed.

(b) IMPLEMENTATION REPORT.—Every 6 months following the submission of a report under subsection (a) until the adoption of a new or revised standard described in such report, the Secretary shall submit to the Congress an implementation report describing the Secretary's progress in implementing the Secretary's plan or the issuance of the new or revised standard.

Subtitle D—Public Housing

SEC. 151. PUBLIC HOUSING CAPITAL FUND.

Section 9 of the United States Housing Act of 1937 (42 U.S.C. 1437g) is amended—

(1) in subsection (d)(1)—

(A) in subparagraph (I), by striking "and" at the end;

(B) in subparagraph (J), by striking the period at the end and inserting a semicolon; and

(C) by adding at the end the following new subparagraphs:

"(K) improvement of energy and water-use efficiency by installing fixtures and fittings that conform to the American Society of Mechanical Engineers/American National Standards Institute standards A112.19.2–1998 and A112.18.1–2000, or any revision thereto, applicable at the time of installation, and by increasing energy efficiency and water conservation by such other means as the Secretary determines are appropriate; and

"(L) integrated utility management and capital planning to maximize energy conservation and efficiency measures."; and

(2) in subsection (e)(2)(C)—

(A) by striking "The" and inserting the following:

"(i) IN GENERAL.—The"; and

(B) by adding at the end the following:

"(ii) THIRD PARTY CONTRACTS.—Contracts described in clause (i) may include contracts for equipment conversions to less costly utility sources, projects with resident-paid utilities, and adjustments to frozen base year consumption, including systems repaired to meet applicable building and safety codes and adjustments for occupancy rates increased by rehabilitation.

"(iii) TERM OF CONTRACT.—The total term of a contract described in clause (i) shall not exceed 20 years to allow longer payback periods for retrofits, including windows, heating system replacements, wall insulation, site-based generation, advanced energy savings technologies, including renewable energy generation, and other such retrofits.".

SEC. 152. ENERGY-EFFICIENT APPLIANCES. 42 USC 15841.

In purchasing appliances, a public housing agency shall purchase energy-efficient appliances that are Energy Star products or FEMP-designated products, as such terms are defined in section 553 of the National Energy Conservation Policy Act, unless the purchase of energy-efficient appliances is not cost-effective to the agency.

SEC. 153. ENERGY EFFICIENCY STANDARDS.

Section 109 of the Cranston-Gonzalez National Affordable Housing Act (42 U.S.C. 12709) is amended—

(1) in subsection (a)—

(A) in paragraph (1)—

(i) by striking "1 year after the date of the enactment of the Energy Policy Act of 1992" and inserting "September 30, 2006";

(ii) in subparagraph (A), by striking "and" at the end;

(iii) in subparagraph (B), by striking the period at the end and inserting "; and"; and

(iv) by adding at the end the following:

"(C) rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants under section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v), where such standards are determined to be cost effective by the Secretary of Housing and Urban Development."; and

(B) in paragraph (2), by inserting ", and, with respect to rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants under section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v), the 2003 International Energy Conservation Code" after "90.1–1989')";

(2) in subsection (b)—

(A) by striking "within 1 year after the date of the enactment of the Energy Policy Act of 1992" and inserting "by September 30, 2006"; and

(B) by inserting ", and, with respect to rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants under section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v), the 2003 International Energy Conservation Code" before the period at the end; and

(3) in subsection (c)—

(A) in the heading, by inserting "AND THE INTERNATIONAL ENERGY CONSERVATION CODE" after "MODEL ENERGY CODE"; and

(B) by inserting ", or, with respect to rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants under section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v), the 2003 International Energy Conservation Code" after "1989".

42 USC 15842.

SEC. 154. ENERGY STRATEGY FOR HUD.

The Secretary of Housing and Urban Development shall develop and implement an integrated strategy to reduce utility expenses through cost-effective energy conservation and efficiency measures and energy efficient design and construction of public and assisted housing. The energy strategy shall include the development of energy reduction goals and incentives for public housing agencies. The Secretary shall submit a report to Congress, not later than 1 year after the date of the enactment of this Act, on the energy strategy and the actions taken by the Department of Housing and Urban Development to monitor the energy usage of public housing agencies and shall submit an update every 2 years thereafter on progress in implementing the strategy.

Reports.
Deadlines.

TITLE II—RENEWABLE ENERGY

Subtitle A—General Provisions

42 USC 15851.

SEC. 201. ASSESSMENT OF RENEWABLE ENERGY RESOURCES.

Deadlines.

(a) RESOURCE ASSESSMENT.—Not later than 6 months after the date of enactment of this Act, and each year thereafter, the Secretary shall review the available assessments of renewable energy resources within the United States, including solar, wind, biomass, ocean (including tidal, wave, current, and thermal), geothermal, and hydroelectric energy resources, and undertake new assessments as necessary, taking into account changes in market conditions, available technologies, and other relevant factors.

(b) CONTENTS OF REPORTS.—Not later than 1 year after the date of enactment of this Act, and each year thereafter, the Secretary shall publish a report based on the assessment under subsection (a). The report shall contain—

(1) a detailed inventory describing the available amount and characteristics of the renewable energy resources; and

(2) such other information as the Secretary believes would be useful in developing such renewable energy resources, including descriptions of surrounding terrain, population and load centers, nearby energy infrastructure, location of energy and water resources, and available estimates of the costs needed to develop each resource, together with an identification of any barriers to providing adequate transmission for remote sources of renewable energy resources to current and emerging markets, recommendations for removing or addressing such barriers, and ways to provide access to the grid that do not unfairly disadvantage renewable or other energy producers.

(c) AUTHORIZATION OF APPROPRIATIONS.—For the purposes of this section, there are authorized to be appropriated to the Secretary $10,000,000 for each of fiscal years 2006 through 2010.

42 USC 13311 note.

SEC. 202. RENEWABLE ENERGY PRODUCTION INCENTIVE.

(a) INCENTIVE PAYMENTS.—Section 1212(a) of the Energy Policy Act of 1992 (42 U.S.C. 13317(a)) is amended—

(1) by striking the last sentence;

(2) by designating the first, second, and third sentences as paragraphs (1), (2), and (3), respectively;

(3) in paragraph (3) (as so designated), by striking "and which satisfies" and all that follows through "deems necessary"; and

(4) by adding at the end the following:

"(4)(A) Subject to subparagraph (B), if there are insufficient appropriations to make full payments for electric production from all qualified renewable energy facilities for a fiscal year, the Secretary shall assign—

"(i) 60 percent of appropriated funds for the fiscal year to facilities that use solar, wind, ocean (including tidal, wave, current, and thermal), geothermal, or closed-loop (dedicated energy crops) biomass technologies to generate electricity; and

"(ii) 40 percent of appropriated funds for the fiscal year to other projects.

"(B) After submitting to Congress an explanation of the reasons for the alteration, the Secretary may alter the percentage requirements of subparagraph (A).".

(b) QUALIFIED RENEWABLE ENERGY FACILITY.—Section 1212(b) of the Energy Policy Act of 1992 (42 U.S.C. 13317(b)) is amended—

(1) by striking "a State or any political" and all that follows through "nonprofit electrical cooperative" and inserting "a not-for-profit electric cooperative, a public utility described in section 115 of the Internal Revenue Code of 1986, a State, Commonwealth, territory, or possession of the United States, or the District of Columbia, or a political subdivision thereof, an Indian tribal government or subdivision thereof, or a Native Corporation (as defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602))."; and

(2) by inserting "landfill gas, livestock methane, ocean (including tidal, wave, current, and thermal)," after "wind, biomass,".

(c) ELIGIBILITY WINDOW.—Section 1212(c) of the Energy Policy Act of 1992 (42 U.S.C. 13317(c)) is amended by striking "during the 10-fiscal year period beginning with the first full fiscal year occurring after the enactment of this section" and inserting "before October 1, 2016".

(d) PAYMENT PERIOD.—Section 1212(d) of the Energy Policy Act of 1992 (42 U.S.C. 13317(d)) is amended in the second sentence by inserting ", or in which the Secretary determines that all necessary Federal and State authorizations have been obtained to begin construction of the facility" after "eligible for such payments".

(e) AMOUNT OF PAYMENT.—Section 1212(e)(1) of the Energy Policy Act of 1992 (42 U.S.C. 13317(e)(1)) is amended in the first sentence by inserting "landfill gas, livestock methane, ocean (including tidal, wave, current, and thermal)," after "wind, biomass,".

(f) TERMINATION OF AUTHORITY.—Section 1212(f) of the Energy Policy Act of 1992 (42 U.S.C. 13317(f)) is amended by striking "the expiration of" and all that follows through "of this section" and inserting "September 30, 2026".

(g) AUTHORIZATION OF APPROPRIATIONS.—Section 1212 of the Energy Policy Act of 1992 (42 U.S.C. 13317) is amended by striking subsection (g) and inserting the following:

"(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section for each of fiscal years 2006 through 2026, to remain available until expended.".

42 USC 15852.

SEC. 203. FEDERAL PURCHASE REQUIREMENT.

President.

(a) REQUIREMENT.—The President, acting through the Secretary, shall seek to ensure that, to the extent economically feasible and technically practicable, of the total amount of electric energy the Federal Government consumes during any fiscal year, the following amounts shall be renewable energy:

(1) Not less than 3 percent in fiscal years 2007 through 2009.

(2) Not less than 5 percent in fiscal years 2010 through 2012.

(3) Not less than 7.5 percent in fiscal year 2013 and each fiscal year thereafter.

(b) DEFINITIONS.—In this section:

(1) BIOMASS.—The term "biomass" means any lignin waste material that is segregated from other waste materials and is determined to be nonhazardous by the Administrator of the Environmental Protection Agency and any solid, nonhazardous, cellulosic material that is derived from—

(A) any of the following forest-related resources: mill residues, precommercial thinnings, slash, and brush, or nonmerchantable material;

(B) solid wood waste materials, including waste pallets, crates, dunnage, manufacturing and construction wood wastes (other than pressure-treated, chemically-treated, or painted wood wastes), and landscape or right-of-way tree trimmings, but not including municipal solid waste (garbage), gas derived from the biodegradation of solid waste, or paper that is commonly recycled;

(C) agriculture wastes, including orchard tree crops, vineyard, grain, legumes, sugar, and other crop by-products or residues, and livestock waste nutrients; or

(D) a plant that is grown exclusively as a fuel for the production of electricity.

(2) RENEWABLE ENERGY.—The term "renewable energy" means electric energy generated from solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project.

(c) CALCULATION.—For purposes of determining compliance with the requirement of this section, the amount of renewable energy shall be doubled if—

(1) the renewable energy is produced and used on-site at a Federal facility;

(2) the renewable energy is produced on Federal lands and used at a Federal facility; or

(3) the renewable energy is produced on Indian land as defined in title XXVI of the Energy Policy Act of 1992 (25 U.S.C. 3501 et seq.) and used at a Federal facility.

(d) REPORT.—Not later than April 15, 2007, and every 2 years thereafter, the Secretary shall provide a report to Congress on the progress of the Federal Government in meeting the goals established by this section.

SEC. 204. USE OF PHOTOVOLTAIC ENERGY IN PUBLIC BUILDINGS.

(a) IN GENERAL.—Subchapter VI of chapter 31 of title 40, United States Code, is amended by adding at the end the following:

"§ 3177. Use of photovoltaic energy in public buildings

"(a) PHOTOVOLTAIC ENERGY COMMERCIALIZATION PROGRAM.—

"(1) IN GENERAL.—The Administrator of General Services may establish a photovoltaic energy commercialization program for the procurement and installation of photovoltaic solar electric systems for electric production in new and existing public buildings.

"(2) PURPOSES.—The purposes of the program shall be to accomplish the following:

"(A) To accelerate the growth of a commercially viable photovoltaic industry to make this energy system available to the general public as an option which can reduce the national consumption of fossil fuel.

"(B) To reduce the fossil fuel consumption and costs of the Federal Government.

"(C) To attain the goal of installing solar energy systems in 20,000 Federal buildings by 2010, as contained in the Federal Government's Million Solar Roof Initiative of 1997.

"(D) To stimulate the general use within the Federal Government of life-cycle costing and innovative procurement methods.

"(E) To develop program performance data to support policy decisions on future incentive programs with respect to energy.

"(3) ACQUISITION OF PHOTOVOLTAIC SOLAR ELECTRIC SYSTEMS.—

"(A) IN GENERAL.—The program shall provide for the acquisition of photovoltaic solar electric systems and associated storage capability for use in public buildings.

"(B) ACQUISITION LEVELS.—The acquisition of photovoltaic electric systems shall be at a level substantial enough to allow use of low-cost production techniques with at least 150 megawatts (peak) cumulative acquired during the 5 years of the program.

"(4) ADMINISTRATION.—The Administrator shall administer the program and shall—

"(A) issue such rules and regulations as may be appropriate to monitor and assess the performance and operation of photovoltaic solar electric systems installed pursuant to this subsection;

"(B) develop innovative procurement strategies for the acquisition of such systems; and

Reports.

"(C) transmit to Congress an annual report on the results of the program.

"(b) PHOTOVOLTAIC SYSTEMS EVALUATION PROGRAM.—

Deadline.

"(1) IN GENERAL.—Not later than 60 days after the date of enactment of this section, the Administrator shall establish a photovoltaic solar energy systems evaluation program to evaluate such photovoltaic solar energy systems as are required in public buildings.

"(2) PROGRAM REQUIREMENT.—In evaluating photovoltaic solar energy systems under the program, the Administrator shall ensure that such systems reflect the most advanced technology.

"(c) AUTHORIZATION OF APPROPRIATIONS.—

"(1) PHOTOVOLTAIC ENERGY COMMERCIALIZATION PROGRAM.—There are authorized to be appropriated to carry out subsection (a) $50,000,000 for each of fiscal years 2006 through 2010. Such sums shall remain available until expended.

"(2) PHOTOVOLTAIC SYSTEMS EVALUATION PROGRAM.—There are authorized to be appropriated to carry out subsection (b) $10,000,000 for each of fiscal years 2006 through 2010. Such sums shall remain available until expended.".

(b) CONFORMING AMENDMENT.—The table of sections for the National Energy Conservation Policy Act is amended by inserting after the item relating to section 569 the following:

"Sec. 570. Use of photovoltaic energy in public buildings.".

SEC. 205. BIOBASED PRODUCTS.

Section 9002(c)(1) of the Farm Security and Rural Investment Act of 2002 (7 U.S.C. 8102(c)(1)) is amended by inserting "or such items that comply with the regulations issued under section 103 of Public Law 100–556 (42 U.S.C. 6914b–1)" after "practicable".

SEC. 206. RENEWABLE ENERGY SECURITY.

(a) WEATHERIZATION ASSISTANCE.—Section 415(c) of the Energy Conservation and Production Act (42 U.S.C. 6865(c)) is amended—

(1) in paragraph (1), by striking "in paragraph (3)" and inserting "in paragraphs (3) and (4)";

(2) in paragraph (3), by striking "$2,500 per dwelling unit average provided in paragraph (1)" and inserting "dwelling unit averages provided in paragraphs (1) and (4)"; and

(3) by adding at the end the following new paragraphs:

"(4) The expenditure of financial assistance provided under this part for labor, weatherization materials, and related matters for a renewable energy system shall not exceed an average of $3,000 per dwelling unit.

Regulations.

"(5)(A) The Secretary shall by regulations—

"(i) establish the criteria which are to be used in prescribing performance and quality standards under paragraph (6)(A)(ii) or in specifying any form of renewable energy under paragraph (6)(A)(i)(I); and

"(ii) establish a procedure under which a manufacturer of an item may request the Secretary to certify that the item will be treated, for purposes of this paragraph, as a renewable energy system.

"(B) The Secretary shall make a final determination with respect to any request filed under subparagraph (A)(ii) within 1

year after the filing of the request, together with any information required to be filed with such request under subparagraph (A)(ii).

"(C) Each month the Secretary shall publish a report of any request under subparagraph (A)(ii) which has been denied during the preceding month and the reasons for the denial. Reports.

"(D) The Secretary shall not specify any form of renewable energy under paragraph (6)(A)(i)(I) unless the Secretary determines that—

"(i) there will be a reduction in oil or natural gas consumption as a result of such specification;

"(ii) such specification will not result in an increased use of any item which is known to be, or reasonably suspected to be, environmentally hazardous or a threat to public health or safety; and

"(iii) available Federal subsidies do not make such specification unnecessary or inappropriate (in the light of the most advantageous allocation of economic resources).

"(6) In this subsection—

"(A) the term 'renewable energy system' means a system which—

"(i) when installed in connection with a dwelling, transmits or uses—

"(I) solar energy, energy derived from the geothermal deposits, energy derived from biomass, or any other form of renewable energy which the Secretary specifies by regulations, for the purpose of heating or cooling such dwelling or providing hot water or electricity for use within such dwelling; or

"(II) wind energy for nonbusiness residential purposes;

"(ii) meets the performance and quality standards (if any) which have been prescribed by the Secretary by regulations;

"(iii) in the case of a combustion rated system, has a thermal efficiency rating of at least 75 percent; and

"(iv) in the case of a solar system, has a thermal efficiency rating of at least 15 percent; and

"(B) the term 'biomass' means any organic matter that is available on a renewable or recurring basis, including agricultural crops and trees, wood and wood wastes and residues, plants (including aquatic plants), grasses, residues, fibers, and animal wastes, municipal wastes, and other waste materials.".

(b) DISTRICT HEATING AND COOLING PROGRAMS.—Section 172 of the Energy Policy Act of 1992 (42 U.S.C. 13451 note) is amended—

(1) in subsection (a)—

(A) by striking "and" at the end of paragraph (3);

(B) by striking the period at the end of paragraph (4) and inserting "; and"; and

(C) by adding at the end the following new paragraph:

"(5) evaluate the use of renewable energy systems (as such term is defined in section 415(c) of the Energy Conservation and Production Act (42 U.S.C. 6865(c))) in residential buildings."; and

(2) in subsection (b), by striking "this Act" and inserting "the Energy Policy Act of 2005".

(c) REBATE PROGRAM.— 42 USC 15853.

(1) ESTABLISHMENT.—The Secretary shall establish a program providing rebates for consumers for expenditures made for the installation of a renewable energy system in connection with a dwelling unit or small business.

(2) AMOUNT OF REBATE.—Rebates provided under the program established under paragraph (1) shall be in an amount not to exceed the lesser of—

(A) 25 percent of the expenditures described in paragraph (1) made by the consumer; or

(B) $3,000.

(3) DEFINITION.—For purposes of this subsection, the term "renewable energy system" has the meaning given that term in section 415(c)(6)(A) of the Energy Conservation and Production Act (42 U.S.C. 6865(c)(6)(A)), as added by subsection (a)(3) of this section.

(4) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this subsection, to remain available until expended—

(A) $150,000,000 for fiscal year 2006;

(B) $150,000,000 for fiscal year 2007;

(C) $200,000,000 for fiscal year 2008;

(D) $250,000,000 for fiscal year 2009; and

(E) $250,000,000 for fiscal year 2010.

Deadline. Reports.

(d) RENEWABLE FUEL INVENTORY.—Not later than 180 days after the date of enactment of this Act, the Secretary shall transmit to Congress a report containing—

(1) an inventory of renewable fuels available for consumers; and

(2) a projection of future inventories of renewable fuels based on the incentives provided in this section.

SEC. 207. INSTALLATION OF PHOTOVOLTAIC SYSTEM.

Appropriation authorization.

There is authorized to be appropriated to the General Services Administration to install a photovoltaic system, as set forth in the Sun Wall Design Project, for the headquarters building of the Department of Energy located at 1000 Independence Avenue Southwest in the District of Columbia, commonly know as the Forrestal Building, $20,000,000 for fiscal year 2006. Such sums shall remain available until expended.

42 USC 15854.

SEC. 208. SUGAR CANE ETHANOL PROGRAM.

(a) DEFINITION OF PROGRAM.—In this section, the term "program" means the Sugar Cane Ethanol Program established by subsection (b).

(b) ESTABLISHMENT.—There is established within the Environmental Protection Agency a program to be known as the "Sugar Cane Ethanol Program".

(c) PROJECT.—

(1) IN GENERAL.—Subject to the availability of appropriations under subsection (d), in carrying out the program, the Administrator of the Environmental Protection Agency shall establish a project that is—

(A) carried out in multiple States—

(i) in each of which is produced cane sugar that is eligible for loans under section 156 of the Federal Agriculture Improvement and Reform Act of 1996 (7 U.S.C. 7272), or a similar subsequent authority; and

(ii) at the option of each such State, that have an incentive program that requires the use of ethanol in the State; and

(B) designed to study the production of ethanol from cane sugar, sugarcane, and sugarcane byproducts.

(2) REQUIREMENTS.—A project described in paragraph (1) shall—

(A) be limited to sugar producers and the production of ethanol in the States of Florida, Louisiana, Texas, and Hawaii, divided equally among the States, to demonstrate that the process may be applicable to cane sugar, sugarcane, and sugarcane byproducts;

(B) include information on the ways in which the scale of production may be replicated once the sugar cane industry has located sites for, and constructed, ethanol production facilities; and

(C) not last more than 3 years.

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $36,000,000, to remain available until expended.

SEC. 209. RURAL AND REMOTE COMMUNITY ELECTRIFICATION GRANTS.

The Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2601 et seq.) is amended in title VI by adding at the end the following:

"SEC. 609. RURAL AND REMOTE COMMUNITIES ELECTRIFICATION GRANTS. 7 USC 918c.

"(a) DEFINITIONS.—In this section:

"(1) The term 'eligible grantee' means a local government or municipality, peoples' utility district, irrigation district, and cooperative, nonprofit, or limited-dividend association in a rural area.

"(2) The term 'incremental hydropower' means additional generation achieved from increased efficiency after January 1, 2005, at a hydroelectric dam that was placed in service before January 1, 2005.

"(3) The term 'renewable energy' means electricity generated from—

"(A) a renewable energy source; or

"(B) hydrogen, other than hydrogen produced from a fossil fuel, that is produced from a renewable energy source.

"(4) The term 'renewable energy source' means—

"(A) wind;

"(B) ocean waves;

"(C) biomass;

"(D) solar;

"(E) landfill gas;

"(F) incremental hydropower;

"(G) livestock methane; or

"(H) geothermal energy.

"(5) The term 'rural area' means a city, town, or unincorporated area that has a population of not more than 10,000 inhabitants.

"(b) GRANTS.—The Secretary, in consultation with the Secretary of Agriculture and the Secretary of the Interior, may provide grants under this section to eligible grantees for the purpose of—

"(1) increasing energy efficiency, siting or upgrading transmission and distribution lines serving rural areas; or

"(2) providing or modernizing electric generation facilities that serve rural areas.

"(c) GRANT ADMINISTRATION.—(1) The Secretary shall make grants under this section based on a determination of cost-effectiveness and the most effective use of the funds to achieve the purposes described in subsection (b).

"(2) For each fiscal year, the Secretary shall allocate grant funds under this section equally between the purposes described in paragraphs (1) and (2) of subsection (b).

"(3) In making grants for the purposes described in subsection (b)(2), the Secretary shall give preference to renewable energy facilities.

"(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out this section $20,000,000 for each of fiscal years 2006 through 2012.".

42 USC 15855.

SEC. 210. GRANTS TO IMPROVE THE COMMERCIAL VALUE OF FOREST BIOMASS FOR ELECTRIC ENERGY, USEFUL HEAT, TRANSPORTATION FUELS, AND OTHER COMMERCIAL PURPOSES.

(a) DEFINITIONS.—In this section:

(1) BIOMASS.—The term "biomass" means nonmerchantable materials or precommercial thinnings that are byproducts of preventive treatments, such as trees, wood, brush, thinnings, chips, and slash, that are removed—

(A) to reduce hazardous fuels;

(B) to reduce or contain disease or insect infestation; or

(C) to restore forest health.

(2) INDIAN TRIBE.—The term "Indian tribe" has the meaning given the term in section 4(e) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450b(e)).

(3) NONMERCHANTABLE.—For purposes of subsection (b), the term "nonmerchantable" means that portion of the byproducts of preventive treatments that would not otherwise be used for higher value products.

(4) PERSON.—The term "person" includes—

(A) an individual;

(B) a community (as determined by the Secretary concerned);

(C) an Indian tribe;

(D) a small business or a corporation that is incorporated in the United States; and

(E) a nonprofit organization.

(5) PREFERRED COMMUNITY.—The term "preferred community" means—

(A) any Indian tribe;

(B) any town, township, municipality, or other similar unit of local government (as determined by the Secretary concerned) that—

(i) has a population of not more than 50,000 individuals; and

(ii) the Secretary concerned, in the sole discretion of the Secretary concerned, determines contains or is located near Federal or Indian land, the condition of

which is at significant risk of catastrophic wildfire, disease, or insect infestation or which suffers from disease or insect infestation; or

(C) any county that—

(i) is not contained within a metropolitan statistical area; and

(ii) the Secretary concerned, in the sole discretion of the Secretary concerned, determines contains or is located near Federal or Indian land, the condition of which is at significant risk of catastrophic wildfire, disease, or insect infestation or which suffers from disease or insect infestation.

(6) SECRETARY CONCERNED.—The term "Secretary concerned" means the Secretary of Agriculture or the Secretary of the Interior.

(b) BIOMASS COMMERCIAL USE GRANT PROGRAM.—

(1) IN GENERAL.—The Secretary concerned may make grants to any person in a preferred community that owns or operates a facility that uses biomass as a raw material to produce electric energy, sensible heat, or transportation fuels to offset the costs incurred to purchase biomass for use by such facility.

(2) GRANT AMOUNTS.—A grant under this subsection may not exceed $20 per green ton of biomass delivered.

(3) MONITORING OF GRANT RECIPIENT ACTIVITIES.—As a condition of a grant under this subsection, the grant recipient shall keep such records as the Secretary concerned may require to fully and correctly disclose the use of the grant funds and all transactions involved in the purchase of biomass. Upon notice by a representative of the Secretary concerned, the grant recipient shall afford the representative reasonable access to the facility that purchases or uses biomass and an opportunity to examine the inventory and records of the facility.

(c) IMPROVED BIOMASS USE GRANT PROGRAM.—

(1) IN GENERAL.—The Secretary concerned may make grants to persons to offset the cost of projects to develop or research opportunities to improve the use of, or add value to, biomass. In making such grants, the Secretary concerned shall give preference to persons in preferred communities.

(2) SELECTION.—The Secretary concerned shall select a grant recipient under paragraph (1) after giving consideration to—

(A) the anticipated public benefits of the project, including the potential to develop thermal or electric energy resources or affordable energy;

(B) opportunities for the creation or expansion of small businesses and micro-businesses;

(C) the potential for new job creation;

(D) the potential for the project to improve efficiency or develop cleaner technologies for biomass utilization; and

(E) the potential for the project to reduce the hazardous fuels from the areas in greatest need of treatment.

(3) GRANT AMOUNT.—A grant under this subsection may not exceed $500,000.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $50,000,000 for each of the fiscal years 2006 through 2016 to carry out this section.

(e) REPORT.—Not later than October 1, 2010, the Secretary of Agriculture, in consultation with the Secretary of the Interior, shall submit to the Committee on Energy and Natural Resources and the Committee on Agriculture, Nutrition, and Forestry of the Senate, and the Committee on Resources, the Committee on Energy and Commerce, and the Committee on Agriculture of the House of Representatives, a report describing the results of the grant programs authorized by this section. The report shall include the following:

(1) An identification of the size, type, and use of biomass by persons that receive grants under this section.

(2) The distance between the land from which the biomass was removed and the facility that used the biomass.

(3) The economic impacts, particularly new job creation, resulting from the grants to and operation of the eligible operations.

SEC. 211. SENSE OF CONGRESS REGARDING GENERATION CAPACITY OF ELECTRICITY FROM RENEWABLE ENERGY RESOURCES ON PUBLIC LANDS.

It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity.

Subtitle B—Geothermal Energy

John Rishel Geothermal Steam Act Amendments of 2005.
30 USC 1001 note.

SEC. 221. SHORT TITLE.

This subtitle may be cited as the "John Rishel Geothermal Steam Act Amendments of 2005".

SEC. 222. COMPETITIVE LEASE SALE REQUIREMENTS.

Section 4 of the Geothermal Steam Act of 1970 (30 U.S.C. 1003) is amended to read as follows:

"SEC. 4. LEASING PROCEDURES.

"(a) NOMINATIONS.—The Secretary shall accept nominations of land to be leased at any time from qualified companies and individuals under this Act.

"(b) COMPETITIVE LEASE SALE REQUIRED.—

"(1) IN GENERAL.—Except as otherwise specifically provided by this Act, all land to be leased that is not subject to leasing under subsection (c) shall be leased as provided in this subsection to the highest responsible qualified bidder, as determined by the Secretary.

"(2) COMPETITIVE LEASE SALES.—The Secretary shall hold a competitive lease sale at least once every 2 years for land in a State that has nominations pending under subsection (a) if the land is otherwise available for leasing.

"(3) LANDS SUBJECT TO MINING CLAIMS.—Lands that are subject to a mining claim for which a plan of operations has been approved by the relevant Federal land management agency may be available for noncompetitive leasing under this section to the mining claim holder.

"(c) NONCOMPETITIVE LEASING.—The Secretary shall make available for a period of 2 years for noncompetitive leasing any

tract for which a competitive lease sale is held, but for which the Secretary does not receive any bids in a competitive lease sale.

"(d) PENDING LEASE APPLICATIONS.—

"(1) IN GENERAL.—It shall be a priority for the Secretary, and for the Secretary of Agriculture with respect to National Forest Systems land, to ensure timely completion of administrative actions, including amendments to applicable forest plans and resource management plans, necessary to process applications for geothermal leasing pending on the date of enactment of this subsection. All future forest plans and resource management plans for areas with high geothermal resource potential shall consider geothermal leasing and development.

"(2) ADMINISTRATION.—An application described in paragraph (1) and any lease issued pursuant to the application—

"(A) except as provided in subparagraph (B), shall be subject to this section as in effect on the day before the date of enactment of this paragraph; or

"(B) at the election of the applicant, shall be subject to this section as in effect on the effective date of this paragraph.

"(e) LEASES SOLD AS A BLOCK.—If information is available to the Secretary indicating a geothermal resource that could be produced as 1 unit can reasonably be expected to underlie more than 1 parcel to be offered in a competitive lease sale, the parcels for such a resource may be offered for bidding as a block in the competitive lease sale.".

SEC. 223. DIRECT USE.

(a) FEES FOR DIRECT USE.—Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) is amended—

(1) in subsection (c), by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively;

(2) by redesignating subsections (a) through (d) as paragraphs (1) through (4), respectively;

(3) by inserting "(a) IN GENERAL.—" after "SEC. 5."; and

(4) by adding at the end the following:

"(b) DIRECT USE.—

"(1) IN GENERAL.—Notwithstanding subsection (a)(1), the Secretary shall establish a schedule of fees, in lieu of royalties for geothermal resources, that a lessee or its affiliate— Fees.

"(A) uses for a purpose other than the commercial generation of electricity; and

"(B) does not sell.

"(2) SCHEDULE OF FEES.—The schedule of fees—

"(A) may be based on the quantity or thermal content, or both, of geothermal resources used;

"(B) shall ensure a fair return to the United States for use of the resource; and

"(C) shall encourage development of the resource.

"(3) STATE, TRIBAL, OR LOCAL GOVERNMENTS.—If a State, tribal, or local government is the lessee and uses geothermal resources without sale and for public purposes other than commercial generation of electricity, the Secretary shall charge only a nominal fee for use of the resource.

"(4) FINAL REGULATION.—In issuing any final regulation establishing a schedule of fees under this subsection, the Secretary shall seek—

"(A) to provide lessees with a simplified administrative system;

"(B) to facilitate development of direct use of geothermal resources; and

"(C) to contribute to sustainable economic development opportunities in the area.".

(b) LEASING FOR DIRECT USE.—Section 4 of the Geothermal Steam Act of 1970 (30 U.S.C. 1003) (as amended by section 222) is further amended by adding at the end the following:

"(f) LEASING FOR DIRECT USE OF GEOTHERMAL RESOURCES.—Notwithstanding subsection (b), the Secretary may identify areas in which the land to be leased under this Act exclusively for direct use of geothermal resources, without sale for purposes other than commercial generation of electricity, may be leased to any qualified applicant that first applies for such a lease under regulations issued by the Secretary, if the Secretary—

Notice. Deadline.

"(1) publishes a notice of the land proposed for leasing not later than 90 days before the date of the issuance of the lease;

"(2) does not receive during the 90-day period beginning on the date of the publication any nomination to include the land concerned in the next competitive lease sale; and

"(3) determines there is no competitive interest in the geothermal resources in the land to be leased.

"(g) AREA SUBJECT TO LEASE FOR DIRECT USE.—

"(1) IN GENERAL.—Subject to paragraph (2), a geothermal lease for the direct use of geothermal resources shall cover not more than the quantity of acreage determined by the Secretary to be reasonably necessary for the proposed use.

"(2) LIMITATIONS.—The quantity of acreage covered by the lease shall not exceed the limitations established under section 7.".

30 USC 1004 note.

(c) APPLICATION OF NEW LEASE TERMS.—The schedule of fees established under the amendment made by subsection (a)(4) shall apply with respect to payments under a lease converted under this subsection that are due and owing, and have been paid, on or after July 16, 2003. This subsection shall not require the refund of royalties paid to a State under section 20 of the Geothermal Steam Act of 1970 (30 U.S.C. 1019) prior to the date of enactment of this Act.

SEC. 224. ROYALTIES AND NEAR-TERM PRODUCTION INCENTIVES.

(a) ROYALTY.—Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) is further amended—

(1) in subsection (a) by striking paragraph (1) and inserting the following:

"(1) a royalty on electricity produced using geothermal resources, other than direct use of geothermal resources, that shall be—

"(A) not less than 1 percent and not more than 2.5 percent of the gross proceeds from the sale of electricity produced from such resources during the first 10 years of production under the lease; and

"(B) not less than 2 and not more than 5 percent of the gross proceeds from the sale of electricity produced from such resources during each year after such 10-year period;"; and

(2) by adding at the end the following:

"(c) FINAL REGULATION ESTABLISHING ROYALTY RATES.—In issuing any final regulation establishing royalty rates under this section, the Secretary shall seek—

"(1) to provide lessees a simplified administrative system;

"(2) to encourage new development; and

"(3) to achieve the same level of royalty revenues over a 10-year period as the regulation in effect on the date of enactment of this subsection.

"(d) CREDITS FOR IN-KIND PAYMENTS OF ELECTRICITY.—The Secretary may provide to a lessee a credit against royalties owed under this Act, in an amount equal to the value of electricity provided under contract to a State or county government that is entitled to a portion of such royalties under section 20 of this Act, section 35 of the Mineral Leasing Act (30 U.S.C. 191), except as otherwise provided by this section, or section 6 of the Mineral Leasing Act for Acquired Lands (30 U.S.C. 355), if—

"(1) the Secretary has approved in advance the contract between the lessee and the State or county government for such in-kind payments;

"(2) the contract establishes a specific methodology to determine the value of such credits; and

"(3) the maximum credit will be equal to the royalty value owed to the State or county that is a party to the contract and the electricity received will serve as the royalty payment from the Federal Government to that entity.".

(b) DISPOSAL OF MONEYS FROM SALES, BONUSES, ROYALTIES, AND RENTS.—Section 20 of the Geothermal Steam Act of 1970 (30 U.S.C. 1019) is amended to read as follows:

"SEC. 20. DISPOSAL OF MONEYS FROM SALES, BONUSES, RENTALS, AND ROYALTIES.

"(a) IN GENERAL.—Except with respect to lands in the State of Alaska, all monies received by the United States from sales, bonuses, rentals, and royalties under this Act shall be paid into the Treasury of the United States. Of amounts deposited under this subsection, subject to the provisions of subsection (b) of section 35 of the Mineral Leasing Act (30 U.S.C. 191(b)) and section 5(a)(2) of this Act—

"(1) 50 percent shall be paid to the State within the boundaries of which the leased lands or geothermal resources are or were located; and

"(2) 25 percent shall be paid to the county within the boundaries of which the leased lands or geothermal resources are or were located.

"(b) USE OF PAYMENTS.—Amounts paid to a State or county under subsection (a) shall be used consistent with the terms of section 35 of the Mineral Leasing Act (30 U.S.C. 191).".

(c) NEAR-TERM PRODUCTION INCENTIVE FOR EXISTING LEASES.— 30 USC 1004 note.

(1) IN GENERAL.—Notwithstanding section 5(a) of the Geothermal Steam Act of 1970, the royalty required to be paid shall be 50 percent of the amount of the royalty otherwise required, on any lease issued before the date of enactment

of this Act that does not convert to new royalty terms under subsection (e)—

(A) with respect to commercial production of energy from a facility that begins such production in the 6-year period beginning on the date of enactment of this Act; or

(B) on qualified expansion geothermal energy.

(2) 4-YEAR APPLICATION.—Paragraph (1) applies only to new commercial production of energy from a facility in the first 4 years of such production.

(d) DEFINITION OF QUALIFIED EXPANSION GEOTHERMAL ENERGY.—In this section, the term "qualified expansion geothermal energy" means geothermal energy produced from a generation facility for which—

(1) the production is increased by more than 10 percent as a result of expansion of the facility carried out in the 6-year period beginning on the date of enactment of this Act; and

(2) such production increase is greater than 10 percent of the average production by the facility during the 5-year period preceding the expansion of the facility (as such average is adjusted to reflect any trend in changes in production during that period).

(e) ROYALTY UNDER EXISTING LEASES.—

(1) IN GENERAL.—Any lessee under a lease issued under the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) before the date of enactment of this Act may, within the time period specified in paragraph (2), submit to the Secretary of the Interior a request to modify the terms of the lease relating to payment of royalties to provide—

(A) in the case of a lease that meets the requirements of subsection (b) of section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by section 223), that royalties be based on the schedule of fees established under that section; and

(B) in the case of any other lease, that royalties be computed on a percentage of the gross proceeds from the sale of electricity, at a royalty rate that is expected to yield total royalty payments equivalent to payments that would have been received for comparable production under the royalty rate in effect for the lease before the date of enactment of this subsection.

Deadlines.

(2) TIMING.—A request for a modification under paragraph (1) shall be submitted to the Secretary of the Interior by the date that is not later than—

(A) in the case of a lease for direct use, 18 months after the effective date of the schedule of fees established by the Secretary of the Interior under section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004); or

(B) in the case of any other lease, 18 months after the effective date of the final regulation issued under subsection (a).

(3) APPLICATION OF MODIFICATION.—If the lessee requests modification of a lease under paragraph (1)—

Deadline.

(A) the Secretary of the Interior shall, within 180 days after the receipt of the request for modification, modify the lease to comply with—

(i) in the case of a lease for direct use, the schedule of fees established by the Secretary under section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004); or

(ii) in the case of any other lease, the royalty for the lease established under paragraph (1)(B); and

(B) the modification shall apply to any use of geothermal resources to which subsection (a) applies that occurs after the date of the modification.

(4) CONSULTATION.—The Secretary of the Interior shall consult with the State and local governments affected by any proposed changes in lease royalty terms under this subsection.

SEC. 225. COORDINATION OF GEOTHERMAL LEASING AND PERMITTING ON FEDERAL LANDS. 42 USC 15871.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary of the Interior and the Secretary of Agriculture shall enter into and submit to Congress a memorandum of understanding in accordance with this section, the Geothermal Steam Act of 1970 (as amended by this Act), and other applicable laws, regarding coordination of leasing and permitting for geothermal development of public lands and National Forest System lands under their respective jurisdictions. Deadline. Memorandum.

(b) LEASE AND PERMIT APPLICATIONS.—The memorandum of understanding shall—

(1) establish an administrative procedure for processing geothermal lease applications, including lines of authority, steps in application processing, and time limits for application procession;

(2) establish a 5-year program for geothermal leasing of lands in the National Forest System, and a process for updating that program every 5 years; and

(3) establish a program for reducing the backlog of geothermal lease application pending on January 1, 2005, by 90 percent within the 5-year period beginning on the date of enactment of this Act, including, as necessary, by issuing leases, rejecting lease applications for failure to comply with the provisions of the regulations under which they were filed, or determining that an original applicant (or the applicant's assigns, heirs, or estate) is no longer interested in pursuing the lease application. Effective date.

(c) DATA RETRIEVAL SYSTEM.—The memorandum of understanding shall establish a joint data retrieval system that is capable of tracking lease and permit applications and providing to the applicant information as to their status within the Departments of the Interior and Agriculture, including an estimate of the time required for administrative action.

SEC. 226. ASSESSMENT OF GEOTHERMAL ENERGY POTENTIAL. Deadline. 42 USC 15872.

Not later than 3 years after the date of enactment of this Act and thereafter as the availability of data and developments in technology warrants, the Secretary of the Interior, acting through the Director of the United States Geological Survey and in cooperation with the States, shall—

(1) update the Assessment of Geothermal Resources made during 1978; and

(2) submit to Congress the updated assessment.

SEC. 227. COOPERATIVE OR UNIT PLANS.

Section 18 of the Geothermal Steam Act of 1970 (30 U.S.C. 1017) is amended to read as follows:

"SEC. 18. UNIT AND COMMUNITIZATION AGREEMENTS.

"(a) ADOPTION OF UNITS BY LESSEES.—

"(1) IN GENERAL.—For the purpose of more properly conserving the natural resources of any geothermal reservoir, field, or like area, or any part thereof (whether or not any part of the geothermal reservoir, field, or like area, is subject to any cooperative plan of development or operation (referred to in this section as a 'unit agreement')), lessees thereof and their representatives may unite with each other, or jointly or separately with others, in collectively adopting and operating under a unit agreement for the reservoir, field, or like area, or any part thereof, including direct use resources, if determined and certified by the Secretary to be necessary or advisable in the public interest.

"(2) MAJORITY INTEREST OF SINGLE LEASES.—A majority interest of owners of any single lease shall have the authority to commit the lease to a unit agreement.

"(3) INITIATIVE OF SECRETARY.—The Secretary may also initiate the formation of a unit agreement, or require an existing Federal lease to commit to a unit agreement, if in the public interest.

"(4) MODIFICATION OF LEASE REQUIREMENTS BY SECRETARY.—

"(A) IN GENERAL.—The Secretary may, in the discretion of the Secretary and with the consent of the holders of leases involved, establish, alter, change, or revoke rates of operations (including drilling, operations, production, and other requirements) of the leases and make conditions with respect to the leases, with the consent of the lessees, in connection with the creation and operation of any such unit agreement as the Secretary may consider necessary or advisable to secure the protection of the public interest.

"(B) UNLIKE TERMS OR RATES.—Leases with unlike lease terms or royalty rates shall not be required to be modified to be in the same unit.

"(b) REQUIREMENT OF PLANS UNDER NEW LEASES.—The Secretary may—

"(1) provide that geothermal leases issued under this Act shall contain a provision requiring the lessee to operate under a unit agreement; and

"(2) prescribe the unit agreement under which the lessee shall operate, which shall adequately protect the rights of all parties in interest, including the United States.

"(c) MODIFICATION OF RATE OF PROSPECTING, DEVELOPMENT, AND PRODUCTION.—The Secretary may require that any unit agreement authorized by this section that applies to land owned by the United States contain a provision under which authority is vested in the Secretary, or any person, committee, or State or Federal officer or agency as may be designated in the unit agreement to alter or modify, from time to time, the rate of prospecting and development and the quantity and rate of production under the unit agreement.

"(d) EXCLUSION FROM DETERMINATION OF HOLDING OR CONTROL.—Any land that is subject to a unit agreement approved or prescribed by the Secretary under this section shall not be considered in determining holdings or control under section 7.

"(e) POOLING OF CERTAIN LAND.—If separate tracts of land cannot be independently developed and operated to use geothermal resources pursuant to any section of this Act—

"(1) the land, or a portion of the land, may be pooled with other land, whether or not owned by the United States, for purposes of development and operation under a communitization agreement providing for an apportionment of production or royalties among the separate tracts of land comprising the production unit, if the pooling is determined by the Secretary to be in the public interest; and

"(2) operation or production pursuant to the communitization agreement shall be treated as operation or production with respect to each tract of land that is subject to the communitization agreement.

"(f) UNIT AGREEMENT REVIEW.—

"(1) IN GENERAL.—Not later than 5 years after the date of approval of any unit agreement and at least every 5 years thereafter, the Secretary shall— Deadlines.

"(A) review each unit agreement; and

"(B) after notice and opportunity for comment, eliminate from inclusion in the unit agreement any land that the Secretary determines is not reasonably necessary for unit operations under the unit agreement.

"(2) BASIS FOR ELIMINATION.—The elimination shall—

"(A) be based on scientific evidence; and

"(B) occur only if the elimination is determined by the Secretary to be for the purpose of conserving and properly managing the geothermal resource.

"(3) EXTENSION.—Any land eliminated under this subsection shall be eligible for an extension under section 6(g) if the land meets the requirements for the extension.

"(g) DRILLING OR DEVELOPMENT CONTRACTS.—

"(1) IN GENERAL.—The Secretary may, on such conditions as the Secretary may prescribe, approve drilling or development contracts made by one or more lessees of geothermal leases, with one or more persons, associations, or corporations if, in the discretion of the Secretary, the conservation of natural resources or the public convenience or necessity may require or the interests of the United States may be best served by the approval.

"(2) HOLDINGS OR CONTROL.—Each lease operated under an approved drilling or development contract, and interest under the contract, shall be excepted in determining holdings or control under section 7.

"(h) COORDINATION WITH STATE GOVERNMENTS.—The Secretary shall coordinate unitization and pooling activities with appropriate State agencies.".

SEC. 228. ROYALTY ON BYPRODUCTS.

Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by section 223(a)) is further amended in subsection (a) by striking paragraph (2) and inserting the following:

"(2) a royalty on any byproduct that is a mineral specified in the first section of the Mineral Leasing Act (30 U.S.C. 181), and that is derived from production under the lease, at the rate of the royalty that applies under that Act to production of the mineral under a lease under that Act;".

SEC. 229. AUTHORITIES OF SECRETARY TO READJUST TERMS, CONDITIONS, RENTALS, AND ROYALTIES.

30 USC 1007.

Section 8(b) of the Geothermal Steam Act of 1970 (30 U.S.C. 1006) is amended in the second sentence by striking "period, and in no event" and all that follows through the end of the sentence and inserting "period".

SEC. 230. CREDITING OF RENTAL TOWARD ROYALTY.

Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by sections 223 and 224) is further amended—

(1) in subsection (a)(2) by inserting "and" after the semicolon at the end;

(2) in subsection (a)(3) by striking "; and" and inserting a period;

(3) by striking paragraph (4) of subsection (a); and

(4) by adding at the end the following:

"(e) CREDITING OF RENTAL TOWARD ROYALTY.—Any annual rental under this section that is paid with respect to a lease before the first day of the year for which the annual rental is owed shall be credited to the amount of royalty that is required to be paid under the lease for that year.".

SEC. 231. LEASE DURATION AND WORK COMMITMENT REQUIREMENTS.

Section 6 of the Geothermal Steam Act of 1970 (30 U.S.C. 1005) is amended—

(1) by striking so much as precedes subsection (c), and striking subsections (e), (g), (h), (i), and (j);

(2) by redesignating subsections (c), (d), and (f) in order as subsections (g), (h), and (i); and

(3) by inserting before subsection (g), as so redesignated, the following:

Regulations.

"SEC. 6. LEASE TERM AND WORK COMMITMENT REQUIREMENTS.

"(a) IN GENERAL.—

"(1) PRIMARY TERM.—A geothermal lease shall be for a primary term of 10 years.

"(2) INITIAL EXTENSION.—The Secretary shall extend the primary term of a geothermal lease for 5 years if, for each year after the 10th year of the lease—

"(A) the Secretary determined under subsection (b) that the lessee satisfied the work commitment requirements that applied to the lease for that year; or

"(B) the lessee paid in annual payments accordance with subsection (c).

"(3) ADDITIONAL EXTENSION.—The Secretary shall extend the primary term of a geothermal lease (after an initial extension under paragraph (2)) for an additional 5 years if, for each year of the initial extension under paragraph (2), the Secretary determined under subsection (b) that the lessee satisfied the minimum work requirements that applied to the lease for that year.

"(b) REQUIREMENT TO SATISFY ANNUAL MINIMUM WORK REQUIREMENT.—

"(1) IN GENERAL.—The lessee for a geothermal lease shall, for each year after the 10th year of the lease, satisfy minimum work requirements prescribed by the Secretary that apply to the lease for that year.

"(2) PRESCRIPTION OF MINIMUM WORK REQUIREMENTS.—The Secretary shall issue regulations prescribing minimum work requirements for geothermal leases, that—

"(A) establish a geothermal potential; and

"(B) if a geothermal potential has been established, confirm the existence of producible geothermal resources.

"(c) PAYMENTS IN LIEU OF MINIMUM WORK REQUIREMENTS.—In lieu of the minimum work requirements set forth in subsection (b)(2), the Secretary shall by regulation establish minimum annual payments which may be made by the lessee for a limited number of years that the Secretary determines will not impair achieving diligent development of the geothermal resource, but in no event shall the number of years exceed the duration of the extension period provided in subsection (a).

"(d) TRANSITION RULES FOR LEASES ISSUED PRIOR TO ENACTMENT OF ENERGY POLICY ACT OF 2005.—The Secretary shall by regulation establish transition rules for leases issued before the date of the enactment of this subsection, including terms under which a lease that is near the end of its term on the date of enactment of this subsection may be extended for up to 2 years—

"(1) to allow achievement of production under the lease; or

"(2) to allow the lease to be included in a producing unit.

"(e) GEOTHERMAL LEASE OVERLYING MINING CLAIM.—

"(1) EXEMPTION.—The lessee for a geothermal lease of an area overlying an area subject to a mining claim for which a plan of operations has been approved by the relevant Federal land management agency is exempt from annual work requirements established under this Act, if development of the geothermal resource subject to the lease would interfere with the mining operations under such claim.

"(2) TERMINATION OF EXEMPTION.—An exemption under this paragraph expires upon the termination of the mining operations.

"(f) TERMINATION OF APPLICATION OF REQUIREMENTS.—Minimum work requirements prescribed under this section shall not apply to a geothermal lease after the date on which the geothermal resource is utilized under the lease in commercial quantities.".

SEC. 232. ADVANCED ROYALTIES REQUIRED FOR CESSATION OF PRODUCTION.

Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by sections 223, 224, and 230) is further amended by adding at the end the following:

"(f) ADVANCED ROYALTIES REQUIRED FOR CESSATION OF PRODUCTION.—

"(1) IN GENERAL.—Subject to paragraphs (2) and (3), if, at any time after commercial production under a lease is achieved, production ceases for any reason, the lease shall remain in full force and effect for a period of not more than

an aggregate number of 10 years beginning on the date production ceases, if, during the period in which production is ceased, the lessee pays royalties in advance at the monthly average rate at which the royalty was paid during the period of production.

"(2) REDUCTION.—The amount of any production royalty paid for any year shall be reduced (but not below 0) by the amount of any advanced royalties paid under the lease to the extent that the advance royalties have not been used to reduce production royalties for a prior year.

"(3) EXCEPTIONS.—Paragraph (1) shall not apply if the cessation in production is required or otherwise caused by—

"(A) the Secretary;

"(B) the Secretary of the Air Force;

"(C) the Secretary of the Army;

"(D) the Secretary of the Navy;

"(E) a State or a political subdivision of a State; or

"(F) a force majeure.".

SEC. 233. ANNUAL RENTAL.

(a) ANNUAL RENTAL RATE.—Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by section 223(a)) is further amended in subsection (a) by striking paragraph (3) and inserting the following:

"(3) payment in advance of an annual rental of not less than—

"(A) for each of the 1st through 10th years of the lease—

"(i) in the case of a lease awarded in a noncompetitive lease sale, $1 per acre or fraction thereof; or

"(ii) in the case of a lease awarded in a competitive lease sale, $2 per acre or fraction thereof for the 1st year and $3 per acre or fraction thereof for each of the 2nd through 10th years; and

"(B) for each year after the 10th year of the lease, $5 per acre or fraction thereof;".

(b) TERMINATION OF LEASE FOR FAILURE TO PAY RENTAL.—Section 5 of the Geothermal Steam Act of 1970 (30 U.S.C. 1004) (as amended by sections 223, 224, 230, and 232) is further amended by adding at the end the following:

"(g) TERMINATION OF LEASE FOR FAILURE TO PAY RENTAL.—

"(1) IN GENERAL.—The Secretary shall terminate any lease with respect to which rental is not paid in accordance with this Act and the terms of the lease under which the rental is required, on the expiration of the 45-day period beginning on the date of the failure to pay the rental.

"(2) NOTIFICATION.—The Secretary shall promptly notify a lessee that has not paid rental required under the lease that the lease will be terminated at the end of the period referred to in paragraph (1).

"(3) REINSTATEMENT.—A lease that would otherwise terminate under paragraph (1) shall not terminate under that paragraph if the lessee pays to the Secretary, before the end of the period referred to in paragraph (1), the amount of rental due plus a late fee equal to 10 percent of the amount.".

SEC. 234. DEPOSIT AND USE OF GEOTHERMAL LEASE REVENUES FOR 5 FISCAL YEARS. 42 USC 15873.

(a) DEPOSIT OF GEOTHERMAL RESOURCES LEASES.—Notwithstanding any other provision of law, amounts received by the United States in the first 5 fiscal years beginning after the date of enactment of this Act as rentals, royalties, and other payments required under leases under the Geothermal Steam Act of 1970, excluding funds required to be paid to State and county governments, shall be deposited into a separate account in the Treasury.

(b) USE OF DEPOSITS.—Amounts deposited under subsection (a) shall be available to the Secretary of the Interior for expenditure, without further appropriation and without fiscal year limitation, to implement the Geothermal Steam Act of 1970 and this Act.

(c) TRANSFER OF FUNDS.—For the purposes of coordination and processing of geothermal leases and geothermal use authorizations on Federal land the Secretary of the Interior may authorize the expenditure or transfer of such funds as are necessary to the Forest Service.

SEC. 235. ACREAGE LIMITATIONS.

Section 7 of the Geothermal Steam Act of 1970 (30 U.S.C. 1006) is amended—

(1) by striking "**SEC. 7.**", and by inserting immediately before and above the first paragraph the following:

"SEC. 7. ACREAGE LIMITATIONS.";

(2) in the first paragraph—

(A) by striking "two thousand five hundred and sixty acres" and inserting "5,120 acres"; and

(B) by striking "twenty thousand four hundred and eighty acres" and inserting "51,200 acres"; and

(3) by striking the second paragraph.

SEC. 236. TECHNICAL AMENDMENTS.

The Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) is further amended as follows:

(1) By striking "geothermal steam and associated geothermal resources" each place it appears and inserting "geothermal resources". 30 USC 1001, 1002, 1005, 1020, 1022, 1024–1026.

(2) Section 2 (30 U.S.C. 1001) is amended by adding at the end the following:

"(g) 'direct use' means utilization of geothermal resources for commercial, residential, agricultural, public facilities, or other energy needs other than the commercial production of electricity; and".

(3) Section 21 (30 U.S.C. 1020) is amended by striking "(a) Within one hundred" and all that follows through "(b) Geothermal" and inserting "Geothermal".

(4) The first section (30 U.S.C. 1001 note) is amended by striking "That this" and inserting the following:

"SEC. 1. SHORT TITLE.

"This".

(5) Section 2 (30 U.S.C. 1001) is amended by striking "**SEC. 2.** As" and inserting the following:

"SEC. 2. DEFINITIONS.

"As".

(6) Section 3 (30 U.S.C. 1002) is amended by striking "**SEC. 3.** Subject" and inserting the following:

"SEC. 3. LANDS SUBJECT TO GEOTHERMAL LEASING.

"Subject".

(7) Section 5 (30 U.S.C. 1004) is further amended by striking "**SEC. 5.**", and by inserting immediately before and above subsection (a) the following:

"SEC. 5. RENTS AND ROYALTIES.".

(8) Section 8 (30 U.S.C. 1007) is amended by striking "**SEC. 8.** (a) The" and inserting the following:

"SEC. 8. READJUSTMENT OF LEASE TERMS AND CONDITIONS.

"(a) The".

(9) Section 9 (30 U.S.C. 1008) is amended by striking "**SEC. 9.** If" and inserting the following:

"SEC. 9. BYPRODUCTS.

"If".

(10) Section 10 (30 U.S.C. 1009) is amended by striking "**SEC. 10.** The" and inserting the following:

"SEC. 10. RELINQUISHMENT OF GEOTHERMAL RIGHTS.

"The".

(11) Section 11 (30 U.S.C. 1010) is amended by striking "**SEC. 11.** The" and inserting the following:

"SEC. 11. SUSPENSION OF OPERATIONS AND PRODUCTION.

"The".

(12) Section 12 (30 U.S.C. 1011) is amended by striking "**SEC. 12.** Leases" and inserting the following:

"SEC. 12. TERMINATION OF LEASES.

"Leases".

(13) Section 13 (30 U.S.C. 1012) is amended by striking "**SEC. 13.** The" and inserting the following:

"SEC. 13. WAIVER, SUSPENSION, OR REDUCTION OF RENTAL OR ROYALTY.

"The".

(14) Section 14 (30 U.S.C. 1013) is amended by striking "**SEC. 14.** Subject" and inserting the following:

"SEC. 14. SURFACE LAND USE.

"Subject".

(15) Section 15 (30 U.S.C. 1014) is amended by striking "**SEC. 15.** (a) Geothermal" and inserting the following:

"SEC. 15. LANDS SUBJECT TO GEOTHERMAL LEASING.

"(a) Geothermal".

(16) Section 16 (30 U.S.C. 1015) is amended by striking "**SEC. 16.** Leases" and inserting the following:

"SEC. 16. REQUIREMENT FOR LESSEES.

"Leases".

(17) Section 17 (30 U.S.C. 1016) is amended by striking "**SEC. 17.** Administration" and inserting the following:

"SEC. 17. ADMINISTRATION.

"Administration".

(18) Section 19 (30 U.S.C. 1018) is amended by striking "**SEC. 19.** Upon" and inserting the following:

"SEC. 19. DATA FROM FEDERAL AGENCIES.

"Upon".

(19) Section 21 (30 U.S.C. 1020) is further amended by striking "**SEC. 21.**", and by inserting immediately before and above the remainder of that section the following:

"SEC. 21. PUBLICATION IN FEDERAL REGISTER; RESERVATION OF MINERAL RIGHTS.".

(20) Section 22 (30 U.S.C. 1021) is amended by striking "**SEC. 22.** Nothing" and inserting the following:

"SEC. 22. FEDERAL EXEMPTION FROM STATE WATER LAWS.

"Nothing".

(21) Section 23 (30 U.S.C. 1022) is amended by striking "**SEC. 23.** (a) All" and inserting the following:

"SEC. 23. PREVENTION OF WASTE; EXCLUSIVITY.

"(a) All".

(22) Section 24 (30 U.S.C. 1023) is amended by striking "**SEC. 24.** The" and inserting the following:

"SEC. 24. RULES AND REGULATIONS.

"The".

(23) Section 25 (30 U.S.C. 1024) is amended by striking "**SEC. 25.** As" and inserting the following:

"SEC. 25. INCLUSION OF GEOTHERMAL LEASING UNDER CERTAIN OTHER LAWS.

"As".

(24) Section 26 is amended by striking "**SEC. 26.** The" and inserting the following: 30 USC 530.

"SEC. 26. AMENDMENT.

"The".

(25) Section 27 (30 U.S.C. 1025) is amended by striking "**SEC. 27.** The" and inserting the following:

"SEC. 27. FEDERAL RESERVATION OF CERTAIN MINERAL RIGHTS.

"The".

(26) Section 28 (30 U.S.C. 1026) is amended by striking "**SEC. 28.** (a)(1) The" and inserting the following:

"SEC. 28. SIGNIFICANT THERMAL FEATURES.

"(a)(1) The".

(27) Section 29 (30 U.S.C. 1027) is amended by striking "**SEC. 29.** The" and inserting the following:

"SEC. 29. LAND SUBJECT TO PROHIBITION ON LEASING.

"The".

SEC. 237. INTERMOUNTAIN WEST GEOTHERMAL CONSORTIUM.

(a) PARTICIPATION AUTHORIZED.—The Secretary, acting through the Idaho National Laboratory, may participate in a consortium described in subsection (b) to address science and science policy

issues surrounding the expanded discovery and use of geothermal energy, including from geothermal resources on public lands.

Establishment.

(b) MEMBERS.—The consortium referred to in subsection (a) shall—

(1) be known as the "Intermountain West Geothermal Consortium";

(2) be a regional consortium of institutions and government agencies that focuses on building collaborative efforts among the universities in the State of Idaho, other regional universities, State agencies, and the Idaho National Laboratory;

(3) include Boise State University, the University of Idaho (including the Idaho Water Resources Research Institute), the Oregon Institute of Technology, the Desert Research Institute with the University and Community College System of Nevada, and the Energy and Geoscience Institute at the University of Utah;

(4) be hosted and managed by Boise State University; and

(5) have a director appointed by Boise State University, and associate directors appointed by each participating institution.

(c) FINANCIAL ASSISTANCE.—The Secretary, acting through the Idaho National Laboratory and subject to the availability of appropriations, will provide financial assistance to Boise State University for expenditure under contracts with members of the consortium to carry out the activities of the consortium.

Subtitle C—Hydroelectric

SEC. 241. ALTERNATIVE CONDITIONS AND FISHWAYS.

(a) FEDERAL RESERVATIONS.—Section 4(e) of the Federal Power Act (16 U.S.C. 797(e)) is amended by inserting after "adequate protection and utilization of such reservation." at the end of the first proviso the following: "The license applicant and any party to the proceeding shall be entitled to a determination on the record, after opportunity for an agency trial-type hearing of no more than 90 days, on any disputed issues of material fact with respect to such conditions. All disputed issues of material fact raised by any party shall be determined in a single trial-type hearing to be conducted by the relevant resource agency in accordance with the regulations promulgated under this subsection and within the time frame established by the Commission for each license proceeding. Within 90 days of the date of enactment of the Energy Policy Act of 2005, the Secretaries of the Interior, Commerce, and Agriculture shall establish jointly, by rule, the procedures for such expedited trial-type hearing, including the opportunity to undertake discovery and cross-examine witnesses, in consultation with the Federal Energy Regulatory Commission.".

Deadline. Regulations. Procedures.

(b) FISHWAYS.—Section 18 of the Federal Power Act (16 U.S.C. 811) is amended by inserting after "and such fishways as may be prescribed by the Secretary of Commerce." the following: "The license applicant and any party to the proceeding shall be entitled to a determination on the record, after opportunity for an agency trial-type hearing of no more than 90 days, on any disputed issues of material fact with respect to such fishways. All disputed issues of material fact raised by any party shall be determined in a

Deadline.

single trial-type hearing to be conducted by the relevant resource agency in accordance with the regulations promulgated under this subsection and within the time frame established by the Commission for each license proceeding. Within 90 days of the date of enactment of the Energy Policy Act of 2005, the Secretaries of the Interior, Commerce, and Agriculture shall establish jointly, by rule, the procedures for such expedited trial-type hearing, including the opportunity to undertake discovery and cross-examine witnesses, in consultation with the Federal Energy Regulatory Commission.".

Deadline. Regulations. Procedures.

(c) ALTERNATIVE CONDITIONS AND PRESCRIPTIONS.—Part I of the Federal Power Act (16 U.S.C. 791a et seq.) is amended by adding the following new section at the end thereof:

"SEC. 33. ALTERNATIVE CONDITIONS AND PRESCRIPTIONS.

16 USC 823d.

"(a) ALTERNATIVE CONDITIONS.—(1) Whenever any person applies for a license for any project works within any reservation of the United States, and the Secretary of the department under whose supervision such reservation falls (referred to in this subsection as the 'Secretary') deems a condition to such license to be necessary under the first proviso of section 4(e), the license applicant or any other party to the license proceeding may propose an alternative condition.

"(2) Notwithstanding the first proviso of section 4(e), the Secretary shall accept the proposed alternative condition referred to in paragraph (1), and the Commission shall include in the license such alternative condition, if the Secretary determines, based on substantial evidence provided by the license applicant, any other party to the proceeding, or otherwise available to the Secretary, that such alternative condition—

"(A) provides for the adequate protection and utilization of the reservation; and

"(B) will either, as compared to the condition initially by the Secretary—

"(i) cost significantly less to implement; or

"(ii) result in improved operation of the project works for electricity production.

"(3) In making a determination under paragraph (2), the Secretary shall consider evidence provided for the record by any party to a licensing proceeding, or otherwise available to the Secretary, including any evidence provided by the Commission, on the implementation costs or operational impacts for electricity production of a proposed alternative.

"(4) The Secretary concerned shall submit into the public record of the Commission proceeding with any condition under section 4(e) or alternative condition it accepts under this section, a written statement explaining the basis for such condition, and reason for not accepting any alternative condition under this section. The written statement must demonstrate that the Secretary gave equal consideration to the effects of the condition adopted and alternatives not accepted on energy supply, distribution, cost, and use; flood control; navigation; water supply; and air quality (in addition to the preservation of other aspects of environmental quality); based on such information as may be available to the Secretary, including information voluntarily provided in a timely manner by the applicant and others. The Secretary shall also submit, together with the aforementioned written statement, all studies, data, and

Public information. Records.

other factual information available to the Secretary and relevant to the Secretary's decision.

"(5) If the Commission finds that the Secretary's final condition would be inconsistent with the purposes of this part, or other applicable law, the Commission may refer the dispute to the Commission's Dispute Resolution Service. The Dispute Resolution Service shall consult with the Secretary and the Commission and issue a non-binding advisory within 90 days. The Secretary may accept the Dispute Resolution Service advisory unless the Secretary finds that the recommendation will not adequately protect the reservation. The Secretary shall submit the advisory and the Secretary's final written determination into the record of the Commission's proceeding.

Deadline.

Records.

"(b) ALTERNATIVE PRESCRIPTIONS.—(1) Whenever the Secretary of the Interior or the Secretary of Commerce prescribes a fishway under section 18, the license applicant or any other party to the license proceeding may propose an alternative to such prescription to construct, maintain, or operate a fishway.

"(2) Notwithstanding section 18, the Secretary of the Interior or the Secretary of Commerce, as appropriate, shall accept and prescribe, and the Commission shall require, the proposed alternative referred to in paragraph (1), if the Secretary of the appropriate department determines, based on substantial evidence provided by the license applicant, any other party to the proceeding, or otherwise available to the Secretary, that such alternative—

"(A) will be no less protective than the fishway initially prescribed by the Secretary; and

"(B) will either, as compared to the fishway initially prescribed by the Secretary—

"(i) cost significantly less to implement; or

"(ii) result in improved operation of the project works for electricity production.

"(3) In making a determination under paragraph (2), the Secretary shall consider evidence provided for the record by any party to a licensing proceeding, or otherwise available to the Secretary, including any evidence provided by the Commission, on the implementation costs or operational impacts for electricity production of a proposed alternative.

Public information. Records.

"(4) The Secretary concerned shall submit into the public record of the Commission proceeding with any prescription under section 18 or alternative prescription it accepts under this section, a written statement explaining the basis for such prescription, and reason for not accepting any alternative prescription under this section. The written statement must demonstrate that the Secretary gave equal consideration to the effects of the prescription adopted and alternatives not accepted on energy supply, distribution, cost, and use; flood control; navigation; water supply; and air quality (in addition to the preservation of other aspects of environmental quality); based on such information as may be available to the Secretary, including information voluntarily provided in a timely manner by the applicant and others. The Secretary shall also submit, together with the aforementioned written statement, all studies, data, and other factual information available to the Secretary and relevant to the Secretary's decision.

"(5) If the Commission finds that the Secretary's final prescription would be inconsistent with the purposes of this part, or other applicable law, the Commission may refer the dispute to the

Commission's Dispute Resolution Service. The Dispute Resolution Service shall consult with the Secretary and the Commission and issue a non-binding advisory within 90 days. The Secretary may accept the Dispute Resolution Service advisory unless the Secretary finds that the recommendation will not adequately protect the fish resources. The Secretary shall submit the advisory and the Secretary's final written determination into the record of the Commission's proceeding.". Deadline. Records.

SEC. 242. HYDROELECTRIC PRODUCTION INCENTIVES. 42 USC 15881.

(a) INCENTIVE PAYMENTS.—For electric energy generated and sold by a qualified hydroelectric facility during the incentive period, the Secretary shall make, subject to the availability of appropriations, incentive payments to the owner or operator of such facility. The amount of such payment made to any such owner or operator shall be as determined under subsection (e) of this section. Payments under this section may only be made upon receipt by the Secretary of an incentive payment application which establishes that the applicant is eligible to receive such payment and which satisfies such other requirements as the Secretary deems necessary. Such application shall be in such form, and shall be submitted at such time, as the Secretary shall establish.

(b) DEFINITIONS.—For purposes of this section:

(1) QUALIFIED HYDROELECTRIC FACILITY.—The term "qualified hydroelectric facility" means a turbine or other generating device owned or solely operated by a non-Federal entity which generates hydroelectric energy for sale and which is added to an existing dam or conduit.

(2) EXISTING DAM OR CONDUIT.—The term "existing dam or conduit" means any dam or conduit the construction of which was completed before the date of the enactment of this section and which does not require any construction or enlargement of impoundment or diversion structures (other than repair or reconstruction) in connection with the installation of a turbine or other generating device.

(3) CONDUIT.—The term "conduit" has the same meaning as when used in section 30(a)(2) of the Federal Power Act (16 U.S.C. 823a(a)(2)).

The terms defined in this subsection shall apply without regard to the hydroelectric kilowatt capacity of the facility concerned, without regard to whether the facility uses a dam owned by a governmental or nongovernmental entity, and without regard to whether the facility begins operation on or after the date of the enactment of this section. Applicability.

(c) ELIGIBILITY WINDOW.—Payments may be made under this section only for electric energy generated from a qualified hydroelectric facility which begins operation during the period of 10 fiscal years beginning with the first full fiscal year occurring after the date of enactment of this subtitle.

(d) INCENTIVE PERIOD.—A qualified hydroelectric facility may receive payments under this section for a period of 10 fiscal years (referred to in this section as the "incentive period"). Such period shall begin with the fiscal year in which electric energy generated from the facility is first eligible for such payments.

(e) AMOUNT OF PAYMENT.—

(1) IN GENERAL.—Payments made by the Secretary under this section to the owner or operator of a qualified hydroelectric

facility shall be based on the number of kilowatt hours of hydroelectric energy generated by the facility during the incentive period. For any such facility, the amount of such payment shall be 1.8 cents per kilowatt hour (adjusted as provided in paragraph (2)), subject to the availability of appropriations under subsection (g), except that no facility may receive more than $750,000 in 1 calendar year.

(2) ADJUSTMENTS.—The amount of the payment made to any person under this section as provided in paragraph (1) shall be adjusted for inflation for each fiscal year beginning after calendar year 2005 in the same manner as provided in the provisions of section 29(d)(2)(B) of the Internal Revenue Code of 1986, except that in applying such provisions the calendar year 2005 shall be substituted for calendar year 1979.

(f) SUNSET.—No payment may be made under this section to any qualified hydroelectric facility after the expiration of the period of 20 fiscal years beginning with the first full fiscal year occurring after the date of enactment of this subtitle, and no payment may be made under this section to any such facility after a payment has been made with respect to such facility for a period of 10 fiscal years.

(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the purposes of this section $10,000,000 for each of the fiscal years 2006 through 2015.

42 USC 15882.

SEC. 243. HYDROELECTRIC EFFICIENCY IMPROVEMENT.

(a) INCENTIVE PAYMENTS.—The Secretary shall make incentive payments to the owners or operators of hydroelectric facilities at existing dams to be used to make capital improvements in the facilities that are directly related to improving the efficiency of such facilities by at least 3 percent.

(b) LIMITATIONS.—Incentive payments under this section shall not exceed 10 percent of the costs of the capital improvement concerned and not more than 1 payment may be made with respect to improvements at a single facility. No payment in excess of $750,000 may be made with respect to improvements at a single facility.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section not more than $10,000,000 for each of the fiscal years 2006 through 2015.

SEC. 244. ALASKA STATE JURISDICTION OVER SMALL HYDROELECTRIC PROJECTS.

Section 32 of the Federal Power Act (16 U.S.C. 823c) is amended—

(1) in subsection (a)(3)(C), by inserting "except as provided in subsection (j)," before "conditions"; and

(2) by adding at the end the following:

"(j) FISH AND WILDLIFE.—If the State of Alaska determines that a recommendation under subsection (a)(3)(C) is inconsistent with paragraphs (1) and (2) of subsection (a), the State of Alaska may decline to adopt all or part of the recommendations in accordance with the procedures established under section 10(j)(2).".

Montana.

SEC. 245. FLINT CREEK HYDROELECTRIC PROJECT.

Applicability.
Effective dates.

(a) EXTENSION OF TIME.—Notwithstanding the time period specified in section 5 of the Federal Power Act (16 U.S.C. 798)

that would otherwise apply to the Federal Energy Regulatory Commission (referred to in this section as the "Commission") project numbered 12107, the Commission shall—

(1) if the preliminary permit is in effect on the date of enactment of this Act, extend the preliminary permit for a period of 3 years beginning on the date on which the preliminary permit expires; or

(2) if the preliminary permit expired before the date of enactment of this Act, on request of the permittee, reinstate the preliminary permit for an additional 3-year period beginning on the date of enactment of this Act.

(b) LIMITATION ON CERTAIN FEES.—Notwithstanding section 10(e)(1) of the Federal Power Act (16 U.S.C. 803(e)(1)) or any other provision of Federal law providing for the payment to the United States of charges for the use of Federal land for the purposes of operating and maintaining a hydroelectric development licensed by the Commission, any political subdivision of the State of Montana that holds a Commission license for the Commission project numbered 12107 in Granite and Deer Lodge Counties, Montana, shall be required to pay to the United States for the use of that land for each year during which the political subdivision continues to hold the license for the project, the lesser of—

(1) $25,000; or

(2) such annual charge as the Commission or any other department or agency of the Federal Government may assess.

SEC. 246. SMALL HYDROELECTRIC POWER PROJECTS.

Section 408(a)(6) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2708(a)(6)) is amended by striking "April 20, 1977" and inserting "July 22, 2005".

Subtitle D—Insular Energy

SEC. 251. INSULAR AREAS ENERGY SECURITY.

Section 604 of the Act entitled "An Act to authorize appropriations for certain insular areas of the United States, and for other purposes", approved December 24, 1980 (48 U.S.C. 1492), is amended—

(1) in subsection (a)(4) by striking the period and inserting a semicolon;

(2) by adding at the end of subsection (a) the following new paragraphs:

"(5) electric power transmission and distribution lines in insular areas are inadequate to withstand damage caused by the hurricanes and typhoons which frequently occur in insular areas and such damage often costs millions of dollars to repair; and

"(6) the refinement of renewable energy technologies since the publication of the 1982 Territorial Energy Assessment prepared pursuant to subsection (c) reveals the need to reassess the state of energy production, consumption, infrastructure, reliance on imported energy, opportunities for energy conservation and increased energy efficiency, and indigenous sources in regard to the insular areas.";

(3) by amending subsection (e) to read as follows:

"(e)(1) The Secretary of the Interior, in consultation with the Secretary of Energy and the head of government of each insular area, shall update the plans required under subsection (c) by—

"(A) updating the contents required by subsection (c);

"(B) drafting long-term energy plans for such insular areas with the objective of reducing, to the extent feasible, their reliance on energy imports by the year 2012, increasing energy conservation and energy efficiency, and maximizing, to the extent feasible, use of indigenous energy sources; and

"(C) drafting long-term energy transmission line plans for such insular areas with the objective that the maximum percentage feasible of electric power transmission and distribution lines in each insular area be protected from damage caused by hurricanes and typhoons.

"(2) In carrying out this subsection, the Secretary of Energy shall identify and evaluate the strategies or projects with the greatest potential for reducing the dependence on imported fossil fuels as used for the generation of electricity, including strategies and projects for—

"(A) improved supply-side efficiency of centralized electrical generation, transmission, and distribution systems;

"(B) improved demand-side management through—

"(i) the application of established standards for energy efficiency for appliances;

"(ii) the conduct of energy audits for business and industrial customers; and

"(iii) the use of energy savings performance contracts;

"(C) increased use of renewable energy, including—

"(i) solar thermal energy for electric generation;

"(ii) solar thermal energy for water heating in large buildings, such as hotels, hospitals, government buildings, and residences;

"(iii) photovoltaic energy;

"(iv) wind energy;

"(v) hydroelectric energy;

"(vi) wave energy;

"(vii) energy from ocean thermal resources, including ocean thermal-cooling for community air conditioning;

"(viii) water vapor condensation for the production of potable water;

"(ix) fossil fuel and renewable hybrid electrical generation systems; and

"(x) other strategies or projects that the Secretary may identify as having significant potential; and

"(D) fuel substitution and minimization with indigenous biofuels, such as coconut oil.

"(3) In carrying out this subsection, for each insular area with a significant need for distributed generation, the Secretary of Energy shall identify and evaluate the most promising strategies and projects described in subparagraphs (C) and (D) of paragraph (2) for meeting that need.

"(4) In assessing the potential of any strategy or project under paragraphs (2) and (3), the Secretary of Energy shall consider—

"(A) the estimated cost of the power or energy to be produced, including—

"(i) any additional costs associated with the distribution of the generation; and

"(ii) the long-term availability of the generation source;

"(B) the capacity of the local electrical utility to manage, operate, and maintain any project that may be undertaken; and

"(C) other factors the Secretary of Energy considers to be appropriate.

"(5) Not later than 1 year after the date of enactment of this subsection, the Secretary of the Interior shall submit to the Committee on Energy and Natural Resources of the Senate, the Committee on Resources of the House of Representatives, and the Committee on Energy and Commerce of the House of Representatives, the updated plans for each insular area required by this subsection."; and

Deadline.

(4) by amending subsection (g)(4) to read as follows:

"(4) POWER LINE GRANTS FOR INSULAR AREAS.—

"(A) IN GENERAL.—The Secretary of the Interior is authorized to make grants to governments of insular areas of the United States to carry out eligible projects to protect electric power transmission and distribution lines in such insular areas from damage caused by hurricanes and typhoons.

"(B) ELIGIBLE PROJECTS.—The Secretary of the Interior may award grants under subparagraph (A) only to governments of insular areas of the United States that submit written project plans to the Secretary for projects that meet the following criteria:

"(i) The project is designed to protect electric power transmission and distribution lines located in 1 or more of the insular areas of the United States from damage caused by hurricanes and typhoons.

"(ii) The project is likely to substantially reduce the risk of future damage, hardship, loss, or suffering.

"(iii) The project addresses 1 or more problems that have been repetitive or that pose a significant risk to public health and safety.

"(iv) The project is not likely to cost more than the value of the reduction in direct damage and other negative impacts that the project is designed to prevent or mitigate. The cost benefit analysis required by this criterion shall be computed on a net present value basis.

"(v) The project design has taken into consideration long-term changes to the areas and persons it is designed to protect and has manageable future maintenance and modification requirements.

"(vi) The project plan includes an analysis of a range of options to address the problem it is designed to prevent or mitigate and a justification for the selection of the project in light of that analysis.

"(vii) The applicant has demonstrated to the Secretary that the matching funds required by subparagraph (D) are available.

"(C) PRIORITY.—When making grants under this paragraph, the Secretary of the Interior shall give priority to grants for projects which are likely to—

"(i) have the greatest impact on reducing future disaster losses; and

"(ii) best conform with plans that have been approved by the Federal Government or the government of the insular area where the project is to be carried out for development or hazard mitigation for that insular area.

"(D) MATCHING REQUIREMENT.—The Federal share of the cost for a project for which a grant is provided under this paragraph shall not exceed 75 percent of the total cost of that project. The non-Federal share of the cost may be provided in the form of cash or services.

"(E) TREATMENT OF FUNDS FOR CERTAIN PURPOSES.—Grants provided under this paragraph shall not be considered as income, a resource, or a duplicative program when determining eligibility or benefit levels for Federal major disaster and emergency assistance.

"(F) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this paragraph $6,000,000 for each fiscal year beginning after the date of the enactment of this paragraph.".

42 USC 15891.

SEC. 252. PROJECTS ENHANCING INSULAR ENERGY INDEPENDENCE.

(a) PROJECT FEASIBILTY STUDIES.—

(1) IN GENERAL.—On a request described in paragraph (2), the Secretary shall conduct a feasibility study of a project to implement a strategy or project identified in the plans submitted to Congress pursuant to section 604 of the Act entitled "An Act to authorize appropriations for certain insular areas of the United States, and for other purposes", approved December 24, 1980 (48 U.S.C. 1492), as having the potential to—

(A) significantly reduce the dependence of an insular area on imported fossil fuels; or

(B) provide needed distributed generation to an insular area.

(2) REQUEST.—The Secretary shall conduct a feasibility study under paragraph (1) on—

(A) the request of an electric utility located in an insular area that commits to fund at least 10 percent of the cost of the study; and

(B) if the electric utility is located in the Federated States of Micronesia, the Republic of the Marshall Islands, or the Republic of Palau, written support for that request by the President or the Ambassador of the affected freely associated state.

(3) CONSULTATION.—The Secretary shall consult with regional utility organizations in—

(A) conducting feasibility studies under paragraph (1); and

(B) determining the feasibility of potential projects.

(4) FEASIBILITY.—For the purpose of a feasibility study under paragraph (1), a project shall be determined to be feasible if the project would significantly reduce the dependence of an insular area on imported fossil fuels, or provide needed distributed generation to an insular area, at a reasonable cost.

(b) IMPLEMENTATION.—

(1) IN GENERAL.—On a determination by the Secretary (in consultation with the Secretary of the Interior) that a project

is feasible under subsection (a) and a commitment by an electric utility to operate and maintain the project, the Secretary may provide such technical and financial assistance as the Secretary determines is appropriate for the implementation of the project.

(2) REGIONAL UTILITY ORGANIZATIONS.—In providing assistance under paragraph (1), the Secretary shall consider providing the assistance through regional utility organizations.

(c) AUTHORIZATION OF APPROPRIATIONS.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary—

(A) $500,000 for each fiscal year for project feasibility studies under subsection (a); and

(B) $4,000,000 for each fiscal year for project implementation under subsection (b).

(2) LIMITATION OF FUNDS RECEIVED BY INSULAR AREAS.—No insular area may receive, during any 3-year period, more than 20 percent of the total funds made available during that 3-year period under subparagraphs (A) and (B) of paragraph (1) unless the Secretary determines that providing funding in excess of that percentage best advances existing opportunities to meet the objectives of this section.

TITLE III—OIL AND GAS

Subtitle A—Petroleum Reserve and Home Heating Oil

SEC. 301. PERMANENT AUTHORITY TO OPERATE THE STRATEGIC PETROLEUM RESERVE AND OTHER ENERGY PROGRAMS.

(a) AMENDMENT TO TITLE I OF THE ENERGY POLICY AND CONSERVATION ACT.—Title I of the Energy Policy and Conservation Act (42 U.S.C. 6212 et seq.) is amended—

(1) by striking section 166 (42 U.S.C. 6246) and inserting the following:

"AUTHORIZATION OF APPROPRIATIONS

"SEC. 166. There are authorized to be appropriated to the Secretary such sums as are necessary to carry out this part and part D, to remain available until expended.";

(2) by striking section 186 (42 U.S.C. 6250e); and

(3) by striking part E (42 U.S.C. 6251).

(b) AMENDMENT TO TITLE II OF THE ENERGY POLICY AND CONSERVATION ACT.—Title II of the Energy Policy and Conservation Act (42 U.S.C. 6271 et seq.) is amended—

(1) by inserting before section 273 (42 U.S.C. 6283) the following:

"PART C—SUMMER FILL AND FUEL BUDGETING PROGRAMS";

(2) by striking section 273(e) (42 U.S.C. 6283(e)); and

(3) by striking part D (42 U.S.C. 6285).

(c) TECHNICAL AMENDMENTS.—The table of contents for the Energy Policy and Conservation Act is amended—

(1) by inserting after the items relating to part C of title I the following:

"PART D—NORTHEAST HOME HEATING OIL RESERVE

"Sec. 181. Establishment.
"Sec. 182. Authority.
"Sec. 183. Conditions for release; plan.
"Sec. 184. Northeast Home Heating Oil Reserve Account.
"Sec. 185. Exemptions.";

(2) by amending the items relating to part C of title II to read as follows:

"PART C—SUMMER FILL AND FUEL BUDGETING PROGRAMS

"Sec. 273. Summer fill and fuel budgeting programs.";

and

(3) by striking the items relating to part D of title II.

(d) AMENDMENT TO THE ENERGY POLICY AND CONSERVATION ACT.—Section 183(b)(1) of the Energy Policy and Conservation Act (42 U.S.C. 6250b(b)(1)) is amended by striking "by more" and all that follows through "mid-October through March" and inserting "by more than 60 percent over its 5-year rolling average for the months of mid-October through March (considered as a heating season average)".

42 USC 6240 note.

(e) FILL STRATEGIC PETROLEUM RESERVE TO CAPACITY.—

(1) IN GENERAL.—The Secretary shall, as expeditiously as practicable, without incurring excessive cost or appreciably affecting the price of petroleum products to consumers, acquire petroleum in quantities sufficient to fill the Strategic Petroleum Reserve to the 1,000,000,000-barrel capacity authorized under section 154(a) of the Energy Policy and Conservation Act (42 U.S.C. 6234(a)), in accordance with the sections 159 and 160 of that Act (42 U.S.C. 6239, 6240).

(2) PROCEDURES.—

(A) AMENDMENT.—Section 160 of the Energy Policy and Conservation Act (42 U.S.C. 6240) is amended by inserting after subsection (b) the following new subsection:

Public information. Notice.

"(c) PROCEDURES.—The Secretary shall develop, with public notice and opportunity for comment, procedures consistent with the objectives of this section to acquire petroleum for the Reserve. Such procedures shall take into account the need to—

"(1) maximize overall domestic supply of crude oil (including quantities stored in private sector inventories);

"(2) avoid incurring excessive cost or appreciably affecting the price of petroleum products to consumers;

"(3) minimize the costs to the Department of the Interior and the Department of Energy in acquiring such petroleum products (including foregone revenues to the Treasury when petroleum products for the Reserve are obtained through the royalty-in-kind program);

"(4) protect national security;

"(5) avoid adversely affecting current and futures prices, supplies, and inventories of oil; and

"(6) address other factors that the Secretary determines to be appropriate.".

42 USC 6240 note.

(B) REVIEW OF REQUESTS FOR DEFERRALS OF SCHEDULED DELIVERIES.—The procedures developed under section 160(c) of the Energy Policy and Conservation Act, as added by subparagraph (A), shall include procedures and criteria

for the review of requests for the deferrals of scheduled deliveries.

(C) DEADLINES.—The Secretary shall—

(i) propose the procedures required under the amendment made by subparagraph (A) not later than 120 days after the date of enactment of this Act;

(ii) promulgate the procedures not later than 180 days after the date of enactment of this Act; and

(iii) comply with the procedures in acquiring petroleum for the Reserve effective beginning on the date that is 180 days after the date of enactment of this Act.

SEC. 302. NATIONAL OILHEAT RESEARCH ALLIANCE.

Section 713 of the Energy Act of 2000 (Public Law 106–469; 42 U.S.C. 6201 note) is amended by striking "4" and inserting "9".

SEC. 303. SITE SELECTION.

Deadline.

Not later than 1 year after the date of enactment of this Act, the Secretary shall complete a proceeding to select, from sites that the Secretary has previously studied, sites necessary to enable acquisition by the Secretary of the full authorized volume of the Strategic Petroleum Reserve. In such proceeding, the Secretary shall first consider and give preference to the five sites which the Secretary previously assessed in the Draft Environmental Impact Statement, DOE/EIS–0165–D. However, the Secretary in his discretion may select other sites as proposed by a State where a site has been previously studied by the Secretary to meet the full authorized volume of the Strategic Petroleum Reserve.

Subtitle B—Natural Gas

SEC. 311. EXPORTATION OR IMPORTATION OF NATURAL GAS.

(a) SCOPE OF NATURAL GAS ACT.—Section 1(b) of the Natural Gas Act (15 U.S.C. 717(b)) is amended by inserting "and to the importation or exportation of natural gas in foreign commerce and to persons engaged in such importation or exportation," after "such transportation or sale,".

(b) DEFINITION.—Section 2 of the Natural Gas Act (15 U.S.C. 717a) is amended by adding at the end the following new paragraph:

"(11) 'LNG terminal' includes all natural gas facilities located onshore or in State waters that are used to receive, unload, load, store, transport, gasify, liquefy, or process natural gas that is imported to the United States from a foreign country, exported to a foreign country from the United States, or transported in interstate commerce by waterborne vessel, but does not include—

"(A) waterborne vessels used to deliver natural gas to or from any such facility; or

"(B) any pipeline or storage facility subject to the jurisdiction of the Commission under section 7.".

(c) AUTHORIZATION FOR SITING, CONSTRUCTION, EXPANSION, OR OPERATION OF LNG TERMINALS.—(1) The title for section 3 of the Natural Gas Act (15 U.S.C. 717b) is amended by inserting "; LNG TERMINALS" after "EXPORTATION OR IMPORTATION OF NATURAL GAS".

(2) Section 3 of the Natural Gas Act (15 U.S.C. 717b) is amended by adding at the end the following:

"(d) Except as specifically provided in this Act, nothing in this Act affects the rights of States under—

"(1) the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.);

"(2) the Clean Air Act (42 U.S.C. 7401 et seq.); or

"(3) the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.).

"(e)(1) The Commission shall have the exclusive authority to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal. Except as specifically provided in this Act, nothing in this Act is intended to affect otherwise applicable law related to any Federal agency's authorities or responsibilities related to LNG terminals.

"(2) Upon the filing of any application to site, construct, expand, or operate an LNG terminal, the Commission shall—

"(A) set the matter for hearing;

Notice.

"(B) give reasonable notice of the hearing to all interested persons, including the State commission of the State in which the LNG terminal is located and, if not the same, the Governor-appointed State agency described in section 3A;

"(C) decide the matter in accordance with this subsection; and

"(D) issue or deny the appropriate order accordingly.

"(3)(A) Except as provided in subparagraph (B), the Commission may approve an application described in paragraph (2), in whole or part, with such modifications and upon such terms and conditions as the Commission find necessary or appropriate.

"(B) Before January 1, 2015, the Commission shall not—

"(i) deny an application solely on the basis that the applicant proposes to use the LNG terminal exclusively or partially for gas that the applicant or an affiliate of the applicant will supply to the facility; or

"(ii) condition an order on—

"(I) a requirement that the LNG terminal offer service to customers other than the applicant, or any affiliate of the applicant, securing the order;

"(II) any regulation of the rates, charges, terms, or conditions of service of the LNG terminal; or

"(III) a requirement to file with the Commission schedules or contracts related to the rates, charges, terms, or conditions of service of the LNG terminal.

Termination date.

"(C) Subparagraph (B) shall cease to have effect on January 1, 2030.

"(4) An order issued for an LNG terminal that also offers service to customers on an open access basis shall not result in subsidization of expansion capacity by existing customers, degradation of service to existing customers, or undue discrimination against existing customers as to their terms or conditions of service at the facility, as all of those terms are defined by the Commission.

"(f)(1) In this subsection, the term 'military installation'—

"(A) means a base, camp, post, range, station, yard, center, or homeport facility for any ship or other activity under the jurisdiction of the Department of Defense, including any leased facility, that is located within a State, the District of Columbia, or any territory of the United States; and

"(B) does not include any facility used primarily for civil works, rivers and harbors projects, or flood control projects, as determined by the Secretary of Defense.

"(2) The Commission shall enter into a memorandum of understanding with the Secretary of Defense for the purpose of ensuring that the Commission coordinate and consult with the Secretary of Defense on the siting, construction, expansion, or operation of liquefied natural gas facilities that may affect an active military installation.

Memorandum.

"(3) The Commission shall obtain the concurrence of the Secretary of Defense before authorizing the siting, construction, expansion, or operation of liquefied natural gas facilities affecting the training or activities of an active military installation.".

(d) LNG TERMINAL STATE AND LOCAL SAFETY CONCERNS.—After section 3 of the Natural Gas Act (15 U.S.C. 717b) insert the following:

"STATE AND LOCAL SAFETY CONSIDERATIONS

"SEC. 3A. (a) The Commission shall promulgate regulations on the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) pre-filing process within 60 days after the date of enactment of this section. An applicant shall comply with pre-filing process required under the National Environmental Policy Act of 1969 prior to filing an application with the Commission. The regulations shall require that the pre-filing process commence at least 6 months prior to the filing of an application for authorization to construct an LNG terminal and encourage applicants to cooperate with State and local officials.

Regulations. Deadline. 15 USC 717b–1.

"(b) The Governor of a State in which an LNG terminal is proposed to be located shall designate the appropriate State agency for the purposes of consulting with the Commission regarding an application under section 3. The Commission shall consult with such State agency regarding State and local safety considerations prior to issuing an order pursuant to section 3. For the purposes of this section, State and local safety considerations include—

"(1) the kind and use of the facility;

"(2) the existing and projected population and demographic characteristics of the location;

"(3) the existing and proposed land use near the location;

"(4) the natural and physical aspects of the location;

"(5) the emergency response capabilities near the facility location; and

"(6) the need to encourage remote siting.

"(c) The State agency may furnish an advisory report on State and local safety considerations to the Commission with respect to an application no later than 30 days after the application was filed with the Commission. Before issuing an order authorizing an applicant to site, construct, expand, or operate an LNG terminal, the Commission shall review and respond specifically to the issues raised by the State agency described in subsection (b) in the advisory report. This subsection shall apply to any application filed after the date of enactment of the Energy Policy Act of 2005. A State agency has 30 days after such date of enactment to file an advisory report related to any applications pending at the Commission as of such date of enactment.

Applicability.

Deadline. Reports.

"(d) The State commission of the State in which an LNG terminal is located may, after the terminal is operational, conduct

safety inspections in conformance with Federal regulations and guidelines with respect to the LNG terminal upon written notice to the Commission. The State commission may notify the Commission of any alleged safety violations. The Commission shall transmit information regarding such allegations to the appropriate Federal agency, which shall take appropriate action and notify the State commission.

Notification.

"(e)(1) In any order authorizing an LNG terminal the Commission shall require the LNG terminal operator to develop an Emergency Response Plan. The Emergency Response Plan shall be prepared in consultation with the United States Coast Guard and State and local agencies and be approved by the Commission prior to any final approval to begin construction. The Plan shall include a cost-sharing plan.

"(2) A cost-sharing plan developed under paragraph (1) shall include a description of any direct cost reimbursements that the applicant agrees to provide to any State and local agencies with responsibility for security and safety—

"(A) at the LNG terminal; and

"(B) in proximity to vessels that serve the facility.".

SEC. 312. NEW NATURAL GAS STORAGE FACILITIES.

Section 4 of the Natural Gas Act (15 U.S.C. 717c) is amended by adding at the end the following:

"(f)(1) In exercising its authority under this Act or the Natural Gas Policy Act of 1978 (15 U.S.C. 3301 et seq.), the Commission may authorize a natural gas company (or any person that will be a natural gas company on completion of any proposed construction) to provide storage and storage-related services at market-based rates for new storage capacity related to a specific facility placed in service after the date of enactment of the Energy Policy Act of 2005, notwithstanding the fact that the company is unable to demonstrate that the company lacks market power, if the Commission determines that—

"(A) market-based rates are in the public interest and necessary to encourage the construction of the storage capacity in the area needing storage services; and

"(B) customers are adequately protected.

"(2) The Commission shall ensure that reasonable terms and conditions are in place to protect consumers.

"(3) If the Commission authorizes a natural gas company to charge market-based rates under this subsection, the Commission shall review periodically whether the market-based rate is just, reasonable, and not unduly discriminatory or preferential.".

SEC. 313. PROCESS COORDINATION; HEARINGS; RULES OF PROCEDURE.

(a) IN GENERAL.—Section 15 of the Natural Gas Act (15 U.S.C. 717n) is amended—

(1) by striking the section heading and inserting "PROCESS COORDINATION; HEARINGS; RULES OF PROCEDURE";

(2) by redesignating subsections (a) and (b) as subsections (e) and (f), respectively; and

(3) by striking "SEC. 15." and inserting the following:

"SEC. 15.(a) In this section, the term 'Federal authorization'—

"(1) means any authorization required under Federal law with respect to an application for authorization under section

3 or a certificate of public convenience and necessity under section 7; and

"(2) includes any permits, special use authorizations, certifications, opinions, or other approvals as may be required under Federal law with respect to an application for authorization under section 3 or a certificate of public convenience and necessity under section 7.

"(b) DESIGNATION AS LEAD AGENCY.—

"(1) IN GENERAL.—The Commission shall act as the lead agency for the purposes of coordinating all applicable Federal authorizations and for the purposes of complying with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

"(2) OTHER AGENCIES.—Each Federal and State agency considering an aspect of an application for Federal authorization shall cooperate with the Commission and comply with the deadlines established by the Commission.

"(c) SCHEDULE.—

"(1) COMMISSION AUTHORITY TO SET SCHEDULE.—The Commission shall establish a schedule for all Federal authorizations. In establishing the schedule, the Commission shall—

"(A) ensure expeditious completion of all such proceedings; and

"(B) comply with applicable schedules established by Federal law.

"(2) FAILURE TO MEET SCHEDULE.—If a Federal or State administrative agency does not complete a proceeding for an approval that is required for a Federal authorization in accordance with the schedule established by the Commission, the applicant may pursue remedies under section 19(d).

"(d) CONSOLIDATED RECORD.—The Commission shall, with the cooperation of Federal and State administrative agencies and officials, maintain a complete consolidated record of all decisions made or actions taken by the Commission or by a Federal administrative agency or officer (or State administrative agency or officer acting under delegated Federal authority) with respect to any Federal authorization. Such record shall be the record for—

"(1) appeals or reviews under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.), provided that the record may be supplemented as expressly provided pursuant to section 319 of that Act; or

"(2) judicial review under section 19(d) of decisions made or actions taken of Federal and State administrative agencies and officials, provided that, if the Court determines that the record does not contain sufficient information, the Court may remand the proceeding to the Commission for further development of the consolidated record.".

(b) JUDICIAL REVIEW.—Section 19 of the Natural Gas Act (15 U.S.C. 717r) is amended by adding at the end the following:

"(d) JUDICIAL REVIEW.—

"(1) IN GENERAL.—The United States Court of Appeals for the circuit in which a facility subject to section 3 or section 7 is proposed to be constructed, expanded, or operated shall have original and exclusive jurisdiction over any civil action for the review of an order or action of a Federal agency (other than the Commission) or State administrative agency acting pursuant to Federal law to issue, condition, or deny any permit,

license, concurrence, or approval (hereinafter collectively referred to as 'permit') required under Federal law, other than the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.).

"(2) AGENCY DELAY.—The United States Court of Appeals for the District of Columbia shall have original and exclusive jurisdiction over any civil action for the review of an alleged failure to act by a Federal agency (other than the Commission) or State administrative agency acting pursuant to Federal law to issue, condition, or deny any permit required under Federal law, other than the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.), for a facility subject to section 3 or section 7. The failure of an agency to take action on a permit required under Federal law, other than the Coastal Zone Management Act of 1972, in accordance with the Commission schedule established pursuant to section 15(c) shall be considered inconsistent with Federal law for the purposes of paragraph (3).

"(3) COURT ACTION.—If the Court finds that such order or action is inconsistent with the Federal law governing such permit and would prevent the construction, expansion, or operation of the facility subject to section 3 or section 7, the Court shall remand the proceeding to the agency to take appropriate action consistent with the order of the Court. If the Court remands the order or action to the Federal or State agency, the Court shall set a reasonable schedule and deadline for the agency to act on remand.

"(4) COMMISSION ACTION.—For any action described in this subsection, the Commission shall file with the Court the consolidated record of such order or action to which the appeal hereunder relates.

"(5) EXPEDITED REVIEW.—The Court shall set any action brought under this subsection for expedited consideration.".

SEC. 314. PENALTIES.

(a) CRIMINAL PENALTIES.—

(1) NATURAL GAS ACT.—Section 21 of the Natural Gas Act (15 U.S.C. 717t) is amended—

(A) in subsection (a)—

(i) by striking "$5,000" and inserting "$1,000,000"; and

(ii) by striking "two years" and inserting "5 years"; and

(B) in subsection (b), by striking "$500" and inserting "$50,000".

(2) NATURAL GAS POLICY ACT OF 1978.—Section 504(c) of the Natural Gas Policy Act of 1978 (15 U.S.C. 3414(c)) is amended—

(A) in paragraph (1)—

(i) in subparagraph (A), by striking "$5,000" and inserting "$1,000,000"; and

(ii) in subparagraph (B), by striking "two years" and inserting "5 years"; and

(B) in paragraph (2), by striking "$500 for each violation" and inserting "$50,000 for each day on which the offense occurs".

(b) CIVIL PENALTIES.—

(1) NATURAL GAS ACT.—The Natural Gas Act (15 U.S.C. 717 et seq.) is amended—

(A) by redesignating sections 22 through 24 as sections 24 through 26, respectively; and

15 USC 717u–717w.

(B) by inserting after section 21 (15 U.S.C. 717t) the following:

"CIVIL PENALTY AUTHORITY

"SEC. 22. (a) Any person that violates this Act, or any rule, regulation, restriction, condition, or order made or imposed by the Commission under authority of this Act, shall be subject to a civil penalty of not more than $1,000,000 per day per violation for as long as the violation continues.

15 USC 717t–1.

"(b) The penalty shall be assessed by the Commission after notice and opportunity for public hearing.

"(c) In determining the amount of a proposed penalty, the Commission shall take into consideration the nature and seriousness of the violation and the efforts to remedy the violation.".

(2) NATURAL GAS POLICY ACT OF 1978.—Section 504(b)(6)(A) of the Natural Gas Policy Act of 1978 (15 U.S.C. 3414(b)(6)(A)) is amended—

(A) in clause (i), by striking "$5,000" and inserting "$1,000,000"; and

(B) in clause (ii), by striking "$25,000" and inserting "$1,000,000".

SEC. 315. MARKET MANIPULATION.

The Natural Gas Act is amended by inserting after section 4 (15 U.S.C. 717c) the following:

"PROHIBITION ON MARKET MANIPULATION

"SEC. 4A. It shall be unlawful for any entity, directly or indirectly, to use or employ, in connection with the purchase or sale of natural gas or the purchase or sale of transportation services subject to the jurisdiction of the Commission, any manipulative or deceptive device or contrivance (as those terms are used in section 10(b) of the Securities Exchange Act of 1934 (15 U.S.C. 78j(b))) in contravention of such rules and regulations as the Commission may prescribe as necessary in the public interest or for the protection of natural gas ratepayers. Nothing in this section shall be construed to create a private right of action.".

15 USC 717c–1.

SEC. 316. NATURAL GAS MARKET TRANSPARENCY RULES.

The Natural Gas Act (15 U.S.C. 717 et seq.) is amended by inserting after section 22 the following:

"NATURAL GAS MARKET TRANSPARENCY RULES

"SEC. 23. (a)(1) The Commission is directed to facilitate price transparency in markets for the sale or transportation of physical natural gas in interstate commerce, having due regard for the public interest, the integrity of those markets, fair competition, and the protection of consumers.

15 USC 717t–2.

"(2) The Commission may prescribe such rules as the Commission determines necessary and appropriate to carry out the purposes of this section. The rules shall provide for the dissemination, on a timely basis, of information about the availability and prices

of natural gas sold at wholesale and in interstate commerce to the Commission, State commissions, buyers and sellers of wholesale natural gas, and the public.

"(3) The Commission may—

"(A) obtain the information described in paragraph (2) from any market participant; and

"(B) rely on entities other than the Commission to receive and make public the information, subject to the disclosure rules in subsection (b).

"(4) In carrying out this section, the Commission shall consider the degree of price transparency provided by existing price publishers and providers of trade processing services, and shall rely on such publishers and services to the maximum extent possible. The Commission may establish an electronic information system if it determines that existing price publications are not adequately providing price discovery or market transparency.

"(b)(1) Rules described in subsection (a)(2), if adopted, shall exempt from disclosure information the Commission determines would, if disclosed, be detrimental to the operation of an effective market or jeopardize system security.

"(2) In determining the information to be made available under this section and the time to make the information available, the Commission shall seek to ensure that consumers and competitive markets are protected from the adverse effects of potential collusion or other anticompetitive behaviors that can be facilitated by untimely public disclosure of transaction-specific information.

Deadline.
Memorandum.

"(c)(1) Within 180 days of enactment of this section, the Commission shall conclude a memorandum of understanding with the Commodity Futures Trading Commission relating to information sharing, which shall include, among other things, provisions ensuring that information requests to markets within the respective jurisdiction of each agency are properly coordinated to minimize duplicative information requests, and provisions regarding the treatment of proprietary trading information.

"(2) Nothing in this section may be construed to limit or affect the exclusive jurisdiction of the Commodity Futures Trading Commission under the Commodity Exchange Act (7 U.S.C. 1 et seq.).

"(d)(1) The Commission shall not condition access to interstate pipeline transportation on the reporting requirements of this section.

"(2) The Commission shall not require natural gas producers, processors, or users who have a de minimis market presence to comply with the reporting requirements of this section.

"(e)(1) Except as provided in paragraph (2), no person shall be subject to any civil penalty under this section with respect to any violation occurring more than 3 years before the date on which the person is provided notice of the proposed penalty under section 22(b).

"(2) Paragraph (1) shall not apply in any case in which the Commission finds that a seller that has entered into a contract for the transportation or sale of natural gas subject to the jurisdiction of the Commission has engaged in fraudulent market manipulation activities materially affecting the contract in violation of section 4A.".

SEC. 317. FEDERAL-STATE LIQUEFIED NATURAL GAS FORUMS.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary, in cooperation and consultation with the Secretary of Transportation, the Secretary of Homeland Security, the Federal Energy Regulatory Commission, and the Governors of the Coastal States, shall convene not less than 3 forums on liquefied natural gas. Deadline.

(b) REQUIREMENTS.—The forums shall—

(1) be located in areas where liquefied natural gas facilities are under consideration;

(2) be designed to foster dialogue among Federal officials, State and local officials, the general public, independent experts, and industry representatives; and

(3) at a minimum, provide an opportunity for public education and dialogue on—

(A) the role of liquefied natural gas in meeting current and future United States energy supply requirements and demand, in the context of the full range of energy supply options;

(B) the Federal and State siting and permitting processes;

(C) the potential risks and rewards associated with importing liquefied natural gas;

(D) the Federal safety and environmental requirements (including regulations) applicable to liquefied natural gas;

(E) prevention, mitigation, and response strategies for liquefied natural gas hazards; and

(F) additional issues as appropriate.

(c) PURPOSE.—The purpose of the forums shall be to identify and develop best practices for addressing the issues and challenges associated with liquefied natural gas imports, building on existing cooperative efforts.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 318. PROHIBITION OF TRADING AND SERVING BY CERTAIN INDIVIDUALS.

Section 20 of the Natural Gas Act (15 U.S.C. 717s) is amended by adding at the end the following:

"(d) In any proceedings under subsection (a), the court may prohibit, conditionally or unconditionally, and permanently or for such period of time as the court determines, any individual who is engaged or has engaged in practices constituting a violation of section 4A (including related rules and regulations) from—

"(1) acting as an officer or director of a natural gas company; or

"(2) engaging in the business of—

"(A) the purchasing or selling of natural gas; or

"(B) the purchasing or selling of transmission services subject to the jurisdiction of the Commission.".

Subtitle C—Production

SEC. 321. OUTER CONTINENTAL SHELF PROVISIONS.

(a) STORAGE ON THE OUTER CONTINENTAL SHELF.—Section 5(a)(5) of the Outer Continental Shelf Lands Act (43 U.S.C. 1334(a)(5)) is amended by inserting "from any source" after "oil and gas".

(b) NATURAL GAS DEFINED.—Section 3(13) of the Deepwater Port Act of 1974 (33 U.S.C. 1502(13)) is amended by adding at the end before the semicolon the following: ", natural gas liquids, liquefied petroleum gas, and condensate recovered from natural gas".

SEC. 322. HYDRAULIC FRACTURING.

Paragraph (1) of section 1421(d) of the Safe Drinking Water Act (42 U.S.C. 300h(d)) is amended to read as follows:

"(1) UNDERGROUND INJECTION.—The term 'underground injection'—

"(A) means the subsurface emplacement of fluids by well injection; and

"(B) excludes—

"(i) the underground injection of natural gas for purposes of storage; and

"(ii) the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities.".

SEC. 323. OIL AND GAS EXPLORATION AND PRODUCTION DEFINED.

Section 502 of the Federal Water Pollution Control Act (33 U.S.C. 1362) is amended by adding at the end the following:

"(24) OIL AND GAS EXPLORATION AND PRODUCTION.—The term 'oil and gas exploration, production, processing, or treatment operations or transmission facilities' means all field activities or operations associated with exploration, production, processing, or treatment operations, or transmission facilities, including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities.".

Subtitle D—Naval Petroleum Reserve

10 USC 7420 note.

SEC. 331. TRANSFER OF ADMINISTRATIVE JURISDICTION AND ENVIRONMENTAL REMEDIATION, NAVAL PETROLEUM RESERVE NUMBERED 2, KERN COUNTY, CALIFORNIA.

Effective date.

(a) ADMINISTRATION JURISDICTION TRANSFER TO SECRETARY OF THE INTERIOR.—Effective on the date of the enactment of this Act, administrative jurisdiction and control over all public domain lands included within Naval Petroleum Reserve Numbered 2 located in Kern County, California (other than the lands specified in subsection (b)), are transferred from the Secretary to the Secretary of the Interior for management, subject to subsection (c), in accordance with the laws governing management of the public lands, and the regulations promulgated under such laws, including the

Mineral Leasing Act (30 U.S.C. 181 et seq.) and the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.).

(b) EXCLUSION OF CERTAIN RESERVE LANDS.—The transfer of administrative jurisdiction made by subsection (a) does not include the following lands:

(1) That portion of Naval Petroleum Reserve Numbered 2 authorized for disposal under section 3403(a) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (Public Law 105–261; 10 U.S.C. 7420 note).

(2) That portion of the surface estate of Naval Petroleum Reserve Numbered 2 conveyed to the City of Taft, California, by section 333.

(c) PURPOSE OF TRANSFER.—

(1) PRODUCTION OF HYDROCARBON RESOURCES.—Notwithstanding any other provision of law, the principal purpose of the lands subject to transfer under subsection (a) is the production of hydrocarbon resources, and the Secretary of the Interior shall manage the lands in a fashion consistent with this purpose. In managing the lands, the Secretary of the Interior shall regulate operations to prevent unnecessary degradation and to provide for ultimate economic recovery of the resources.

(2) DISPOSAL AUTHORITY AND SURFACE USE.—The Secretary of the Interior may make disposals of lands subject to transfer under subsection (a), or allow commercial or non-profit surface use of such lands, not to exceed 10 acres each, so long as the disposals or surface uses do not materially interfere with the ultimate economic recovery of the hydrocarbon resources of such lands. All revenues received from the disposal of lands under this paragraph or from allowing the surface use of such lands shall be deposited in the Naval Petroleum Reserve Numbered 2 Lease Revenue Account established by section 332.

(d) CONFORMING AMENDMENT.—Section 3403 of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (Public Law 105–261; 10 U.S.C. 7420 note) is amended by striking subsection (b).

SEC. 332. NAVAL PETROLEUM RESERVE NUMBERED 2 LEASE REVENUE ACCOUNT.

10 USC 7420 note.

(a) ESTABLISHMENT.—There is established in the Treasury a special deposit account to be known as the "Naval Petroleum Reserve Numbered 2 Lease Revenue Account" (in this section referred to as the "lease revenue account"). The lease revenue account is a revolving account, and amounts in the lease revenue account shall be available to the Secretary of the Interior, without further appropriation, for the purposes specified in subsection (b).

(b) PURPOSES OF ACCOUNT.—

(1) ENVIRONMENTAL-RELATED COSTS.—The lease revenue account shall be the sole and exclusive source of funds to pay for any and all costs and expenses incurred by the United States for—

(A) environmental investigations (other than any environmental investigations that were conducted by the Secretary before the transfer of the Naval Petroleum Reserve Numbered 2 lands under section 331), remediation, compliance actions, response, waste management, impediments, fines or penalties, or any other costs or expenses

of any kind arising from, or relating to, conditions existing on or below the Naval Petroleum Reserve Numbered 2 lands, or activities occurring or having occurred on such lands, on or before the date of the transfer of such lands; and

(B) any future remediation necessitated as a result of pre-transfer and leasing activities on such lands.

(2) TRANSITION COSTS.—The lease revenue account shall also be available for use by the Secretary of the Interior to pay for transition costs incurred by the Department of the Interior associated with the transfer and leasing of the Naval Petroleum Reserve Numbered 2 lands.

(c) FUNDING.—The lease revenue account shall consist of the following:

(1) Notwithstanding any other provision of law, for a period of three years after the date of the transfer of the Naval Petroleum Reserve Numbered 2 lands under section 331, the sum of $500,000 per year of revenue from leases entered into before that date, including bonuses, rents, royalties, and interest charges collected pursuant to the Federal Oil and Gas Royalty Management Act of 1982 (30 U.S.C. 1701 et. seq.), derived from the Naval Petroleum Reserve Numbered 2 lands, shall be deposited into the lease revenue account.

(2) Subject to subsection (d), all revenues derived from leases on Naval Petroleum Reserve Numbered 2 lands issued on or after the date of the transfer of such lands, including bonuses, rents, royalties, and interest charges collected pursuant to the Federal Oil and Gas Royalty Management Act of 1982 (30 U.S.C. 1701 et seq.), shall be deposited into the lease revenue account.

(d) LIMITATION.—Funds in the lease revenue account shall not exceed $3,000,000 at any one time. Whenever funds in the lease revenue account are obligated or expended so that the balance in the account falls below that amount, lease revenues referred to in subsection (c)(2) shall be deposited in the account to maintain a balance of $3,000,000.

Certification.

(e) TERMINATION OF ACCOUNT.—At such time as the Secretary of the Interior certifies that remediation of all environmental contamination of Naval Petroleum Reserve Numbered 2 lands in existence as of the date of the transfer of such lands under section 331 has been successfully completed, that all costs and expenses of investigation, remediation, compliance actions, response, waste management, impediments, fines, or penalties associated with environmental contamination of such lands in existence as of the date of the transfer have been paid in full, and that the transition costs of the Department of the Interior referred to in subsection (b)(2) have been paid in full, the lease revenue account shall be terminated and any remaining funds shall be distributed in accordance with subsection (f).

Applicability.

(f) DISTRIBUTION OF REMAINING FUNDS.—Section 35 of the Mineral Leasing Act (30 U.S.C. 191) shall apply to the payment and distribution of all funds remaining in the lease revenue account upon its termination under subsection (e).

SEC. 333. LAND CONVEYANCE, PORTION OF NAVAL PETROLEUM RESERVE NUMBERED 2, TO CITY OF TAFT, CALIFORNIA.

10 USC 7420 note.

(a) CONVEYANCE.—Effective on the date of the enactment of this Act, there is conveyed to the City of Taft, California (in this section referred to as the "City"), all surface right, title, and interest of the United States in and to a parcel of real property consisting of approximately 220 acres located in the NE¼, the NE¼ of the NW¼, and the N½ of the SE¼ of the NW¼ of section 18, township 32 south, range 24 east, Mount Diablo meridian, Kern County, California.

Effective date.

(b) CONSIDERATION.—The conveyance under subsection (a) is made without the payment of consideration by the City.

(c) TREATMENT OF EXISTING RIGHTS.—The conveyance under subsection (a) is subject to valid existing rights, including Federal oil and gas lease SAC–019577.

(d) TREATMENT OF MINERALS.—All coal, oil, gas, and other minerals within the lands conveyed under subsection (a) are reserved to the United States, except that the United States and its lessees, licensees, permittees, or assignees shall have no right of surface use or occupancy of the lands. Nothing in this subsection shall be construed to require the United States or its lessees, licensees, permittees, or assignees to support the surface of the conveyed lands.

(e) INDEMNIFY AND HOLD HARMLESS.—The City shall indemnify, defend, and hold harmless the United States for, from, and against, and the City shall assume all responsibility for, any and all liability of any kind or nature, including all loss, cost, expense, or damage, arising from the City's use or occupancy of, or operations on, the land conveyed under subsection (a), whether such use or occupancy of, or operations on, occurred before or occur after the date of the enactment of this Act.

(f) INSTRUMENT OF CONVEYANCE.—Not later than 1 year after the date of the enactment of this Act, the Secretary shall execute, file, and cause to be recorded in the appropriate office a deed or other appropriate instrument documenting the conveyance made by this section.

Deadline.
Records.

SEC. 334. REVOCATION OF LAND WITHDRAWAL.

Effective date.
10 USC 7420 note.

Effective on the date of the enactment of this Act, the Executive Order of December 13, 1912, which created Naval Petroleum Reserve Numbered 2, is revoked in its entirety.

Subtitle E—Production Incentives

SEC. 341. DEFINITION OF SECRETARY.

42 USC 15901.

In this subtitle, the term "Secretary" means the Secretary of the Interior.

SEC. 342. PROGRAM ON OIL AND GAS ROYALTIES IN-KIND.

42 USC 15902.

(a) APPLICABILITY OF SECTION.—Notwithstanding any other provision of law, this section applies to all royalty in-kind accepted by the Secretary on or after the date of enactment of this Act under any Federal oil or gas lease or permit under—

(1) section 36 of the Mineral Leasing Act (30 U.S.C. 192);

(2) section 27 of the Outer Continental Shelf Lands Act (43 U.S.C. 1353); or

(3) any other Federal law governing leasing of Federal land for oil and gas development.

(b) TERMS AND CONDITIONS.—All royalty accruing to the United States shall, on the demand of the Secretary, be paid in-kind. If the Secretary makes such a demand, the following provisions apply to the payment:

(1) SATISFACTION OF ROYALTY OBLIGATION.—Delivery by, or on behalf of, the lessee of the royalty amount and quality due under the lease satisfies royalty obligation of the lessee for the amount delivered, except that transportation and processing reimbursements paid to, or deductions claimed by, the lessee shall be subject to review and audit.

(2) MARKETABLE CONDITION.—

(A) DEFINITION OF MARKETABLE CONDITION.—In this paragraph, the term "in marketable condition" means sufficiently free from impurities and otherwise in a condition that the royalty production will be accepted by a purchaser under a sales contract typical of the field or area in which the royalty production was produced.

(B) REQUIREMENT.—Royalty production shall be placed in marketable condition by the lessee at no cost to the United States.

(3) DISPOSITION BY THE SECRETARY.—The Secretary may—

(A) sell or otherwise dispose of any royalty production taken in-kind (other than oil or gas transferred under section 27(a)(3) of the Outer Continental Shelf Lands Act (43 U.S.C. 1353(a)(3)) for not less than the market price; and

(B) transport or process (or both) any royalty production taken in-kind.

(4) RETENTION BY THE SECRETARY.—The Secretary may, notwithstanding section 3302 of title 31, United States Code, retain and use a portion of the revenues from the sale of oil and gas taken in-kind that otherwise would be deposited to miscellaneous receipts, without regard to fiscal year limitation, or may use oil or gas received as royalty taken in-kind (referred to in this paragraph as "royalty production") to pay the cost of—

(A) transporting the royalty production;

(B) processing the royalty production;

(C) disposing of the royalty production; or

(D) any combination of transporting, processing, and disposing of the royalty production.

(5) LIMITATION.—

(A) IN GENERAL.—Except as provided in subparagraph (B), the Secretary may not use revenues from the sale of oil and gas taken in-kind to pay for personnel, travel, or other administrative costs of the Federal Government.

(B) EXCEPTION.—Notwithstanding subparagraph (A), the Secretary may use a portion of the revenues from royalty in-kind sales, without fiscal year limitation, to pay salaries and other administrative costs directly related to the royalty in-kind program.

(c) REIMBURSEMENT OF COST.—If the lessee, pursuant to an agreement with the United States or as provided in the lease, processes the royalty gas or delivers the royalty oil or gas at a point not on or adjacent to the lease area, the Secretary shall—

(1) reimburse the lessee for the reasonable costs of transportation (not including gathering) from the lease to the point of delivery or for processing costs; or

(2) allow the lessee to deduct the transportation or processing costs in reporting and paying royalties in-value for other Federal oil and gas leases.

(d) BENEFIT TO THE UNITED STATES REQUIRED.—The Secretary may receive oil or gas royalties in-kind only if the Secretary determines that receiving royalties in-kind provides benefits to the United States that are greater than or equal to the benefits that are likely to have been received had royalties been taken in-value.

(e) REPORTS.—

(1) IN GENERAL.—Not later than September 30, 2006, the Secretary shall submit to Congress a report that addresses—

(A) actions taken to develop business processes and automated systems to fully support the royalty-in-kind capability to be used in tandem with the royalty-in-value approach in managing Federal oil and gas revenue; and

(B) future royalty-in-kind businesses operation plans and objectives.

(2) REPORTS ON OIL OR GAS ROYALTIES TAKEN IN-KIND.—For each of fiscal years 2006 through 2015 in which the United States takes oil or gas royalties in-kind from production in any State or from the outer Continental Shelf, excluding royalties taken in-kind and sold to refineries under subsection (h), the Secretary shall submit to Congress a report that describes—

(A) the 1 or more methodologies used by the Secretary to determine compliance with subsection (d), including the performance standard for comparing amounts received by the United States derived from royalties in-kind to amounts likely to have been received had royalties been taken in-value;

(B) an explanation of the evaluation that led the Secretary to take royalties in-kind from a lease or group of leases, including the expected revenue effect of taking royalties in-kind;

(C) actual amounts received by the United States derived from taking royalties in-kind and costs and savings incurred by the United States associated with taking royalties in-kind, including administrative savings and any new or increased administrative costs; and

(D) an evaluation of other relevant public benefits or detriments associated with taking royalties in-kind.

(f) DEDUCTION OF EXPENSES.—

(1) IN GENERAL.—Before making payments under section 35 of the Mineral Leasing Act (30 U.S.C. 191) or section 8(g) of the Outer Continental Shelf Lands Act (43 U.S.C. 1337(g)) of revenues derived from the sale of royalty production taken in-kind from a lease, the Secretary shall deduct amounts paid or deducted under subsections (b)(4) and (c) and deposit the amount of the deductions in the miscellaneous receipts of the Treasury.

(2) ACCOUNTING FOR DEDUCTIONS.—When the Secretary allows the lessee to deduct transportation or processing costs under subsection (c), the Secretary may not reduce any payments to recipients of revenues derived from any other Federal oil and gas lease as a consequence of that deduction.

(g) CONSULTATION WITH STATES.—The Secretary—

(1) shall consult with a State before conducting a royalty in-kind program under this subtitle within the State;

(2) may delegate management of any portion of the Federal royalty in-kind program to the State except as otherwise prohibited by Federal law; and

(3) shall consult annually with any State from which Federal oil or gas royalty is being taken in-kind to ensure, to the maximum extent practicable, that the royalty in-kind program provides revenues to the State greater than or equal to the revenues likely to have been received had royalties been taken in-value.

(h) SMALL REFINERIES.—

(1) PREFERENCE.—If the Secretary finds that sufficient supplies of crude oil are not available in the open market to refineries that do not have their own source of supply for crude oil, the Secretary may grant preference to those refineries in the sale of any royalty oil accruing or reserved to the United States under Federal oil and gas leases issued under any mineral leasing law, for processing or use in those refineries at private sale at not less than the market price.

(2) PRORATION AMONG REFINERIES IN PRODUCTION AREA.—In disposing of oil under this subsection, the Secretary may, at the discretion of the Secretary, prorate the oil among refineries described in paragraph (1) in the area in which the oil is produced.

(i) DISPOSITION TO FEDERAL AGENCIES.—

(1) ONSHORE ROYALTY.—Any royalty oil or gas taken by the Secretary in-kind from onshore oil and gas leases may be sold at not less than the market price to any Federal agency.

(2) OFFSHORE ROYALTY.—Any royalty oil or gas taken in-kind from a Federal oil or gas lease on the outer Continental Shelf may be disposed of only under section 27 of the Outer Continental Shelf Lands Act (43 U.S.C. 1353).

(j) FEDERAL LOW-INCOME ENERGY ASSISTANCE PROGRAMS.—

(1) PREFERENCE.—In disposing of royalty oil or gas taken in-kind under this section, the Secretary may grant a preference to any person, including any Federal or State agency, for the purpose of providing additional resources to any Federal low-income energy assistance program.

(2) REPORT.—Not later than 3 years after the date of enactment of this Act, the Secretary shall submit a report to Congress—

(A) assessing the effectiveness of granting preferences specified in paragraph (1); and

(B) providing a specific recommendation on the continuation of authority to grant preferences.

42 USC 15903.

SEC. 343. MARGINAL PROPERTY PRODUCTION INCENTIVES.

(a) DEFINITION OF MARGINAL PROPERTY.—Until such time as the Secretary issues regulations under subsection (e) that prescribe a different definition, in this section, the term "marginal property" means an onshore unit, communitization agreement, or lease not within a unit or communitization agreement, that produces on average the combined equivalent of less than 15 barrels of oil per well per day or 90,000,000 British thermal units of gas per

well per day calculated based on the average over the 3 most recent production months, including only wells that produce on more than half of the days during those 3 production months.

(b) CONDITIONS FOR REDUCTION OF ROYALTY RATE.—Until such time as the Secretary issues regulations under subsection (e) that prescribe different standards or requirements, the Secretary shall reduce the royalty rate on—

(1) oil production from marginal properties as prescribed in subsection (c) if the spot price of West Texas Intermediate crude oil at Cushing, Oklahoma, is, on average, less than $15 per barrel (adjusted in accordance with the Consumer Price Index for all-urban consumers, United States city average, as published by the Bureau of Labor Statistics) for 90 consecutive trading days; and

(2) gas production from marginal properties as prescribed in subsection (c) if the spot price of natural gas delivered at Henry Hub, Louisiana, is, on average, less than $2.00 per million British thermal units (adjusted in accordance with the Consumer Price Index for all-urban consumers, United States city average, as published by the Bureau of Labor Statistics) for 90 consecutive trading days.

(c) REDUCED ROYALTY RATE.—

(1) IN GENERAL.—When a marginal property meets the conditions specified in subsection (b), the royalty rate shall be the lesser of—

(A) 5 percent; or

(B) the applicable rate under any other statutory or regulatory royalty relief provision that applies to the affected production.

(2) PERIOD OF EFFECTIVENESS.—The reduced royalty rate under this subsection shall be effective beginning on the first day of the production month following the date on which the applicable condition specified in subsection (b) is met.

(d) TERMINATION OF REDUCED ROYALTY RATE.—A royalty rate prescribed in subsection (c)(1) shall terminate—

(1) with respect to oil production from a marginal property, on the first day of the production month following the date on which—

(A) the spot price of West Texas Intermediate crude oil at Cushing, Oklahoma, on average, exceeds $15 per barrel (adjusted in accordance with the Consumer Price Index for all-urban consumers, United States city average, as published by the Bureau of Labor Statistics) for 90 consecutive trading days; or

(B) the property no longer qualifies as a marginal property; and

(2) with respect to gas production from a marginal property, on the first day of the production month following the date on which—

(A) the spot price of natural gas delivered at Henry Hub, Louisiana, on average, exceeds $2.00 per million British thermal units (adjusted in accordance with the Consumer Price Index for all-urban consumers, United States city average, as published by the Bureau of Labor Statistics) for 90 consecutive trading days; or

(B) the property no longer qualifies as a marginal property.

(e) REGULATIONS PRESCRIBING DIFFERENT RELIEF.—

(1) DISCRETIONARY REGULATIONS.—The Secretary may by regulation prescribe different parameters, standards, and requirements for, and a different degree or extent of, royalty relief for marginal properties in lieu of those prescribed in subsections (a) through (d).

Deadline.

(2) MANDATORY REGULATIONS.—Unless a determination is made under paragraph (3), not later than 18 months after the date of enactment of this Act, the Secretary shall by regulation—

(A) prescribe standards and requirements for, and the extent of royalty relief for, marginal properties for oil and gas leases on the outer Continental Shelf; and

(B) define what constitutes a marginal property on the outer Continental Shelf for purposes of this section.

(3) REPORT.—To the extent the Secretary determines that it is not practicable to issue the regulations referred to in paragraph (2), the Secretary shall provide a report to Congress explaining such determination by not later than 18 months after the date of enactment of this Act.

(4) CONSIDERATIONS.—In issuing regulations under this subsection, the Secretary may consider—

(A) oil and gas prices and market trends;

(B) production costs;

(C) abandonment costs;

(D) Federal and State tax provisions and the effects of those provisions on production economics;

(E) other royalty relief programs;

(F) regional differences in average wellhead prices;

(G) national energy security issues; and

(H) other relevant matters, as determined by the Secretary.

(f) SAVINGS PROVISION.—Nothing in this section prevents a lessee from receiving royalty relief or a royalty reduction pursuant to any other law (including a regulation) that provides more relief than the amounts provided by this section.

42 USC 15904.

SEC. 344. INCENTIVES FOR NATURAL GAS PRODUCTION FROM DEEP WELLS IN THE SHALLOW WATERS OF THE GULF OF MEXICO.

(a) ROYALTY INCENTIVE REGULATIONS FOR ULTRA DEEP GAS WELLS.—

Deadline.

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, in addition to any other regulations that may provide royalty incentives for natural gas produced from deep wells on oil and gas leases issued pursuant to the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.), the Secretary shall issue regulations granting royalty relief suspension volumes of not less than 35 billion cubic feet with respect to the production of natural gas from ultra deep wells on leases issued in shallow waters less than 400 meters deep located in the Gulf of Mexico wholly west of 87 degrees, 30 minutes west longitude. Regulations issued under this subsection shall be retroactive to the date that the notice of proposed rulemaking is published in the Federal Register.

Effective date.
Notices.
Federal Register, publication.

(2) SUSPENSION VOLUMES.—The Secretary may grant suspension volumes of not less than 35 billion cubic feet in any case in which—

(A) the ultra deep well is a sidetrack; or

(B) the lease has previously produced from wells with a perforated interval the top of which is at least 15,000 feet true vertical depth below the datum at mean sea level.

(3) DEFINITIONS.—In this subsection:

(A) ULTRA DEEP WELL.—The term "ultra deep well" means a well drilled with a perforated interval, the top of which is at least 20,000 true vertical depth below the datum at mean sea level.

(B) SIDETRACK.—

(i) IN GENERAL.—The term "sidetrack" means a well resulting from drilling an additional hole to a new objective bottom-hole location by leaving a previously drilled hole.

(ii) INCLUSION.—The term "sidetrack" includes—

(I) drilling a well from a platform slot reclaimed from a previously drilled well;

(II) re-entering and deepening a previously drilled well; and

(III) a bypass from a sidetrack, including drilling around material blocking a hole or drilling to straighten a crooked hole.

(b) ROYALTY INCENTIVE REGULATIONS FOR DEEP GAS WELLS.—Not later than 180 days after the date of enactment of this Act, in addition to any other regulations that may provide royalty incentives for natural gas produced from deep wells on oil and gas leases issued pursuant to the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.), the Secretary shall issue regulations granting royalty relief suspension volumes with respect to production of natural gas from deep wells on leases issued in waters more than 200 meters but less than 400 meters deep located in the Gulf of Mexico wholly west of 87 degrees, 30 minutes west longitude. The suspension volumes for deep wells within 200 to 400 meters of water depth shall be calculated using the same methodology used to calculate the suspension volumes for deep wells in the shallower waters of the Gulf of Mexico, and in no case shall the suspension volumes for deep wells within 200 to 400 meters of water depth be lower than those for deep wells in shallower waters. Regulations issued under this subsection shall be retroactive to the date that the notice of proposed rulemaking is published in the Federal Register.

Deadline.

Effective date.
Notices.
Federal Register, publication.

(c) LIMITATIONS.—The Secretary may place limitations on the royalty relief granted under this section based on market price. The royalty relief granted under this section shall not apply to a lease for which deep water royalty relief is available.

SEC. 345. ROYALTY RELIEF FOR DEEP WATER PRODUCTION.

42 USC 15905.

(a) IN GENERAL.—Subject to subsections (b) and (c), for each tract located in water depths of greater than 400 meters in the Western and Central Planning Area of the Gulf of Mexico (including the portion of the Eastern Planning Area of the Gulf of Mexico encompassing whole lease blocks lying west of 87 degrees, 30 minutes West longitude), any oil or gas lease sale under the Outer

Effective date.

Continental Shelf Lands Act (43 U.S.C. 1331 et seq.) occurring during the 5-year period beginning on the date of enactment of this Act shall use the bidding system authorized under section 8(a)(1)(H) of the Outer Continental Shelf Lands Act (43 U.S.C. 1337(a)(1)(H)).

(b) SUSPENSION OF ROYALTIES.—The suspension of royalties under subsection (a) shall be established at a volume of not less than—

(1) 5,000,000 barrels of oil equivalent for each lease in water depths of 400 to 800 meters;

(2) 9,000,000 barrels of oil equivalent for each lease in water depths of 800 to 1,600 meters;

(3) 12,000,000 barrels of oil equivalent for each lease in water depths of 1,600 to 2,000 meters; and

(4) 16,000,000 barrels of oil equivalent for each lease in water depths greater than 2,000 meters.

(c) LIMITATION.—The Secretary may place limitations on royalty relief granted under this section based on market price.

SEC. 346. ALASKA OFFSHORE ROYALTY SUSPENSION.

Section 8(a)(3)(B) of the Outer Continental Shelf Lands Act (43 U.S.C. 1337(a)(3)(B)) is amended by inserting "and in the Planning Areas offshore Alaska" after "West longitude".

SEC. 347. OIL AND GAS LEASING IN THE NATIONAL PETROLEUM RESERVE IN ALASKA.

(a) TRANSFER OF AUTHORITY.—

(1) REDESIGNATION.—The Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6501 et seq.) is amended by redesignating section 107 (42 U.S.C. 6507) as section 108.

42 USC 6506a.

(2) TRANSFER.—The matter under the heading "**EXPLORATION OF NATIONAL PETROLEUM RESERVE IN ALASKA**" under the heading "**ENERGY AND MINERALS**" of title I of Public Law 96–514 (42 U.S.C. 6508) is—

(A) transferred to the Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6501 et seq.);

(B) redesignated as section 107 of that Act; and

(C) moved so as to appear after section 106 of that Act (42 U.S.C. 6506).

(b) COMPETITIVE LEASING.—Section 107 of the Naval Petroleum Reserves Production Act of 1976 (as amended by subsection (a)(2)) is amended—

(1) by striking the heading and all that follows through "*Provided*, That (1) activities" and inserting the following:

"SEC. 107. COMPETITIVE LEASING OF OIL AND GAS.

"(a) IN GENERAL.—The Secretary shall conduct an expeditious program of competitive leasing of oil and gas in the Reserve in accordance with this Act.

"(b) MITIGATION OF ADVERSE EFFECTS.—Activities";

(2) by striking "Alaska (the Reserve); (2) the" and inserting "Alaska".

"(c) LAND USE PLANNING; BLM WILDERNESS STUDY.—The";

(3) by striking "Reserve; (3) the" and inserting "Reserve".

"(d) FIRST LEASE SALE.—The;";

(4) by striking "4332); (4) the" and inserting "4321 et seq.)".

"(e) WITHDRAWALS.—The";

(5) by striking "herein; (5) bidding" and inserting "under this section".

"(f) BIDDING SYSTEMS.—Bidding";

(6) by striking "629); (6) lease" and inserting "629)".

"(g) GEOLOGICAL STRUCTURES.—Lease";

(7) by striking "structures; (7) the" and inserting "structures".

"(h) SIZE OF LEASE TRACTS.—The";

(8) by striking "Secretary; (8)" and all that follows through "Drilling, production," and inserting "Secretary".

"(i) TERMS.— Deadlines.

"(1) IN GENERAL.—Each lease shall be issued for an initial period of not more than 10 years, and shall be extended for so long thereafter as oil or gas is produced from the lease in paying quantities, oil or gas is capable of being produced in paying quantities, or drilling or reworking operations, as approved by the Secretary, are conducted on the leased land.

"(2) RENEWAL OF LEASES WITH DISCOVERIES.—At the end of the primary term of a lease the Secretary shall renew for an additional 10-year term a lease that does not meet the requirements of paragraph (1) if the lessee submits to the Secretary an application for renewal not later than 60 days before the expiration of the primary lease and the lessee certifies, and the Secretary agrees, that hydrocarbon resources were discovered on one or more wells drilled on the leased land in such quantities that a prudent operator would hold the lease for potential future development.

"(3) RENEWAL OF LEASES WITHOUT DISCOVERIES.—At the end of the primary term of a lease the Secretary shall renew for an additional 10-year term a lease that does not meet the requirements of paragraph (1) if the lessee submits to the Secretary an application for renewal not later than 60 days before the expiration of the primary lease and pays the Secretary a renewal fee of $100 per acre of leased land, and—

"(A) the lessee provides evidence, and the Secretary agrees that, the lessee has diligently pursued exploration that warrants continuation with the intent of continued exploration or future potential development of the leased land; or

"(B) all or part of the lease—

"(i) is part of a unit agreement covering a lease described in subparagraph (A); and

"(ii) has not been previously contracted out of the unit.

"(4) APPLICABILITY.—This subsection applies to a lease that is in effect on or after the date of enactment of the Energy Policy Act of 2005.

"(5) EXPIRATION FOR FAILURE TO PRODUCE.—Notwithstanding any other provision of this Act, if no oil or gas is produced from a lease within 30 years after the date of the issuance of the lease the lease shall expire. Deadline.

"(6) TERMINATION.—No lease issued under this section covering lands capable of producing oil or gas in paying quantities shall expire because the lessee fails to produce the same due to circumstances beyond the control of the lessee.

"(j) UNIT AGREEMENTS.—

"(1) IN GENERAL.—For the purpose of conservation of the natural resources of all or part of any oil or gas pool, field, reservoir, or like area, lessees (including representatives) of the pool, field, reservoir, or like area may unite with each other, or jointly or separately with others, in collectively adopting and operating under a unit agreement for all or part of the pool, field, reservoir, or like area (whether or not any other part of the oil or gas pool, field, reservoir, or like area is already subject to any cooperative or unit plan of development or operation), if the Secretary determines the action to be necessary or advisable in the public interest. In determining the public interest, the Secretary should consider, among other things, the extent to which the unit agreement will minimize the impact to surface resources of the leases and will facilitate consolidation of facilities.

"(2) CONSULTATION.—In making a determination under paragraph (1), the Secretary shall consult with and provide opportunities for participation by the State of Alaska or a Regional Corporation (as defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602)) with respect to the creation or expansion of units that include acreage in which the State of Alaska or the Regional Corporation has an interest in the mineral estate.

"(3) PRODUCTION ALLOCATION METHODOLOGY.—(A) The Secretary may use a production allocation methodology for each participating area within a unit that includes solely Federal land in the Reserve.

"(B) The Secretary shall use a production allocation methodology for each participating area within a unit that includes Federal land in the Reserve and non-Federal land based on the characteristics of each specific oil or gas pool, field, reservoir, or like area to take into account reservoir heterogeneity and area variation in reservoir producibility across diverse leasehold interests. The implementation of the foregoing production allocation methodology shall be controlled by agreement among the affected lessors and lessees.

"(4) BENEFIT OF OPERATIONS.—Drilling, production,";

(9) by striking "When separate" and inserting the following:

"(5) POOLING.—If separate";

(10) by inserting "(in consultation with the owners of the other land)" after "determined by the Secretary of the Interior";

(11) by striking "thereto; (10) to" and all that follows through "the terms provided therein" and inserting "to the agreement.

"(k) EXPLORATION INCENTIVES.—

"(1) IN GENERAL.—

"(A) WAIVER, SUSPENSION, OR REDUCTION.—To encourage the greatest ultimate recovery of oil or gas or in the interest of conservation, the Secretary may waive, suspend, or reduce the rental fees or minimum royalty, or reduce the royalty on an entire leasehold (including on any lease operated pursuant to a unit agreement), whenever (after consultation with the State of Alaska and the North Slope Borough of Alaska and the concurrence of any Regional Corporation for leases that include land that was made available for acquisition by the Regional Corporation under the provisions of section 1431(o) of the Alaska National

Interest Lands Conservation Act (16 U.S.C. 3101 et seq.)) in the judgment of the Secretary it is necessary to do so to promote development, or whenever in the judgment of the Secretary the leases cannot be successfully operated under the terms provided therein.

"(B) APPLICABILITY.—This paragraph applies to a lease that is in effect on or after the date of enactment of the Energy Policy Act of 2005.";

(12) by striking "The Secretary is authorized to" and inserting the following:

"(2) SUSPENSION OF OPERATIONS AND PRODUCTION.—The Secretary may";

(13) by striking "In the event" and inserting the following:

"(3) SUSPENSION OF PAYMENTS.—If";

(14) by striking "thereto; and (11) all" and inserting "to the lease.

"(l) RECEIPTS.—All";

(15) by redesignating subparagraphs (A), (B), and (C) as paragraphs (1), (2), and (3), respectively;

(16) by striking "Any agency" and inserting the following:

"(m) EXPLORATIONS.—Any agency";

(17) by striking "Any action" and inserting the following:

"(n) ENVIRONMENTAL IMPACT STATEMENTS.—

"(1) JUDICIAL REVIEW.—Any action";

(18) by striking "The detailed" and inserting the following:

"(2) INITIAL LEASE SALES.—The detailed";

(19) by striking "section 104(b) of the Naval Petroleum Reserves Production Act of 1976 (90 Stat. 304; 42 U.S.C. 6504)" and inserting "section 104(a)"; and

(20) by adding at the end the following:

"(o) REGULATIONS.—As soon as practicable after the date of enactment of the Energy Policy Act of 2005, the Secretary shall issue regulations to implement this section.

"(p) WAIVER OF ADMINISTRATION FOR CONVEYED LANDS.—

"(1) IN GENERAL.—Notwithstanding section 14(g) of the Alaska Native Claims Settlement Act (43 U.S.C. 1613(g))—

"(A) the Secretary of the Interior shall waive administration of any oil and gas lease to the extent that the lease covers any land in the Reserve in which all of the subsurface estate is conveyed to the Arctic Slope Regional Corporation (referred to in this subsection as the 'Corporation');

"(B)(i) in a case in which a conveyance of a subsurface estate described in subparagraph (A) does not include all of the land covered by the oil and gas lease, the person that owns the subsurface estate in any particular portion of the land covered by the lease shall be entitled to all of the revenues reserved under the lease as to that portion, including, without limitation, all the royalty payable with respect to oil or gas produced from or allocated to that portion;

"(ii) in a case described in clause (i), the Secretary of the Interior shall—

"(I) segregate the lease into 2 leases, 1 of which shall cover only the subsurface estate conveyed to the Corporation; and

"(II) waive administration of the lease that covers the subsurface estate conveyed to the Corporation; and

"(iii) the segregation of the lease described in clause (ii)(I) has no effect on the obligations of the lessee under either of the resulting leases, including obligations relating to operations, production, or other circumstances (other than payment of rentals or royalties); and

"(C) nothing in this subsection limits the authority of the Secretary of the Interior to manage the federally-owned surface estate within the Reserve.".

(c) CONFORMING AMENDMENTS.—Section 104 of the Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6504) is amended—

(1) by striking subsection (a); and

(2) by redesignating subsections (b) through (d) as subsections (a) through (c), respectively.

Alaska.
42 USC 15906.

SEC. 348. NORTH SLOPE SCIENCE INITIATIVE.

(a) ESTABLISHMENT.—

(1) IN GENERAL.—The Secretary of the Interior shall establish a long-term initiative to be known as the "North Slope Science Initiative" (referred to in this section as the "Initiative").

(2) PURPOSE.—The purpose of the Initiative shall be to implement efforts to coordinate collection of scientific data that will provide a better understanding of the terrestrial, aquatic, and marine ecosystems of the North Slope of Alaska.

(b) OBJECTIVES.—To ensure that the Initiative is conducted through a comprehensive science strategy and implementation plan, the Initiative shall, at a minimum—

(1) identify and prioritize information needs for inventory, monitoring, and research activities to address the individual and cumulative effects of past, ongoing, and anticipated development activities and environmental change on the North Slope;

(2) develop an understanding of information needs for regulatory and land management agencies, local governments, and the public;

(3) focus on prioritization of pressing natural resource management and ecosystem information needs, coordination, and cooperation among agencies and organizations;

(4) coordinate ongoing and future inventory, monitoring, and research activities to minimize duplication of effort, share financial resources and expertise, and assure the collection of quality information;

(5) identify priority needs not addressed by agency science programs in effect on the date of enactment of this Act and develop a funding strategy to meet those needs;

(6) provide a consistent approach to high caliber science, including inventory, monitoring, and research;

(7) maintain and improve public and agency access to—

(A) accumulated and ongoing research; and

(B) contemporary and traditional local knowledge; and

(8) ensure through appropriate peer review that the science conducted by participating agencies and organizations is of the highest technical quality.

(c) MEMBERSHIP.—

(1) IN GENERAL.—To ensure comprehensive collection of scientific data, in carrying out the Initiative, the Secretary shall consult and coordinate with Federal, State, and local agencies that have responsibilities for land and resource management across the North Slope.

(2) COOPERATIVE AGREEMENTS.—The Secretary shall enter into cooperative agreements with the State of Alaska, the North Slope Borough, the Arctic Slope Regional Corporation, and other Federal agencies as appropriate to coordinate efforts, share resources, and fund projects under this section.

(d) SCIENCE TECHNICAL ADVISORY PANEL.— Establishment.

(1) IN GENERAL.—The Initiative shall include a panel to provide advice on proposed inventory, monitoring, and research functions.

(2) MEMBERSHIP.—The panel described in paragraph (1) shall consist of a representative group of not more than 15 scientists and technical experts from diverse professions and interests, including the oil and gas industry, subsistence users, Native Alaskan entities, conservation organizations, wildlife management organizations, and academia, as determined by the Secretary.

(e) REPORTS.—Not later than 3 years after the date of enactment of this section and each year thereafter, the Secretary shall publish a report that describes the studies and findings of the Initiative.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 349. ORPHANED, ABANDONED, OR IDLED WELLS ON FEDERAL LAND. 42 USC 15907.

(a) IN GENERAL.—The Secretary, in cooperation with the Secretary of Agriculture, shall establish a program not later than 1 year after the date of enactment of this Act to remediate, reclaim, and close orphaned, abandoned, or idled oil and gas wells located on land administered by the land management agencies within the Department of the Interior and the Department of Agriculture. Deadline.

(b) ACTIVITIES.—The program under subsection (a) shall—

(1) include a means of ranking orphaned, abandoned, or idled wells sites for priority in remediation, reclamation, and closure, based on public health and safety, potential environmental harm, and other land use priorities;

(2) provide for identification and recovery of the costs of remediation, reclamation, and closure from persons or other entities currently providing a bond or other financial assurance required under State or Federal law for an oil or gas well that is orphaned, abandoned, or idled; and

(3) provide for recovery from the persons or entities identified under paragraph (2), or their sureties or guarantors, of the costs of remediation, reclamation, and closure of such wells.

(c) COOPERATION AND CONSULTATIONS.—In carrying out the program under subsection (a), the Secretary shall—

(1) work cooperatively with the Secretary of Agriculture and the States within which Federal land is located; and

(2) consult with the Secretary of Energy and the Interstate Oil and Gas Compact Commission.

Deadline.

(d) PLAN.—Not later than 1 year after the date of enactment of this Act, the Secretary, in cooperation with the Secretary of Agriculture, shall submit to Congress a plan for carrying out the program under subsection (a).

(e) IDLED WELL.—For the purposes of this section, a well is idled if—

(1) the well has been nonoperational for at least 7 years; and

(2) there is no anticipated beneficial use for the well.

(f) FEDERAL REIMBURSEMENT FOR ORPHANED WELL RECLAMATION PILOT PROGRAM.—

(1) REIMBURSEMENT FOR REMEDIATING, RECLAIMING, AND CLOSING WELLS ON LAND SUBJECT TO A NEW LEASE.—The Secretary shall carry out a pilot program under which, in issuing a new oil and gas lease on federally owned land on which 1 or more orphaned wells are located, the Secretary—

(A) may require, other than as a condition of the lease, that the lessee remediate, reclaim, and close in accordance with standards established by the Secretary, all orphaned wells on the land leased; and

(B) shall develop a program to reimburse a lessee, through a royalty credit against the Federal share of royalties owed or other means, for the reasonable actual costs of remediating, reclaiming, and closing the orphaned wells pursuant to that requirement.

(2) REIMBURSEMENT FOR RECLAIMING ORPHANED WELLS ON OTHER LAND.—In carrying out this subsection, the Secretary—

(A) may authorize any lessee under an oil and gas lease on federally owned land to reclaim in accordance with the Secretary's standards—

(i) an orphaned well on unleased federally owned land; or

(ii) an orphaned well located on an existing lease on federally owned land for the reclamation of which the lessee is not legally responsible; and

(B) shall develop a program to provide reimbursement of 100 percent of the reasonable actual costs of remediating, reclaiming, and closing the orphaned well, through credits against the Federal share of royalties or other means.

(3) REGULATIONS.—The Secretary may issue such regulations as are appropriate to carry out this subsection.

(g) TECHNICAL ASSISTANCE PROGRAM FOR NON-FEDERAL LAND.—

(1) IN GENERAL.—The Secretary of Energy shall establish a program to provide technical and financial assistance to oil and gas producing States to facilitate State efforts over a 10-year period to ensure a practical and economical remedy for environmental problems caused by orphaned or abandoned oil and gas exploration or production well sites on State or private land.

(2) ASSISTANCE.—The Secretary of Energy shall work with the States, through the Interstate Oil and Gas Compact Commission, to assist the States in quantifying and mitigating

environmental risks of onshore orphaned or abandoned oil or gas wells on State and private land.

(3) ACTIVITIES.—The program under paragraph (1) shall include—

(A) mechanisms to facilitate identification, if feasible, of the persons currently providing a bond or other form of financial assurance required under State or Federal law for an oil or gas well that is orphaned or abandoned;

(B) criteria for ranking orphaned or abandoned well sites based on factors such as public health and safety, potential environmental harm, and other land use priorities;

(C) information and training programs on best practices for remediation of different types of sites; and

(D) funding of State mitigation efforts on a cost-shared basis.

(h) AUTHORIZATION OF APPROPRIATIONS.—

(1) IN GENERAL.—There are authorized to be appropriated to carry out this section $25,000,000 for each of fiscal years 2006 through 2010.

(2) USE.—Of the amounts authorized under paragraph (1), $5,000,000 are authorized for each fiscal year for activities under subsection (f).

SEC. 350. COMBINED HYDROCARBON LEASING.

(a) SPECIAL PROVISIONS REGARDING LEASING.—Section 17(b)(2) of the Mineral Leasing Act (30 U.S.C. 226(b)(2)) is amended—

(1) by inserting "(A)" after "(2)"; and

(2) by adding at the end the following:

"(B) For any area that contains any combination of tar sand and oil or gas (or both), the Secretary may issue under this Act, separately—

"(i) a lease for exploration for and extraction of tar sand; and

"(ii) a lease for exploration for and development of oil and gas.

"(C) A lease issued for tar sand shall be issued using the same bidding process, annual rental, and posting period as a lease issued for oil and gas, except that the minimum acceptable bid required for a lease issued for tar sand shall be $2 per acre.

"(D) The Secretary may waive, suspend, or alter any requirement under section 26 that a permittee under a permit authorizing prospecting for tar sand must exercise due diligence, to promote any resource covered by a combined hydrocarbon lease.".

(b) CONFORMING AMENDMENT.—Section 17(b)(1)(B) of the Mineral Leasing Act (30 U.S.C. 226(b)(1)(B)) is amended in the second sentence by inserting ", subject to paragraph (2)(B)," after "Secretary".

(c) REGULATIONS.—Not later than 45 days after the date of enactment of this Act, the Secretary shall issue final regulations to implement this section.

Deadline.
30 USC 226 note.

SEC. 351. PRESERVATION OF GEOLOGICAL AND GEOPHYSICAL DATA.

National Geographical and Geophysical Data Preservation Program Act of 2005.
42 USC 15908.

(a) SHORT TITLE.—This section may be cited as the "National Geological and Geophysical Data Preservation Program Act of 2005".

(b) PROGRAM.—The Secretary shall carry out a National Geological and Geophysical Data Preservation Program in accordance with this section—

(1) to archive geologic, geophysical, and engineering data, maps, well logs, and samples;

(2) to provide a national catalog of such archival material; and

(3) to provide technical and financial assistance related to the archival material.

Deadline.

(c) PLAN.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a plan for the implementation of the Program.

(d) DATA ARCHIVE SYSTEM.—

(1) ESTABLISHMENT.—The Secretary shall establish, as a component of the Program, a data archive system to provide for the storage, preservation, and archiving of subsurface, surface, geological, geophysical, and engineering data and samples. The Secretary, in consultation with the Advisory Committee, shall develop guidelines relating to the data archive system, including the types of data and samples to be preserved.

(2) SYSTEM COMPONENTS.—The system shall be comprised of State agencies that elect to be part of the system and agencies within the Department of the Interior that maintain geological and geophysical data and samples that are designated by the Secretary in accordance with this subsection. The Program shall provide for the storage of data and samples through data repositories operated by such agencies.

(3) LIMITATION OF DESIGNATION.—The Secretary may not designate a State agency as a component of the data archive system unless that agency is the agency that acts as the geological survey in the State.

(4) DATA FROM FEDERAL LAND.—The data archive system shall provide for the archiving of relevant subsurface data and samples obtained from Federal land—

(A) in the most appropriate repository designated under paragraph (2), with preference being given to archiving data in the State in which the data were collected; and

(B) consistent with all applicable law and requirements relating to confidentiality and proprietary data.

(e) NATIONAL CATALOG.—

(1) IN GENERAL.—As soon as practicable after the date of enactment of this Act, the Secretary shall develop and maintain, as a component of the Program, a national catalog that identifies—

(A) data and samples available in the data archive system established under subsection (d);

(B) the repository for particular material in the system; and

(C) the means of accessing the material.

(2) AVAILABILITY.—The Secretary shall make the national catalog accessible to the public on the site of the Survey on the Internet, consistent with all applicable requirements related to confidentiality and proprietary data.

(f) ADVISORY COMMITTEE.—

(1) IN GENERAL.—The Advisory Committee shall advise the Secretary on planning and implementation of the Program.

(2) NEW DUTIES.—In addition to its duties under the National Geologic Mapping Act of 1992 (43 U.S.C. 31a et seq.), the Advisory Committee shall perform the following duties:

(A) Advise the Secretary on developing guidelines and procedures for providing assistance for facilities under subsection (g)(1).

(B) Review and critique the draft implementation plan prepared by the Secretary under subsection (c).

(C) Identify useful studies of data archived under the Program that will advance understanding of the Nation's energy and mineral resources, geologic hazards, and engineering geology.

(D) Review the progress of the Program in archiving significant data and preventing the loss of such data, and the scientific progress of the studies funded under the Program.

(E) Include in the annual report to the Secretary required under section 5(b)(3) of the National Geologic Mapping Act of 1992 (43 U.S.C. 31d(b)(3)) an evaluation of the progress of the Program toward fulfilling the purposes of the Program under subsection (b).

(g) FINANCIAL ASSISTANCE.—

(1) ARCHIVE FACILITIES.—Subject to the availability of appropriations, the Secretary shall provide financial assistance to a State agency that is designated under subsection (d)(2) for providing facilities to archive energy material.

(2) STUDIES.—Subject to the availability of appropriations, the Secretary shall provide financial assistance to any State agency designated under subsection (d)(2) for studies and technical assistance activities that enhance understanding, interpretation, and use of materials archived in the data archive system established under subsection (d).

(3) FEDERAL SHARE.—The Federal share of the cost of an activity carried out with assistance under this subsection shall be not more than 50 percent of the total cost of the activity.

Applicability.

(4) PRIVATE CONTRIBUTIONS.—The Secretary shall apply to the non-Federal share of the cost of an activity carried out with assistance under this subsection the value of private contributions of property and services used for that activity.

(h) REPORT.—The Secretary shall include in each report under section 8 of the National Geologic Mapping Act of 1992 (43 U.S.C. 31g)—

(1) a description of the status of the Program;

(2) an evaluation of the progress achieved in developing the Program during the period covered by the report; and

(3) any recommendations for legislative or other action the Secretary considers necessary and appropriate to fulfill the purposes of the Program under subsection (b).

(i) MAINTENANCE OF STATE EFFORT.—It is the intent of Congress that the States not use this section as an opportunity to reduce State resources applied to the activities that are the subject of the Program.

(j) DEFINITIONS.—In this section:

(1) ADVISORY COMMITTEE.—The term "Advisory Committee" means the advisory committee established under section 5 of the National Geologic Mapping Act of 1992 (43 U.S.C. 31d).

(2) PROGRAM.—The term "Program" means the National Geological and Geophysical Data Preservation Program carried out under this section.

(3) SECRETARY.—The term "Secretary" means the Secretary of the Interior, acting through the Director of the United States Geological Survey.

(4) SURVEY.—The term "Survey" means the United States Geological Survey.

(k) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $30,000,000 for each of fiscal years 2006 through 2010.

SEC. 352. OIL AND GAS LEASE ACREAGE LIMITATIONS.

Section 27(d)(1) of the Mineral Leasing Act (30 U.S.C. 184(d)(1)) is amended by inserting after "acreage held in special tar sand areas" the following: ", and acreage under any lease any portion of which has been committed to a federally approved unit or cooperative plan or communitization agreement or for which royalty (including compensatory royalty or royalty in-kind) was paid in the preceding calendar year,".

42 USC 15909.

SEC. 353. GAS HYDRATE PRODUCTION INCENTIVE.

(a) PURPOSE.—The purpose of this section is to promote natural gas production from the natural gas hydrate resources on the outer Continental Shelf and Federal lands in Alaska by providing royalty incentives.

(b) SUSPENSION OF ROYALTIES.—

(1) IN GENERAL.—The Secretary may grant royalty relief in accordance with this section for natural gas produced from gas hydrate resources under an eligible lease.

(2) ELIGIBLE LEASES.—A lease shall be an eligible lease for purposes of this section if—

(A) it is issued under the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.), or is an oil and gas lease issued for onshore Federal lands in Alaska;

(B) it is issued prior to January 1, 2016; and

(C) production under the lease of natural gas from gas hydrate resources commences prior to January 1, 2018.

(3) AMOUNT OF RELIEF.—The Secretary shall conduct a rulemaking and grant royalty relief under this section as a suspension volume if the Secretary determines that such royalty relief would encourage production of natural gas from gas hydrate resources from an eligible lease. The maximum suspension volume shall be 30 billion cubic feet of natural gas per lease. Such relief shall be in addition to any other royalty relief under any other provision applicable to the lease that does not specifically grant a gas hydrate production incentive. Such royalty suspension volume shall be applied to any eligible production occurring on or after the date of publication of the advanced notice of proposed rulemaking.

(4) LIMITATION.—The Secretary may place limitations on royalty relief granted under this section based on market price.

(c) APPLICATION.—This section shall apply to any eligible lease issued before, on, or after the date of enactment of this Act.

(d) RULEMAKINGS.—

Publication.
Notices.
Deadlines.

(1) REQUIREMENT.—The Secretary shall publish the advanced notice of proposed rulemaking within 180 days after the date of enactment of this Act and complete the rulemaking

implementing this section within 365 days after the date of enactment of this Act.

(2) GAS HYDRATE RESOURCES DEFINED.—Such regulations shall define the term "gas hydrate resources" to include both the natural gas content of gas hydrates within the hydrate stability zone and free natural gas trapped by and beneath the hydrate stability zone.

(e) REVIEW.—Not later than 365 days after the date of enactment of this Act, the Secretary, in consultation with the Secretary of Energy, shall carry out a review of, and submit to Congress a report on, further opportunities to enhance production of natural gas from gas hydrate resources on the outer Continental Shelf and on Federal lands in Alaska through the provision of other production incentives or through technical or financial assistance.

Deadline.
Reports.

SEC. 354. ENHANCED OIL AND NATURAL GAS PRODUCTION THROUGH CARBON DIOXIDE INJECTION.

42 USC 15910.

(a) PRODUCTION INCENTIVE.—

(1) FINDINGS.—Congress finds the following:

(A) Approximately two-thirds of the original oil in place in the United States remains unproduced.

(B) Enhanced oil and natural gas production from the sequestering of carbon dioxide and other appropriate gases has the potential to increase oil and natural gas production.

(C) Capturing and productively using carbon dioxide would help reduce the carbon intensity of the economy.

(2) PURPOSE.—The purpose of this section is—

(A) to promote the capturing, transportation, and injection of produced carbon dioxide, natural carbon dioxide, and other appropriate gases or other matter for sequestration into oil and gas fields; and

(B) to promote oil and natural gas production from the outer Continental Shelf and onshore Federal lands under lease by providing royalty incentives to use enhanced recovery techniques using injection of the substances referred to in subparagraph (A).

(b) SUSPENSION OF ROYALTIES.—

(1) IN GENERAL.—If the Secretary determines that reduction of the royalty under a Federal oil and gas lease that is an eligible lease is in the public interest and promotes the purposes of this section, the Secretary shall undertake a rulemaking to provide for such reduction for an eligible lease.

(2) RULEMAKINGS.—The Secretary shall publish the advanced notice of proposed rulemaking within 180 days after the date of enactment of this Act and complete the rulemaking implementing this section within 365 days after the date of enactment of this Act.

Publication.
Notices.
Deadlines.

(3) ELIGIBLE LEASES.—A lease shall be an eligible lease for purposes of this section if—

(A) it is a lease for production of oil and gas from the outer Continental Shelf or Federal onshore lands;

(B) the injection of the substances referred to in subsection (a)(2)(A) will be used as an enhanced recovery technique on such lease; and

(C) the Secretary determines that the lease contains oil or gas that would not likely be produced without the royalty reduction provided under this section.

(4) AMOUNT OF RELIEF.—The rulemaking shall provide for a suspension volume, which shall not exceed 5,000,000 barrels of oil equivalent for each eligible lease. Such suspension volume shall be applied to any production from an eligible lease occurring on or after the date of publication of any advanced notice of proposed rulemaking under this subsection.

(5) LIMITATION.—The Secretary may place limitations on the royalty reduction granted under this section based on market price.

(6) APPLICATION.—This section shall apply to any eligible lease issued before, on, or after the date of enactment of this Act.

(c) DEMONSTRATION PROGRAM.—

(1) ESTABLISHMENT.—

(A) IN GENERAL.—The Secretary of Energy shall establish a competitive grant program to provide grants to producers of oil and gas to carry out projects to inject carbon dioxide for the purpose of enhancing recovery of oil or natural gas while increasing the sequestration of carbon dioxide.

(B) PROJECTS.—The demonstration program shall provide for—

(i) not more than 10 projects in the Willistin Basin in North Dakota and Montana; and

(ii) 1 project in the Cook Inlet Basin in Alaska.

(2) REQUIREMENTS.—

(A) IN GENERAL.—The Secretary of Energy shall issue requirements relating to applications for grants under paragraph (1).

(B) RULEMAKING.—The issuance of requirements under subparagraph (A) shall not require a rulemaking.

(C) MINIMUM REQUIREMENTS.—At a minimum, the Secretary shall require under subparagraph (A) that an application for a grant include—

(i) a description of the project proposed in the application;

(ii) an estimate of the production increase and the duration of the production increase from the project, as compared to conventional recovery techniques, including water flooding;

(iii) an estimate of the carbon dioxide sequestered by project, over the life of the project;

(iv) a plan to collect and disseminate data relating to each project to be funded by the grant;

(v) a description of the means by which the project will be sustainable without Federal assistance after the completion of the term of the grant;

(vi) a complete description of the costs of the project, including acquisition, construction, operation, and maintenance costs over the expected life of the project;

(vii) a description of which costs of the project will be supported by Federal assistance under this section; and

(viii) a description of any secondary or tertiary recovery efforts in the field and the efficacy of water flood recovery techniques used.

(3) PARTNERS.—An applicant for a grant under paragraph (1) may carry out a project under a pilot program in partnership with 1 or more other public or private entities.

(4) SELECTION CRITERIA.—In evaluating applications under this subsection, the Secretary of Energy shall—

(A) consider the previous experience with similar projects of each applicant; and

(B) give priority consideration to applications that—

(i) are most likely to maximize production of oil and gas in a cost-effective manner;

(ii) sequester significant quantities of carbon dioxide from anthropogenic sources;

(iii) demonstrate the greatest commitment on the part of the applicant to ensure funding for the proposed project and the greatest likelihood that the project will be maintained or expanded after Federal assistance under this section is completed; and

(iv) minimize any adverse environmental effects from the project.

(5) DEMONSTRATION PROGRAM REQUIREMENTS.—

(A) MAXIMUM AMOUNT.—The Secretary of Energy shall not provide more than $3,000,000 in Federal assistance under this subsection to any applicant.

(B) COST SHARING.—The Secretary of Energy shall require cost-sharing under this subsection in accordance with section 988.

(C) PERIOD OF GRANTS.—

(i) IN GENERAL.—A project funded by a grant under this subsection shall begin construction not later than 2 years after the date of provision of the grant, but in any case not later than December 31, 2010. Deadline.

(ii) TERM.—The Secretary shall not provide grant funds to any applicant under this subsection for a period of more than 5 years.

(6) TRANSFER OF INFORMATION AND KNOWLEDGE.—The Secretary of Energy shall establish mechanisms to ensure that the information and knowledge gained by participants in the program under this subsection are transferred among other participants and interested persons, including other applicants that submitted applications for a grant under this subsection. Procedures.

(7) SCHEDULE.—

(A) PUBLICATION.—Not later than 180 days after the date of enactment of this Act, the Secretary of Energy shall publish in the Federal Register, and elsewhere, as appropriate, a request for applications to carry out projects under this subsection. Deadline. Federal Register, publication.

(B) DATE FOR APPLICATIONS.—An application for a grant under this subsection shall be submitted not later than 180 days after the date of publication of the request under subparagraph (A). Deadline.

(C) SELECTION.—After the date by which applications for grants are required to be submitted under subparagraph (B), the Secretary of Energy, in a timely manner, shall select, after peer review and based on the criteria under paragraph (4), those projects to be awarded a grant under this subsection.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 355. ASSESSMENT OF DEPENDENCE OF STATE OF HAWAII ON OIL.

(a) ASSESSMENT.—The Secretary of Energy shall assess the economic implications of the dependence of the State of Hawaii on oil as the principal source of energy for the State, including—

(1) the short- and long-term prospects for crude oil supply disruption and price volatility and potential impacts on the economy of Hawaii;

(2) the economic relationship between oil-fired generation of electricity from residual fuel and refined petroleum products consumed for ground, marine, and air transportation;

(3) the technical and economic feasibility of increasing the contribution of renewable energy resources for generation of electricity, on an island-by-island basis, including—

(A) siting and facility configuration;

(B) environmental, operational, and safety considerations;

(C) the availability of technology;

(D) the effects on the utility system, including reliability;

(E) infrastructure and transport requirements;

(F) community support; and

(G) other factors affecting the economic impact of such an increase and any effect on the economic relationship described in paragraph (2);

(4) the technical and economic feasibility of using liquefied natural gas to displace residual fuel oil for electric generation, including neighbor island opportunities, and the effect of the displacement on the economic relationship described in paragraph (2), including—

(A) the availability of supply;

(B) siting and facility configuration for onshore and offshore liquefied natural gas receiving terminals;

(C) the factors described in subparagraphs (B) through (F) of paragraph (3); and

(D) other economic factors;

(5) the technical and economic feasibility of using renewable energy sources (including hydrogen) for ground, marine, and air transportation energy applications to displace the use of refined petroleum products, on an island-by-island basis, and the economic impact of the displacement on the relationship described in paragraph (2); and

(6) an island-by-island approach to—

(A) the development of hydrogen from renewable resources; and

(B) the application of hydrogen to the energy needs of Hawaii.

(b) CONTRACTING AUTHORITY.—The Secretary of Energy may carry out the assessment under subsection (a) directly or, in whole or in part, through 1 or more contracts with qualified public or private entities.

(c) REPORT.—Not later than 300 days after the date of enactment of this Act, the Secretary of Energy shall prepare (in consultation with agencies of the State of Hawaii and other stakeholders, as appropriate), and submit to Congress, a report describing the findings, conclusions, and recommendations resulting from the assessment.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 356. DENALI COMMISSION. 42 USC 15911.

(a) DEFINITION OF COMMISSION.—In this section, the term "Commission" means the Denali Commission established by the Denali Commission Act of 1998 (42 U.S.C. 3121 note; Public Law 105–277).

(b) ENERGY PROGRAMS.—The Commission shall use amounts made available under subsection (d) to carry out energy programs, including—

(1) energy generation and development, including—

(A) fuel cells, hydroelectric, solar, wind, wave, and tidal energy; and

(B) alternative energy sources;

(2) the construction of energy transmission, including interties;

(3) the replacement and cleanup of fuel tanks;

(4) the construction of fuel transportation networks and related facilities;

(5) power cost equalization programs; and

(6) projects using coal as a fuel, including coal gasification projects.

(c) OPEN MEETINGS.—

(1) IN GENERAL.—Except as provided in paragraph (2), a meeting of the Commission shall be open to the public if—

(A) the Commission members take action on behalf of the Commission; or

(B) the deliberations of the Commission determine, or result in the joint conduct or disposition of, official Commission business.

(2) EXCEPTIONS.—Paragraph (1) shall not apply to any portion of a Commission meeting for which the Commission, in public session, votes to close the meeting for the reasons described in paragraph (2), (4), (5), or (6) of subsection (c) of section 552b of title 5, United States Code.

(3) PUBLIC NOTICE.—

(A) IN GENERAL.—At least 1 week before a meeting of the Commission, the Commission shall make a public announcement of the meeting that describes— Deadline.

(i) the time, place, and subject matter of the meeting;

(ii) whether the meeting is to be open or closed to the public; and

(iii) the name and telephone number of an appropriate person to respond to requests for information about the meeting.

(B) ADDITIONAL NOTICE.—The Commission shall make a public announcement of any change to the information

made available under subparagraph (A) at the earliest practicable time.

(4) MINUTES.—The Commission shall keep, and make available to the public, a transcript, electronic recording, or minutes from each Commission meeting, except for portions of the meeting closed under paragraph (2).

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Commission not more than $55,000,000 for each of fiscal years 2006 through 2015 to carry out subsection (b).

42 USC 15912.

SEC. 357. COMPREHENSIVE INVENTORY OF OCS OIL AND NATURAL GAS RESOURCES.

(a) IN GENERAL.—The Secretary shall conduct an inventory and analysis of oil and natural gas resources beneath all of the waters of the United States Outer Continental Shelf ("OCS"). The inventory and analysis shall—

(1) use available data on oil and gas resources in areas offshore of Mexico and Canada that will provide information on trends of oil and gas accumulation in areas of the OCS;

(2) use any available technology, except drilling, but including 3–D seismic technology to obtain accurate resource estimates;

(3) analyze how resource estimates in OCS areas have changed over time in regards to gathering geological and geophysical data, initial exploration, or full field development, including areas such as the deepwater and subsalt areas in the Gulf of Mexico;

(4) estimate the effect that understated oil and gas resource inventories have on domestic energy investments; and

(5) identify and explain how legislative, regulatory, and administrative programs or processes restrict or impede the development of identified resources and the extent that they affect domestic supply, such as moratoria, lease terms and conditions, operational stipulations and requirements, approval delays by the Federal Government and coastal States, and local zoning restrictions for onshore processing facilities and pipeline landings.

(b) REPORTS.—The Secretary shall submit a report to Congress on the inventory of estimates and the analysis of restrictions or impediments, together with any recommendations, within 6 months of the date of enactment of the section. The report shall be publicly available and updated at least every 5 years.

Public information.

Subtitle F—Access to Federal Lands

SEC. 361. FEDERAL ONSHORE OIL AND GAS LEASING AND PERMITTING PRACTICES.

(a) REVIEW OF ONSHORE OIL AND GAS LEASING PRACTICES.—

(1) IN GENERAL.—The Secretary of the Interior, in consultation with the Secretary of Agriculture with respect to National Forest System lands under the jurisdiction of the Department of Agriculture, shall perform an internal review of current Federal onshore oil and gas leasing and permitting practices.

(2) INCLUSIONS.—The review shall include the process for—

(A) accepting or rejecting offers to lease;

(B) administrative appeals of decisions or orders of officers or employees of the Bureau of Land Management with respect to a Federal oil or gas lease;

(C) considering surface use plans of operation, including the timeframes in which the plans are considered, and any recommendations for improving and expediting the process; and

(D) identifying stipulations to address site-specific concerns and conditions, including those stipulations relating to the environment and resource use conflicts.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Secretary of the Interior and the Secretary of Agriculture shall transmit a report to Congress that describes—

(1) actions taken under section 3 of Executive Order No. 13212 (42 U.S.C. 13201 note); and

(2) actions taken or any plans to improve the Federal onshore oil and gas leasing program.

SEC. 362. MANAGEMENT OF FEDERAL OIL AND GAS LEASING PROGRAMS. 42 USC 15921.

(a) TIMELY ACTION ON LEASES AND PERMITS.—

(1) SECRETARY OF THE INTERIOR.—To ensure timely action on oil and gas leases and applications for permits to drill on land otherwise available for leasing, the Secretary of the Interior (referred to in this section as the "Secretary") shall—

(A) ensure expeditious compliance with section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)) and any other applicable environmental and cultural resources laws;

(B) improve consultation and coordination with the States and the public; and

(C) improve the collection, storage, and retrieval of information relating to the oil and gas leasing activities.

(2) SECRETARY OF AGRICULTURE.—To ensure timely action on oil and gas lease applications for permits to drill on land otherwise available for leasing, the Secretary of Agriculture shall—

(A) ensure expeditious compliance with all applicable environmental and cultural resources laws; and

(B) improve the collection, storage, and retrieval of information relating to the oil and gas leasing activities.

(b) BEST MANAGEMENT PRACTICES.—

(1) IN GENERAL.—Not later than 18 months after the date of enactment of this Act, the Secretary shall develop and implement best management practices to— Deadline.

(A) improve the administration of the onshore oil and gas leasing program under the Mineral Leasing Act (30 U.S.C. 181 et seq.); and

(B) ensure timely action on oil and gas leases and applications for permits to drill on land otherwise available for leasing.

(2) CONSIDERATIONS.—In developing the best management practices under paragraph (1), the Secretary shall consider any recommendations from the review under section 361.

(3) REGULATIONS.—Not later than 180 days after the development of the best management practices under paragraph (1), the Secretary shall publish, for public comment, Deadline.

proposed regulations that set forth specific timeframes for processing leases and applications in accordance with the best management practices, including deadlines for—

(A) approving or disapproving—

(i) resource management plans and related documents;

(ii) lease applications;

(iii) applications for permits to drill; and

(iv) surface use plans; and

(B) related administrative appeals.

(c) IMPROVED ENFORCEMENT.—The Secretary and the Secretary of Agriculture shall improve inspection and enforcement of oil and gas activities, including enforcement of terms and conditions in permits to drill on land under the jurisdiction of the Secretary and the Secretary of Agriculture, respectively.

(d) AUTHORIZATION OF APPROPRIATIONS.—In addition to amounts made available to carry out activities relating to oil and gas leasing on public land administered by the Secretary and National Forest System land administered by the Secretary of Agriculture, there are authorized to be appropriated for each of fiscal years 2006 through 2010—

(1) to the Secretary, acting through the Director of the Bureau of Land Management—

(A) $40,000,000 to carry out subsections (a)(1) and (b); and

(B) $20,000,000 to carry out subsection (c);

(2) to the Secretary, acting through the Director of the United States Fish and Wildlife Service, $5,000,000 to carry out subsection (a)(1); and

(3) to the Secretary of Agriculture, acting through the Chief of the Forest Service, $5,000,000 to carry out subsections (a)(2) and (c).

42 USC 15922.

SEC. 363. CONSULTATION REGARDING OIL AND GAS LEASING ON PUBLIC LAND.

Deadline.
Memorandum.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary of the Interior and the Secretary of Agriculture shall enter into a memorandum of understanding regarding oil and gas leasing on—

(1) public land under the jurisdiction of the Secretary of the Interior; and

(2) National Forest System land under the jurisdiction of the Secretary of Agriculture.

(b) CONTENTS.—The memorandum of understanding shall include provisions that—

(1) establish administrative procedures and lines of authority that ensure timely processing of—

(A) oil and gas lease applications;

(B) surface use plans of operation, including steps for processing surface use plans; and

(C) applications for permits to drill consistent with applicable timelines;

(2) eliminate duplication of effort by providing for coordination of planning and environmental compliance efforts;

(3) ensure that lease stipulations are—

(A) applied consistently;

(B) coordinated between agencies; and

(C) only as restrictive as necessary to protect the resource for which the stipulations are applied;

(4) establish a joint data retrieval system that is capable of—

(A) tracking applications and formal requests made in accordance with procedures of the Federal onshore oil and gas leasing program; and

(B) providing information regarding the status of the applications and requests within the Department of the Interior and the Department of Agriculture; and

(5) establish a joint geographic information system mapping system for use in—

(A) tracking surface resource values to aid in resource management; and

(B) processing surface use plans of operation and applications for permits to drill.

SEC. 364. ESTIMATES OF OIL AND GAS RESOURCES UNDERLYING ONSHORE FEDERAL LAND.

(a) ASSESSMENT.—Section 604 of the Energy Act of 2000 (42 U.S.C. 6217) is amended—

(1) in subsection (a)—

(A) in paragraph (1)—

(i) by striking "reserve"; and

(ii) by striking "and" after the semicolon; and

(B) by striking paragraph (2) and inserting the following:

"(2) the extent and nature of any restrictions or impediments to the development of the resources, including—

"(A) impediments to the timely granting of leases;

"(B) post-lease restrictions, impediments, or delays on development for conditions of approval, applications for permits to drill, or processing of environmental permits; and

"(C) permits or restrictions associated with transporting the resources for entry into commerce; and

"(3) the quantity of resources not produced or introduced into commerce because of the restrictions.";

(2) in subsection (b)—

(A) by striking "reserve" and inserting "resource"; and

(B) by striking "publically" and inserting "publicly"; and

(3) by striking subsection (d) and inserting the following:

"(d) ASSESSMENTS.—Using the inventory, the Secretary of Energy shall make periodic assessments of economically recoverable resources accounting for a range of parameters such as current costs, commodity prices, technology, and regulations.".

(b) METHODOLOGY.—The Secretary of the Interior shall use the same assessment methodology across all geological provinces, areas, and regions in preparing and issuing national geological assessments to ensure accurate comparisons of geological resources. 42 USC 15923.

SEC. 365. PILOT PROJECT TO IMPROVE FEDERAL PERMIT COORDINATION. 42 USC 15924.

(a) ESTABLISHMENT.—The Secretary of the Interior (referred to in this section as the "Secretary") shall establish a Federal Permit Streamlining Pilot Project (referred to in this section as the "Pilot Project").

(b) MEMORANDUM OF UNDERSTANDING.—

Deadline.

(1) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Secretary shall enter into a memorandum of understanding for purposes of this section with—

(A) the Secretary of Agriculture;

(B) the Administrator of the Environmental Protection Agency; and

(C) the Chief of Engineers.

(2) STATE PARTICIPATION.—The Secretary may request that the Governors of Wyoming, Montana, Colorado, Utah, and New Mexico be signatories to the memorandum of understanding.

(c) DESIGNATION OF QUALIFIED STAFF.—

Deadline.

(1) IN GENERAL.—Not later than 30 days after the date of the signing of the memorandum of understanding under subsection (b), all Federal signatory parties shall, if appropriate, assign to each of the field offices identified in subsection (d) an employee who has expertise in the regulatory issues relating to the office in which the employee is employed, including, as applicable, particular expertise in—

(A) the consultations and the preparation of biological opinions under section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536);

(B) permits under section 404 of Federal Water Pollution Control Act (33 U.S.C. 1344);

(C) regulatory matters under the Clean Air Act (42 U.S.C. 7401 et seq.);

(D) planning under the National Forest Management Act of 1976 (16 U.S.C. 472a et seq.); and

(E) the preparation of analyses under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

(2) DUTIES.—Each employee assigned under paragraph (1) shall—

Deadline.

(A) not later than 90 days after the date of assignment, report to the Bureau of Land Management Field Managers in the office to which the employee is assigned;

(B) be responsible for all issues relating to the jurisdiction of the home office or agency of the employee; and

(C) participate as part of the team of personnel working on proposed energy projects, planning, and environmental analyses.

(d) FIELD OFFICES.—The following Bureau of Land Management Field Offices shall serve as the Pilot Project offices:

(1) Rawlins, Wyoming.

(2) Buffalo, Wyoming.

(3) Miles City, Montana.

(4) Farmington, New Mexico.

(5) Carlsbad, New Mexico.

(6) Grand Junction/Glenwood Springs, Colorado.

(7) Vernal, Utah.

(e) REPORTS.—Not later than 3 years after the date of enactment of this Act, the Secretary shall submit to Congress a report that—

(1) outlines the results of the Pilot Project to date; and

(2) makes a recommendation to the President regarding whether the Pilot Project should be implemented throughout the United States.

(f) ADDITIONAL PERSONNEL.—The Secretary shall assign to each field office identified in subsection (d) any additional personnel that are necessary to ensure the effective implementation of—

(1) the Pilot Project; and

(2) other programs administered by the field offices, including inspection and enforcement relating to energy development on Federal land, in accordance with the multiple use mandate of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.).

(g) PERMIT PROCESSING IMPROVEMENT FUND.—Section 35 of the Mineral Leasing Act (30 U.S.C. 191) is amended by adding at the end the following:

"(c)(1) Notwithstanding the first sentence of subsection (a), any rentals received from leases in any State (other than the State of Alaska) on or after the date of enactment of this subsection shall be deposited in the Treasury, to be allocated in accordance with paragraph (2).

"(2) Of the amounts deposited in the Treasury under paragraph (1)—

"(A) 50 percent shall be paid by the Secretary of the Treasury to the State within the boundaries of which the leased land is located or the deposits were derived; and

"(B) 50 percent shall be deposited in a special fund in the Treasury, to be known as the 'BLM Permit Processing Improvement Fund' (referred to in this subsection as the 'Fund').

"(3) For each of fiscal years 2006 through 2015, the Fund shall be available to the Secretary of the Interior for expenditure, without further appropriation and without fiscal year limitation, for the coordination and processing of oil and gas use authorizations on onshore Federal land under the jurisdiction of the Pilot Project offices identified in section 365(d) of the Energy Policy Act of 2005.".

(h) TRANSFER OF FUNDS.—For the purposes of coordination and processing of oil and gas use authorizations on Federal land under the administration of the Pilot Project offices identified in subsection (d), the Secretary may authorize the expenditure or transfer of such funds as are necessary to—

(1) the United States Fish and Wildlife Service;

(2) the Bureau of Indian Affairs;

(3) the Forest Service;

(4) the Environmental Protection Agency;

(5) the Corps of Engineers; and

(6) the States of Wyoming, Montana, Colorado, Utah, and New Mexico.

(i) FEES.—During the period in which the Pilot Project is authorized, the Secretary shall not implement a rulemaking that would enable an increase in fees to recover additional costs related to processing drilling-related permit applications and use authorizations.

(j) SAVINGS PROVISION.—Nothing in this section affects—

(1) the operation of any Federal or State law; or

(2) any delegation of authority made by the head of a Federal agency whose employees are participating in the Pilot Project.

SEC. 366. DEADLINE FOR CONSIDERATION OF APPLICATIONS FOR PERMITS.

Section 17 of the Mineral Leasing Act (30 U.S.C. 226) is amended by adding at the end the following:

"(p) DEADLINES FOR CONSIDERATION OF APPLICATIONS FOR PERMITS.—

Notification.

"(1) IN GENERAL.—Not later than 10 days after the date on which the Secretary receives an application for any permit to drill, the Secretary shall—

"(A) notify the applicant that the application is complete; or

"(B) notify the applicant that information is missing and specify any information that is required to be submitted for the application to be complete.

"(2) ISSUANCE OR DEFERRAL.—Not later than 30 days after the applicant for a permit has submitted a complete application, the Secretary shall—

"(A) issue the permit, if the requirements under the National Environmental Policy Act of 1969 and other applicable law have been completed within such timeframe; or

Notice.

"(B) defer the decision on the permit and provide to the applicant a notice—

"(i) that specifies any steps that the applicant could take for the permit to be issued; and

"(ii) a list of actions that need to be taken by the agency to complete compliance with applicable law together with timelines and deadlines for completing such actions.

"(3) REQUIREMENTS FOR DEFERRED APPLICATIONS.—

"(A) IN GENERAL.—If the Secretary provides notice under paragraph (2)(B), the applicant shall have a period of 2 years from the date of receipt of the notice in which to complete all requirements specified by the Secretary, including providing information needed for compliance with the National Environmental Policy Act of 1969.

"(B) ISSUANCE OF DECISION ON PERMIT.—If the applicant completes the requirements within the period specified in subparagraph (A), the Secretary shall issue a decision on the permit not later than 10 days after the date of completion of the requirements described in subparagraph (A), unless compliance with the National Environmental Policy Act of 1969 and other applicable law has not been completed within such timeframe.

"(C) DENIAL OF PERMIT.—If the applicant does not complete the requirements within the period specified in subparagraph (A) or if the applicant does not comply with applicable law, the Secretary shall deny the permit.".

42 USC 15925.

SEC. 367. FAIR MARKET VALUE DETERMINATIONS FOR LINEAR RIGHTS-OF-WAY ACROSS PUBLIC LANDS AND NATIONAL FORESTS.

Deadline.

(a) UPDATE OF FEE SCHEDULE.—Not later than 1 year after the date of enactment of this section—

(1) the Secretary of the Interior shall update section 2806.20 of title 43, Code of Federal Regulations, as in effect on the date of enactment of this section, to revise the per

acre rental fee zone value schedule by State, county, and type of linear right-of-way use to reflect current values of land in each zone; and

(2) the Secretary of Agriculture shall make the same revision for linear rights-of-way granted, issued, or renewed under title V of the Federal Lands Policy and Management Act of 1976 (43 U.S.C. 1761 et seq.) on National Forest System land.

(b) FAIR MARKET VALUE RENTAL DETERMINATION FOR LINEAR RIGHTS-OF-WAY.—The fair market value rent of a linear right-of-way across public lands or National Forest System lands issued under section 504 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1764) or section 28 of the Mineral Leasing Act (30 U.S.C. 185) shall be determined in accordance with subpart 2806 of title 43, Code of Federal Regulations, as in effect on the date of enactment of this section (including the annual or periodic updates specified in the regulations) and as updated in accordance with subsection (a).

SEC. 368. ENERGY RIGHT-OF-WAY CORRIDORS ON FEDERAL LAND. 42 USC 15926.

(a) WESTERN STATES.—Not later than 2 years after the date of enactment of this Act, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Defense, the Secretary of Energy, and the Secretary of the Interior (in this section referred to collectively as "the Secretaries"), in consultation with the Federal Energy Regulatory Commission, States, tribal or local units of governments as appropriate, affected utility industries, and other interested persons, shall consult with each other and shall— Deadline.

(1) designate, under their respective authorities, corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land in the eleven contiguous Western States (as defined in section 103(o) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1702(o));

(2) perform any environmental reviews that may be required to complete the designation of such corridors; and

(3) incorporate the designated corridors into the relevant agency land use and resource management plans or equivalent plans.

(b) OTHER STATES.—Not later than 4 years after the date of enactment of this Act, the Secretaries, in consultation with the Federal Energy Regulatory Commission, affected utility industries, and other interested persons, shall jointly— Deadline.

(1) identify corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land in States other than those described in subsection (a); and

(2) schedule prompt action to identify, designate, and incorporate the corridors into the applicable land use plans.

(c) ONGOING RESPONSIBILITIES.—The Secretaries, in consultation with the Federal Energy Regulatory Commission, affected utility industries, and other interested parties, shall establish procedures under their respective authorities that— Procedures.

(1) ensure that additional corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land are promptly identified and designated as necessary; and

(2) expedite applications to construct or modify oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities within such corridors, taking into account prior analyses and environmental reviews undertaken during the designation of such corridors.

(d) CONSIDERATIONS.—In carrying out this section, the Secretaries shall take into account the need for upgraded and new electricity transmission and distribution facilities to—

(1) improve reliability;

(2) relieve congestion; and

(3) enhance the capability of the national grid to deliver electricity.

(e) SPECIFICATIONS OF CORRIDOR.—A corridor designated under this section shall, at a minimum, specify the centerline, width, and compatible uses of the corridor.

Oil Shale, Tar Sands, and Other Strategic Unconventional Fuels Act of 2005. Deadlines. 42 USC 15927.

SEC. 369. OIL SHALE, TAR SANDS, AND OTHER STRATEGIC UNCONVENTIONAL FUELS.

(a) SHORT TITLE.—This section may be cited as the "Oil Shale, Tar Sands, and Other Strategic Unconventional Fuels Act of 2005".

(b) DECLARATION OF POLICY.—Congress declares that it is the policy of the United States that—

(1) United States oil shale, tar sands, and other unconventional fuels are strategically important domestic resources that should be developed to reduce the growing dependence of the United States on politically and economically unstable sources of foreign oil imports;

(2) the development of oil shale, tar sands, and other strategic unconventional fuels, for research and commercial development, should be conducted in an environmentally sound manner, using practices that minimize impacts; and

(3) development of those strategic unconventional fuels should occur, with an emphasis on sustainability, to benefit the United States while taking into account affected States and communities.

(c) LEASING PROGRAM FOR RESEARCH AND DEVELOPMENT OF OIL SHALE AND TAR SANDS.—In accordance with section 21 of the Mineral Leasing Act (30 U.S.C. 241) and any other applicable law, except as provided in this section, not later than 180 days after the date of enactment of this Act, from land otherwise available for leasing, the Secretary of the Interior (referred to in this section as the "Secretary") shall make available for leasing such land as the Secretary considers to be necessary to conduct research and development activities with respect to technologies for the recovery of liquid fuels from oil shale and tar sands resources on public lands. Prospective public lands within each of the States of Colorado, Utah, and Wyoming shall be made available for such research and development leasing.

(d) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT AND COMMERCIAL LEASING PROGRAM FOR OIL SHALE AND TAR SANDS.—

(1) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT.—Not later than 18 months after the date of enactment of this Act, in accordance with section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)), the Secretary shall complete a programmatic environmental impact statement for a commercial leasing program for oil shale and tar sands resources on public lands, with an emphasis on

the most geologically prospective lands within each of the States of Colorado, Utah, and Wyoming.

(2) FINAL REGULATION.—Not later than 6 months after the completion of the programmatic environmental impact statement under this subsection, the Secretary shall publish a final regulation establishing such program.

(e) COMMENCEMENT OF COMMERCIAL LEASING OF OIL SHALE AND TAR SANDS.—Not later than 180 days after publication of the final regulation required by subsection (d), the Secretary shall consult with the Governors of States with significant oil shale and tar sands resources on public lands, representatives of local governments in such States, interested Indian tribes, and other interested persons, to determine the level of support and interest in the States in the development of tar sands and oil shale resources. If the Secretary finds sufficient support and interest exists in a State, the Secretary may conduct a lease sale in that State under the commercial leasing program regulations. Evidence of interest in a lease sale under this subsection shall include, but not be limited to, appropriate areas nominated for leasing by potential lessees and other interested parties.

(f) DILIGENT DEVELOPMENT REQUIREMENTS.—The Secretary shall, by regulation, designate work requirements and milestones to ensure the diligent development of the lease. Regulations.

(g) INITIAL REPORT BY THE SECRETARY OF THE INTERIOR.—Within 90 days after the date of enactment of this Act, the Secretary of the Interior shall report to the Committee on Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate on—

(1) the interim actions necessary to—

(A) develop the program, complete the programmatic environmental impact statement, and promulgate the final regulation as required by subsection (d); and

(B) conduct the first lease sales under the program as required by subsection (e); and

(2) a schedule to complete such actions within the time limits mandated by this section.

(h) TASK FORCE.—

(1) ESTABLISHMENT.—The Secretary of Energy, in cooperation with the Secretary of the Interior and the Secretary of Defense, shall establish a task force to develop a program to coordinate and accelerate the commercial development of strategic unconventional fuels, including but not limited to oil shale and tar sands resources within the United States, in an integrated manner.

(2) COMPOSITION.—The Task Force shall be composed of—

(A) the Secretary of Energy (or the designee of the Secretary);

(B) the Secretary of the Interior (or the designee of the Secretary of the Interior);

(C) the Secretary of Defense (or the designee of the Secretary of Defense);

(D) the Governors of affected States; and

(E) representatives of local governments in affected areas.

(3) RECOMMENDATIONS.—The Task Force shall make such recommendations regarding promoting the development of the

strategic unconventional fuels resources within the United States as it may deem appropriate.

(4) PARTNERSHIPS.—The Task Force shall make recommendations with respect to initiating a partnership with the Province of Alberta, Canada, for purposes of sharing information relating to the development and production of oil from tar sands, and similar partnerships with other nations that contain significant oil shale resources.

(5) REPORTS.—

(A) INITIAL REPORT.—Not later than 180 days after the date of enactment of this Act, the Task Force shall submit to the President and Congress a report that describes the analysis and recommendations of the Task Force.

(B) SUBSEQUENT REPORTS.—The Secretary shall provide an annual report describing the progress in developing the strategic unconventional fuels resources within the United States for each of the 5 years following submission of the report provided for in subparagraph (A).

Establishment.

(i) OFFICE OF PETROLEUM RESERVES.—

(1) IN GENERAL.—The Office of Petroleum Reserves of the Department of Energy shall—

(A) coordinate the creation and implementation of a commercial strategic fuel development program for the United States;

(B) evaluate the strategic importance of unconventional sources of strategic fuels to the security of the United States;

(C) promote and coordinate Federal Government actions that facilitate the development of strategic fuels in order to effectively address the energy supply needs of the United States;

(D) identify, assess, and recommend appropriate actions of the Federal Government required to assist in the development and manufacturing of strategic fuels; and

(E) coordinate and facilitate appropriate relationships between private industry and the Federal Government to promote sufficient and timely private investment to commercialize strategic fuels for domestic and military use.

(2) CONSULTATION AND COORDINATION.—The Office of Petroleum Reserves shall work closely with the Task Force and coordinate its staff support.

(3) ANNUAL REPORTS.—Not later than 180 days after the date of enactment of this Act and annually thereafter, the Secretary shall submit to Congress a report that describes the activities of the Office of Petroleum Reserves carried out under this subsection.

(j) MINERAL LEASING ACT AMENDMENTS.—

(1) SECTION 17.—Section 17(b)(2) of the Mineral Leasing Act (30 U.S.C. 226(b)(2)), as amended by section 350, is further amended—

(A) in subparagraph (A) (as designated by the amendment made by subsection (a)(1) of that section) by designating the first, second, and third sentences as clauses (i), (ii), and (iii), respectively;

(B) by moving clause (ii), as so designated, so as to begin immediately after and below clause (i);

(C) by moving clause (iii), as so designated, so as to begin immediately after and below clause (ii);

(D) in clause (i) of subparagraph (A) (as designated by subparagraph (A) of this paragraph) by striking "five thousand one hundred and twenty" and inserting "5,760"; and

(E) by adding at the end the following:

"(iv) No lease issued under this paragraph shall be included in any chargeability limitation associated with oil and gas leases.".

(2) SECTION 21.—Section 21(a) of the Mineral Leasing Act (30 U.S.C. 241(a)) is amended—

(A) by striking "(a) That the Secretary" and inserting the following:

"(a)(1) The Secretary";

(B) by striking "; that no lease" and inserting a period, followed by the following:

"(2) No lease";

(C) by striking "Leases may be for" and inserting the following:

"(3) Leases may be for";

(D) by striking "For the privilege" and inserting the following:

"(4) For the privilege";

(E) in paragraph (2) (as designated by subparagraph (B) of this paragraph) by striking "five thousand one hundred and twenty" and inserting "5,760";

(F) in paragraph (4) (as designated by subparagraph (D) of this paragraph) by striking "rate of 50 cents per acre" and inserting "rate of $2.00 per acre";

(G)(i) by striking ": *Provided further,* That not more than one lease shall be granted under this section to any" and inserting ": *Provided further,* That no"; and

(ii) by striking "except that with respect to leases for" and inserting "shall acquire or hold more than 50,000 acres of oil shale leases in any one State. For"; and

(H) by adding at the end the following:

"(5) No lease issued under this section shall be included in any chargeability limitation associated with oil and gas leases.".

(k) INTERAGENCY COORDINATION AND EXPEDITIOUS REVIEW OF PERMITTING PROCESS.—

(1) DEPARTMENT OF THE INTERIOR AS LEAD AGENCY.—Upon written request of a prospective applicant for Federal authorization to develop a proposed oil shale or tar sands project, the Department of the Interior shall act as the lead Federal agency for the purposes of coordinating all applicable Federal authorizations and environmental reviews. To the maximum extent practicable under applicable Federal law, the Secretary shall coordinate this Federal authorization and review process with any Indian tribes and State and local agencies responsible for conducting any separate permitting and environmental reviews.

(2) IMPLEMENTING REGULATIONS.—Not later than 6 months after the date of enactment of this Act, the Secretary shall issue any regulations necessary to implement this subsection.

(l) COST-SHARED DEMONSTRATION TECHNOLOGIES.—

(1) IDENTIFICATION.—The Secretary of Energy shall identify technologies for the development of oil shale and tar sands that—

(A) are ready for demonstration at a commercially-representative scale; and

(B) have a high probability of leading to commercial production.

(2) ASSISTANCE.—For each technology identified under paragraph (1), the Secretary of Energy may provide—

(A) technical assistance;

(B) assistance in meeting environmental and regulatory requirements; and

(C) cost-sharing assistance.

(m) NATIONAL OIL SHALE AND TAR SANDS ASSESSMENT.—

(1) ASSESSMENT.—

(A) IN GENERAL.—The Secretary shall carry out a national assessment of oil shale and tar sands resources for the purposes of evaluating and mapping oil shale and tar sands deposits, in the geographic areas described in subparagraph (B). In conducting such an assessment, the Secretary shall make use of the extensive geological assessment work for oil shale and tar sands already conducted by the United States Geological Survey.

(B) GEOGRAPHIC AREAS.—The geographic areas referred to in subparagraph (A), listed in the order in which the Secretary shall assign priority, are—

(i) the Green River Region of the States of Colorado, Utah, and Wyoming;

(ii) the Devonian oil shales and other hydrocarbon-bearing rocks having the nomenclature of "shale" located east of the Mississippi River; and

(iii) any remaining area in the central and western United States (including the State of Alaska) that contains oil shale and tar sands, as determined by the Secretary.

(2) USE OF STATE SURVEYS AND UNIVERSITIES.—In carrying out the assessment under paragraph (1), the Secretary may request assistance from any State-administered geological survey or university.

(n) LAND EXCHANGES.—

(1) IN GENERAL.—To facilitate the recovery of oil shale and tar sands, especially in areas where Federal, State, and private lands are intermingled, the Secretary shall consider the use of land exchanges where appropriate and feasible to consolidate land ownership and mineral interests into manageable areas.

(2) IDENTIFICATION AND PRIORITY OF PUBLIC LANDS.—The Secretary shall identify public lands containing deposits of oil shale or tar sands within the Green River, Piceance Creek, Uintah, and Washakie geologic basins, and shall give priority to implementing land exchanges within those basins. The Secretary shall consider the geology of the respective basin in determining the optimum size of the lands to be consolidated.

(3) COMPLIANCE WITH SECTION 206 OF FLPMA.—A land exchange undertaken in furtherance of this subsection shall be implemented in accordance with section 206 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1716).

(o) ROYALTY RATES FOR LEASES.—The Secretary shall establish royalties, fees, rentals, bonus, or other payments for leases under this section that shall—

(1) encourage development of the oil shale and tar sands resource; and

(2) ensure a fair return to the United States.

(p) HEAVY OIL TECHNICAL AND ECONOMIC ASSESSMENT.—The Secretary of Energy shall update the 1987 technical and economic assessment of domestic heavy oil resources that was prepared by the Interstate Oil and Gas Compact Commission. Such an update should include all of North America and cover all unconventional oil, including heavy oil, tar sands (oil sands), and oil shale.

(q) PROCUREMENT OF UNCONVENTIONAL FUELS BY THE DEPARTMENT OF DEFENSE.—

(1) IN GENERAL.—Chapter 141 of title 10, United States Code, is amended by inserting after section 2398 the following:

"§ 2398a. Procurement of fuel derived from coal, oil shale, and tar sands

"(a) USE OF FUEL TO MEET DEPARTMENT OF DEFENSE NEEDS.—The Secretary of Defense shall develop a strategy to use fuel produced, in whole or in part, from coal, oil shale, and tar sands (referred to in this section as a 'covered fuel') that are extracted by either mining or in-situ methods and refined or otherwise processed in the United States in order to assist in meeting the fuel requirements of the Department of Defense when the Secretary determines that it is in the national interest.

"(b) AUTHORITY TO PROCURE.—The Secretary of Defense may enter into 1 or more contracts or other agreements (that meet the requirements of this section) to procure a covered fuel to meet 1 or more fuel requirements of the Department of Defense.

"(c) CLEAN FUEL REQUIREMENTS.—A covered fuel may be procured under subsection (b) only if the covered fuel meets such standards for clean fuel produced from domestic sources as the Secretary of Defense shall establish for purposes of this section in consultation with the Department of Energy.

"(d) MULTIYEAR CONTRACT AUTHORITY.—Subject to applicable provisions of law, any contract or other agreement for the procurement of covered fuel under subsection (b) may be for 1 or more years at the election of the Secretary of Defense.

"(e) FUEL SOURCE ANALYSIS.—In order to facilitate the procurement by the Department of Defense of covered fuel under subsection (b), the Secretary of Defense may carry out a comprehensive assessment of current and potential locations in the United States for the supply of covered fuel to the Department.".

(2) CLERICAL AMENDMENT.—The table of sections for chapter 141 of title 10, United States Code, is amended by inserting after the item relating to section 2398 the following:

"2398a. Procurement of fuel derived from coal, oil shale, and tar sands.".

(r) STATE WATER RIGHTS.—Nothing in this section preempts or affects any State water law or interstate compact relating to water.

(s) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 370. FINGER LAKES WITHDRAWAL.

All Federal land within the boundary of Finger Lakes National Forest in the State of New York is withdrawn from—

(1) all forms of entry, appropriation, or disposal under the public land laws; and

(2) disposition under all laws relating to oil and gas leasing.

30 USC 188 note.

SEC. 371. REINSTATEMENT OF LEASES.

Effective date.
Termination date.

(a) LEASES TERMINATED FOR CERTAIN FAILURE TO PAY RENTAL.—Notwithstanding section 31(d)(2)(B) of the Mineral Leasing Act (30 U.S.C. 188(d)(2)(B)) as in effect before the effective date of this section, and notwithstanding the amendment made by subsection (b) of this section, the Secretary of the Interior may reinstate any oil and gas lease issued under that Act that was terminated for failure of a lessee to pay the full amount of rental on or before the anniversary date of the lease, during the period beginning on September 1, 2001, and ending on June 30, 2004, if—

Deadline.

(1) not later than 120 days after the date of enactment of this Act, the lessee—

(A) files a petition for reinstatement of the lease;

(B) complies with the conditions of section 31(e) of the Mineral Leasing Act (30 U.S.C. 188(e)); and

Certification.

(C) certifies that the lessee did not receive a notice of termination by the date that was 13 months before the date of termination; and

(2) the land is available for leasing.

(b) DEADLINE FOR PETITIONS, GENERALLY.—Section 31(d)(2) of the Mineral Leasing Act (30 U.S.C. 188(d)(2)) is amended by striking subparagraphs (A) and (B) and inserting the following:

"(A) with respect to any lease that terminated under subsection (b) on or before the date of the enactment of the Energy Policy Act of 2005, a petition for reinstatement (together with the required back rental and royalty accruing after the date of termination) is filed on or before the earlier of—

"(i) 60 days after the lessee receives from the Secretary notice of termination, whether by return of check or by any other form of actual notice; or

"(ii) 15 months after the termination of the lease; or

"(B) with respect to any lease that terminates under subsection (b) after the date of the enactment of the Energy Policy Act of 2005, a petition for reinstatement (together with the required back rental and royalty accruing after the date of termination) is filed on or before the earlier of—

"(i) 60 days after receipt of the notice of termination sent by the Secretary by certified mail to all lessees of record; or

"(ii) 24 months after the termination of the lease.".

42 USC 15928.

SEC. 372. CONSULTATION REGARDING ENERGY RIGHTS-OF-WAY ON PUBLIC LAND.

(a) MEMORANDUM OF UNDERSTANDING.—

Deadline.

(1) IN GENERAL.—Not later than 6 months after the date of enactment of this Act, the Secretary of Energy, in consultation with the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Defense with respect to lands under their respective jurisdictions, shall enter into a memorandum of understanding to coordinate all applicable Federal authorizations and environmental reviews relating to a proposed or existing utility facility. To the maximum extent practicable under applicable law, the Secretary of Energy shall, to ensure timely review and permit decisions, coordinate such authorizations and reviews with any Indian tribes, multi-State entities, and State agencies that are responsible for conducting any separate permitting and environmental reviews of the affected utility facility.

(2) CONTENTS.—The memorandum of understanding shall include provisions that—

(A) establish—

(i) a unified right-of-way application form; and

(ii) an administrative procedure for processing right-of-way applications, including lines of authority, steps in application processing, and timeframes for application processing;

(B) provide for coordination of planning relating to the granting of the rights-of-way;

(C) provide for an agreement among the affected Federal agencies to prepare a single environmental review document to be used as the basis for all Federal authorization decisions; and

(D) provide for coordination of use of right-of-way stipulations to achieve consistency.

(b) NATURAL GAS PIPELINES.—

(1) IN GENERAL.—With respect to permitting activities for interstate natural gas pipelines, the May 2002 document entitled "Interagency Agreement On Early Coordination Of Required Environmental And Historic Preservation Reviews Conducted In Conjunction With The Issuance Of Authorizations To Construct And Operate Interstate Natural Gas Pipelines Certificated By The Federal Energy Regulatory Commission" shall constitute compliance with subsection (a).

(2) REPORT.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, and every 2 years thereafter, agencies that are signatories to the document referred to in paragraph (1) shall transmit to Congress a report on how the agencies under the jurisdiction of the Secretaries are incorporating and implementing the provisions of the document referred to in paragraph (1).

(B) CONTENTS.—The report shall address—

(i) efforts to implement the provisions of the document referred to in paragraph (1);

(ii) whether the efforts have had a streamlining effect;

(iii) further improvements to the permitting process of the agency; and

(iv) recommendations for inclusion of State and tribal governments in a coordinated permitting process.

(c) DEFINITION OF UTILITY FACILITY.—In this section, the term "utility facility" means any privately, publicly, or cooperatively owned line, facility, or system—

(1) for the transportation of—

(A) oil, natural gas, synthetic liquid fuel, or gaseous fuel;

(B) any refined product produced from oil, natural gas, synthetic liquid fuel, or gaseous fuel; or

(C) products in support of the production of material referred to in subparagraph (A) or (B);

(2) for storage and terminal facilities in connection with the production of material referred to in paragraph (1); or

(3) for the generation, transmission, and distribution of electric energy.

SEC. 373. SENSE OF CONGRESS REGARDING DEVELOPMENT OF MINERALS UNDER PADRE ISLAND NATIONAL SEASHORE.

(a) FINDINGS.—Congress finds the following:

(1) Pursuant to Public Law 87–712 (16 U.S.C. 459d et seq.; popularly known as the "Federal Enabling Act") and various deeds and actions under that Act, the United States is the owner of only the surface estate of certain lands constituting the Padre Island National Seashore.

(2) Ownership of the oil, gas, and other minerals in the subsurface estate of the lands constituting the Padre Island National Seashore was never acquired by the United States, and ownership of those interests is held by the State of Texas and private parties.

(3) Public Law 87–712 (16 U.S.C. 459d et seq.)—

(A) expressly contemplated that the United States would recognize the ownership and future development of the oil, gas, and other minerals in the subsurface estate of the lands constituting the Padre Island National Seashore by the owners and their mineral lessees; and

(B) recognized that approval of the State of Texas was required to create Padre Island National Seashore.

(4) Approval was given for the creation of Padre Island National Seashore by the State of Texas through Tex. Rev. Civ. Stat. Ann. Art. 6077(t) (Vernon 1970), which expressly recognized that development of the oil, gas, and other minerals in the subsurface of the lands constituting Padre Island National Seashore would be conducted with full rights of ingress and egress under the laws of the State of Texas.

(b) SENSE OF CONGRESS.—It is the sense of Congress that with regard to Federal law, any regulation of the development of oil, gas, or other minerals in the subsurface of the lands constituting Padre Island National Seashore should be made as if those lands retained the status that the lands had on September 27, 1962.

Louisiana.

SEC. 374. LIVINGSTON PARISH MINERAL RIGHTS TRANSFER.

Section 102 of Public Law 102–562 (106 Stat. 4234) is amended by striking subsection (b) and inserting the following:

"(b) RESERVATION OF OIL AND GAS RIGHTS AND CONVEYANCE OF REMAINING MINERAL RIGHTS.—Subject to the limitations set forth in subsection (c), the United States hereby excepts and reserves from the provisions of subsection (a), all rights to oil and gas underlying such lands, along with the right to explore

for, and produce the oil and gas under applicable law and such regulations as the Secretary of the Interior may prescribe. Not later than 180 days after the date of enactment of the Energy Policy Act of 2005, the Secretary of the Interior shall convey the remaining mineral rights to the parties who as of the date of enactment of the Energy Policy Act of 2005 would be recognized as holders of a right, title, or interest to any portion of such minerals under the laws of the State of Louisiana, but for the interest of the United States in such minerals.

"(c) OIL AND GAS RESOURCE ASSESSMENT AND REPORT.—The United States Geological Survey shall conduct a resource assessment and publish a report of the findings of such resource assessment ('USGS Assessment and Report') within 1 year of the date of enactment of the Energy Policy Act of 2005. The USGS Assessment and Report shall provide an assessment of all oil and gas resources underlying the certain lands in Livingston Parish, Louisiana, as described in section 103 (the 'Livingston Parish lands'). Upon a finding by the Secretary of the Interior based upon the USGS Assessment and Report that it is unlikely that economically recoverable oil and gas resources are present, the Secretary shall convey all rights to oil and gas underlying such lands to the recipients, or their successors, heirs, or assigns, of the conveyances under subsection (b). Such further conveyances shall be made within 180 days after a finding by the Secretary that it is unlikely that economically recoverable oil and gas resources are present.". Deadlines.

Subtitle G—Miscellaneous

SEC. 381. DEADLINE FOR DECISION ON APPEALS OF CONSISTENCY DETERMINATION UNDER THE COASTAL ZONE MANAGEMENT ACT OF 1972.

Section 319 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1465) is amended to read as follows:

"APPEALS TO THE SECRETARY

"SEC. 319. (a) NOTICE.—Not later than 30 days after the date of the filing of an appeal to the Secretary of a consistency determination under section 307, the Secretary shall publish an initial notice in the Federal Register. Federal Register, publication.

"(b) CLOSURE OF RECORD.—

"(1) IN GENERAL.—Not later than the end of the 160-day period beginning on the date of publication of an initial notice under subsection (a), except as provided in paragraph (3), the Secretary shall immediately close the decision record and receive no more filings on the appeal.

"(2) NOTICE.—After closing the administrative record, the Secretary shall immediately publish a notice in the Federal Register that the administrative record has been closed. Federal Register, publication.

"(3) EXCEPTION.—

"(A) IN GENERAL.—Subject to subparagraph (B), during the 160-day period described in paragraph (1), the Secretary may stay the closing of the decision record—

"(i) for a specific period mutually agreed to in writing by the appellant and the State agency; or

"(ii) as the Secretary determines necessary to receive, on an expedited basis—

"(I) any supplemental information specifically requested by the Secretary to complete a consistency review under this Act; or

"(II) any clarifying information submitted by a party to the proceeding related to information in the consolidated record compiled by the lead Federal permitting agency.

"(B) APPLICABILITY.—The Secretary may only stay the 160-day period described in paragraph (1) for a period not to exceed 60 days.

"(c) DEADLINE FOR DECISION.—

Notices. Federal Register, publication.

"(1) IN GENERAL.—Not later than 60 days after the date of publication of a Federal Register notice stating when the decision record for an appeal has been closed, the Secretary shall issue a decision or publish a notice in the Federal Register explaining why a decision cannot be issued at that time.

"(2) SUBSEQUENT DECISION.—Not later than 15 days after the date of publication of a Federal Register notice explaining why a decision cannot be issued within the 60-day period, the Secretary shall issue a decision.".

16 USC 1466.

SEC. 382. APPEALS RELATING TO OFFSHORE MINERAL DEVELOPMENT.

For any Federal administrative agency proceeding that is an appeal or review under section 319 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1465), as amended by this Act, related to any Federal authorization for the permitting, approval, or other authorization of an energy project, the lead Federal permitting agency for the project shall, with the cooperation of Federal and State administrative agencies, maintain a consolidated record of all decisions made or actions taken by the lead agency or by another Federal or State administrative agency or officer. Such record shall be the initial record for appeals or reviews under that Act, provided that the record may be supplemented as expressly provided pursuant to section 319 of that Act.

SEC. 383. ROYALTY PAYMENTS UNDER LEASES UNDER THE OUTER CONTINENTAL SHELF LANDS ACT.

(a) ROYALTY RELIEF.—

(1) IN GENERAL.—For purposes of providing compensation for lessees and a State for which amounts are authorized by section 6004(c) of the Oil Pollution Act of 1990 (Public Law 101–380), a lessee may withhold from payment any royalty due and owing to the United States under any leases under the Outer Continental Shelf Lands Act (43 U.S.C. 1301 et seq.) for offshore oil or gas production from a covered lease tract if, on or before the date that the payment is due and payable to the United States, the lessee makes a payment to the State of 44 cents for every $1 of royalty withheld.

(2) TREATMENT OF AMOUNTS.—Any royalty withheld by a lessee in accordance with this section (including any portion thereof that is paid to the State under paragraph (1)) shall be treated as paid for purposes of satisfaction of the royalty obligations of the lessee to the United States.

(3) CERTIFICATION OF WITHHELD AMOUNTS.—The Secretary of the Treasury shall—

(A) determine the amount of royalty withheld by a lessee under this section; and

(B) promptly publish a certification when the total amount of royalty withheld by the lessee under this section is equal to— Publication.

(i) the dollar amount stated at page 47 of Senate Report number 101–534, which is designated therein as the total drainage claim for the West Delta field; plus

(ii) interest as described at page 47 of that Report.

(b) PERIOD OF ROYALTY RELIEF.—Subsection (a) shall apply to royalty amounts that are due and payable in the period beginning on October 1, 2006, and ending on the date on which the Secretary of the Treasury publishes a certification under subsection (a)(3)(B). Applicability. Effective date. Termination date.

(c) DEFINITIONS.—As used in this section:

(1) COVERED LEASE TRACT.—The term "covered lease tract" means a leased tract (or portion of a leased tract)—

(A) lying seaward of the zone defined and governed by section 8(g) of the Outer Continental Shelf Lands Act (43 U.S.C. 1337(g)); or

(B) lying within such zone but to which such section does not apply.

(2) LESSEE.—The term "lessee"—

(A) means a person or entity that, on the date of the enactment of the Oil Pollution Act of 1990, was a lessee referred to in section 6004(c) of that Act (as in effect on that date of the enactment), but did not hold lease rights in Federal offshore lease OCS–G–5669; and

(B) includes successors and affiliates of a person or entity described in subparagraph (A).

SEC. 384. COASTAL IMPACT ASSISTANCE PROGRAM.

Section 31 of the Outer Continental Shelf Lands Act (43 U.S.C. 1356a) is amended to read as follows:

"SEC. 31. COASTAL IMPACT ASSISTANCE PROGRAM.

"(a) DEFINITIONS.—In this section:

"(1) COASTAL POLITICAL SUBDIVISION.—The term 'coastal political subdivision' means a political subdivision of a coastal State any part of which political subdivision is—

"(A) within the coastal zone (as defined in section 304 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1453)) of the coastal State as of the date of enactment of the Energy Policy Act of 2005; and

"(B) not more than 200 nautical miles from the geographic center of any leased tract.

"(2) COASTAL POPULATION.—The term 'coastal population' means the population, as determined by the most recent official data of the Census Bureau, of each political subdivision any part of which lies within the designated coastal boundary of a State (as defined in a State's coastal zone management program under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.)).

"(3) COASTAL STATE.—The term 'coastal State' has the meaning given the term in section 304 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1453).

"(4) COASTLINE.—The term 'coastline' has the meaning given the term 'coast line' in section 2 of the Submerged Lands Act (43 U.S.C. 1301).

"(5) DISTANCE.—The term 'distance' means the minimum great circle distance, measured in statute miles.

"(6) LEASED TRACT.—The term 'leased tract' means a tract that is subject to a lease under section 6 or 8 for the purpose of drilling for, developing, and producing oil or natural gas resources.

"(7) LEASING MORATORIA.—The term 'leasing moratoria' means the prohibitions on preleasing, leasing, and related activities on any geographic area of the outer Continental Shelf as contained in sections 107 through 109 of division E of the Consolidated Appropriations Act, 2005 (Public Law 108–447; 118 Stat. 3063).

"(8) POLITICAL SUBDIVISION.—The term 'political subdivision' means the local political jurisdiction immediately below the level of State government, including counties, parishes, and boroughs.

"(9) PRODUCING STATE.—

"(A) IN GENERAL.—The term 'producing State' means a coastal State that has a coastal seaward boundary within 200 nautical miles of the geographic center of a leased tract within any area of the outer Continental Shelf.

"(B) EXCLUSION.—The term 'producing State' does not include a producing State, a majority of the coastline of which is subject to leasing moratoria, unless production was occurring on January 1, 2005, from a lease within 10 nautical miles of the coastline of that State.

"(10) QUALIFIED OUTER CONTINENTAL SHELF REVENUES.—

"(A) IN GENERAL.—The term 'qualified Outer Continental Shelf revenues' means all amounts received by the United States from each leased tract or portion of a leased tract—

"(i) lying—

"(I) seaward of the zone covered by section 8(g); or

"(II) within that zone, but to which section 8(g) does not apply; and

"(ii) the geographic center of which lies within a distance of 200 nautical miles from any part of the coastline of any coastal State.

"(B) INCLUSIONS.—The term 'qualified Outer Continental Shelf revenues' includes bonus bids, rents, royalties (including payments for royalty taken in kind and sold), net profit share payments, and related late-payment interest from natural gas and oil leases issued under this Act.

"(C) EXCLUSION.—The term 'qualified Outer Continental Shelf revenues' does not include any revenues from a leased tract or portion of a leased tract that is located in a geographic area subject to a leasing moratorium on January 1, 2005, unless the lease was in production on January 1, 2005.

"(b) PAYMENTS TO PRODUCING STATES AND COASTAL POLITICAL SUBDIVISIONS.—

"(1) IN GENERAL.—The Secretary shall, without further appropriation, disburse to producing States and coastal political subdivisions in accordance with this section $250,000,000 for each of fiscal years 2007 through 2010.

"(2) DISBURSEMENT.—In each fiscal year, the Secretary shall disburse to each producing State for which the Secretary has approved a plan under subsection (c), and to coastal political subdivisions under paragraph (4), such funds as are allocated to the producing State or coastal political subdivision, respectively, under this section for the fiscal year.

"(3) ALLOCATION AMONG PRODUCING STATES.—

"(A) IN GENERAL.—Except as provided in subparagraph (C) and subject to subparagraph (D), the amounts available under paragraph (1) shall be allocated to each producing State based on the ratio that—

"(i) the amount of qualified outer Continental Shelf revenues generated off the coastline of the producing State; bears to

"(ii) the amount of qualified outer Continental Shelf revenues generated off the coastline of all producing States.

"(B) AMOUNT OF OUTER CONTINENTAL SHELF REVENUES.—For purposes of subparagraph (A)—

"(i) the amount of qualified outer Continental Shelf revenues for each of fiscal years 2007 and 2008 shall be determined using qualified outer Continental Shelf revenues received for fiscal year 2006; and

"(ii) the amount of qualified outer Continental Shelf revenues for each of fiscal years 2009 and 2010 shall be determined using qualified outer Continental Shelf revenues received for fiscal year 2008.

"(C) MULTIPLE PRODUCING STATES.—In a case in which more than one producing State is located within 200 nautical miles of any portion of a leased tract, the amount allocated to each producing State for the leased tract shall be inversely proportional to the distance between—

"(i) the nearest point on the coastline of the producing State; and

"(ii) the geographic center of the leased tract.

"(D) MINIMUM ALLOCATION.—The amount allocated to a producing State under subparagraph (A) shall be at least 1 percent of the amounts available under paragraph (1).

"(4) PAYMENTS TO COASTAL POLITICAL SUBDIVISIONS.—

"(A) IN GENERAL.—The Secretary shall pay 35 percent of the allocable share of each producing State, as determined under paragraph (3) to the coastal political subdivisions in the producing State.

"(B) FORMULA.—Of the amount paid by the Secretary to coastal political subdivisions under subparagraph (A)—

"(i) 25 percent shall be allocated to each coastal political subdivision in the proportion that—

"(I) the coastal population of the coastal political subdivision; bears to

"(II) the coastal population of all coastal political subdivisions in the producing State;

"(ii) 25 percent shall be allocated to each coastal political subdivision in the proportion that—

"(I) the number of miles of coastline of the coastal political subdivision; bears to

"(II) the number of miles of coastline of all coastal political subdivisions in the producing State; and

"(iii) 50 percent shall be allocated in amounts that are inversely proportional to the respective distances between the points in each coastal political subdivision that are closest to the geographic center of each leased tract, as determined by the Secretary.

"(C) EXCEPTION FOR THE STATE OF LOUISIANA.—For the purposes of subparagraph (B)(ii), the coastline for coastal political subdivisions in the State of Louisiana without a coastline shall be considered to be ⅓ the average length of the coastline of all coastal political subdivisions with a coastline in the State of Louisiana.

"(D) EXCEPTION FOR THE STATE OF ALASKA.—For the purposes of carrying out subparagraph (B)(iii) in the State of Alaska, the amounts allocated shall be divided equally among the two coastal political subdivisions that are closest to the geographic center of a leased tract.

"(E) EXCLUSION OF CERTAIN LEASED TRACTS.—For purposes of subparagraph (B)(iii), a leased tract or portion of a leased tract shall be excluded if the tract or portion of a leased tract is located in a geographic area subject to a leasing moratorium on January 1, 2005, unless the lease was in production on that date.

"(5) NO APPROVED PLAN.—

"(A) IN GENERAL.—Subject to subparagraph (B) and except as provided in subparagraph (C), in a case in which any amount allocated to a producing State or coastal political subdivision under paragraph (4) or (5) is not disbursed because the producing State does not have in effect a plan that has been approved by the Secretary under subsection (c), the Secretary shall allocate the undisbursed amount equally among all other producing States.

"(B) RETENTION OF ALLOCATION.—The Secretary shall hold in escrow an undisbursed amount described in subparagraph (A) until such date as the final appeal regarding the disapproval of a plan submitted under subsection (c) is decided.

"(C) WAIVER.—The Secretary may waive subparagraph (A) with respect to an allocated share of a producing State and hold the allocable share in escrow if the Secretary determines that the producing State is making a good faith effort to develop and submit, or update, a plan in accordance with subsection (c).

"(c) COASTAL IMPACT ASSISTANCE PLAN.—

"(1) SUBMISSION OF STATE PLANS.—

Deadline.

"(A) IN GENERAL.—Not later than July 1, 2008, the Governor of a producing State shall submit to the Secretary a coastal impact assistance plan.

"(B) PUBLIC PARTICIPATION.—In carrying out subparagraph (A), the Governor shall solicit local input and provide for public participation in the development of the plan.

"(2) APPROVAL.—

"(A) IN GENERAL.—The Secretary shall approve a plan of a producing State submitted under paragraph (1) before disbursing any amount to the producing State, or to a

coastal political subdivision located in the producing State, under this section.

"(B) COMPONENTS.—The Secretary shall approve a plan submitted under paragraph (1) if—

"(i) the Secretary determines that the plan is consistent with the uses described in subsection (d); and

"(ii) the plan contains—

"(I) the name of the State agency that will have the authority to represent and act on behalf of the producing State in dealing with the Secretary for purposes of this section;

"(II) a program for the implementation of the plan that describes how the amounts provided under this section to the producing State will be used;

"(III) for each coastal political subdivision that receives an amount under this section—

"(aa) the name of a contact person; and

"(bb) a description of how the coastal political subdivision will use amounts provided under this section;

"(IV) a certification by the Governor that ample opportunity has been provided for public participation in the development and revision of the plan; and

Certification.

"(V) a description of measures that will be taken to determine the availability of assistance from other relevant Federal resources and programs.

"(3) AMENDMENT.—Any amendment to a plan submitted under paragraph (1) shall be—

"(A) developed in accordance with this subsection; and

"(B) submitted to the Secretary for approval or disapproval under paragraph (4).

"(4) PROCEDURE.—Not later than 90 days after the date on which a plan or amendment to a plan is submitted under paragraph (1) or (3), the Secretary shall approve or disapprove the plan or amendment.

Deadline.

"(d) AUTHORIZED USES.—

"(1) IN GENERAL.—A producing State or coastal political subdivision shall use all amounts received under this section, including any amount deposited in a trust fund that is administered by the State or coastal political subdivision and dedicated to uses consistent with this section, in accordance with all applicable Federal and State laws, only for one or more of the following purposes:

"(A) Projects and activities for the conservation, protection, or restoration of coastal areas, including wetland.

"(B) Mitigation of damage to fish, wildlife, or natural resources.

"(C) Planning assistance and the administrative costs of complying with this section.

"(D) Implementation of a federally-approved marine, coastal, or comprehensive conservation management plan.

"(E) Mitigation of the impact of outer Continental Shelf activities through funding of onshore infrastructure projects and public service needs.

"(2) COMPLIANCE WITH AUTHORIZED USES.—If the Secretary determines that any expenditure made by a producing State or coastal political subdivision is not consistent with this subsection, the Secretary shall not disburse any additional amount under this section to the producing State or the coastal political subdivision until such time as all amounts obligated for unauthorized uses have been repaid or reobligated for authorized uses.

"(3) LIMITATION.—Not more than 23 percent of amounts received by a producing State or coastal political subdivision for any 1 fiscal year shall be used for the purposes described in subparagraphs (C) and (E) of paragraph (1).".

SEC. 385. STUDY OF AVAILABILITY OF SKILLED WORKERS.

Contracts.

(a) IN GENERAL.—The Secretary shall enter into an arrangement with the National Academy of Sciences under which the National Academy of Sciences shall conduct a study of the short-term and long-term availability of skilled workers to meet the energy and mineral security requirements of the United States.

(b) INCLUSIONS.—The study shall include an analysis of—

(1) the need for and availability of workers for the oil, gas, and mineral industries;

(2) the availability of skilled labor at both entry level and more senior levels; and

(3) recommendations for future actions needed to meet future labor requirements.

(c) REPORT.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress a report that describes the results of the study.

42 USC 15941.

SEC. 386. GREAT LAKES OIL AND GAS DRILLING BAN.

No Federal or State permit or lease shall be issued for new oil and gas slant, directional, or offshore drilling in or under one or more of the Great Lakes.

Deadline.
42 USC 13368 note.

SEC. 387. FEDERAL COALBED METHANE REGULATION.

Any State currently on the list of Affected States established under section 1339(b) of the Energy Policy Act of 1992 (42 U.S.C. 13368(b)) shall be removed from the list if, not later than 3 years after the date of enactment of this Act, the State takes, or prior to the date of enactment has taken, any of the actions required for removal from the list under such section 1339(b).

SEC. 388. ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF.

(a) AMENDMENT TO OUTER CONTINENTAL SHELF LANDS ACT.—Section 8 of the Outer Continental Shelf Lands Act (43 U.S.C. 1337) is amended by adding at the end the following:

"(p) LEASES, EASEMENTS, OR RIGHTS-OF-WAY FOR ENERGY AND RELATED PURPOSES.—

"(1) IN GENERAL.—The Secretary, in consultation with the Secretary of the Department in which the Coast Guard is operating and other relevant departments and agencies of the Federal Government, may grant a lease, easement, or right-of-way on the outer Continental Shelf for activities not otherwise authorized in this Act, the Deepwater Port Act of 1974 (33 U.S.C. 1501 et seq.), the Ocean Thermal Energy Conversion

Act of 1980 (42 U.S.C. 9101 et seq.), or other applicable law, if those activities—

"(A) support exploration, development, production, or storage of oil or natural gas, except that a lease, easement, or right-of-way shall not be granted in an area in which oil and gas preleasing, leasing, and related activities are prohibited by a moratorium;

"(B) support transportation of oil or natural gas, excluding shipping activities;

"(C) produce or support production, transportation, or transmission of energy from sources other than oil and gas; or

"(D) use, for energy-related purposes or for other authorized marine-related purposes, facilities currently or previously used for activities authorized under this Act, except that any oil and gas energy-related uses shall not be authorized in areas in which oil and gas preleasing, leasing, and related activities are prohibited by a moratorium.

"(2) PAYMENTS AND REVENUES.—(A) The Secretary shall establish royalties, fees, rentals, bonuses, or other payments to ensure a fair return to the United States for any lease, easement, or right-of-way granted under this subsection.

"(B) The Secretary shall provide for the payment of 27 percent of the revenues received by the Federal Government as a result of payments under this section from projects that are located wholly or partially within the area extending three nautical miles seaward of State submerged lands. Payments shall be made based on a formula established by the Secretary by rulemaking no later than 180 days after the date of enactment of this section that provides for equitable distribution, based on proximity to the project, among coastal states that have a coastline that is located within 15 miles of the geographic center of the project.

Regulations. Deadline.

"(3) COMPETITIVE OR NONCOMPETITIVE BASIS.—Except with respect to projects that meet the criteria established under section 388(d) of the Energy Policy Act of 2005, the Secretary shall issue a lease, easement, or right-of-way under paragraph (1) on a competitive basis unless the Secretary determines after public notice of a proposed lease, easement, or right-of-way that there is no competitive interest.

"(4) REQUIREMENTS.—The Secretary shall ensure that any activity under this subsection is carried out in a manner that provides for—

"(A) safety;

"(B) protection of the environment;

"(C) prevention of waste;

"(D) conservation of the natural resources of the outer Continental Shelf;

"(E) coordination with relevant Federal agencies;

"(F) protection of national security interests of the United States;

"(G) protection of correlative rights in the outer Continental Shelf;

"(H) a fair return to the United States for any lease, easement, or right-of-way under this subsection;

"(I) prevention of interference with reasonable uses (as determined by the Secretary) of the exclusive economic zone, the high seas, and the territorial seas;

"(J) consideration of—

"(i) the location of, and any schedule relating to, a lease, easement, or right-of-way for an area of the outer Continental Shelf; and

"(ii) any other use of the sea or seabed, including use for a fishery, a sealane, a potential site of a deepwater port, or navigation;

"(K) public notice and comment on any proposal submitted for a lease, easement, or right-of-way under this subsection; and

"(L) oversight, inspection, research, monitoring, and enforcement relating to a lease, easement, or right-of-way under this subsection.

"(5) LEASE DURATION, SUSPENSION, AND CANCELLATION.—The Secretary shall provide for the duration, issuance, transfer, renewal, suspension, and cancellation of a lease, easement, or right-of-way under this subsection.

"(6) SECURITY.—The Secretary shall require the holder of a lease, easement, or right-of-way granted under this subsection to—

"(A) furnish a surety bond or other form of security, as prescribed by the Secretary;

"(B) comply with such other requirements as the Secretary considers necessary to protect the interests of the public and the United States; and

"(C) provide for the restoration of the lease, easement, or right-of-way.

"(7) COORDINATION AND CONSULTATION WITH AFFECTED STATE AND LOCAL GOVERNMENTS.—The Secretary shall provide for coordination and consultation with the Governor of any State or the executive of any local government that may be affected by a lease, easement, or right-of-way under this subsection.

Deadline.

"(8) REGULATIONS.—Not later than 270 days after the date of enactment of the Energy Policy Act of 2005, the Secretary, in consultation with the Secretary of Defense, the Secretary of the Department in which the Coast Guard is operating, the Secretary of Commerce, heads of other relevant departments and agencies of the Federal Government, and the Governor of any affected State, shall issue any necessary regulations to carry out this subsection.

"(9) EFFECT OF SUBSECTION.—Nothing in this subsection displaces, supersedes, limits, or modifies the jurisdiction, responsibility, or authority of any Federal or State agency under any other Federal law.

"(10) APPLICABILITY.—This subsection does not apply to any area on the outer Continental Shelf within the exterior boundaries of any unit of the National Park System, National Wildlife Refuge System, or National Marine Sanctuary System, or any National Monument.".

43 USC 1337 note.

(b) COORDINATED OCS MAPPING INITIATIVE.—

(1) IN GENERAL.—The Secretary of the Interior, in cooperation with the Secretary of Commerce, the Commandant of the Coast Guard, and the Secretary of Defense, shall establish

an interagency comprehensive digital mapping initiative for the outer Continental Shelf to assist in decisionmaking relating to the siting of activities under subsection (p) of section 8 of the Outer Continental Shelf Lands Act (43 U.S.C. 1337) (as added by subsection (a)).

(2) USE OF DATA.—The mapping initiative shall use, and develop procedures for accessing, data collected before the date on which the mapping initiative is established, to the maximum extent practicable.

(3) INCLUSIONS.—Mapping carried out under the mapping initiative shall include an indication of the locations on the outer Continental Shelf of—

(A) Federally-permitted activities;

(B) obstructions to navigation;

(C) submerged cultural resources;

(D) undersea cables;

(E) offshore aquaculture projects; and

(F) any area designated for the purpose of safety, national security, environmental protection, or conservation and management of living marine resources.

(c) CONFORMING AMENDMENT.—Section 8 of the Outer Continental Shelf Lands Act (43 U.S.C. 1337) is amended by striking the section heading and inserting the following: "LEASES, EASEMENTS, AND RIGHTS-OF-WAY ON THE OUTER CONTINENTAL SHELF.—".

(d) SAVINGS PROVISION.—Nothing in the amendment made by subsection (a) requires the resubmittal of any document that was previously submitted or the reauthorization of any action that was previously authorized with respect to a project for which, before the date of enactment of this Act— 43 USC 1337 note.

(1) an offshore test facility has been constructed; or

(2) a request for a proposal has been issued by a public authority.

(e) STATE CLAIMS TO JURISDICTION OVER SUBMERGED LANDS.—Nothing in this section shall be construed to alter, limit, or modify any claim of any State to any jurisdiction over, or any right, title, or interest in, any submerged lands. 43 USC 1337 note.

SEC. 389. OIL SPILL RECOVERY INSTITUTE.

Title V of the Oil Pollution Act of 1990 (33 U.S.C. 2731 et seq.) is amended—

(1) in section 5001(i), by striking "September 30, 2012" and inserting "1 year after the date on which the Secretary, in consultation with the Secretary of the Interior, determines that oil and gas exploration, development, and production in the State of Alaska have ceased"; and 33 USC 2731.

(2) in section 5006(c), by striking "October 1, 2012" and inserting "1 year after the date on which the Secretary, in consultation with the Secretary of the Interior, determines that oil and gas exploration, development, and production in the State of Alaska have ceased,". 33 USC 2736.

SEC. 390. NEPA REVIEW. 42 USC 15942.

(a) NEPA REVIEW.—Action by the Secretary of the Interior in managing the public lands, or the Secretary of Agriculture in managing National Forest System Lands, with respect to any of the activities described in subsection (b) shall be subject to a rebuttable presumption that the use of a categorical exclusion under

the National Environmental Policy Act of 1969 (NEPA) would apply if the activity is conducted pursuant to the Mineral Leasing Act for the purpose of exploration or development of oil or gas.

(b) ACTIVITIES DESCRIBED.—The activities referred to in subsection (a) are the following:

(1) Individual surface disturbances of less than 5 acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed.

(2) Drilling an oil or gas well at a location or well pad site at which drilling has occurred previously within 5 years prior to the date of spudding the well.

(3) Drilling an oil or gas well within a developed field for which an approved land use plan or any environmental document prepared pursuant to NEPA analyzed such drilling as a reasonably foreseeable activity, so long as such plan or document was approved within 5 years prior to the date of spudding the well.

(4) Placement of a pipeline in an approved right-of-way corridor, so long as the corridor was approved within 5 years prior to the date of placement of the pipeline.

(5) Maintenance of a minor activity, other than any construction or major renovation or a building or facility.

Subtitle H—Refinery Revitalization

42 USC 15951.

SEC. 391. FINDINGS AND DEFINITIONS.

(a) FINDINGS.—Congress finds that—

(1) it serves the national interest to increase petroleum refining capacity for gasoline, heating oil, diesel fuel, jet fuel, kerosene, and petrochemical feedstocks wherever located within the United States, to bring more supply to the markets for the use of the American people;

(2) United States demand for refined petroleum products currently exceeds the country's petroleum refining capacity to produce such products;

(3) this excess demand has been met with increased imports;

(4) due to lack of capacity, refined petroleum product imports are expected to grow from 7.9 percent to 10.7 percent of total refined product by 2025;

(5) refiners are still subject to significant environmental and other regulations and face several new requirements under the Clean Air Act (42 U.S.C. 7401 et seq.) over the next decade; and

(6) better coordination of Federal and State regulatory reviews may help facilitate siting and construction of new refineries to meet the demand in the United States for refined products.

(b) DEFINITIONS.—In this subtitle:

(1) ADMINISTRATOR.—The term "Administrator" means the Administrator of the Environmental Protection Agency.

(2) STATE.—The term "State" means—

(A) a State;

(B) the Commonwealth of Puerto Rico; and

(C) any other territory or possession of the United States.

SEC. 392. FEDERAL-STATE REGULATORY COORDINATION AND ASSISTANCE. 42 USC 15952.

(a) IN GENERAL.—At the request of the Governor of a State, the Administrator may enter into a refinery permitting cooperative agreement with the State, under which each party to the agreement identifies steps, including timelines, that it will take to streamline the consideration of Federal and State environmental permits for a new refinery.

(b) AUTHORITY UNDER AGREEMENT.—The Administrator shall be authorized to—

(1) accept from a refiner a consolidated application for all permits required from the Environmental Protection Agency, to the extent consistent with other applicable law;

(2) enter into memoranda of agreement with other Federal agencies to coordinate consideration of refinery applications and permits among Federal agencies; and

(3) enter into memoranda of agreement with a State, under which Federal and State review of refinery permit applications will be coordinated and concurrently considered, to the extent practicable.

(c) STATE ASSISTANCE.—The Administrator is authorized to provide financial assistance to State governments to facilitate the hiring of additional personnel with expertise in fields relevant to consideration of refinery permits.

(d) OTHER ASSISTANCE.—The Administrator is authorized to provide technical, legal, or other assistance to State governments to facilitate their review of applications to build new refineries.

TITLE IV—COAL

Subtitle A—Clean Coal Power Initiative

SEC. 401. AUTHORIZATION OF APPROPRIATIONS. 42 USC 15961.

(a) CLEAN COAL POWER INITIATIVE.—There are authorized to be appropriated to the Secretary to carry out the activities authorized by this subtitle $200,000,000 for each of fiscal years 2006 through 2014, to remain available until expended.

(b) REPORT.—The Secretary shall submit to Congress the report required by this subsection not later than March 31, 2007. The report shall include, with respect to subsection (a), a plan containing—

(1) a detailed assessment of whether the aggregate funding levels provided under subsection (a) are the appropriate funding levels for that program;

(2) a detailed description of how proposals will be solicited and evaluated, including a list of all activities expected to be undertaken;

(3) a detailed list of technical milestones for each coal and related technology that will be pursued; and

(4) a detailed description of how the program will avoid problems enumerated in Government Accountability Office

reports on the Clean Coal Technology Program, including problems that have resulted in unspent funds and projects that failed either financially or scientifically.

42 USC 15962.

SEC. 402. PROJECT CRITERIA.

(a) IN GENERAL.—To be eligible to receive assistance under this subtitle, a project shall advance efficiency, environmental performance, and cost competitiveness well beyond the level of technologies that are in commercial service or have been demonstrated on a scale that the Secretary determines is sufficient to demonstrate that commercial service is viable as of the date of enactment of this Act.

(b) TECHNICAL CRITERIA FOR CLEAN COAL POWER INITIATIVE.—

(1) GASIFICATION PROJECTS.—

(A) IN GENERAL.—In allocating the funds made available under section 401(a), the Secretary shall ensure that at least 70 percent of the funds are used only to fund projects on coal-based gasification technologies, including—

(i) gasification combined cycle;

(ii) gasification fuel cells and turbine combined cycle;

(iii) gasification coproduction;

(iv) hybrid gasification and combustion; and

(v) other advanced coal based technologies capable of producing a concentrated stream of carbon dioxide.

(B) TECHNICAL MILESTONES.—

(i) PERIODIC DETERMINATION.—

(I) IN GENERAL.—The Secretary shall periodically set technical milestones specifying the emission and thermal efficiency levels that coal gasification projects under this subtitle shall be designed, and reasonably expected, to achieve.

(II) PRESCRIPTIVE MILESTONES.—The technical milestones shall become more prescriptive during the period of the clean coal power initiative.

(ii) 2020 GOALS.—The Secretary shall establish the periodic milestones so as to achieve by the year 2020 coal gasification projects able—

(I) to remove at least 99 percent of sulfur dioxide;

(II) to emit not more than .05 lbs of NO_x per million Btu;

(III) to achieve at least 95 percent reductions in mercury emissions; and

(IV) to achieve a thermal efficiency of at least—

(aa) 50 percent for coal of more than 9,000 Btu;

(bb) 48 percent for coal of 7,000 to 9,000 Btu; and

(cc) 46 percent for coal of less than 7,000 Btu.

(2) OTHER PROJECTS.—

(A) ALLOCATION OF FUNDS.—The Secretary shall ensure that up to 30 percent of the funds made available under section 401(a) are used to fund projects other than those described in paragraph (1).

(B) TECHNICAL MILESTONES.—

(i) PERIODIC DETERMINATION.—

(I) IN GENERAL.—The Secretary shall periodically establish technical milestones specifying the emission and thermal efficiency levels that projects funded under this paragraph shall be designed, and reasonably expected, to achieve.

(II) PRESCRIPTIVE MILESTONES.—The technical milestones shall become more prescriptive during the period of the clean coal power initiative.

(ii) 2020 GOALS.—The Secretary shall set the periodic milestones so as to achieve by the year 2020 projects able—

(I) to remove at least 97 percent of sulfur dioxide;

(II) to emit no more than .08 lbs of NO_x per million Btu;

(III) to achieve at least 90 percent reductions in mercury emissions; and

(IV) to achieve a thermal efficiency of at least—

(aa) 43 percent for coal of more than 9,000 Btu;

(bb) 41 percent for coal of 7,000 to 9,000 Btu; and

(cc) 39 percent for coal of less than 7,000 Btu.

(3) CONSULTATION.—Before setting the technical milestones under paragraphs (1)(B) and (2)(B), the Secretary shall consult with—

(A) the Administrator of the Environmental Protection Agency; and

(B) interested entities, including—

(i) coal producers;

(ii) industries using coal;

(iii) organizations that promote coal or advanced coal technologies;

(iv) environmental organizations;

(v) organizations representing workers; and

(vi) organizations representing consumers.

(4) EXISTING UNITS.—In the case of projects at units in existence on the date of enactment of this Act, in lieu of the thermal efficiency requirements described in paragraphs (1)(B)(ii)(IV) and (2)(B)(ii)(IV), the milestones shall be designed to achieve an overall thermal design efficiency improvement, compared to the efficiency of the unit as operated, of not less than—

(A) 7 percent for coal of more than 9,000 Btu;

(B) 6 percent for coal of 7,000 to 9,000 Btu; or

(C) 4 percent for coal of less than 7,000 Btu.

(5) ADMINISTRATION.—

(A) ELEVATION OF SITE.—In evaluating project proposals to achieve thermal efficiency levels established under paragraphs (1)(B)(i) and (2)(B)(i) and in determining progress towards thermal efficiency milestones under paragraphs (1)(B)(ii)(IV), (2)(B)(ii)(IV), and (4), the Secretary

shall take into account and make adjustments for the elevation of the site at which a project is proposed to be constructed.

(B) APPLICABILITY OF MILESTONES.—In applying the thermal efficiency milestones under paragraphs (1)(B)(ii)(IV), (2)(B)(ii)(IV), and (4) to projects that separate and capture at least 50 percent of the potential emissions of carbon dioxide by a facility, the energy used for separation and capture of carbon dioxide shall not be counted in calculating the thermal efficiency.

(C) PERMITTED USES.—In carrying out this section, the Secretary may give priority to projects that include, as part of the project—

(i) the separation or capture of carbon dioxide; or

(ii) the reduction of the demand for natural gas if deployed.

(c) FINANCIAL CRITERIA.—The Secretary shall not provide financial assistance under this subtitle for a project unless the recipient documents to the satisfaction of the Secretary that—

(1) the recipient is financially responsible;

(2) the recipient will provide sufficient information to the Secretary to enable the Secretary to ensure that the funds are spent efficiently and effectively; and

(3) a market exists for the technology being demonstrated or applied, as evidenced by statements of interest in writing from potential purchasers of the technology.

(d) FINANCIAL ASSISTANCE.—The Secretary shall provide financial assistance to projects that, as determined by the Secretary—

(1) meet the requirements of subsections (a), (b), and (c); and

(2) are likely—

(A) to achieve overall cost reductions in the use of coal to generate useful forms of energy or chemical feedstocks;

(B) to improve the competitiveness of coal among various forms of energy in order to maintain a diversity of fuel choices in the United States to meet electricity generation requirements; and

(C) to demonstrate methods and equipment that are applicable to 25 percent of the electricity generating facilities, using various types of coal, that use coal as the primary feedstock as of the date of enactment of this Act.

(e) COST-SHARING.—In carrying out this subtitle, the Secretary shall require cost sharing in accordance with section 988.

(f) SCHEDULED COMPLETION OF SELECTED PROJECTS.—

(1) IN GENERAL.—In selecting a project for financial assistance under this section, the Secretary shall establish a reasonable period of time during which the owner or operator of the project shall complete the construction or demonstration phase of the project, as the Secretary determines to be appropriate.

(2) CONDITION OF FINANCIAL ASSISTANCE.—The Secretary shall require as a condition of receipt of any financial assistance under this subtitle that the recipient of the assistance enter

into an agreement with the Secretary not to request an extension of the time period established for the project by the Secretary under paragraph (1).

(3) EXTENSION OF TIME PERIOD.—

(A) IN GENERAL.—Subject to subparagraph (B), the Secretary may extend the time period established under paragraph (1) if the Secretary determines, in the sole discretion of the Secretary, that the owner or operator of the project cannot complete the construction or demonstration phase of the project within the time period due to circumstances beyond the control of the owner or operator.

(B) LIMITATION.—The Secretary shall not extend a time period under subparagraph (A) by more than 4 years.

(g) FEE TITLE.—The Secretary may vest fee title or other property interests acquired under cost-share clean coal power initiative agreements under this subtitle in any entity, including the United States.

(h) DATA PROTECTION.—For a period not exceeding 5 years after completion of the operations phase of a cooperative agreement, the Secretary may provide appropriate protections (including exemptions from subchapter II of chapter 5 of title 5, United States Code) against the dissemination of information that—

(1) results from demonstration activities carried out under the clean coal power initiative program; and

(2) would be a trade secret or commercial or financial information that is privileged or confidential if the information had been obtained from and first produced by a non-Federal party participating in a clean coal power initiative project.

(i) APPLICABILITY.—No technology, or level of emission reduction, solely by reason of the use of the technology, or the achievement of the emission reduction, by 1 or more facilities receiving assistance under this Act, shall be considered to be—

(1) adequately demonstrated for purposes of section 111 of the Clean Air Act (42 U.S.C. 7411);

(2) achievable for purposes of section 169 of that Act (42 U.S.C. 7479); or

(3) achievable in practice for purposes of section 171 of that Act (42 U.S.C. 7501).

SEC. 403. REPORT. 42 USC 15963.

Not later than 1 year after the date of enactment of this Act, and once every 2 years thereafter through 2014, the Secretary, in consultation with other appropriate Federal agencies, shall submit to Congress a report describing—

(1) the technical milestones set forth in section 402 and how those milestones ensure progress toward meeting the requirements of subsections (b)(1)(B) and (b)(2) of section 402; and

(2) the status of projects funded under this subtitle.

SEC. 404. CLEAN COAL CENTERS OF EXCELLENCE. 42 USC 15964.

(a) IN GENERAL.—As part of the clean coal power initiative, the Secretary shall award competitive, merit-based grants to institutions of higher education for the establishment of centers of excellence for energy systems of the future.

(b) BASIS FOR GRANTS.—The Secretary shall award grants under this section to institutions of higher education that show the greatest potential for advancing new clean coal technologies.

Subtitle B—Clean Power Projects

42 USC 15971.

SEC. 411. INTEGRATED COAL/RENEWABLE ENERGY SYSTEM.

(a) IN GENERAL.—Subject to the availability of appropriations, the Secretary may provide loan guarantees for a project to produce energy from coal of less than 7,000 Btu/lb. using appropriate advanced integrated gasification combined cycle technology, including repowering of existing facilities, that—

(1) is combined with wind and other renewable sources;

(2) minimizes and offers the potential to sequester carbon dioxide emissions; and

(3) provides a ready source of hydrogen for near-site fuel cell demonstrations.

(b) REQUIREMENTS.—The facility—

(1) may be built in stages;

(2) shall have a combined output of at least 200 megawatts at successively more competitive rates; and

(3) shall be located in the Upper Great Plains.

Applicability.

(c) TECHNICAL CRITERIA.—Technical criteria described in section 402(b) shall apply to the facility.

(d) INVESTMENT TAX CREDITS.—

(1) IN GENERAL.—The loan guarantees provided under this section do not preclude the facility from receiving an allocation for investment tax credits under section 48A of the Internal Revenue Code of 1986.

(2) OTHER FUNDING.—Use of the investment tax credit described in paragraph (1) does not prohibit the use of other clean coal program funding.

42 USC 15972.

SEC. 412. LOAN TO PLACE ALASKA CLEAN COAL TECHNOLOGY FACILITY IN SERVICE.

(a) DEFINITIONS.—In this section:

(1) BORROWER.—The term "borrower" means the owner of the clean coal technology plant.

(2) CLEAN COAL TECHNOLOGY PLANT.—The term "clean coal technology plant" means the plant located near Healy, Alaska, constructed under Department cooperative agreement number DE–FC–22–91PC90544.

(3) COST OF A DIRECT LOAN.—The term "cost of a direct loan" has the meaning given the term in section 502(5)(B) of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a(5)(B)).

(b) AUTHORIZATION.—Subject to subsection (c), the Secretary shall use amounts made available under subsection (e) to provide the cost of a direct loan to the borrower for purposes of placing the clean coal technology plant into reliable operation for the generation of electricity.

(c) REQUIREMENTS.—

(1) MAXIMUM LOAN AMOUNT.—The amount of the direct loan provided under subsection (b) shall not exceed $80,000,000.

(2) DETERMINATIONS BY SECRETARY.—Before providing the direct loan to the borrower under subsection (b), the Secretary shall determine that—

(A) the plan of the borrower for placing the clean coal technology plant in reliable operation has a reasonable prospect of success;

(B) the amount of the loan (when combined with amounts available to the borrower from other sources) will be sufficient to carry out the project; and

(C) there is a reasonable prospect that the borrower will repay the principal and interest on the loan.

(3) INTEREST; TERM.—The direct loan provided under subsection (b) shall bear interest at a rate and for a term that the Secretary determines appropriate, after consultation with the Secretary of the Treasury, taking into account the needs and capacities of the borrower and the prevailing rate of interest for similar loans made by public and private lenders.

(4) ADDITIONAL TERMS AND CONDITIONS.—The Secretary may require any other terms and conditions that the Secretary determines to be appropriate.

(d) USE OF PAYMENTS.—The Secretary shall retain any payments of principal and interest on the direct loan provided under subsection (b) to support energy research and development activities, to remain available until expended, subject to any other conditions in an applicable appropriations Act.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to provide the cost of a direct loan under subsection (b).

SEC. 413. WESTERN INTEGRATED COAL GASIFICATION DEMONSTRATION PROJECT. 42 USC 15973.

(a) IN GENERAL.—Subject to the availability of appropriations, the Secretary shall carry out a project to demonstrate production of energy from coal mined in the western United States using integrated gasification combined cycle technology (referred to in this section as the "demonstration project").

(b) COMPONENTS.—The demonstration project—

(1) may include repowering of existing facilities;

(2) shall be designed to demonstrate the ability to use coal with an energy content of not more than 9,000 Btu/lb.; and

(3) shall be capable of removing and sequestering carbon dioxide emissions.

(c) ALL TYPES OF WESTERN COALS.—Notwithstanding the foregoing, and to the extent economically feasible, the demonstration project shall also be designed to demonstrate the ability to use a variety of types of coal (including subbituminous and bituminous coal with an energy content of up to 13,000 Btu/lb.) mined in the western United States.

(d) LOCATION.—The demonstration project shall be located in a western State at an altitude of greater than 4,000 feet above sea level.

(e) COST SHARING.—The Federal share of the cost of the demonstration project shall be determined in accordance with section 988.

(f) LOAN GUARANTEES.—Notwithstanding title XIV, the demonstration project shall not be eligible for Federal loan guarantees.

SEC. 414. COAL GASIFICATION. 42 USC 15974.

The Secretary is authorized to provide loan guarantees for a project to produce energy from a plant using integrated gasification combined cycle technology of at least 400 megawatts in capacity that produces power at competitive rates in deregulated

energy generation markets and that does not receive any subsidy (direct or indirect) from ratepayers.

42 USC 15975.

SEC. 415. PETROLEUM COKE GASIFICATION.

The Secretary is authorized to provide loan guarantees for at least 5 petroleum coke gasification projects.

42 USC 15976.

SEC. 416. ELECTRON SCRUBBING DEMONSTRATION.

The Secretary shall use $5,000,000 from amounts appropriated to initiate, through the Chicago Operations Office, a project to demonstrate the viability of high-energy electron scrubbing technology on commercial-scale electrical generation using high-sulfur coal.

42 USC 15977.

SEC. 417. DEPARTMENT OF ENERGY TRANSPORTATION FUELS FROM ILLINOIS BASIN COAL.

(a) IN GENERAL.—The Secretary shall carry out a program to evaluate the commercial and technical viability of advanced technologies for the production of Fischer-Tropsch transportation fuels, and other transportation fuels, manufactured from Illinois basin coal, including the capital modification of existing facilities and the construction of testing facilities under subsection (b).

(b) FACILITIES.—For the purpose of evaluating the commercial and technical viability of different processes for producing Fischer-Tropsch transportation fuels, and other transportation fuels, from Illinois basin coal, the Secretary shall support the use and capital modification of existing facilities and the construction of new facilities at—

(1) Southern Illinois University Coal Research Center;

(2) University of Kentucky Center for Applied Energy Research; and

(3) Energy Center at Purdue University.

(c) GASIFICATION PRODUCTS TEST CENTER.—In conjunction with the activities described in subsections (a) and (b), the Secretary shall construct a test center to evaluate and confirm liquid and gas products from syngas catalysis in order that the system has an output of at least 500 gallons of Fischer-Tropsch transportation fuel per day in a 24-hour operation.

Deadlines.

(d) MILESTONES.—

(1) SELECTION OF PROCESSES.—Not later than 180 days after the date of enactment of this Act, the Secretary shall select processes for evaluating the commercial and technical viability of different processes of producing Fischer-Tropsch transportation fuels, and other transportation fuels, from Illinois basin coal.

(2) AGREEMENTS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall offer to enter into agreements—

(A) to carry out the activities described in this section, at the facilities described in subsection (b); and

(B) for the capital modifications or construction of the facilities at the locations described in subsection (b).

(3) EVALUATIONS.—Not later than 3 years after the date of enactment of the Act, the Secretary shall begin, at the facilities described in subsection (b), evaluation of the technical and commercial viability of different processes of producing Fischer-Tropsch transportation fuels, and other transportation fuels, from Illinois basin coal.

(4) CONSTRUCTION OF FACILITIES.—

(A) IN GENERAL.—The Secretary shall construct the facilities described in subsection (b) at the lowest cost practicable.

(B) GRANTS OR AGREEMENTS.—The Secretary may make grants or enter into agreements or contracts with the institutions of higher education described in subsection (b).

(e) COST SHARING.—The cost of making grants under this section shall be shared in accordance with section 988.

(f) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $85,000,000 for the period of fiscal years 2006 through 2010.

Subtitle C—Coal and Related Programs

SEC. 421. AMENDMENT OF THE ENERGY POLICY ACT OF 1992.

(a) AMENDMENT.—The Energy Policy Act of 1992 (42 U.S.C. 13201 et seq.) is amended by adding at the end the following:

"TITLE XXXI—CLEAN AIR COAL PROGRAM

"SEC. 3101. PURPOSES. 42 USC 13571.

"The purposes of this title are to—

"(1) promote national energy policy and energy security, diversity, and economic competitiveness benefits that result from the increased use of coal;

"(2) mitigate financial risks, reduce the cost of clean coal generation, and increase the marketplace acceptance of clean coal generation and pollution control equipment and processes; and

"(3) facilitate the environmental performance of clean coal generation.

"SEC. 3102. AUTHORIZATION OF PROGRAM. 42 USC 13572.

"(a) IN GENERAL.—The Secretary shall carry out a program of financial assistance to—

"(1) facilitate the production and generation of coal-based power, through the deployment of clean coal electric generating equipment and processes that, compared to equipment or processes that are in operation on a full scale—

"(A) improve—

"(i) energy efficiency; or

"(ii) environmental performance consistent with relevant Federal and State clean air requirements, including those promulgated under the Clean Air Act (42 U.S.C. 7401 et seq.); and

"(B) are not yet cost competitive; and

"(2) facilitate the utilization of existing coal-based electricity generation plants through projects that—

"(A) deploy advanced air pollution control equipment and processes; and

"(B) are designed to voluntarily enhance environmental performance above current applicable obligations under the

Clean Air Act and State implementation efforts pursuant to such Act.

"(b) FINANCIAL CRITERIA.—As determined by the Secretary for a particular project, financial assistance under this title shall be in the form of—

"(1) cost-sharing of an appropriate percentage of the total project cost, not to exceed 50 percent as calculated under section 988 of the Energy Policy Act of 2005; or

"(2) financial assistance, including grants, cooperative agreements, or loans as authorized under this Act or other statutory authority of the Secretary.

42 USC 13573.

"SEC. 3103. GENERATION PROJECTS.

"(a) ELIGIBLE PROJECTS.—Projects supported under section 3102(a)(1) may include—

"(1) equipment or processes previously supported by a Department of Energy program;

"(2) advanced combustion equipment and processes that the Secretary determines will be cost-effective and could substantially contribute to meeting environmental or energy needs, including gasification, gasification fuel cells, gasification coproduction, oxidation combustion techniques, ultra-supercritical boilers, and chemical looping; and

"(3) hybrid gasification/combustion systems, including systems integrating fuel cells with gasification or combustion units.

"(b) CRITERIA.—The Secretary shall establish criteria for the selection of generation projects under section 3102(a)(1). The Secretary may modify the criteria as appropriate to reflect improvements in equipment, except that the criteria shall not be modified to be less stringent. The selection criteria shall include—

"(1) prioritization of projects whose installation is likely to result in significant air quality improvements in nonattainment air quality areas;

"(2) prioritization of projects whose installation is likely to result in lower emission rates of pollution;

"(3) prioritization of projects that result in the repowering or replacement of older, less efficient units;

"(4) documented broad interest in the procurement of the equipment and utilization of the processes used in the projects by owners or operators of facilities for electricity generation;

"(5) equipment and processes beginning in 2006 through 2011 that are projected to achieve a thermal efficiency of—

"(A) 40 percent for coal of more than 9,000 Btu per pound based on higher heating values;

"(B) 38 percent for coal of 7,000 to 9,000 Btu per pound passed on higher heating values; and

"(C) 36 percent for coal of less than 7,000 Btu per pound based on higher heating values;

except that energy used for coproduction or cogeneration shall not be counted in calculating the thermal efficiency under this paragraph; and

"(6) equipment and processes beginning in 2012 and 2013 that are projected to achieve a thermal efficiency of—

"(A) 45 percent for coal of more than 9,000 Btu per pound based on higher heating values;

"(B) 44 percent for coal of 7,000 to 9,000 Btu per pound passed on higher heating values; and

"(C) 40 percent for coal of less than 7,000 Btu per pound based on higher heating values;

except that energy used for coproduction or cogeneration shall not be counted in calculating the thermal efficiency under this paragraph.

"(c) PROGRAM BALANCE AND PRIORITY.—In carrying out the program under section 3102(a)(1), the Secretary shall ensure, to the extent practicable, that—

"(1) between 25 percent and 75 percent of the projects supported are for the sole purpose of electrical generation; and

"(2) priority is given to projects that use electrical generation equipment and processes that have been developed and demonstrated and applied in actual production of electricity, but are not yet cost-competitive, and that achieve greater efficiency and environmental performance.

"(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out section 3102(a)(1)—

"(1) $250,000,000 for fiscal year 2007;

"(2) $350,000,000 for fiscal year 2008;

"(3) $400,000,000 for each of fiscal years 2009 through 2012; and

"(4) $300,000,000 for fiscal year 2013.

"(e) APPLICABILITY.—No technology, or level of emission reduction, shall be treated as adequately demonstrated for purpose of section 111 of the Clean Air Act (42 U.S.C. 7411), achievable for purposes of section 169 of that Act (42 U.S.C. 7479), or achievable in practice for purposes of section 171 of that Act (42 U.S.C. 7501) solely by reason of the use of such technology, or the achievement of such emission reduction, by one or more facilities receiving assistance under section 3102(a)(1).

"SEC. 3104. AIR QUALITY ENHANCEMENT PROGRAM. 42 USC 13574.

"(a) ELIGIBLE PROJECTS.—Projects supported under section 3102(a)(2) shall—

"(1) utilize technologies that meet relevant Federal and State clean air requirements applicable to the unit or facility, including being adequately demonstrated for purposes of section 111 of the Clean Air Act (42 U.S.C. 7411), achievable for purposes of section 169 of that Act (42 U.S.C. 7479), or achievable in practice for purposes of section 171 of that Act (42 U.S.C. 7501); or

"(2) utilize equipment or processes that exceed relevant Federal or State clean air requirements applicable to the unit or facilities included in the projects by achieving greater efficiency or environmental performance.

"(b) PRIORITY IN PROJECT SELECTION.—In making an award under section 3102(a)(2), the Secretary shall give priority to—

"(1) projects whose installation is likely to result in significant air quality improvements in nonattainment air quality areas or substantially reduce the emission level of criteria pollutants and mercury air emissions;

"(2) projects for pollution control that result in the mitigation or collection of more than 1 pollutant; and

"(3) projects designed to allow the use of the waste byproducts or other byproducts of the equipment.

"(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out section 3102(a)(2)—

"(1) $300,000,000 for fiscal year 2007;

"(2) $100,000,000 for fiscal year 2008;

"(3) $40,000,000 for fiscal year 2009;

"(4) $30,000,000 for fiscal year 2010; and

"(5) $30,000,000 for fiscal year 2011.

"(d) APPLICABILITY.—No technology, or level of emission reduction under subsection (a)(2) shall be treated as adequately demonstrated for purpose of Section 111 of the Clean Air Act (42 U.S.C. 7411), achievable for purposes of section 169 of that Act (42 U.S.C. 7479), or achievable in practice for purposes of section 171 of that Act (42 U.S.C. 7501) solely by reason of the use of such technology, or the achievement of such emission reduction, by one or more facilities receiving assistance under section 3102(a)(2).".

(b) TABLE OF CONTENTS AMENDMENT.—The table of contents of the Energy Policy Act of 1992 (42 U.S.C. prec. 13201) is amended by adding at the end the following:

"TITLE XXXI—CLEAN AIR COAL PROGRAM

"Sec. 3101. Purposes.
"Sec. 3102. Authorization of program.
"Sec. 3103. Generation projects.
"Sec. 3104. Air quality enhancement program.".

Coal Leasing Amendments Act of 2005.
42 USC 15801.

Subtitle D—Federal Coal Leases

SEC. 431. SHORT TITLE.

This subtitle may be cited as the "Coal Leasing Amendments Act of 2005".

SEC. 432. REPEAL OF THE 160-ACRE LIMITATION FOR COAL LEASES.

Section 3 of the Mineral Leasing Act (30 U.S.C. 203) is amended—

(1) in the first sentence, by striking "Any person" and inserting the following: "(a)(1) Except as provided in paragraph (3), on a finding by the Secretary under paragraph (2), any person";

(2) in the second sentence, by striking "The Secretary" and inserting the following:
"(b) The Secretary";

(3) in the third sentence, by striking "The minimum" and inserting the following:
"(c) The minimum";

(4) in subsection (a) (as designated by paragraph (1))—

(A) by striking "upon" and all that follows and inserting the following: "secure modifications of the original coal lease by including additional coal lands or coal deposits contiguous or cornering to those embraced in the lease."; and

(B) by adding at the end the following:

"(2) A finding referred to in paragraph (1) is a finding by the Secretary that the modifications—

"(A) would be in the interest of the United States;

"(B) would not displace a competitive interest in the lands; and

"(C) would not include lands or deposits that can be developed as part of another potential or existing operation.

"(3) In no case shall the total area added by modifications to an existing coal lease under paragraph (1)—

"(A) exceed 960 acres; or

"(B) add acreage larger than that in the original lease.".

SEC. 433. APPROVAL OF LOGICAL MINING UNITS.

Section 2(d)(2) of the Mineral Leasing Act (30 U.S.C. 202a(2)) is amended—

(1) by inserting "(A)" after "(2)"; and

(2) by adding at the end the following:

"(B) The Secretary may establish a period of more than 40 years if the Secretary determines that the longer period—

"(i) will ensure the maximum economic recovery of a coal deposit; or

"(ii) the longer period is in the interest of the orderly, efficient, or economic development of a coal resource.".

SEC. 434. PAYMENT OF ADVANCE ROYALTIES UNDER COAL LEASES.

Section 7(b) of the Mineral Leasing Act (30 U.S.C. 207(b)) is amended—

(1) in the first sentence, by striking "Each lease" and inserting the following: "(1) Each lease";

(2) in the second sentence, by striking "The Secretary" and inserting the following:

"(2) The Secretary";

(3) in the third sentence, by striking "Such advance royalties" and inserting the following:

"(3) Advance royalties described in paragraph (2)";

(4) in the seventh sentence, by striking "The Secretary" and inserting the following:

"(6) The Secretary";

(5) in the last sentence, by striking "Nothing" and inserting the following:

"(7) Nothing";

(6) by striking the fourth, fifth, and sixth sentences; and

(7) by inserting after paragraph (3) (as designated by paragraph (3)) the following:

"(4) Advance royalties described in paragraph (2) shall be computed—

"(A) based on—

"(i) the average price in the spot market for sales of comparable coal from the same region during the last month of each applicable continued operation year; or

"(ii) in the absence of a spot market for comparable coal from the same region, by using a comparable method established by the Secretary of the Interior to capture the commercial value of coal; and

"(B) based on commercial quantities, as defined by regulation by the Secretary of the Interior.

"(5) The aggregate number of years during the period of any lease for which advance royalties may be accepted in lieu of the condition of continued operation shall not exceed 20 years.

"(6) The amount of any production royalty paid for any year shall be reduced (but not below 0) by the amount of any advance royalties paid under a lease described in paragraph (5) to the

extent that the advance royalties have not been used to reduce production royalties for a prior year.".

SEC. 435. ELIMINATION OF DEADLINE FOR SUBMISSION OF COAL LEASE OPERATION AND RECLAMATION PLAN.

Section 7(c) of the Mineral Leasing Act (30 U.S.C. 207(c)) is amended by striking "and not later than three years after a lease is issued,".

SEC. 436. AMENDMENT RELATING TO FINANCIAL ASSURANCES WITH RESPECT TO BONUS BIDS.

Section 2(a) of the Mineral Leasing Act (30 U.S.C. 201(a)) is amended by adding at the end the following:

"(4)(A) The Secretary shall not require a surety bond or any other financial assurance to guarantee payment of deferred bonus bid installments with respect to any coal lease issued on a cash bonus bid to a lessee or successor in interest having a history of a timely payment of noncontested coal royalties and advanced coal royalties in lieu of production (where applicable) and bonus bid installment payments.

"(B) The Secretary may waive any requirement that a lessee provide a surety bond or other financial assurance to guarantee payment of deferred bonus bid installment with respect to any coal lease issued before the date of the enactment of the Energy Policy Act of 2005 only if the Secretary determines that the lessee has a history of making timely payments referred to in subparagraph (A).

Deadline. Notices.

"(5) Notwithstanding any other provision of law, if the lessee under a coal lease fails to pay any installment of a deferred cash bonus bid within 10 days after the Secretary provides written notice that payment of the installment is past due—

"(A) the lease shall automatically terminate; and

"(B) any bonus payments already made to the United States with respect to the lease shall not be returned to the lessee or credited in any future lease sale.".

42 USC 15991.

SEC. 437. INVENTORY REQUIREMENT.

(a) REVIEW OF ASSESSMENTS.—

(1) IN GENERAL.—The Secretary of the Interior, in consultation with the Secretary of Agriculture and the Secretary, shall review coal assessments and other available data to identify—

(A) Federal lands with coal resources that are available for development;

(B) the extent and nature of any restrictions on the development of coal resources on Federal lands identified under paragraph (1); and

(C) with respect to areas of such lands for which sufficient data exists, resources of compliant coal and supercompliant coal.

(2) DEFINITIONS.—For purposes of this subsection—

(A) the term "compliant coal" means coal that contains not less than 1.0 and not more than 1.2 pounds of sulfur dioxide per million Btu; and

(B) the term "supercompliant coal" means coal that contains less than 1.0 pounds of sulfur dioxide per million Btu.

(b) COMPLETION AND UPDATING OF THE INVENTORY.—The Secretary—

(1) shall complete the inventory under subsection (a) by not later than 2 years after the date of enactment of this Act; and

Deadline.

(2) shall update the inventory as the availability of data and developments in technology warrant.

(c) REPORT.—The Secretary shall submit to the Committee on Resources of the House of Representatives and to the Committee on Energy and Natural Resources of the Senate and make publicly available—

(1) a report containing the inventory under this section, by not later than 2 years after the effective date of this section; and

(2) each update of such inventory.

SEC. 438. APPLICATION OF AMENDMENTS.

30 USC 201 note.

The amendments made by this subtitle apply with respect to any coal lease issued before, on, or after the date of the enactment of this Act.

TITLE V—INDIAN ENERGY

Indian Tribal Energy Development and Self-Determination Act of 2005. 42 USC 15801 note.

SEC. 501. SHORT TITLE.

This title may be cited as the "Indian Tribal Energy Development and Self-Determination Act of 2005".

SEC. 502. OFFICE OF INDIAN ENERGY POLICY AND PROGRAMS.

(a) IN GENERAL.—Title II of the Department of Energy Organization Act (42 U.S.C. 7131 et seq.) is amended by adding at the end the following:

"OFFICE OF INDIAN ENERGY POLICY AND PROGRAMS

"SEC. 217. (a) ESTABLISHMENT.—There is established within the Department an Office of Indian Energy Policy and Programs (referred to in this section as the 'Office'). The Office shall be headed by a Director, who shall be appointed by the Secretary and compensated at a rate equal to that of level IV of the Executive Schedule under section 5315 of title 5, United States Code.

42 USC 7144e.

"(b) DUTIES OF DIRECTOR.—The Director, in accordance with Federal policies promoting Indian self-determination and the purposes of this Act, shall provide, direct, foster, coordinate, and implement energy planning, education, management, conservation, and delivery programs of the Department that—

"(1) promote Indian tribal energy development, efficiency, and use;

"(2) reduce or stabilize energy costs;

"(3) enhance and strengthen Indian tribal energy and economic infrastructure relating to natural resource development and electrification; and

"(4) bring electrical power and service to Indian land and the homes of tribal members located on Indian lands or acquired, constructed, or improved (in whole or in part) with Federal funds.".

(b) CONFORMING AMENDMENTS.—

(1) The table of contents of the Department of Energy Organization Act (42 U.S.C. prec. 7101) is amended—

(A) in the item relating to section 209, by striking "Section" and inserting "Sec."; and

(B) by striking the items relating to sections 213 through 216 and inserting the following:

"Sec. 213. Establishment of policy for National Nuclear Security Administration.
"Sec. 214. Establishment of security, counterintelligence, and intelligence policies.
"Sec. 215. Office of Counterintelligence.
"Sec. 216. Office of Intelligence.
"Sec. 217. Office of Indian Energy Policy and Programs.".

(2) Section 5315 of title 5, United States Code, is amended by inserting after the item related to the Inspector General, Department of Energy the following new item:

"Director, Office of Indian Energy Policy and Programs, Department of Energy.".

SEC. 503. INDIAN ENERGY.

(a) IN GENERAL.—Title XXVI of the Energy Policy Act of 1992 (25 U.S.C. 3501 et seq.) is amended to read as follows:

"TITLE XXVI—INDIAN ENERGY

25 USC 3501.

"SEC. 2601. DEFINITIONS.

"In this title:

"(1) The term 'Director' means the Director of the Office of Indian Energy Policy and Programs, Department of Energy.

"(2) The term 'Indian land' means—

"(A) any land located within the boundaries of an Indian reservation, pueblo, or rancheria;

"(B) any land not located within the boundaries of an Indian reservation, pueblo, or rancheria, the title to which is held—

"(i) in trust by the United States for the benefit of an Indian tribe or an individual Indian;

"(ii) by an Indian tribe or an individual Indian, subject to restriction against alienation under laws of the United States; or

"(iii) by a dependent Indian community; and

"(C) land that is owned by an Indian tribe and was conveyed by the United States to a Native Corporation pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.), or that was conveyed by the United States to a Native Corporation in exchange for such land.

"(3) The term 'Indian reservation' includes—

"(A) an Indian reservation in existence in any State or States as of the date of enactment of this paragraph;

"(B) a public domain Indian allotment; and

"(C) a dependent Indian community located within the borders of the United States, regardless of whether the community is located—

"(i) on original or acquired territory of the community; or

"(ii) within or outside the boundaries of any State or States.

"(4)(A) The term 'Indian tribe' has the meaning given the term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450b).

"(B) For the purpose of paragraph (12) and sections 2603(b)(1)(C) and 2604, the term 'Indian tribe' does not include any Native Corporation.

"(5) The term 'integration of energy resources' means any project or activity that promotes the location and operation of a facility (including any pipeline, gathering system, transportation system or facility, or electric transmission or distribution facility) on or near Indian land to process, refine, generate electricity from, or otherwise develop energy resources on, Indian land.

"(6) The term 'Native Corporation' has the meaning given the term in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602).

"(7) The term 'organization' means a partnership, joint venture, limited liability company, or other unincorporated association or entity that is established to develop Indian energy resources.

"(8) The term 'Program' means the Indian energy resource development program established under section 2602(a).

"(9) The term 'Secretary' means the Secretary of the Interior.

"(10) The term 'sequestration' means the long-term separation, isolation, or removal of greenhouse gases from the atmosphere, including through a biological or geologic method such as reforestation or an underground reservoir.

"(11) The term 'tribal energy resource development organization' means an organization of two or more entities, at least one of which is an Indian tribe, that has the written consent of the governing bodies of all Indian tribes participating in the organization to apply for a grant, loan, or other assistance under section 2602.

"(12) The term 'tribal land' means any land or interests in land owned by any Indian tribe, title to which is held in trust by the United States, or is subject to a restriction against alienation under laws of the United States.

"SEC. 2602. INDIAN TRIBAL ENERGY RESOURCE DEVELOPMENT. 25 USC 3502.

"(a) DEPARTMENT OF THE INTERIOR PROGRAM.—

"(1) To assist Indian tribes in the development of energy resources and further the goal of Indian self-determination, the Secretary shall establish and implement an Indian energy resource development program to assist consenting Indian tribes and tribal energy resource development organizations in achieving the purposes of this title.

"(2) In carrying out the Program, the Secretary shall— Grants.

"(A) provide development grants to Indian tribes and tribal energy resource development organizations for use in developing or obtaining the managerial and technical capacity needed to develop energy resources on Indian land, and to properly account for resulting energy production and revenues;

"(B) provide grants to Indian tribes and tribal energy resource development organizations for use in carrying out projects to promote the integration of energy resources, and to process, use, or develop those energy resources, on Indian land;

Loans.

"(C) provide low-interest loans to Indian tribes and tribal energy resource development organizations for use in the promotion of energy resource development on Indian land and integration of energy resources; and

"(D) provide grants and technical assistance to an appropriate tribal environmental organization, as determined by the Secretary, that represents multiple Indian tribes to establish a national resource center to develop tribal capacity to establish and carry out tribal environmental programs in support of energy-related programs and activities under this title, including—

"(i) training programs for tribal environmental officials, program managers, and other governmental representatives;

"(ii) the development of model environmental policies and tribal laws, including tribal environmental review codes, and the creation and maintenance of a clearinghouse of best environmental management practices; and

"(iii) recommended standards for reviewing the implementation of tribal environmental laws and policies within tribal judicial or other tribal appeals systems.

Appropriation authorization.

"(3) There are authorized to be appropriated to carry out this subsection such sums as are necessary for each of fiscal years 2006 through 2016.

"(b) DEPARTMENT OF ENERGY INDIAN ENERGY EDUCATION PLANNING AND MANAGEMENT ASSISTANCE PROGRAM.—

"(1) The Director shall establish programs to assist consenting Indian tribes in meeting energy education, research and development, planning, and management needs.

"(2) In carrying out this subsection, the Director may provide grants, on a competitive basis, to an Indian tribe or tribal energy resource development organization for use in carrying out—

"(A) energy, energy efficiency, and energy conservation programs;

"(B) studies and other activities supporting tribal acquisitions of energy supplies, services, and facilities, including the creation of tribal utilities to assist in securing electricity to promote electrification of homes and businesses on Indian land;

"(C) planning, construction, development, operation, maintenance, and improvement of tribal electrical generation, transmission, and distribution facilities located on Indian land; and

"(D) development, construction, and interconnection of electric power transmission facilities located on Indian land with other electric transmission facilities.

"(3)(A) The Director shall develop a program to support and implement research projects that provide Indian tribes with opportunities to participate in carbon sequestration practices on Indian land, including—

"(i) geologic sequestration;

"(ii) forest sequestration;

"(iii) agricultural sequestration; and

"(iv) any other sequestration opportunities the Director considers to be appropriate.

"(B) The activities carried out under subparagraph (A) shall be—

"(i) coordinated with other carbon sequestration research and development programs conducted by the Secretary of Energy;

"(ii) conducted to determine methods consistent with existing standardized measurement protocols to account and report the quantity of carbon dioxide or other greenhouse gases sequestered in projects that may be implemented on Indian land; and

"(iii) reviewed periodically to collect and distribute to Indian tribes information on carbon sequestration practices that will increase the sequestration of carbon without threatening the social and economic well-being of Indian tribes.

"(4)(A) The Director, in consultation with Indian tribes, may develop a formula for providing grants under this subsection.

"(B) In providing a grant under this subsection, the Director shall give priority to any application received from an Indian tribe with inadequate electric service (as determined by the Director).

"(C) In providing a grant under this subsection for an activity to provide, or expand the provision of, electricity on Indian land, the Director shall encourage cooperative arrangements between Indian tribes and utilities that provide service to Indian tribes, as the Director determines to be appropriate.

"(5) The Secretary of Energy may issue such regulations as the Secretary determines to be necessary to carry out this subsection.

Appropriation authorization.

"(6) There is authorized to be appropriated to carry out this subsection $20,000,000 for each of fiscal years 2006 through 2016.

"(c) DEPARTMENT OF ENERGY LOAN GUARANTEE PROGRAM.—

"(1) Subject to paragraphs (2) and (4), the Secretary of Energy may provide loan guarantees (as defined in section 502 of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a)) for an amount equal to not more than 90 percent of the unpaid principal and interest due on any loan made to an Indian tribe for energy development.

"(2) In providing a loan guarantee under this subsection for an activity to provide, or expand the provision of, electricity on Indian land, the Secretary of Energy shall encourage cooperative arrangements between Indian tribes and utilities that provide service to Indian tribes, as the Secretary determines to be appropriate.

"(3) A loan guarantee under this subsection shall be made by—

"(A) a financial institution subject to examination by the Secretary of Energy; or

"(B) an Indian tribe, from funds of the Indian tribe.

"(4) The aggregate outstanding amount guaranteed by the Secretary of Energy at any time under this subsection shall not exceed $2,000,000,000.

Appropriation authorization.

"(5) The Secretary of Energy may issue such regulations as the Secretary of Energy determines are necessary to carry out this subsection.

"(6) There are authorized to be appropriated such sums as are necessary to carry out this subsection, to remain available until expended.

Deadline. Reports.

"(7) Not later than 1 year after the date of enactment of this section, the Secretary of Energy shall submit to Congress a report on the financing requirements of Indian tribes for energy development on Indian land.

"(d) PREFERENCE.—

"(1) In purchasing electricity or any other energy product or byproduct, a Federal agency or department may give preference to an energy and resource production enterprise, partnership, consortium, corporation, or other type of business organization the majority of the interest in which is owned and controlled by 1 or more Indian tribes.

"(2) In carrying out this subsection, a Federal agency or department shall not—

"(A) pay more than the prevailing market price for an energy product or byproduct; or

"(B) obtain less than prevailing market terms and conditions.

25 USC 3503.

"SEC. 2603. INDIAN TRIBAL ENERGY RESOURCE REGULATION.

"(a) GRANTS.—The Secretary may provide to Indian tribes, on an annual basis, grants for use in accordance with subsection (b).

"(b) USE OF FUNDS.—Funds from a grant provided under this section may be used—

"(1)(A) by an Indian tribe for the development of a tribal energy resource inventory or tribal energy resource on Indian land;

"(B) by an Indian tribe for the development of a feasibility study or other report necessary to the development of energy resources on Indian land;

"(C) by an Indian tribe (other than an Indian Tribe in the State of Alaska, except the Metlakatla Indian Community) for—

"(i) the development and enforcement of tribal laws (including regulations) relating to tribal energy resource development; and

"(ii) the development of technical infrastructure to protect the environment under applicable law; or

"(D) by a Native Corporation for the development and implementation of corporate policies and the development of technical infrastructure to protect the environment under applicable law; and

"(2) by an Indian tribe for the training of employees that—

"(A) are engaged in the development of energy resources on Indian land; or

"(B) are responsible for protecting the environment.

"(c) OTHER ASSISTANCE.—

"(1) In carrying out the obligations of the United States under this title, the Secretary shall ensure, to the maximum extent practicable and to the extent of available resources, that on the request of an Indian tribe, the Indian tribe shall

have available scientific and technical information and expertise, for use in the regulation, development, and management of energy resources of the Indian tribe on Indian land.

"(2) The Secretary may carry out paragraph (1)—

"(A) directly, through the use of Federal officials; or

"(B) indirectly, by providing financial assistance to an Indian tribe to secure independent assistance.

"SEC. 2604. LEASES, BUSINESS AGREEMENTS, AND RIGHTS-OF-WAY INVOLVING ENERGY DEVELOPMENT OR TRANSMISSION. 25 USC 3504.

"(a) LEASES AND BUSINESS AGREEMENTS.—In accordance with this section—

"(1) an Indian tribe may, at the discretion of the Indian tribe, enter into a lease or business agreement for the purpose of energy resource development on tribal land, including a lease or business agreement for—

"(A) exploration for, extraction of, processing of, or other development of the energy mineral resources of the Indian tribe located on tribal land; or

"(B) construction or operation of—

"(i) an electric generation, transmission, or distribution facility located on tribal land; or

"(ii) a facility to process or refine energy resources developed on tribal land; and

"(2) a lease or business agreement described in paragraph (1) shall not require review by or the approval of the Secretary under section 2103 of the Revised Statutes (25 U.S.C. 81), or any other provision of law, if—

"(A) the lease or business agreement is executed pursuant to a tribal energy resource agreement approved by the Secretary under subsection (e);

"(B) the term of the lease or business agreement does not exceed—

"(i) 30 years; or

"(ii) in the case of a lease for the production of oil resources, gas resources, or both, 10 years and as long thereafter as oil or gas is produced in paying quantities; and

"(C) the Indian tribe has entered into a tribal energy resource agreement with the Secretary, as described in subsection (e), relating to the development of energy resources on tribal land (including the periodic review and evaluation of the activities of the Indian tribe under the agreement, to be conducted pursuant to subsection (e)(2)(D)(i)).

"(b) RIGHTS-OF-WAY FOR PIPELINES OR ELECTRIC TRANSMISSION OR DISTRIBUTION LINES.—An Indian tribe may grant a right-of-way over tribal land for a pipeline or an electric transmission or distribution line without review or approval by the Secretary if—

"(1) the right-of-way is executed in accordance with a tribal energy resource agreement approved by the Secretary under subsection (e);

"(2) the term of the right-of-way does not exceed 30 years;

"(3) the pipeline or electric transmission or distribution line serves—

"(A) an electric generation, transmission, or distribution facility located on tribal land; or

"(B) a facility located on tribal land that processes or refines energy resources developed on tribal land; and

"(4) the Indian tribe has entered into a tribal energy resource agreement with the Secretary, as described in subsection (e), relating to the development of energy resources on tribal land (including the periodic review and evaluation of the activities of the Indian tribe under an agreement described in subparagraphs (D) and (E) of subsection (e)(2)).

"(c) RENEWALS.—A lease or business agreement entered into, or a right-of-way granted, by an Indian tribe under this section may be renewed at the discretion of the Indian tribe in accordance with this section.

"(d) VALIDITY.—No lease, business agreement, or right-of-way relating to the development of tribal energy resources under this section shall be valid unless the lease, business agreement, or right-of-way is authorized by a tribal energy resource agreement approved by the Secretary under subsection (e)(2).

"(e) TRIBAL ENERGY RESOURCE AGREEMENTS.—

"(1) On the date on which regulations are promulgated under paragraph (8), an Indian tribe may submit to the Secretary for approval a tribal energy resource agreement governing leases, business agreements, and rights-of-way under this section.

Deadlines.

"(2)(A) Not later than 270 days after the date on which the Secretary receives a tribal energy resource agreement from an Indian tribe under paragraph (1), or not later than 60 days after the Secretary receives a revised tribal energy resource agreement from an Indian tribe under paragraph (4)(C) (or a later date, as agreed to by the Secretary and the Indian tribe), the Secretary shall approve or disapprove the tribal energy resource agreement.

"(B) The Secretary shall approve a tribal energy resource agreement submitted under paragraph (1) if—

"(i) the Secretary determines that the Indian tribe has demonstrated that the Indian tribe has sufficient capacity to regulate the development of energy resources of the Indian tribe;

"(ii) the tribal energy resource agreement includes provisions required under subparagraph (D); and

"(iii) the tribal energy resource agreement includes provisions that, with respect to a lease, business agreement, or right-of-way under this section—

"(I) ensure the acquisition of necessary information from the applicant for the lease, business agreement, or right-of-way;

"(II) address the term of the lease or business agreement or the term of conveyance of the right-of-way;

"(III) address amendments and renewals;

"(IV) address the economic return to the Indian tribe under leases, business agreements, and rights-of-way;

"(V) address technical or other relevant requirements;

"(VI) establish requirements for environmental review in accordance with subparagraph (C);

"(VII) ensure compliance with all applicable environmental laws, including a requirement that each lease, business agreement, and right-of-way state that the lessee, operator, or right-of-way grantee shall comply with all such laws;

"(VIII) identify final approval authority;

"(IX) provide for public notification of final approvals;

"(X) establish a process for consultation with any affected States regarding off-reservation impacts, if any, identified under subparagraph (C)(i);

"(XI) describe the remedies for breach of the lease, business agreement, or right-of-way;

"(XII) require each lease, business agreement, and right-of-way to include a statement that, if any of its provisions violates an express term or requirement of the tribal energy resource agreement pursuant to which the lease, business agreement, or right-of-way was executed—

"(aa) the provision shall be null and void; and

"(bb) if the Secretary determines the provision to be material, the Secretary may suspend or rescind the lease, business agreement, or right-of-way or take other appropriate action that the Secretary determines to be in the best interest of the Indian tribe;

"(XIII) require each lease, business agreement, and right-of-way to provide that it will become effective on the date on which a copy of the executed lease, business agreement, or right-of-way is delivered to the Secretary in accordance with regulations promulgated under paragraph (8);

"(XIV) include citations to tribal laws, regulations, or procedures, if any, that set out tribal remedies that must be exhausted before a petition may be submitted to the Secretary under paragraph (7)(B);

"(XV) specify the financial assistance, if any, to be provided by the Secretary to the Indian tribe to assist in implementation of the tribal energy resource agreement, including environmental review of individual projects; and

"(XVI) in accordance with the regulations promulgated by the Secretary under paragraph (8), require that the Indian tribe, as soon as practicable after receipt of a notice by the Indian tribe, give written notice to the Secretary of—

"(aa) any breach or other violation by another party of any provision in a lease, business agreement, or right-of-way entered into under the tribal energy resource agreement; and

"(bb) any activity or occurrence under a lease, business agreement, or right-of-way that constitutes a violation of Federal or tribal environmental laws.

"(C) Tribal energy resource agreements submitted under paragraph (1) shall establish, and include provisions to ensure compliance with, an environmental review process that, with respect to a lease, business agreement, or right-of-way under this section, provides for, at a minimum—

"(i) the identification and evaluation of all significant environmental effects (as compared to a no-action alternative), including effects on cultural resources;

"(ii) the identification of proposed mitigation measures, if any, and incorporation of appropriate mitigation measures into the lease, business agreement, or right-of-way;

"(iii) a process for ensuring that—

"(I) the public is informed of, and has an opportunity to comment on, the environmental impacts of the proposed action; and

"(II) responses to relevant and substantive comments are provided, before tribal approval of the lease, business agreement, or right-of-way;

"(iv) sufficient administrative support and technical capability to carry out the environmental review process; and

"(v) oversight by the Indian tribe of energy development activities by any other party under any lease, business agreement, or right-of-way entered into pursuant to the tribal energy resource agreement, to determine whether the activities are in compliance with the tribal energy resource agreement and applicable Federal environmental laws.

"(D) A tribal energy resource agreement between the Secretary and an Indian tribe under this subsection shall include—

"(i) provisions requiring the Secretary to conduct a periodic review and evaluation to monitor the performance of the activities of the Indian tribe associated with the development of energy resources under the tribal energy resource agreement; and

"(ii) if a periodic review and evaluation, or an investigation, by the Secretary of any breach or violation described in a notice provided by the Indian tribe to the Secretary in accordance with subparagraph (B)(iii)(XVI), results in a finding by the Secretary of imminent jeopardy to a physical trust asset arising from a violation of the tribal energy resource agreement or applicable Federal laws, provisions authorizing the Secretary to take actions determined by the Secretary to be necessary to protect the asset, including reassumption of responsibility for activities associated with the development of energy resources on tribal land until the violation and any condition that caused the jeopardy are corrected.

"(E) Periodic review and evaluation under subparagraph (D) shall be conducted on an annual basis, except that, after the third annual review and evaluation, the Secretary and the Indian tribe may mutually agree to amend the tribal energy resource agreement to authorize

the review and evaluation under subparagraph (D) to be conducted once every 2 years.

"(3) The Secretary shall provide notice and opportunity for public comment on tribal energy resource agreements submitted for approval under paragraph (1). The Secretary's review of a tribal energy resource agreement shall be limited to activities specified by the provisions of the tribal energy resource agreement.

Notice. Public information.

"(4) If the Secretary disapproves a tribal energy resource agreement submitted by an Indian tribe under paragraph (1), the Secretary shall, not later than 10 days after the date of disapproval—

Deadline.

"(A) notify the Indian tribe in writing of the basis for the disapproval;

Notification.

"(B) identify what changes or other actions are required to address the concerns of the Secretary; and

"(C) provide the Indian tribe with an opportunity to revise and resubmit the tribal energy resource agreement.

"(5) If an Indian tribe executes a lease or business agreement, or grants a right-of-way, in accordance with a tribal energy resource agreement approved under this subsection, the Indian tribe shall, in accordance with the process and requirements under regulations promulgated under paragraph (8), provide to the Secretary—

"(A) a copy of the lease, business agreement, or right-of-way document (including all amendments to and renewals of the document); and

Records.

"(B) in the case of a tribal energy resource agreement or a lease, business agreement, or right-of-way that permits payments to be made directly to the Indian tribe, information and documentation of those payments sufficient to enable the Secretary to discharge the trust responsibility of the United States to enforce the terms of, and protect the rights of the Indian tribe under, the lease, business agreement, or right-of-way.

"(6)(A) In carrying out this section, the Secretary shall—

"(i) act in accordance with the trust responsibility of the United States relating to mineral and other trust resources; and

"(ii) act in good faith and in the best interests of the Indian tribes.

"(B) Subject to the provisions of subsections (a)(2), (b), and (c) waiving the requirement of Secretarial approval of leases, business agreements, and rights-of-way executed pursuant to tribal energy resource agreements approved under this section, and the provisions of subparagraph (D), nothing in this section shall absolve the United States from any responsibility to Indians or Indian tribes, including, but not limited to, those which derive from the trust relationship or from any treaties, statutes, and other laws of the United States, Executive orders, or agreements between the United States and any Indian tribe.

"(C) The Secretary shall continue to fulfill the trust obligation of the United States to ensure that the rights and interests of an Indian tribe are protected if—

"(i) any other party to a lease, business agreement, or right-of-way violates any applicable Federal law or the

terms of any lease, business agreement, or right-of-way under this section; or

"(ii) any provision in a lease, business agreement, or right-of-way violates the tribal energy resource agreement pursuant to which the lease, business agreement, or right-of-way was executed.

"(D)(i) In this subparagraph, the term 'negotiated term' means any term or provision that is negotiated by an Indian tribe and any other party to a lease, business agreement, or right-of-way entered into pursuant to an approved tribal energy resource agreement.

"(ii) Notwithstanding subparagraph (B), the United States shall not be liable to any party (including any Indian tribe) for any negotiated term of, or any loss resulting from the negotiated terms of, a lease, business agreement, or right-of-way executed pursuant to and in accordance with a tribal energy resource agreement approved by the Secretary under paragraph (2).

"(7)(A) In this paragraph, the term 'interested party' means any person (including an entity) that has demonstrated that an interest of the person has sustained, or will sustain, an adverse environmental impact as a result of the failure of an Indian tribe to comply with a tribal energy resource agreement of the Indian tribe approved by the Secretary under paragraph (2).

"(B) After exhaustion of any tribal remedy, and in accordance with regulations promulgated by the Secretary under paragraph (8), an interested party may submit to the Secretary a petition to review the compliance by an Indian tribe with a tribal energy resource agreement of the Indian tribe approved by the Secretary under paragraph (2).

Deadline.

"(C)(i) Not later than 20 days after the date on which the Secretary receives a petition under subparagraph (B), the Secretary shall—

Records.

"(I) provide to the Indian tribe a copy of the petition; and

"(II) consult with the Indian tribe regarding any noncompliance alleged in the petition.

Deadline.
Claims.

"(ii) Not later than 45 days after the date on which a consultation under clause (i)(II) takes place, the Indian tribe shall respond to any claim made in a petition under subparagraph (B).

"(iii) The Secretary shall act in accordance with subparagraphs (D) and (E) only if the Indian tribe—

"(I) denies, or fails to respond to, each claim made in the petition within the period described in clause (ii); or

"(II) fails, refuses, or is unable to cure or otherwise resolve each claim made in the petition within a reasonable period, as determined by the Secretary, after the expiration of the period described in clause (ii).

Deadline.

"(D)(i) Not later than 120 days after the date on which the Secretary receives a petition under subparagraph (B), the Secretary shall determine whether the Indian tribe is not in compliance with the tribal energy resource agreement.

"(ii) The Secretary may adopt procedures under paragraph (8) authorizing an extension of time, not to exceed 120 days,

for making the determination under clause (i) in any case in which the Secretary determines that additional time is necessary to evaluate the allegations of the petition.

"(iii) Subject to subparagraph (E), if the Secretary determines that the Indian tribe is not in compliance with the tribal energy resource agreement, the Secretary shall take such action as the Secretary determines to be necessary to ensure compliance with the tribal energy resource agreement, including—

"(I) temporarily suspending any activity under a lease, business agreement, or right-of-way under this section until the Indian tribe is in compliance with the approved tribal energy resource agreement; or

"(II) rescinding approval of all or part of the tribal energy resource agreement, and if all of the agreement is rescinded, reassuming the responsibility for approval of any future leases, business agreements, or rights-of-way described in subsection (a) or (b).

"(E) Before taking an action described in subparagraph (D)(iii), the Secretary shall—

"(i) make a written determination that describes the manner in which the tribal energy resource agreement has been violated;

"(ii) provide the Indian tribe with a written notice of the violations together with the written determination; and

Notice.

"(iii) before taking any action described in subparagraph (D)(iii) or seeking any other remedy, provide the Indian tribe with a hearing and a reasonable opportunity to attain compliance with the tribal energy resource agreement.

"(F) An Indian tribe described in subparagraph (E) shall retain all rights to appeal under any regulation promulgated by the Secretary.

"(8) Not later than 1 year after the date of enactment of the Energy Policy Act of 2005, the Secretary shall promulgate regulations that implement this subsection, including—

Deadline.
Regulations.

"(A) criteria to be used in determining the capacity of an Indian tribe under paragraph (2)(B)(i), including the experience of the Indian tribe in managing natural resources and financial and administrative resources available for use by the Indian tribe in implementing the approved tribal energy resource agreement of the Indian tribe;

"(B) a process and requirements in accordance with which an Indian tribe may—

"(i) voluntarily rescind a tribal energy resource agreement approved by the Secretary under this subsection; and

"(ii) return to the Secretary the responsibility to approve any future lease, business agreement, or right-of-way under this subsection;

"(C) provisions establishing the scope of, and procedures for, the periodic review and evaluation described in subparagraphs (D) and (E) of paragraph (2), including

provisions for review of transactions, reports, site inspections, and any other review activities the Secretary determines to be appropriate; and

"(D) provisions describing final agency actions after exhaustion of administrative appeals from determinations of the Secretary under paragraph (7).

"(f) NO EFFECT ON OTHER LAW.—Nothing in this section affects the application of—

"(1) any Federal environmental law;

"(2) the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.); or

"(3) except as otherwise provided in this title, the Indian Mineral Development Act of 1982 (25 U.S.C. 2101 et seq.).

"(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary such sums as are necessary for each of fiscal years 2006 through 2016 to carry out this section and to make grants or provide other appropriate assistance to Indian tribes to assist the Indian tribes in developing and implementing tribal energy resource agreements in accordance with this section.

25 USC 3505.

"SEC. 2605. FEDERAL POWER MARKETING ADMINISTRATIONS.

"(a) DEFINITIONS.—In this section:

"(1) The term 'Administrator' means the Administrator of the Bonneville Power Administration and the Administrator of the Western Area Power Administration.

"(2) The term 'power marketing administration' means—

"(A) the Bonneville Power Administration;

"(B) the Western Area Power Administration; and

"(C) any other power administration the power allocation of which is used by or for the benefit of an Indian tribe located in the service area of the administration.

"(b) ENCOURAGEMENT OF INDIAN TRIBAL ENERGY DEVELOPMENT.—Each Administrator shall encourage Indian tribal energy development by taking such actions as the Administrators determine to be appropriate, including administration of programs of the power marketing administration, in accordance with this section.

"(c) ACTION BY ADMINISTRATORS.—In carrying out this section, in accordance with laws in existence on the date of enactment of the Energy Policy Act of 2005—

"(1) each Administrator shall consider the unique relationship that exists between the United States and Indian tribes;

"(2) power allocations from the Western Area Power Administration to Indian tribes may be used to meet firming and reserve needs of Indian-owned energy projects on Indian land;

"(3) the Administrator of the Western Area Power Administration may purchase non-federally generated power from Indian tribes to meet the firming and reserve requirements of the Western Area Power Administration; and

"(4) each Administrator shall not—

"(A) pay more than the prevailing market price for an energy product; or

"(B) obtain less than prevailing market terms and conditions.

"(d) ASSISTANCE FOR TRANSMISSION SYSTEM USE.—

"(1) An Administrator may provide technical assistance to Indian tribes seeking to use the high-voltage transmission system for delivery of electric power.

"(2) The costs of technical assistance provided under paragraph (1) shall be funded—

"(A) by the Secretary of Energy using nonreimbursable funds appropriated for that purpose; or

"(B) by any appropriate Indian tribe.

"(e) POWER ALLOCATION STUDY.—Not later than 2 years after the date of enactment of the Energy Policy Act of 2005, the Secretary of Energy shall submit to Congress a report that— Deadline. Reports.

"(1) describes the use by Indian tribes of Federal power allocations of the power marketing administration (or power sold by the Southwestern Power Administration) to or for the benefit of Indian tribes in a service area of the power marketing administration; and

"(2) identifies—

"(A) the quantity of power allocated to, or used for the benefit of, Indian tribes by the Western Area Power Administration;

"(B) the quantity of power sold to Indian tribes by any other power marketing administration; and

"(C) barriers that impede tribal access to and use of Federal power, including an assessment of opportunities to remove those barriers and improve the ability of power marketing administrations to deliver Federal power.

"(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $750,000, non-reimbursable, to remain available until expended.

"SEC. 2606. WIND AND HYDROPOWER FEASIBILITY STUDY. 25 USC 3506.

"(a) STUDY.—The Secretary of Energy, in coordination with the Secretary of the Army and the Secretary, shall conduct a study of the cost and feasibility of developing a demonstration project that uses wind energy generated by Indian tribes and hydropower generated by the Army Corps of Engineers on the Missouri River to supply firming power to the Western Area Power Administration.

"(b) SCOPE OF STUDY.—The study shall—

"(1) determine the economic and engineering feasibility of blending wind energy and hydropower generated from the Missouri River dams operated by the Army Corps of Engineers, including an assessment of the costs and benefits of blending wind energy and hydropower compared to current sources used for firming power to the Western Area Power Administration;

"(2) review historical and projected requirements for, patterns of availability and use of, and reasons for historical patterns concerning the availability of firming power;

"(3) assess the wind energy resource potential on tribal land and projected cost savings through a blend of wind and hydropower over a 30-year period;

"(4) determine seasonal capacity needs and associated transmission upgrades for integration of tribal wind generation and identify costs associated with these activities;

"(5) include an independent tribal engineer and a Western Area Power Administration customer representative as study team members; and

"(6) incorporate, to the extent appropriate, the results of the Dakotas Wind Transmission study prepared by the Western Area Power Administration.

"(c) REPORT.—Not later than 1 year after the date of enactment of the Energy Policy Act of 2005, the Secretary of Energy, the Secretary, and the Secretary of the Army shall submit to Congress a report that describes the results of the study, including—

"(1) an analysis and comparison of the potential energy cost or benefits to the customers of the Western Area Power Administration through the use of combined wind and hydropower;

"(2) an economic and engineering evaluation of whether a combined wind and hydropower system can reduce reservoir fluctuation, enhance efficient and reliable energy production, and provide Missouri River management flexibility;

"(3) if found feasible, recommendations for a demonstration project to be carried out by the Western Area Power Administration, in partnership with an Indian tribal government or tribal energy resource development organization, and Western Area Power Administration customers to demonstrate the feasibility and potential of using wind energy produced on Indian land to supply firming energy to the Western Area Power Administration; and

"(4) an identification of—

"(A) the economic and environmental costs of, or benefits to be realized through, a Federal-tribal-customer partnership; and

"(B) the manner in which a Federal-tribal-customer partnership could contribute to the energy security of the United States.

"(d) FUNDING.—

"(1) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $1,000,000, to remain available until expended.

"(2) NONREIMBURSABILITY.—Costs incurred by the Secretary in carrying out this section shall be nonreimbursable.".

(b) CONFORMING AMENDMENTS.—The table of contents for the Energy Policy Act of 1992 is amended by striking the items relating to title XXVI and inserting the following:

"Sec. 2601. Definitions.
"Sec. 2602. Indian tribal energy resource development.
"Sec. 2603. Indian tribal energy resource regulation.
"Sec. 2604. Leases, business agreements, and rights-of-way involving energy development or transmission.
"Sec. 2605. Federal Power Marketing Administrations.
"Sec. 2606. Wind and hydropower feasibility study.".

25 USC 3501 note.

SEC. 504. CONSULTATION WITH INDIAN TRIBES.

In carrying out this title and the amendments made by this title, the Secretary and the Secretary of the Interior shall, as appropriate and to the maximum extent practicable, involve and consult with Indian tribes.

SEC. 505. FOUR CORNERS TRANSMISSION LINE PROJECT AND ELECTRIFICATION.

(a) TRANSMISSION LINE PROJECT.—The Dine Power Authority, an enterprise of the Navajo Nation, shall be eligible to receive grants and other assistance under section 217 of the Department of Energy Organization Act, as added by section 502, and section

2602 of the Energy Policy Act of 1992, as amended by this Act, for activities associated with the development of a transmission line from the Four Corners Area to southern Nevada, including related power generation opportunities.

(b) NAVAJO ELECTRIFICATION.—Section 602 of Public Law 106–511 (114 Stat. 2376) is amended—

(1) in subsection (a)—

(A) in the first sentence, by striking "5-year" and inserting "10-year"; and

(B) in the third sentence, by striking "2006" and inserting "2011"; and

(2) in the first sentence of subsection (e) by striking "2006" and inserting "2011".

SEC. 506. ENERGY EFFICIENCY IN FEDERALLY ASSISTED HOUSING. 42 USC 16001.

(a) IN GENERAL.—The Secretary of Housing and Urban Development shall promote energy conservation in housing that is located on Indian land and assisted with Federal resources through—

(1) the use of energy-efficient technologies and innovations (including the procurement of energy-efficient refrigerators and other appliances);

(2) the promotion of shared savings contracts; and

(3) the use and implementation of such other similar technologies and innovations as the Secretary of Housing and Urban Development considers to be appropriate.

(b) AMENDMENT.—Section 202(2) of the Native American Housing and Self-Determination Act of 1996 (25 U.S.C. 4132(2)) is amended by inserting "improvement to achieve greater energy efficiency," after "planning,".

TITLE VI—NUCLEAR MATTERS

Subtitle A—Price-Anderson Act Amendments

Price-Anderson Amendments Act of 2005.

SEC. 601. SHORT TITLE. 42 USC 2011 note.

This subtitle may be cited as the "Price-Anderson Amendments Act of 2005".

SEC. 602. EXTENSION OF INDEMNIFICATION AUTHORITY.

(a) INDEMNIFICATION OF NUCLEAR REGULATORY COMMISSION LICENSEES.—Section 170 c. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(c)) is amended—

(1) in the subsection heading, by striking "LICENSES" and inserting "LICENSEES"; and

(2) by striking "December 31, 2003" each place it appears and inserting "December 31, 2025".

(b) INDEMNIFICATION OF DEPARTMENT CONTRACTORS.—Section 170 d.(1)(A) of the Atomic Energy Act of 1954 (42 U.S.C. 2210(d)(1)(A)) is amended by striking "December 31, 2006" and inserting "December 31, 2025".

(c) INDEMNIFICATION OF NONPROFIT EDUCATIONAL INSTITUTIONS.—Section 170 k. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(k)) is amended by striking "August 1, 2002" each place it appears and inserting "December 31, 2025".

SEC. 603. MAXIMUM ASSESSMENT.

Section 170 of the Atomic Energy Act of 1954 (42 U.S.C. 2210) is amended—

(1) in the second proviso of the third sentence of subsection b.(1)—

(A) by striking "$63,000,000" and inserting "$95,800,000"; and

(B) by striking "$10,000,000 in any 1 year" and inserting "$15,000,000 in any 1 year (subject to adjustment for inflation under subsection t.)"; and

(2) in subsection t.(1)—

(A) by inserting "total and annual" after "amount of the maximum";

(B) by striking "the date of the enactment of the Price-Anderson Amendments Act of 1988" and inserting "August 20, 2003"; and

(C) in subparagraph (A), by striking "such date of enactment" and inserting "August 20, 2003".

SEC. 604. DEPARTMENT LIABILITY LIMIT.

(a) INDEMNIFICATION OF DEPARTMENT CONTRACTORS.—Section 170 d. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(d)) is amended by striking paragraph (2) and inserting the following:

"(2) In an agreement of indemnification entered into under paragraph (1), the Secretary—

"(A) may require the contractor to provide and maintain financial protection of such a type and in such amounts as the Secretary shall determine to be appropriate to cover public liability arising out of or in connection with the contractual activity; and

"(B) shall indemnify the persons indemnified against such liability above the amount of the financial protection required, in the amount of $10,000,000,000 (subject to adjustment for inflation under subsection t.), in the aggregate, for all persons indemnified in connection with the contract and for each nuclear incident, including such legal costs of the contractor as are approved by the Secretary.".

(b) CONTRACT AMENDMENTS.—Section 170 d. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(d)) is further amended by striking paragraph (3) and inserting the following—

"(3) All agreements of indemnification under which the Department of Energy (or its predecessor agencies) may be required to indemnify any person under this section shall be deemed to be amended, on the date of enactment of the Price-Anderson Amendments Act of 2005, to reflect the amount of indemnity for public liability and any applicable financial protection required of the contractor under this subsection.".

(c) LIABILITY LIMIT.—Section 170 e.(1)(B) of the Atomic Energy Act of 1954 (42 U.S.C. 2210(e)(1)(B)) is amended—

(1) by striking "the maximum amount of financial protection required under subsection b. or"; and

(2) by striking "paragraph (3) of subsection d., whichever amount is more" and inserting "paragraph (2) of subsection d.".

SEC. 605. INCIDENTS OUTSIDE THE UNITED STATES.

(a) AMOUNT OF INDEMNIFICATION.—Section 170 d.(5) of the Atomic Energy Act of 1954 (42 U.S.C. 2210(d)(5)) is amended by striking "$100,000,000" and inserting "$500,000,000".

(b) LIABILITY LIMIT.—Section 170 e.(4) of the Atomic Energy Act of 1954 (42 U.S.C. 2210(e)(4)) is amended by striking "$100,000,000" and inserting "$500,000,000".

SEC. 606. REPORTS.

Section 170 p. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(p)) is amended by striking "August 1, 1998" and inserting "December 31, 2021".

SEC. 607. INFLATION ADJUSTMENT.

Section 170 t. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(t)) is amended—

(1) by redesignating paragraph (2) as paragraph (3); and

(2) by inserting after paragraph (1) the following:

"(2) The Secretary shall adjust the amount of indemnification provided under an agreement of indemnification under subsection d. not less than once during each 5-year period following July 1, 2003, in accordance with the aggregate percentage change in the Consumer Price Index since—

"(A) that date, in the case of the first adjustment under this paragraph; or

"(B) the previous adjustment under this paragraph.".

SEC. 608. TREATMENT OF MODULAR REACTORS.

Section 170 b. of the Atomic Energy Act of 1954 (42 U.S.C. 2210(b)) is amended by adding at the end the following:

"(5)(A) For purposes of this section only, the Commission shall consider a combination of facilities described in subparagraph (B) to be a single facility having a rated capacity of 100,000 electrical kilowatts or more.

"(B) A combination of facilities referred to in subparagraph (A) is two or more facilities located at a single site, each of which has a rated capacity of 100,000 electrical kilowatts or more but not more than 300,000 electrical kilowatts, with a combined rated capacity of not more than 1,300,000 electrical kilowatts.".

SEC. 609. APPLICABILITY.

42 USC 2210 note.

The amendments made by sections 603, 604, and 605 do not apply to a nuclear incident that occurs before the date of the enactment of this Act.

SEC. 610. CIVIL PENALTIES.

(a) REPEAL OF AUTOMATIC REMISSION.—Section 234A b.(2) of the Atomic Energy Act of 1954 (42 U.S.C. 2282a(b)(2)) is amended by striking the last sentence.

(b) LIMITATION FOR NOT-FOR-PROFIT INSTITUTIONS.—Subsection d. of section 234A of the Atomic Energy Act of 1954 (42 U.S.C. 2282a(d)) is amended to read as follows:

"d.(1) Notwithstanding subsection a., in the case of any not-for-profit contractor, subcontractor, or supplier, the total amount of civil penalties paid under subsection a. may not exceed the total amount of fees paid within any 1-year period (as determined by the Secretary) under the contract under which the violation occurs.

"(2) For purposes of this section, the term 'not-for-profit' means that no part of the net earnings of the contractor, subcontractor, or supplier inures to the benefit of any natural person or for-profit artificial person.".

42 USC 2282a note.

(c) EFFECTIVE DATE.—The amendments made by this section shall not apply to any violation of the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) occurring under a contract entered into before the date of enactment of this section.

Subtitle B—General Nuclear Matters

SEC. 621. LICENSES.

Section 103 c. of the Atomic Energy Act of 1954 (42 U.S.C. 2133(c)) is amended by inserting "from the authorization to commence operations" after "forty years".

SEC. 622. NUCLEAR REGULATORY COMMISSION SCHOLARSHIP AND FELLOWSHIP PROGRAM.

(a) IN GENERAL.—Chapter 19 of the Atomic Energy Act of 1954 is amended by inserting after section 242 (42 U.S.C. 2015a) the following:

42 USC 2015b.

"SEC. 243. SCHOLARSHIP AND FELLOWSHIP PROGRAM.

"a. SCHOLARSHIP PROGRAM.—To enable students to study, for at least 1 academic semester or equivalent term, science, engineering, or another field of study that the Commission determines is in a critical skill area related to the regulatory mission of the Commission, the Commission may carry out a program to—

"(1) award scholarships to undergraduate students who—

"(A) are United States citizens; and

"(B) enter into an agreement under subsection c. to be employed by the Commission in the area of study for which the scholarship is awarded.

"b. FELLOWSHIP PROGRAM.—To enable students to pursue education in science, engineering, or another field of study that the Commission determines is in a critical skill area related to its regulatory mission, in a graduate or professional degree program offered by an institution of higher education in the United States, the Commission may carry out a program to—

"(1) award fellowships to graduate students who—

"(A) are United States citizens; and

"(B) enter into an agreement under subsection c. to be employed by the Commission in the area of study for which the fellowship is awarded.

"c. REQUIREMENTS.—

"(1) IN GENERAL.—As a condition of receiving a scholarship or fellowship under subsection a. or b., a recipient of the scholarship or fellowship shall enter into an agreement with the Commission under which, in return for the assistance, the recipient shall—

"(A) maintain satisfactory academic progress in the studies of the recipient, as determined by criteria established by the Commission;

"(B) agree that failure to maintain satisfactory academic progress shall constitute grounds on which the Commission may terminate the assistance;

"(C) on completion of the academic course of study in connection with which the assistance was provided, and in accordance with criteria established by the Commission, engage in employment by the Commission for a period specified by the Commission, that shall be not less than 1 time and not more than 3 times the period for which the assistance was provided; and

"(D) if the recipient fails to meet the requirements of subparagraph (A), (B), or (C), reimburse the United States Government for—

"(i) the entire amount of the assistance provided the recipient under the scholarship or fellowship; and

"(ii) interest at a rate determined by the Commission.

"(2) WAIVER OR SUSPENSION.—The Commission may establish criteria for the partial or total waiver or suspension of any obligation of service or payment incurred by a recipient of a scholarship or fellowship under this section.

"d. COMPETITIVE PROCESS.—Recipients of scholarships or fellowships under this section shall be selected through a competitive process primarily on the basis of academic merit and such other criteria as the Commission may establish, with consideration given to financial need and the goal of promoting the participation of individuals identified in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a, 1885b).

"e. DIRECT APPOINTMENT.—The Commission may appoint directly, with no further competition, public notice, or consideration of any other potential candidate, an individual who has—

"(1) received a scholarship or fellowship awarded by the Commission under this section; and

"(2) completed the academic program for which the scholarship or fellowship was awarded.".

(b) CONFORMING AMENDMENT.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) is amended by adding after the item relating to section 242 the following:

"Sec. 243. Scholarship and fellowship program.".

SEC. 623. COST RECOVERY FROM GOVERNMENT AGENCIES.

Section 161 w. of the Atomic Energy Act of 1954 (42 U.S.C. 2201(w)) is amended—

(1) by striking "for or is issued" and all that follows through "1702" and inserting "to the Commission for, or is issued by the Commission, a license or certificate";

(2) by striking "483a" and inserting "9701"; and

(3) by striking ", of applicants for, or holders of, such licenses or certificates".

SEC. 624. ELIMINATION OF PENSION OFFSET FOR CERTAIN REHIRED FEDERAL RETIREES.

(a) IN GENERAL.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201 et seq.) is amended by adding at the end the following:

42 USC 2210c.

"SEC. 170C. ELIMINATION OF PENSION OFFSET FOR CERTAIN REHIRED FEDERAL RETIREES.

"a. IN GENERAL.—The Commission may waive the application of section 8344 or 8468 of title 5, United States Code, on a case-by-case basis for employment of an annuitant—

"(1) in a position of the Commission for which there is exceptional difficulty in recruiting or retaining a qualified employee; or

"(2) when a temporary emergency hiring need exists.

"b. PROCEDURES.—The Commission shall prescribe procedures for the exercise of authority under this section, including—

"(1) criteria for any exercise of authority; and

"(2) procedures for a delegation of authority.

"c. EFFECT OF WAIVER.—An employee as to whom a waiver under this section is in effect shall not be considered an employee for purposes of subchapter II of chapter 83, or chapter 84, of title 5, United States Code.".

(b) CONFORMING AMENDMENT.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) is amended by adding at the end of the items relating to chapter 14 the following:

"Sec. 170C. Elimination of pension offset for certain rehired Federal retirees.".

SEC. 625. ANTITRUST REVIEW.

Section 105 c. of the Atomic Energy Act of 1954 (42 U.S.C. 2135(c)) is amended by adding at the end the following:

"(9) APPLICABILITY.—This subsection does not apply to an application for a license to construct or operate a utilization facility or production facility under section 103 or 104 b. that is filed on or after the date of enactment of this paragraph.".

SEC. 626. DECOMMISSIONING.

Section 161 i. of the Atomic Energy Act of 1954 (42 U.S.C. 2201(i)) is amended—

(1) by striking "and (3)" and inserting "(3)"; and

(2) by inserting before the semicolon at the end the following: ", and (4) to ensure that sufficient funds will be available for the decommissioning of any production or utilization facility licensed under section 103 or 104 b., including standards and restrictions governing the control, maintenance, use, and disbursement by any former licensee under this Act that has control over any fund for the decommissioning of the facility".

SEC. 627. LIMITATION ON LEGAL FEE REIMBURSEMENT.

Title II of the Energy Reorganization Act of 1974 (42 U.S.C. 5841 et seq.) is amended by adding at the end the following new section:

"LIMITATION ON LEGAL FEE REIMBURSEMENT

42 USC 5853.

"SEC. 212. The Department of Energy shall not, except as required under a contract entered into before the date of enactment of this section, reimburse any contractor or subcontractor of the Department for any legal fees or expenses incurred with respect to a complaint subsequent to—

"(1) an adverse determination on the merits with respect to such complaint against the contractor or subcontractor by the Director of the Department of Energy's Office of Hearings

and Appeals pursuant to part 708 of title 10, Code of Federal Regulations, or by a Department of Labor Administrative Law Judge pursuant to section 211 of this Act; or

"(2) an adverse final judgment by any State or Federal court with respect to such complaint against the contractor or subcontractor for wrongful termination or retaliation due to the making of disclosures protected under chapter 12 of title 5, United States Code, section 211 of this Act, or any comparable State law,

unless the adverse determination or final judgment is reversed upon further administrative or judicial review.".

SEC. 628. DECOMMISSIONING PILOT PROGRAM.

(a) PILOT PROGRAM.—The Secretary shall establish a decommissioning pilot program under which the Secretary shall decommission and decontaminate the sodium-cooled fast breeder experimental test-site reactor located in northwest Arkansas, in accordance with the decommissioning activities contained in the report of the Department relating to the reactor, dated August 31, 1998.

(b) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out this section $16,000,000.

SEC. 629. WHISTLEBLOWER PROTECTION.

(a) DEFINITION OF EMPLOYER.—Section 211(a)(2) of the Energy Reorganization Act of 1974 (42 U.S.C. 5851(a)(2)) is amended—

(1) in subparagraph (C), by striking "and" at the end;

(2) in subparagraph (D), by striking the period at the end and inserting a semicolon; and

(3) by adding at the end the following:

"(E) a contractor or subcontractor of the Commission;

"(F) the Commission; and

"(G) the Department of Energy.".

(b) DE NOVO REVIEW.—Subsection (b) of such section 211 is amended by adding at the end the following new paragraph:

"(4) If the Secretary has not issued a final decision within 1 year after the filing of a complaint under paragraph (1), and there is no showing that such delay is due to the bad faith of the person seeking relief under this paragraph, such person may bring an action at law or equity for de novo review in the appropriate district court of the United States, which shall have jurisdiction over such an action without regard to the amount in controversy.". Deadline.

SEC. 630. MEDICAL ISOTOPE PRODUCTION.

Section 134 of the Atomic Energy Act of 1954 (42 U.S.C. 2160d) is amended—

(1) in subsection a., by striking "a. The Commission" and inserting "a. IN GENERAL.—Except as provided in subsection b., the Commission";

(2) by redesignating subsection b. as subsection c.; and

(3) by inserting after subsection a. the following:

"b. MEDICAL ISOTOPE PRODUCTION.—

"(1) DEFINITIONS.—In this subsection:

"(A) HIGHLY ENRICHED URANIUM.—The term 'highly enriched uranium' means uranium enriched to include concentration of U–235 above 20 percent.

"(B) MEDICAL ISOTOPE.—The term 'medical isotope' includes Molybdenum 99, Iodine 131, Xenon 133, and other radioactive materials used to produce a radiopharmaceutical for diagnostic, therapeutic procedures or for research and development.

"(C) RADIOPHARMACEUTICAL.—The term 'radiopharmaceutical' means a radioactive isotope that—

"(i) contains byproduct material combined with chemical or biological material; and

"(ii) is designed to accumulate temporarily in a part of the body for therapeutic purposes or for enabling the production of a useful image for use in a diagnosis of a medical condition.

"(D) RECIPIENT COUNTRY.—The term 'recipient country' means Canada, Belgium, France, Germany, and the Netherlands.

"(2) LICENSES.—The Commission may issue a license authorizing the export (including shipment to and use at intermediate and ultimate consignees specified in the license) to a recipient country of highly enriched uranium for medical isotope production if, in addition to any other requirements of this Act (except subsection a.), the Commission determines that—

"(A) a recipient country that supplies an assurance letter to the United States Government in connection with the consideration by the Commission of the export license application has informed the United States Government that any intermediate consignees and the ultimate consignee specified in the application are required to use the highly enriched uranium solely to produce medical isotopes; and

"(B) the highly enriched uranium for medical isotope production will be irradiated only in a reactor in a recipient country that—

"(i) uses an alternative nuclear reactor fuel; or

"(ii) is the subject of an agreement with the United States Government to convert to an alternative nuclear reactor fuel when alternative nuclear reactor fuel can be used in the reactor.

"(3) REVIEW OF PHYSICAL PROTECTION REQUIREMENTS.—

"(A) IN GENERAL.—The Commission shall review the adequacy of physical protection requirements that, as of the date of an application under paragraph (2), are applicable to the transportation and storage of highly enriched uranium for medical isotope production or control of residual material after irradiation and extraction of medical isotopes.

"(B) IMPOSITION OF ADDITIONAL REQUIREMENTS.—If the Commission determines that additional physical protection requirements are necessary (including a limit on the quantity of highly enriched uranium that may be contained in a single shipment), the Commission shall impose such requirements as license conditions or through other appropriate means.

"(4) FIRST REPORT TO CONGRESS.—

"(A) NAS STUDY.—The Secretary shall enter into an arrangement with the National Academy of Sciences to conduct a study to determine— Contracts.

"(i) the feasibility of procuring supplies of medical isotopes from commercial sources that do not use highly enriched uranium;

"(ii) the current and projected demand and availability of medical isotopes in regular current domestic use;

"(iii) the progress that is being made by the Department of Energy and others to eliminate all use of highly enriched uranium in reactor fuel, reactor targets, and medical isotope production facilities; and

"(iv) the potential cost differential in medical isotope production in the reactors and target processing facilities if the products were derived from production systems that do not involve fuels and targets with highly enriched uranium.

"(B) FEASIBILITY.—For the purpose of this subsection, the use of low enriched uranium to produce medical isotopes shall be determined to be feasible if—

"(i) low enriched uranium targets have been developed and demonstrated for use in the reactors and target processing facilities that produce significant quantities of medical isotopes to serve United States needs for such isotopes;

"(ii) sufficient quantities of medical isotopes are available from low enriched uranium targets and fuel to meet United States domestic needs; and

"(iii) the average anticipated total cost increase from production of medical isotopes in such facilities without use of highly enriched uranium is less than 10 percent.

"(C) REPORT BY THE SECRETARY.—Not later than 5 years after the date of enactment of the Energy Policy Act of 2005, the Secretary shall submit to Congress a report that—

"(i) contains the findings of the National Academy of Sciences made in the study under subparagraph (A); and

"(ii) discloses the existence of any commitments from commercial producers to provide domestic requirements for medical isotopes without use of highly enriched uranium consistent with the feasibility criteria described in subparagraph (B) not later than the date that is 4 years after the date of submission of the report.

"(5) SECOND REPORT TO CONGRESS.—If the study of the National Academy of Sciences determines under paragraph (4)(A)(i) that the procurement of supplies of medical isotopes from commercial sources that do not use highly enriched uranium is feasible, but the Secretary is unable to report the existence of commitments under paragraph (4)(C)(ii), not later than the date that is 6 years after the date of enactment of the Energy Policy Act of 2005, the Secretary shall submit to Congress a report that describes options for developing domestic supplies of medical isotopes in quantities that are

adequate to meet domestic demand without the use of highly enriched uranium consistent with the cost increase described in paragraph (4)(B)(iii).

"(6) CERTIFICATION.—At such time as commercial facilities that do not use highly enriched uranium are capable of meeting domestic requirements for medical isotopes, within the cost increase described in paragraph (4)(B)(iii) and without impairing the reliable supply of medical isotopes for domestic utilization, the Secretary shall submit to Congress a certification to that effect.

"(7) SUNSET PROVISION.—After the Secretary submits a certification under paragraph (6), the Commission shall, by rule, terminate its review of export license applications under this subsection.".

SEC. 631. SAFE DISPOSAL OF GREATER-THAN-CLASS C RADIOACTIVE WASTE.

Notification.

(a) RESPONSIBILITY FOR ACTIVITIES TO PROVIDE STORAGE FACILITY.—The Secretary shall provide to Congress official notification of the final designation of an entity within the Department to have the responsibility of completing activities needed to provide a facility for safely disposing of all greater-than-Class C low-level radioactive waste.

(b) REPORTS AND PLANS.—

(1) REPORT ON PERMANENT DISPOSAL FACILITY.—

(A) PLAN REGARDING COST AND SCHEDULE FOR COMPLETION OF EIS AND ROD.—Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with Congress, shall submit to Congress a report containing an estimate of the cost and a proposed schedule to complete an environmental impact statement and record of decision for a permanent disposal facility for greater-than-Class C radioactive waste.

(B) ANALYSIS OF ALTERNATIVES.—Before the Secretary makes a final decision on the disposal alternative or alternatives to be implemented, the Secretary shall—

(i) submit to Congress a report that describes all alternatives under consideration, including all information required in the comprehensive report making recommendations for ensuring the safe disposal of all greater-than-Class C low-level radioactive waste that was submitted by the Secretary to Congress in February 1987; and

(ii) await action by Congress.

(2) SHORT-TERM PLAN FOR RECOVERY AND STORAGE.—

Deadline.

(A) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to Congress a plan to ensure the continued recovery and storage of greater-than-Class C low-level radioactive sealed sources that pose a security threat until a permanent disposal facility is available.

(B) CONTENTS.—The plan shall address estimated cost, resource, and facility needs.

SEC. 632. PROHIBITION ON NUCLEAR EXPORTS TO COUNTRIES THAT SPONSOR TERRORISM.

(a) IN GENERAL.—Section 129 of the Atomic Energy Act of 1954 (42 U.S.C. 2158) is amended—

(1) by inserting "a." before "No nuclear materials and equipment"; and

(2) by adding at the end the following new subsection:

"b.(1) Notwithstanding any other provision of law, including specifically section 121 of this Act, and except as provided in paragraphs (2) and (3), no nuclear materials and equipment or sensitive nuclear technology, including items and assistance authorized by section 57 b. of this Act and regulated under part 810 of title 10, Code of Federal Regulations, and nuclear-related items on the Commerce Control List maintained under part 774 of title 15 of the Code of Federal Regulations, shall be exported or reexported, or transferred or retransferred whether directly or indirectly, and no Federal agency shall issue any license, approval, or authorization for the export or reexport, or transfer, or retransfer, whether directly or indirectly, of these items or assistance (as defined in this paragraph) to any country whose government has been identified by the Secretary of State as engaged in state sponsorship of terrorist activities (specifically including any country the government of which has been determined by the Secretary of State under section 620A(a) of the Foreign Assistance Act of 1961 (22 U.S.C. 2371(a)), section 6(j)(1) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(1)), or section 40(d) of the Arms Export Control Act (22 U.S.C. 2780(d)) to have repeatedly provided support for acts of international terrorism).

"(2) This subsection shall not apply to exports, reexports, transfers, or retransfers of radiation monitoring technologies, surveillance equipment, seals, cameras, tamper-indication devices, nuclear detectors, monitoring systems, or equipment necessary to safely store, transport, or remove hazardous materials, whether such items, services, or information are regulated by the Department of Energy, the Department of Commerce, or the Commission, except to the extent that such technologies, equipment, seals, cameras, devices, detectors, or systems are available for use in the design or construction of nuclear reactors or nuclear weapons.

"(3) The President may waive the application of paragraph (1) to a country if the President determines and certifies to Congress that the waiver will not result in any increased risk that the country receiving the waiver will acquire nuclear weapons, nuclear reactors, or any materials or components of nuclear weapons and—

"(A) the government of such country has not within the preceding 12-month period willfully aided or abetted the international proliferation of nuclear explosive devices to individuals or groups or willfully aided and abetted an individual or groups in acquiring unsafeguarded nuclear materials;

"(B) in the judgment of the President, the government of such country has provided adequate, verifiable assurances that it will cease its support for acts of international terrorism;

"(C) the waiver of that paragraph is in the vital national security interest of the United States; or

"(D) such a waiver is essential to prevent or respond to a serious radiological hazard in the country receiving the waiver that may or does threaten public health and safety.".

(b) APPLICABILITY TO EXPORTS APPROVED FOR TRANSFER BUT NOT TRANSFERRED.—Subsection b. of section 129 of Atomic Energy Act of 1954, as added by subsection (a) of this section, shall apply with respect to exports that have been approved for transfer as

42 USC 2158 note.

of the date of the enactment of this Act but have not yet been transferred as of that date.

SEC. 633. EMPLOYEE BENEFITS.

Section 3110(a) of the USEC Privatization Act (42 U.S.C. 2297h–8(a)) is amended by adding at the end the following new paragraph:

Deadline. Ohio. Kentucky.

"(8) CONTINUITY OF BENEFITS.—To the extent appropriations are provided in advance for this purpose or are otherwise available, not later than 30 days after the date of enactment of this paragraph, the Secretary shall implement such actions as are necessary to ensure that any employee who—

"(A) is involved in providing infrastructure or environmental remediation services at the Portsmouth, Ohio, or the Paducah, Kentucky, Gaseous Diffusion Plant;

"(B) has been an employee of the Department of Energy's predecessor management and integrating contractor (or its first or second tier subcontractors), or of the Corporation, at the Portsmouth, Ohio, or the Paducah, Kentucky, facility; and

"(C) was eligible as of April 1, 2005, to participate in or transfer into the Multiple Employer Pension Plan or the associated multiple employer retiree health care benefit plans, as defined in those plans,

shall continue to be eligible to participate in or transfer into such pension or health care benefit plans.".

42 USC 16011.

SEC. 634. DEMONSTRATION HYDROGEN PRODUCTION AT EXISTING NUCLEAR POWER PLANTS.

(a) DEMONSTRATION PROJECTS.—The Secretary shall provide for the establishment of 2 projects in geographic areas that are regionally and climatically diverse to demonstrate the commercial production of hydrogen at existing nuclear power plants.

(b) ECONOMIC ANALYSIS.—Prior to making an award under subsection (a), the Secretary shall determine whether the use of existing nuclear power plants is a cost-effective means of producing hydrogen.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for the purposes of carrying out this section not more than $100,000,000.

42 USC 16012.

SEC. 635. PROHIBITION ON ASSUMPTION BY UNITED STATES GOVERNMENT OF LIABILITY FOR CERTAIN FOREIGN INCIDENTS.

(a) IN GENERAL.—Notwithstanding any other provision of law, no officer of the United States or of any department, agency, or instrumentality of the United States Government may enter into any contract or other arrangement, or into any amendment or modification of a contract or other arrangement, the purpose or effect of which would be to directly or indirectly impose liability on the United States Government, or any department, agency, or instrumentality of the United States Government, or to otherwise directly or indirectly require an indemnity by the United States Government, for nuclear incidents occurring in connection with the design, construction, or operation of a production facility or utilization facility in any country whose government has been identified by the Secretary of State as engaged in state sponsorship of terrorist activities (specifically including any country the government of which, as of September 11, 2001, had been determined by the Secretary of State under section 620A(a) of the Foreign

Assistance Act of 1961 (22 U.S.C. 2371(a)), section 6(j)(1) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(1)), or section 40(d) of the Arms Export Control Act (22 U.S.C. 2780(d)) to have repeatedly provided support for acts of international terrorism). This section shall not apply to nuclear incidents occurring as a result of missions, carried out under the direction of the Secretary, the Secretary of Defense, or the Secretary of State, that are necessary to safely secure, store, transport, or remove nuclear materials for nuclear safety or nonproliferation purposes.

(b) DEFINITIONS.—The terms used in this section shall have the same meaning as those terms have under section 11 of the Atomic Energy Act of 1954 (42 U.S.C. 2014), unless otherwise expressly provided in this section.

SEC. 636. AUTHORIZATION OF APPROPRIATIONS. 42 USC 16013.

There are authorized to be appropriated such sums as are necessary to carry out this subtitle and the amendments made by this subtitle.

SEC. 637. NUCLEAR REGULATORY COMMISSION USER FEES AND ANNUAL CHARGES.

(a) IN GENERAL.—Section 6101 of the Omnibus Budget Reconciliation Act of 1990 (42 U.S.C. 2214) is amended—

(1) in subsection (a)—

(A) by striking "Except as provided in paragraph (3), the" and inserting "The" in paragraph (1); and

(B) by striking paragraph (3); and

(2) in subsection (c)—

(A) by striking "and" at the end of paragraph (2)(A)(i);

(B) by striking the period at the end of paragraph (2)(A)(ii) and inserting a semicolon;

(C) by adding at the end of paragraph (2)(A) the following new clauses:

"(iii) amounts appropriated to the Commission for the fiscal year for implementation of section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005; and

"(iv) amounts appropriated to the Commission for homeland security activities of the Commission for the fiscal year, except for the costs of fingerprinting and background checks required by section 149 of the Atomic Energy Act of 1954 (42 U.S.C. 2169) and the costs of conducting security inspections."; and

(D) by amending paragraph (2)(B)(v) to read as follows:

"(v) 90 percent for fiscal year 2005 and each fiscal year thereafter.".

(b) REPEAL.—Section 7601 of the Consolidated Omnibus Budget Reconciliation Act of 1985 (42 U.S.C. 2213) is repealed.

(c) EFFECTIVE DATE.—The amendments made by this section take effect on October 1, 2006. 42 USC 2214 note.

SEC. 638. STANDBY SUPPORT FOR CERTAIN NUCLEAR PLANT DELAYS. 42 USC 16014.

(a) DEFINITIONS.—In this section:

(1) ADVANCED NUCLEAR FACILITY.—The term "advanced nuclear facility" means any nuclear facility the reactor design for which is approved after December 31, 1993, by the Commission (and such design or a substantially similar design of comparable capacity was not approved on or before that date).

(2) COMBINED LICENSE.—The term "combined license" means a combined construction and operating license for an advanced nuclear facility issued by the Commission.

(3) COMMISSION.—The term "Commission" means the Nuclear Regulatory Commission.

(4) SPONSOR.—The term "sponsor" means a person who has applied for or been granted a combined license.

(b) CONTRACT AUTHORITY.—

(1) IN GENERAL.—The Secretary may enter into contracts under this section with sponsors of an advanced nuclear facility that cover a total of 6 reactors, with the 6 reactors consisting of not more than 3 different reactor designs, in accordance with paragraph (2).

(2) REQUIREMENT FOR CONTRACTS.—

(A) DEFINITION OF LOAN COST.—In this paragraph, the term "loan cost" has the meaning given the term "cost of a loan guarantee" under section 502(5)(C) of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a(5)(C)).

(B) ESTABLISHMENT OF ACCOUNTS.—There is established in the Department 2 separate accounts, which shall be known as the—

(i) "Standby Support Program Account"; and

(ii) "Standby Support Grant Account".

(C) REQUIREMENT.—The Secretary shall not enter into a contract under this section unless the Secretary deposits—

(i) in the Standby Support Program Account established under subparagraph (B), funds appropriated to the Secretary in advance of the contract or a combination of appropriated funds and loan guarantee fees that are in an amount sufficient to cover the loan costs described in subsection (d)(5)(A); and

(ii) in the Standby Support Grant Account established under subparagraph (B), funds appropriated to the Secretary in advance of the contract, paid to the Secretary by the sponsor of the advanced nuclear facility, or a combination of appropriations and payments that are in an amount sufficient cover the costs described in subparagraphs (B), (C), and (D) of subsection (d)(5).

(c) COVERED DELAYS.—

(1) INCLUSIONS.—Under each contract authorized by this section, the Secretary shall pay the costs specified in subsection (d), using funds appropriated or collected for the covered costs, if full power operation of the advanced nuclear facility is delayed by—

(A) the failure of the Commission to comply with schedules for review and approval of inspections, tests, analyses, and acceptance criteria established under the combined license or the conduct of preoperational hearings by the Commission for the advanced nuclear facility; or

(B) litigation that delays the commencement of full-power operations of the advanced nuclear facility.

(2) EXCLUSIONS.—The Secretary may not enter into any contract under this section that would obligate the Secretary to pay any costs resulting from—

(A) the failure of the sponsor to take any action required by law or regulation;

(B) events within the control of the sponsor; or

(C) normal business risks.

(d) COVERED COSTS.—

(1) IN GENERAL.—Subject to paragraphs (2), (3), and (4), the costs that shall be paid by the Secretary pursuant to a contract entered into under this section are the costs that result from a delay covered by the contract.

(2) INITIAL 2 REACTORS.—In the case of the first 2 reactors that receive combined licenses and on which construction is commenced, the Secretary shall pay—

(A) 100 percent of the covered costs of delay; but

(B) not more than $500,000,000 per contract.

(3) SUBSEQUENT 4 REACTORS.—In the case of the next 4 reactors that receive a combined license and on which construction is commenced, the Secretary shall pay—

(A) 50 percent of the covered costs of delay that occur after the initial 180-day period of covered delay; but

(B) not more than $250,000,000 per contract.

(4) CONDITIONS ON PAYMENT OF CERTAIN COVERED COSTS.—

(A) IN GENERAL.—The obligation of the Secretary to pay the covered costs described in subparagraph (B) of paragraph (5) is subject to the Secretary receiving from appropriations or payments from other non-Federal sources amounts sufficient to pay the covered costs.

(B) NON-FEDERAL SOURCES.—The Secretary may receive and accept payments from any non-Federal source, which shall be made available without further appropriation for the payment of the covered costs.

(5) TYPES OF COVERED COSTS.—Subject to paragraphs (2), (3), and (4), the contract entered into under this section for an advanced nuclear facility shall include as covered costs those costs that result from a delay during construction and in gaining approval for fuel loading and full-power operation, including—

(A) principal or interest on any debt obligation of an advanced nuclear facility owned by a non-Federal entity; and

(B) the incremental difference between—

(i) the fair market price of power purchased to meet the contractual supply agreements that would have been met by the advanced nuclear facility but for the delay; and

(ii) the contractual price of power from the advanced nuclear facility subject to the delay.

(e) REQUIREMENTS.—Any contract between a sponsor and the Secretary covering an advanced nuclear facility under this section shall require the sponsor to use due diligence to shorten, and to end, the delay covered by the contract.

(f) REPORTS.—For each advanced nuclear facility that is covered by a contract under this section, the Commission shall submit to Congress and the Secretary quarterly reports summarizing the status of licensing actions associated with the advanced nuclear facility.

(g) REGULATIONS.—

(1) IN GENERAL.—Subject to paragraphs (2) and (3), the Secretary shall issue such regulations as are necessary to carry out this section.

Deadline. Public information.

(2) INTERIM FINAL RULEMAKING.—Not later than 270 days after the date of enactment of this Act, the Secretary shall issue for public comment an interim final rule regulating contracts authorized by this section.

Deadline.

(3) NOTICE OF FINAL RULEMAKING.—Not later than 1 year after the date of enactment of this Act, the Secretary shall issue a notice of final rulemaking regulating the contracts.

(h) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

SEC. 639. CONFLICTS OF INTEREST RELATING TO CONTRACTS AND OTHER ARRANGEMENTS.

Section 170A b. of the Atomic Energy Act of 1954 (42 U.S.C. 2210a(b)) is amended—

(1) by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively, and indenting appropriately;

(2) by striking "b. The Commission" and inserting the following:

"b. EVALUATION.—

"(1) IN GENERAL.—Except as provided in paragraph (2), the Nuclear Regulatory Commission"; and

(3) by adding at the end the following:

"(2) NUCLEAR REGULATORY COMMISSION.—Notwithstanding any conflict of interest, the Nuclear Regulatory Commission may enter into a contract, agreement, or arrangement with the Department of Energy or the operator of a Department of Energy facility, if the Nuclear Regulatory Commission determines that—

"(A) the conflict of interest cannot be mitigated; and

"(B) adequate justification exists to proceed without mitigation of the conflict of interest.".

Subtitle C—Next Generation Nuclear Plant Project

42 USC 16021.

SEC. 641. PROJECT ESTABLISHMENT.

(a) ESTABLISHMENT.—The Secretary shall establish a project to be known as the "Next Generation Nuclear Plant Project" (referred to in this subtitle as the "Project").

(b) CONTENT.—The Project shall consist of the research, development, design, construction, and operation of a prototype plant, including a nuclear reactor that—

(1) is based on research and development activities supported by the Generation IV Nuclear Energy Systems Initiative under section 942(d); and

(2) shall be used—

(A) to generate electricity;

(B) to produce hydrogen; or

(C) both to generate electricity and to produce hydrogen.

SEC. 642. PROJECT MANAGEMENT. 42 USC 16022.

(a) DEPARTMENTAL MANAGEMENT.—

(1) IN GENERAL.—The Project shall be managed in the Department by the Office of Nuclear Energy, Science, and Technology.

(2) GENERATION IV NUCLEAR ENERGY SYSTEMS PROGRAM.—The Secretary may combine the Project with the Generation IV Nuclear Energy Systems Initiative.

(3) EXISTING DOE PROJECT MANAGEMENT EXPERTISE.—The Secretary may utilize capabilities for review of construction projects for advanced scientific facilities within the Office of Science to track the progress of the Project.

(b) LABORATORY MANAGEMENT.—

(1) LEAD LABORATORY.—The Idaho National Laboratory shall be the lead National Laboratory for the Project and shall collaborate with other National Laboratories, institutions of higher education, other research institutes, industrial researchers, and international researchers to carry out the Project.

(2) INDUSTRIAL PARTNERSHIPS.—

(A) IN GENERAL.—The Idaho National Laboratory shall organize a consortium of appropriate industrial partners that will carry out cost-shared research, development, design, and construction activities, and operate research facilities, on behalf of the Project.

(B) COST-SHARING.—Activities of industrial partners funded by the Project shall be cost-shared in accordance with section 988.

(C) PREFERENCE.—Preference in determining the final structure of the consortium or any partnerships under this subtitle shall be given to a structure (including designating as a lead industrial partner an entity incorporated in the United States) that retains United States technological leadership in the Project while maximizing cost sharing opportunities and minimizing Federal funding responsibilities.

(3) PROTOTYPE PLANT SITING.—The prototype nuclear reactor and associated plant shall be sited at the Idaho National Laboratory in Idaho.

(4) REACTOR TEST CAPABILITIES.—The Project shall use, if appropriate, reactor test capabilities at the Idaho National Laboratory.

(5) OTHER LABORATORY CAPABILITIES.—The Project may use, if appropriate, facilities at other National Laboratories.

SEC. 643. PROJECT ORGANIZATION. 42 USC 16023.

(a) MAJOR PROJECT ELEMENTS.—The Project shall consist of the following major program elements:

(1) High-temperature hydrogen production technology development and validation.

(2) Energy conversion technology development and validation.

(3) Nuclear fuel development, characterization, and qualification.

(4) Materials selection, development, testing, and qualification.

(5) Reactor and balance-of-plant design, engineering, safety analysis, and qualification.

(b) PROJECT PHASES.—The Project shall be conducted in the following phases:

(1) FIRST PROJECT PHASE.—A first project phase shall be conducted to—

(A) select and validate the appropriate technology under subsection (a)(1);

(B) carry out enabling research, development, and demonstration activities on technologies and components under paragraphs (2) through (4) of subsection (a);

(C) determine whether it is appropriate to combine electricity generation and hydrogen production in a single prototype nuclear reactor and plant; and

(D) carry out initial design activities for a prototype nuclear reactor and plant, including development of design methods and safety analytical methods and studies under subsection (a)(5).

(2) SECOND PROJECT PHASE.—A second project phase shall be conducted to—

(A) continue appropriate activities under paragraphs (1) through (5) of subsection (a);

(B) develop, through a competitive process, a final design for the prototype nuclear reactor and plant;

(C) apply for licenses to construct and operate the prototype nuclear reactor from the Nuclear Regulatory Commission; and

(D) construct and start up operations of the prototype nuclear reactor and its associated hydrogen or electricity production facilities.

(c) PROJECT REQUIREMENTS.—

(1) IN GENERAL.—The Secretary shall ensure that the Project is structured so as to maximize the technical interchange and transfer of technologies and ideas into the Project from other sources of relevant expertise, including—

(A) the nuclear power industry, including nuclear powerplant construction firms, particularly with respect to issues associated with plant design, construction, and operational and safety issues;

(B) the chemical processing industry, particularly with respect to issues relating to—

(i) the use of process energy for production of hydrogen; and

(ii) the integration of technologies developed by the Project into chemical processing environments; and

(C) international efforts in areas related to the Project, particularly with respect to hydrogen production technologies.

(2) INTERNATIONAL COLLABORATION.—

(A) IN GENERAL.—The Secretary shall seek international cooperation, participation, and financial contributions for the Project.

(B) ASSISTANCE FROM INTERNATIONAL PARTNERS.—The Secretary, through the Idaho National Laboratory, may contract for assistance from specialists or facilities from member countries of the Generation IV International

Forum, the Russian Federation, or other international partners if the specialists or facilities provide access to cost-effective and relevant skills or test capabilities.

(C) PARTNER NATIONS.—The Project may involve demonstration of selected project objectives in a partner country.

(D) GENERATION IV INTERNATIONAL FORUM.—The Secretary shall ensure that international activities of the Project are coordinated with the Generation IV International Forum.

(3) REVIEW BY NUCLEAR ENERGY RESEARCH ADVISORY COMMITTEE.—

(A) IN GENERAL.—The Nuclear Energy Research Advisory Committee of the Department (referred to in this paragraph as the "NERAC") shall—

(i) review all program plans for the Project and all progress under the Project on an ongoing basis; and

(ii) ensure that important scientific, technical, safety, and program management issues receive attention in the Project and by the Secretary.

(B) ADDITIONAL EXPERTISE.—The NERAC shall supplement the expertise of the NERAC or appoint subpanels to incorporate into the review by the NERAC the relevant sources of expertise described under paragraph (1).

(C) INITIAL REVIEW.—Not later than 180 days after the date of enactment of this Act, the NERAC shall— Deadline.

(i) review existing program plans for the Project in light of the recommendations of the document entitled "Design Features and Technology Uncertainties for the Next Generation Nuclear Plant," dated June 30, 2004; and

(ii) address any recommendations of the document not incorporated in program plans for the Project.

(D) FIRST PROJECT PHASE REVIEW.—On a determination by the Secretary that the appropriate activities under the first project phase under subsection (b)(1) are nearly complete, the Secretary shall request the NERAC to conduct a comprehensive review of the Project and to report to the Secretary the recommendation of the NERAC concerning whether the Project is ready to proceed to the second project phase under subsection (b)(2).

(E) TRANSMITTAL OF REPORTS TO CONGRESS.—Not later than 60 days after receiving any report from the NERAC related to the Project, the Secretary shall submit to the appropriate committees of the Senate and the House of Representatives a copy of the report, along with any additional views of the Secretary that the Secretary may consider appropriate.

SEC. 644. NUCLEAR REGULATORY COMMISSION. 42 USC 16024.

(a) IN GENERAL.—In accordance with section 202 of the Energy Reorganization Act of 1974 (42 U.S.C. 5842), the Nuclear Regulatory Commission shall have licensing and regulatory authority for any reactor authorized under this subtitle.

(b) LICENSING STRATEGY.—Not later than 3 years after the date of enactment of this Act, the Secretary and the Chairman Deadline.

of the Nuclear Regulatory Commission shall jointly submit to the appropriate committees of the Senate and the House of Representatives a licensing strategy for the prototype nuclear reactor, including—

(1) a description of ways in which current licensing requirements relating to light-water reactors need to be adapted for the types of prototype nuclear reactor being considered by the Project;

(2) a description of analytical tools that the Nuclear Regulatory Commission will have to develop to independently verify designs and performance characteristics of components, equipment, systems, or structures associated with the prototype nuclear reactor;

(3) other research or development activities that may be required on the part of the Nuclear Regulatory Commission in order to review a license application for the prototype nuclear reactor; and

(4) an estimate of the budgetary requirements associated with the licensing strategy.

(c) ONGOING INTERACTION.—The Secretary shall seek the active participation of the Nuclear Regulatory Commission throughout the duration of the Project to—

(1) avoid design decisions that will compromise adequate safety margins in the design of the reactor or impair the accessibility of nuclear safety-related components of the prototype reactor for inspection and maintenance;

(2) develop tools to facilitate inspection and maintenance needed for safety purposes; and

(3) develop risk-based criteria for any future commercial development of a similar reactor architectures.

42 USC 16025.

SEC. 645. PROJECT TIMELINES AND AUTHORIZATION OF APPROPRIATIONS.

Deadline.

(a) TARGET DATE TO COMPLETE THE FIRST PROJECT PHASE.—Not later than September 30, 2011, the Secretary shall—

(1) select the technology to be used by the Project for high-temperature hydrogen production and the initial design parameters for the prototype nuclear plant; or

Reports.

(2) submit to Congress a report establishing an alternative date for making the selection.

(b) DESIGN COMPETITION FOR SECOND PROJECT PHASE.—

(1) IN GENERAL.—The Secretary, acting through the Idaho National Laboratory, shall fund not more than 4 teams for not more than 2 years to develop detailed proposals for competitive evaluation and selection of a single proposal for a final design of the prototype nuclear reactor.

(2) SYSTEMS INTEGRATION.—The Secretary may structure Project activities in the second project phase to use the lead industrial partner of the competitively selected design under paragraph (1) in a systems integration role for final design and construction of the Project.

Deadline.

(c) TARGET DATE TO COMPLETE PROJECT CONSTRUCTION.—Not later than September 30, 2021, the Secretary shall—

(1) complete construction and begin operations of the prototype nuclear reactor and associated energy or hydrogen facilities; or

(2) submit to Congress a report establishing an alternative date for completion. Reports.

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary for research and construction activities under this subtitle (including for transfer to the Nuclear Regulatory Commission for activities under section 644 as appropriate)—

(1) $1,250,000,000 for the period of fiscal years 2006 through 2015; and

(2) such sums as are necessary for each of fiscal years 2016 through 2021.

Subtitle D—Nuclear Security

SEC. 651. NUCLEAR FACILITY AND MATERIALS SECURITY. 42 USC 16041.

(a) SECURITY EVALUATIONS; DESIGN BASIS THREAT RULEMAKING.—

(1) IN GENERAL.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201 et seq.) (as amended by section 624(a)) is amended by adding at the end the following:

"SEC. 170D. SECURITY EVALUATIONS. 42 USC 2210d.

"a. SECURITY RESPONSE EVALUATIONS.—Not less often than once every 3 years, the Commission shall conduct security evaluations at each licensed facility that is part of a class of licensed facilities, as the Commission considers to be appropriate, to assess the ability of a private security force of a licensed facility to defend against any applicable design basis threat. Deadline.

"b. FORCE-ON-FORCE EXERCISES.—(1) The security evaluations shall include force-on-force exercises.

"(2) The force-on-force exercises shall, to the maximum extent practicable, simulate security threats in accordance with any design basis threat applicable to a facility.

"(3) In conducting a security evaluation, the Commission shall mitigate any potential conflict of interest that could influence the results of a force-on-force exercise, as the Commission determines to be necessary and appropriate.

"c. ACTION BY LICENSEES.—The Commission shall ensure that an affected licensee corrects those material defects in performance that adversely affect the ability of a private security force at that facility to defend against any applicable design basis threat.

"d. FACILITIES UNDER HEIGHTENED THREAT LEVELS.—The Commission may suspend a security evaluation under this section if the Commission determines that the evaluation would compromise security at a nuclear facility under a heightened threat level.

"e. REPORT.—Not less often than once each year, the Commission shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Energy and Commerce of the House of Representatives a report, in classified form and unclassified form, that describes the results of each security response evaluation conducted and any relevant corrective action taken by a licensee during the previous year.

"SEC. 170E. DESIGN BASIS THREAT RULEMAKING. 42 USC 2210e.

"a. RULEMAKING.—The Commission shall— Deadlines.

"(1) not later than 90 days after the date of enactment of this section, initiate a rulemaking proceeding, including notice and opportunity for public comment, to be completed not later than 18 months after that date, to revise the design basis threats of the Commission; or

"(2) not later than 18 months after the date of enactment of this section, complete any ongoing rulemaking to revise the design basis threats.

"b. FACTORS.—When conducting its rulemaking, the Commission shall consider the following, but not be limited to—

"(1) the events of September 11, 2001;

"(2) an assessment of physical, cyber, biochemical, and other terrorist threats;

"(3) the potential for attack on facilities by multiple coordinated teams of a large number of individuals;

"(4) the potential for assistance in an attack from several persons employed at the facility;

"(5) the potential for suicide attacks;

"(6) the potential for water-based and air-based threats;

"(7) the potential use of explosive devices of considerable size and other modern weaponry;

"(8) the potential for attacks by persons with a sophisticated knowledge of facility operations;

"(9) the potential for fires, especially fires of long duration;

"(10) the potential for attacks on spent fuel shipments by multiple coordinated teams of a large number of individuals;

"(11) the adequacy of planning to protect the public health and safety at and around nuclear facilities, as appropriate, in the event of a terrorist attack against a nuclear facility; and

"(12) the potential for theft and diversion of nuclear materials from such facilities.".

(2) CONFORMING AMENDMENT.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) (as amended by section 624(b)) is amended by adding at the end of the items relating to chapter 14 the following:

"Sec. 170D. Security evaluations.
"Sec. 170E. Design basis threat rulemaking.".

(3) FEDERAL SECURITY COORDINATORS.—

Deadline.

(A) REGIONAL OFFICES.—Not later than 18 months after the date of enactment of this Act, the Nuclear Regulatory Commission (referred to in this section as the "Commission") shall assign a Federal security coordinator, under the employment of the Commission, to each region of the Commission.

(B) RESPONSIBILITIES.—The Federal security coordinator shall be responsible for—

(i) communicating with the Commission and other Federal, State, and local authorities concerning threats, including threats against such classes of facilities as the Commission determines to be appropriate;

(ii) monitoring such classes of facilities as the Commission determines to be appropriate to ensure that they maintain security consistent with the security plan in accordance with the appropriate threat level; and

(iii) assisting in the coordination of security measures among the private security forces at such classes of facilities as the Commission determines to be appropriate and Federal, State, and local authorities, as appropriate.

(b) BACKUP POWER FOR CERTAIN EMERGENCY NOTIFICATION SYSTEMS.—For any licensed nuclear power plants located where there is a permanent population, as determined by the 2000 decennial census, in excess of 15,000,000 within a 50-mile radius of the power plant, not later than 18 months after enactment of this Act, the Commission shall require that backup power to be available for the emergency notification system of the power plant, including the emergency siren warning system, if the alternating current supply within the 10-mile emergency planning zone of the power plant is lost. Deadline.

(c) ADDITIONAL PROVISIONS.—

(1) PROVISION OF SUPPORT TO UNIVERSITY NUCLEAR SAFETY, SECURITY, AND ENVIRONMENTAL PROTECTION PROGRAMS.—Section 31 b. of the Atomic Energy Act of 1954 (42 U.S.C. 2051(b)) is amended—

(A) by striking "b. The Commission is further authorized to make" and inserting the following:

"b. GRANTS AND CONTRIBUTIONS.—The Commission is authorized—

"(1) to make";

(B) in paragraph (1) (as designated by subparagraph (A)) by striking the period at the end and inserting "; and"; and

(C) by adding at the end the following:

"(2) to provide grants, loans, cooperative agreements, contracts, and equipment to institutions of higher education (as defined in section 102 of the Higher Education Act of 1965 (20 U.S.C. 1002)) to support courses, studies, training, curricula, and disciplines pertaining to nuclear safety, security, or environmental protection, or any other field that the Commission determines to be critical to the regulatory mission of the Commission.".

(2) RECRUITMENT TOOLS.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201 et seq.) (as amended by subsection (a)(1)) is amended by adding at the end the following:

"SEC. 170F. RECRUITMENT TOOLS. 42 USC 2210f.

"The Commission may purchase promotional items of nominal value for use in the recruitment of individuals for employment.".

(3) EXPENSES AUTHORIZED TO BE PAID BY THE COMMISSION.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201 et seq.) (as amended by paragraph (2)) is amended by adding at the end the following:

"SEC. 170G. EXPENSES AUTHORIZED TO BE PAID BY THE COMMISSION. 42 USC 2210g.

"The Commission may—

"(1) pay transportation, lodging, and subsistence expenses of employees who—

"(A) assist scientific, professional, administrative, or technical employees of the Commission; and

"(B) are students in good standing at an institution of higher education (as defined in section 102 of the Higher Education Act of 1965 (20 U.S.C. 1002)) pursuing courses

related to the field in which the students are employed by the Commission; and

"(2) pay the costs of health and medical services furnished, pursuant to an agreement between the Commission and the Department of State, to employees of the Commission and dependents of the employees serving in foreign countries.".

(4) PARTNERSHIP PROGRAM WITH INSTITUTIONS OF HIGHER EDUCATION.—

(A) IN GENERAL.—Chapter 19 of the Atomic Energy Act of 1954 (42 U.S.C. 2015 et seq.) (as amended by section 622(a)) is amended by inserting after section 243 the following:

42 USC 2015c.

"SEC. 244. PARTNERSHIP PROGRAM WITH INSTITUTIONS OF HIGHER EDUCATION.

"a. DEFINITIONS.—In this section:

"(1) HISPANIC-SERVING INSTITUTION.—The term 'Hispanic-serving institution' has the meaning given the term in section 502(a) of the Higher Education Act of 1965 (20 U.S.C. 1101a(a)).

"(2) HISTORICALLY BLACK COLLEGE AND UNIVERSITY.—The term 'historically Black college or university' has the meaning given the term 'part B institution' in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

"(3) TRIBAL COLLEGE.—The term 'Tribal college' has the meaning given the term 'tribally controlled college or university' in section 2(a) of the Tribally Controlled College or University Assistance Act of 1978 (25 U.S.C. 1801(a)).

"b. PARTNERSHIP PROGRAM.—The Commission may establish and participate in activities relating to research, mentoring, instruction, and training with institutions of higher education, including Hispanic-serving institutions, historically Black colleges or universities, and Tribal colleges, to strengthen the capacity of the institutions—

"(1) to educate and train students (including present or potential employees of the Commission); and

"(2) to conduct research in the field of science, engineering, or law, or any other field that the Commission determines is important to the work of the Commission.".

(5) CONFORMING AMENDMENTS.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) (as amended by subsection (a)(2)) is amended—

(A) by adding at the end of the items relating to chapter 14 the following:

"Sec. 170F. Recruitment tools.
"Sec. 170G. Expenses authorized to be paid by the Commission.";

and

(B) by inserting after the item relating to section 243 the following:

"Sec. 244. Partnership program with institutions of higher education.".

(d) RADIATION SOURCE PROTECTION.—

(1) AMENDMENT.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201 et seq.) (as amended by subsection (c)(3)) is amended by adding at the end the following:

42 USC 2210h.

"SEC. 170H. RADIATION SOURCE PROTECTION.

"a. DEFINITIONS.—In this section:

"(1) CODE OF CONDUCT.—The term 'Code of Conduct' means the code entitled the 'Code of Conduct on the Safety and Security of Radioactive Sources', approved by the Board of Governors of the International Atomic Energy Agency and dated September 8, 2003.

"(2) RADIATION SOURCE.—The term 'radiation source' means—

"(A) a Category 1 Source or a Category 2 Source, as defined in the Code of Conduct; and

"(B) any other material that poses a threat such that the material is subject to this section, as determined by the Commission, by regulation, other than spent nuclear fuel and special nuclear materials.

"b. COMMISSION APPROVAL.—Not later than 180 days after the date of enactment of this section, the Commission shall issue regulations prohibiting a person from— Deadline. Regulations.

"(1) exporting a radiation source, unless the Commission has specifically determined under section 57 or 82, consistent with the Code of Conduct, with respect to the exportation, that—

"(A) the recipient of the radiation source may receive and possess the radiation source under the laws and regulations of the country of the recipient;

"(B) the recipient country has the appropriate technical and administrative capability, resources, and regulatory structure to ensure that the radiation source will be managed in a safe and secure manner; and

"(C) before the date on which the radiation source is shipped— Deadline. Notification.

"(i) a notification has been provided to the recipient country; and

"(ii) a notification has been received from the recipient country;

as the Commission determines to be appropriate;

"(2) importing a radiation source, unless the Commission has determined, with respect to the importation, that—

"(A) the proposed recipient is authorized by law to receive the radiation source; and

"(B) the shipment will be made in accordance with any applicable Federal or State law or regulation; and

"(3) selling or otherwise transferring ownership of a radiation source, unless the Commission—

"(A) has determined that the licensee has verified that the proposed recipient is authorized under law to receive the radiation source; and

"(B) has required that the transfer shall be made in accordance with any applicable Federal or State law or regulation.

"c. TRACKING SYSTEM.—(1)(A) Not later than 1 year after the date of enactment of this section, the Commission shall issue regulations establishing a mandatory tracking system for radiation sources in the United States. Deadline. Regulations.

"(B) In establishing the tracking system under subparagraph (A), the Commission shall coordinate with the Secretary of Transportation to ensure compatibility, to the maximum extent

practicable, between the tracking system and any system established by the Secretary of Transportation to track the shipment of radiation sources.

"(2) The tracking system under paragraph (1) shall—

"(A) enable the identification of each radiation source by serial number or other unique identifier;

"(B) require reporting within 7 days of any change of possession of a radiation source;

"(C) require reporting within 24 hours of any loss of control of, or accountability for, a radiation source; and

"(D) provide for reporting under subparagraphs (B) and (C) through a secure Internet connection.

"d. PENALTY.—A violation of a regulation issued under subsection a. or b. shall be punishable by a civil penalty not to exceed $1,000,000.

Deadline.
Contracts.

"e. NATIONAL ACADEMY OF SCIENCES STUDY.—(1) Not later than 60 days after the date of enactment of this section, the Commission shall enter into an arrangement with the National Academy of Sciences under which the National Academy of Sciences shall conduct a study of industrial, research, and commercial uses for radiation sources.

"(2) The study under paragraph (1) shall include a review of uses of radiation sources in existence on the date on which the study is conducted, including an identification of any industrial or other process that—

"(A) uses a radiation source that could be replaced with an economically and technically equivalent (or improved) process that does not require the use of a radiation source; or

"(B) may be used with a radiation source that would pose a lower risk to public health and safety in the event of an accident or attack involving the radiation source.

Deadline.

"(3) Not later than 2 years after the date of enactment of this section, the Commission shall submit to Congress the results of the study under paragraph (1).

Establishment.

"f. TASK FORCE ON RADIATION SOURCE PROTECTION AND SECURITY.—(1) There is established a task force on radiation source protection and security (referred to in this section as the 'task force').

"(2)(A) The chairperson of the task force shall be the Chairperson of the Commission (or a designee).

"(B) The membership of the task force shall consist of the following:

"(i) The Secretary of Homeland Security (or a designee).

"(ii) The Secretary of Defense (or a designee).

"(iii) The Secretary of Energy (or a designee).

"(iv) The Secretary of Transportation (or a designee).

"(v) The Attorney General (or a designee).

"(vi) The Secretary of State (or a designee).

"(vii) The Director of National Intelligence (or a designee).

"(viii) The Director of the Central Intelligence Agency (or a designee).

"(ix) The Director of the Federal Emergency Management Agency (or a designee).

"(x) The Director of the Federal Bureau of Investigation (or a designee).

"(xi) The Administrator of the Environmental Protection Agency (or a designee).

"(3)(A) The task force, in consultation with Federal, State, and local agencies, the Conference of Radiation Control Program Directors, and the Organization of Agreement States, and after public notice and an opportunity for comment, shall evaluate, and provide recommendations relating to, the security of radiation sources in the United States from potential terrorist threats, including acts of sabotage, theft, or use of a radiation source in a radiological dispersal device.

Deadlines. Reports.

"(B) Not later than 1 year after the date of enactment of this section, and not less than once every 4 years thereafter, the task force shall submit to Congress and the President a report, in unclassified form with a classified annex if necessary, providing recommendations, including recommendations for appropriate regulatory and legislative changes, for—

"(i) a list of additional radiation sources that should be required to be secured under this Act, based on the potential attractiveness of the sources to terrorists and the extent of the threat to public health and safety of the sources, taking into consideration—

"(I) radiation source radioactivity levels;

"(II) radioactive half-life of a radiation source;

"(III) dispersability;

"(IV) chemical and material form;

"(V) for radioactive materials with a medical use, the availability of the sources to physicians and patients for medical treatment; and

"(VI) any other factor that the Chairperson of the Commission determines to be appropriate;

"(ii) the establishment of, or modifications to, a national system for recovery of lost or stolen radiation sources;

"(iii) the storage of radiation sources that are not used in a safe and secure manner as of the date on which the report is submitted;

"(iv) modifications to the national tracking system for radiation sources;

"(v) the establishment of, or modifications to, a national system (including user fees and other methods) to provide for the proper disposal of radiation sources secured under this Act;

"(vi) modifications to export controls on radiation sources to ensure that foreign recipients of radiation sources are able and willing to adequately control radiation sources from the United States;

"(vii)(I) any alternative technologies available as of the date on which the report is submitted that may perform some or all of the functions performed by devices or processes that employ radiation sources; and

"(II) the establishment of appropriate regulations and incentives for the replacement of the devices and processes described in subclause (I)—

"(aa) with alternative technologies in order to reduce the number of radiation sources in the United States; or

"(bb) with radiation sources that would pose a lower risk to public health and safety in the event of an accident or attack involving the radiation source; and

"(viii) the creation of, or modifications to, procedures for improving the security of use, transportation, and storage of radiation sources, including—

"(I) periodic audits or inspections by the Commission to ensure that radiation sources are properly secured and can be fully accounted for;

"(II) evaluation of the security measures by the Commission;

"(III) increased fines for violations of Commission regulations relating to security and safety measures applicable to licensees that possess radiation sources;

"(IV) criminal and security background checks for certain individuals with access to radiation sources (including individuals involved with transporting radiation sources);

"(V) requirements for effective and timely exchanges of information relating to the results of criminal and security background checks between the Commission and any State with which the Commission has entered into an agreement under section 274 b.;

"(VI) assurances of the physical security of facilities that contain radiation sources (including facilities used to temporarily store radiation sources being transported); and

"(VII) the screening of shipments to facilities that the Commission determines to be particularly at risk for sabotage of radiation sources to ensure that the shipments do not contain explosives.

Deadline.

"g. ACTION BY COMMISSION.—Not later than 60 days after the date of receipt by Congress and the President of a report under subsection f.(3)(B), the Commission, in accordance with the recommendations of the task force, shall—

"(1) take any action the Commission determines to be appropriate, including revising the system of the Commission for licensing radiation sources; and

"(2) ensure that States that have entered into agreements with the Commission under section 274 b. take similar action in a timely manner.".

(2) CONFORMING AMENDMENT.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) (as amended by subsection (c)(5)(A)) is amended by adding at the end of the items relating to chapter 14 the following:

"Sec. 170H. Radiation source protection.".

(e) TREATMENT OF ACCELERATOR-PRODUCED AND OTHER RADIOACTIVE MATERIAL AS BYPRODUCT MATERIAL.—

(1) DEFINITION OF BYPRODUCT MATERIAL.—Section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)) is amended—

(A) by striking "means (1) any radioactive" and inserting the following: "means—

"(1) any radioactive".

(B) by striking "material, and (2) the tailings" and inserting the following: "material;

"(2) the tailings".

(C) by striking "content." and inserting the following: "content;

"(3)(A) any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after

the date of enactment of this paragraph for use for a commercial, medical, or research activity; or

"(B) any material that—

"(i) has been made radioactive by use of a particle accelerator; and

"(ii) is produced, extracted, or converted after extraction, before, on, or after the date of enactment of this paragraph for use for a commercial, medical, or research activity; and

"(4) any discrete source of naturally occurring radioactive material, other than source material, that—

"(A) the Commission, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and

"(B) before, on, or after the date of enactment of this paragraph is extracted or converted after extraction for use in a commercial, medical, or research activity.".

(2) AGREEMENTS WITH GOVERNORS.—Section 274 b. of the Atomic Energy Act of 1954 (42 U.S.C. 2021(b)) is amended by striking "State—" and all that follows through paragraph (4) and inserting the following: "State:

"(1) Byproduct materials (as defined in section 11 e.).

"(2) Source materials.

"(3) Special nuclear materials in quantities not sufficient to form a critical mass.".

(3) WASTE DISPOSAL.—

(A) DOMESTIC DISTRIBUTION.—Section 81 of the Atomic Energy Act of 1954 (42 U.S.C. 2111) is amended—

(i) by striking "No person may" and inserting the following:

"a. IN GENERAL.—No person may".

(ii) by adding at the end the following:

"b. REQUIREMENTS.—

"(1) IN GENERAL.—Except as provided in paragraph (2), byproduct material, as defined in paragraphs (3) and (4) of section 11 e., may only be transferred to and disposed of in a disposal facility that—

"(A) is adequate to protect public health and safety; and

"(B)(i) is licensed by the Commission; or

"(ii) is licensed by a State that has entered into an agreement with the Commission under section 274 b., if the licensing requirements of the State are compatible with the licensing requirements of the Commission.

"(2) EFFECT OF SUBSECTION.—Nothing in this subsection affects the authority of any entity to dispose of byproduct material, as defined in paragraphs (3) and (4) of section 11 e., at a disposal facility in accordance with any Federal or State solid or hazardous waste law, including the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.).

"c. TREATMENT AS LOW-LEVEL RADIOACTIVE WASTE.—Byproduct material, as defined in paragraphs (3) and (4) of section 11 e.,

disposed of under this section shall not be considered to be low-level radioactive waste for the purposes of—

"(1) section 2 of the Low-Level Radioactive Waste Policy Act (42 U.S.C. 2021b); or

"(2) carrying out a compact that is—

"(A) entered into in accordance with that Act (42 U.S.C. 2021b et seq.); and

"(B) approved by Congress.".

(B) DEFINITION OF LOW-LEVEL RADIOACTIVE WASTE.—Section 2(9) of the Low-Level Radioactive Waste Policy Act (42 U.S.C. 2021b(9)) is amended—

(i) by redesignating subparagraphs (A) and (B) as clauses (i) and (ii), respectively, and indenting the clauses appropriately;

(ii) in the matter preceding clause (i) (as redesignated by subparagraph (A)) by striking "The term" and inserting the following:

"(A) IN GENERAL.—The term"; and

(iii) by adding at the end the following:

"(B) EXCLUSION.—The term 'low-level radioactive waste' does not include byproduct material (as defined in paragraphs (3) and (4) of section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)).".

(4) FINAL REGULATIONS.—

(A) REGULATIONS.—

Deadline.

(i) IN GENERAL.—Not later than 18 months after the date of enactment of this Act, the Commission, after consultation with States and other stakeholders, shall issue final regulations establishing such requirements as the Commission determines to be necessary to carry out this section and the amendments made by this section.

(ii) INCLUSIONS.—The regulations shall include a definition of the term "discrete source" for purposes of paragraphs (3) and (4) of section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)) (as amended by paragraph (1)).

(B) COOPERATION.—In promulgating regulations under paragraph (1), the Commission shall, to the maximum extent practicable—

(i) cooperate with States; and

(ii) use model State standards in existence on the date of enactment of this Act.

(C) TRANSITION PLAN.—

(i) DEFINITION OF BYPRODUCT MATERIAL.—In this paragraph, the term "byproduct material" has the meaning given the term in paragraphs (3) and (4) of section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)) (as amended by paragraph (1)).

(ii) PREPARATION AND PUBLICATION.—To facilitate an orderly transition of regulatory authority with respect to byproduct material, the Commission, in issuing regulations under subparagraph (A), shall prepare and publish a transition plan for—

(I) States that have not, before the date on which the plan is published, entered into an agreement with the Commission under section 274 b.

of the Atomic Energy Act of 1954 (42 U.S.C. 2021(b)); and

(II) States that have entered into an agreement with the Commission under that section before the date on which the plan is published.

(iii) INCLUSIONS.—The transition plan under clause (ii) shall include—

(I) a description of the conditions under which a State may exercise authority over byproduct material; and

(II) a statement of the Commission that any agreement covering byproduct material, as defined in paragraph (1) or (2) of section 11e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)), entered into between the Commission and a State under section 274 b. of that Act (42 U.S.C. 2021(b)) before the date of publication of the transition plan shall be considered to include byproduct material, as defined in paragraph (3) or (4) of section 11e. of that Act (42 U.S.C. 2014(e)) (as amended by paragraph (1)), if the Governor of the State certifies to the Commission on the date of publication of the transition plan that—

(aa) the State has a program for licensing byproduct material, as defined in paragraph (3) or (4) of section 11e. of the Atomic Energy Act of 1954, that is adequate to protect the public health and safety, as determined by the Commission; and

(bb) the State intends to continue to implement the regulatory responsibility of the State with respect to the byproduct material.

(D) AVAILABILITY OF RADIOPHARMACEUTICALS.—In promulgating regulations under subparagraph (A), the Commission shall consider the impact on the availability of radiopharmaceuticals to—

(i) physicians; and

(ii) patients the medical treatment of which relies on radiopharmaceuticals.

(5) WAIVERS.—

(A) IN GENERAL.—Except as provided in subparagraph (B), the Commission may grant a waiver to any entity of any requirement under this section or an amendment made by this section with respect to a matter relating to byproduct material (as defined in paragraphs (3) and (4) of section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)) (as amended by paragraph (1))) if the Commission determines that the waiver is in accordance with the protection of the public health and safety and the promotion of the common defense and security.

(B) EXCEPTIONS.—

(i) IN GENERAL.—The Commission may not grant a waiver under subparagraph (A) with respect to—

(I) any requirement under the amendments made by subsection (c)(1);

(II) a matter relating to an importation into, or exportation from, the United States for a period

ending after the date that is 1 year after the date of enactment of this Act; or

(III) any other matter for a period ending after the date that is 4 years after the date of enactment of this Act.

(ii) WAIVERS TO STATES.—The Commission shall terminate any waiver granted to a State under subparagraph (A) if the Commission determines that—

(I) the State has entered into an agreement with the Commission under section 274 b. of the Atomic Energy Act of 1954 (42 U.S.C. 2021(b));

(II) the agreement described in subclause (I) covers byproduct material (as described in paragraph (3) or (4) of section 11 e. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)) (as amended by paragraph (1))); and

(III) the program of the State for licensing such byproduct material is adequate to protect the public health and safety.

Federal Register, publication. Notice.

(C) PUBLICATION.—The Commission shall publish in the Federal Register a notice of any waiver granted under this subsection.

SEC. 652. FINGERPRINTING AND CRIMINAL HISTORY RECORD CHECKS.

Section 149 of the Atomic Energy Act of 1954 (42 U.S.C. 2169) is amended—

(1) in subsection a.—

(A) by striking "a. The Nuclear" and all that follows through "section 147." and inserting the following:

"a.(1)(A)(i) The Commission shall require each individual or entity described in clause (ii) to fingerprint each individual described in subparagraph (B) before the individual described in subparagraph (B) is permitted access under subparagraph (B).

"(ii) The individuals and entities referred to in clause (i) are individuals and entities that, on or before the date on which an individual is permitted access under subparagraph (B)—

"(I) are licensed or certified to engage in an activity subject to regulation by the Commission;

"(II) have filed an application for a license or certificate to engage in an activity subject to regulation by the Commission; or

Notification.

"(III) have notified the Commission in writing of an intent to file an application for licensing, certification, permitting, or approval of a product or activity subject to regulation by the Commission.

"(B) The Commission shall require to be fingerprinted any individual who—

"(i) is permitted unescorted access to—

"(I) a utilization facility; or

"(II) radioactive material or other property subject to regulation by the Commission that the Commission determines to be of such significance to the public health and safety or the common defense and security as to warrant fingerprinting and background checks; or

"(ii) is permitted access to safeguards information under section 147.";

(B) by striking "All fingerprints obtained by a licensee or applicant as required in the preceding sentence" and inserting the following:

"(2) All fingerprints obtained by an individual or entity as required in paragraph (1)";

(C) by striking "The costs of any identification and records check conducted pursuant to the preceding sentence shall be paid by the licensee or applicant." and inserting the following:

"(3) The costs of an identification or records check under paragraph (2) shall be paid by the individual or entity required to conduct the fingerprinting under paragraph (1)(A)."; and

(D) by striking "Notwithstanding any other provision of law, the Attorney General may provide all the results of the search to the Commission, and, in accordance with regulations prescribed under this section, the Commission may provide such results to licensee or applicant submitting such fingerprints." and inserting the following:

"(4) Notwithstanding any other provision of law—

"(A) the Attorney General may provide any result of an identification or records check under paragraph (2) to the Commission; and

"(B) the Commission, in accordance with regulations prescribed under this section, may provide the results to the individual or entity required to conduct the fingerprinting under paragraph (1)(A).";

(2) in subsection c.—

(A) by striking ", subject to public notice and comment, regulations—" and inserting "requirements—"; and

(B) in paragraph (2)(B), by striking "unescorted access to the facility of a licensee or applicant" and inserting "unescorted access to a utilization facility, radioactive material, or other property described in subsection a.(1)(B)";

(3) by redesignating subsection d. as subsection e.; and

(4) by inserting after subsection c. the following:

"d. The Commission may require a person or individual to conduct fingerprinting under subsection a.(1) by authorizing or requiring the use of any alternative biometric method for identification that has been approved by—

"(1) the Attorney General; and

"(2) the Commission, by regulation.".

SEC. 653. USE OF FIREARMS BY SECURITY PERSONNEL.

The Atomic Energy Act of 1954 is amended by inserting after section 161 (42 U.S.C. 2201) the following:

"SEC. 161A. USE OF FIREARMS BY SECURITY PERSONNEL. 42 USC 2201a.

"a. DEFINITIONS.—In this section, the terms 'handgun', 'rifle', 'shotgun', 'firearm', 'ammunition', 'machinegun', 'short-barreled shotgun', and 'short-barreled rifle' have the meanings given the terms in section 921(a) of title 18, United States Code.

"b. AUTHORIZATION.—Notwithstanding subsections (a)(4), (a)(5), (b)(2), (b)(4), and (o) of section 922 of title 18, United States Code, section 925(d)(3) of title 18, United States Code, section 5844 of the Internal Revenue Code of 1986, and any law (including regulations) of a State or a political subdivision of a State that prohibits the transfer, receipt, possession, transportation, importation, or use of a handgun, a rifle, a shotgun, a short-barreled shotgun, a short-

barreled rifle, a machinegun, a semiautomatic assault weapon, ammunition for any such gun or weapon, or a large capacity ammunition feeding device, in carrying out the duties of the Commission, the Commission may authorize the security personnel of any licensee or certificate holder of the Commission (including an employee of a contractor of such a licensee or certificate holder) to transfer, receive, possess, transport, import, and use 1 or more such guns, weapons, ammunition, or devices, if the Commission determines that—

"(1) the authorization is necessary to the discharge of the official duties of the security personnel; and

"(2) the security personnel—

"(A) are not otherwise prohibited from possessing or receiving a firearm under Federal or State laws relating to possession of firearms by a certain category of persons;

"(B) have successfully completed any requirement under this section for training in the use of firearms and tactical maneuvers;

"(C) are engaged in the protection of—

"(i) a facility owned or operated by a licensee or certificate holder of the Commission that is designated by the Commission; or

"(ii) radioactive material or other property owned or possessed by a licensee or certificate holder of the Commission, or that is being transported to or from a facility owned or operated by such a licensee or certificate holder, and that has been determined by the Commission to be of significance to the common defense and security or public health and safety; and

"(D) are discharging the official duties of the security personnel in transferring, receiving, possessing, transporting, or importing the weapons, ammunition, or devices.

"c. BACKGROUND CHECKS.—A person that receives, possesses, transports, imports, or uses a weapon, ammunition, or a device under subsection (b) shall be subject to a background check by the Attorney General, based on fingerprints and including a background check under section 103(b) of the Brady Handgun Violence Prevention Act (Public Law 103–159; 18 U.S.C. 922 note) to determine whether the person is prohibited from possessing or receiving a firearm under Federal or State law.

"d. EFFECTIVE DATE.—This section takes effect on the date on which guidelines are issued by the Commission, with the approval of the Attorney General, to carry out this section.".

SEC. 654. UNAUTHORIZED INTRODUCTION OF DANGEROUS WEAPONS.

Section 229 of the Atomic Energy Act of 1954 (42 U.S.C. 2278a) is amended—

(1) by striking "SEC. 229, TRESPASS UPON COMMISSION INSTALLATIONS.—" and inserting the following:

"SEC. 229. TRESPASS ON COMMISSION INSTALLATIONS.";

(2) by adjusting the indentations of subsections a., b., and c. so as to reflect proper subsection indentations; and

(3) in subsection a.—

(A) in the first sentence, by striking "a. The" and inserting the following:

"a.(1) The";

(B) in the second sentence, by striking "Every" and inserting the following:

"(2) Every"; and

(C) in paragraph (1) (as designated by subparagraph (A))—

(i) by striking "or in the custody" and inserting "in the custody"; and

(ii) by inserting ", or subject to the licensing authority of the Commission or certification by the Commission under this Act or any other Act" before the period.

SEC. 655. SABOTAGE OF NUCLEAR FACILITIES, FUEL, OR DESIGNATED MATERIAL.

(a) IN GENERAL.—Section 236a. of the Atomic Energy Act of 1954 (42 U.S.C. 2284(a)) is amended—

(1) in paragraph (2), by striking "storage facility" and inserting "treatment, storage, or disposal facility";

(2) in paragraph (3)—

(A) by striking "such a utilization facility" and inserting "a utilization facility licensed under this Act"; and

(B) by striking "or" at the end;

(3) in paragraph (4)—

(A) by striking "facility licensed" and inserting ", uranium conversion, or nuclear fuel fabrication facility licensed or certified"; and

(B) by striking the comma at the end and inserting a semicolon; and

(4) by inserting after paragraph (4) the following:

"(5) any production, utilization, waste storage, waste treatment, waste disposal, uranium enrichment, uranium conversion, or nuclear fuel fabrication facility subject to licensing or certification under this Act during construction of the facility, if the destruction or damage caused or attempted to be caused could adversely affect public health and safety during the operation of the facility;

"(6) any primary facility or backup facility from which a radiological emergency preparedness alert and warning system is activated; or

"(7) any radioactive material or other property subject to regulation by the Commission that, before the date of the offense, the Commission determines, by order or regulation published in the Federal Register, is of significance to the public health and safety or to common defense and security;".

(b) CONFORMING AMENDMENT.—Section 236 of the Atomic Energy Act of 1954 (42 U.S.C. 2284) is amended by striking "intentionally and willfully" each place it appears and inserting "knowingly".

SEC. 656. SECURE TRANSFER OF NUCLEAR MATERIALS.

(a) AMENDMENT.—Chapter 14 of the Atomic Energy Act of 1954 (42 U.S.C. 2201–2210b) (as amended by section 651(d)(1)) is amended by adding at the end the following new section:

"SEC. 170I. SECURE TRANSFER OF NUCLEAR MATERIALS.

42 USC 2210i.

Procedures.

"a. The Commission shall establish a system to ensure that materials described in subsection b., when transferred or received in the United States by any party pursuant to an import or export

license issued pursuant to this Act, are accompanied by a manifest describing the type and amount of materials being transferred or received. Each individual receiving or accompanying the transfer of such materials shall be subject to a security background check conducted by appropriate Federal entities.

"b. Except as otherwise provided by the Commission by regulation, the materials referred to in subsection a. are byproduct materials, source materials, special nuclear materials, high-level radioactive waste, spent nuclear fuel, transuranic waste, and low-level radioactive waste (as defined in section 2(16) of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101(16))).".

Deadline. 42 USC 2210i note.

(b) REGULATIONS.—Not later than 1 year after the date of the enactment of this Act, and from time to time thereafter as it considers necessary, the Nuclear Regulatory Commission shall issue regulations identifying radioactive materials or classes of individuals that, consistent with the protection of public health and safety and the common defense and security, are appropriate exceptions to the requirements of section 170D of the Atomic Energy Act of 1954, as added by subsection (a) of this section.

42 USC 2210i note.

(c) EFFECTIVE DATE.—The amendment made by subsection (a) shall take effect upon the issuance of regulations under subsection (b), except that the background check requirement shall become effective on a date established by the Commission.

42 USC 2210i note.

(d) EFFECT ON OTHER LAW.—Nothing in this section or the amendment made by this section shall waive, modify, or affect the application of chapter 51 of title 49, United States Code, part A of subtitle V of title 49, United States Code, part B of subtitle VI of title 49, United States Code, and title 23, United States Code.

(e) CONFORMING AMENDMENT.—The table of sections of the Atomic Energy Act of 1954 (42 U.S.C. prec. 2011) (as amended by subsection (a)) is amended by adding at the end of the items relating to chapter 14 the following:

"Sec. 170I. Secure transfer of nuclear materials.".

42 USC 16042.

SEC. 657. DEPARTMENT OF HOMELAND SECURITY CONSULTATION.

Before issuing a license for a utilization facility, the Nuclear Regulatory Commission shall consult with the Department of Homeland Security concerning the potential vulnerabilities of the location of the proposed facility to terrorist attack.

TITLE VII—VEHICLES AND FUELS

Subtitle A—Existing Programs

SEC. 701. USE OF ALTERNATIVE FUELS BY DUAL FUELED VEHICLES.

Section 400AA(a)(3)(E) of the Energy Policy and Conservation Act (42 U.S.C. 6374(a)(3)(E)) is amended to read as follows:

"(E)(i) Dual fueled vehicles acquired pursuant to this section shall be operated on alternative fuels unless the Secretary determines that an agency qualifies for a waiver of such requirement for vehicles operated by the agency in a particular geographic area in which—

"(I) the alternative fuel otherwise required to be used in the vehicle is not reasonably available to retail purchasers

of the fuel, as certified to the Secretary by the head of the agency; or

"(II) the cost of the alternative fuel otherwise required to be used in the vehicle is unreasonably more expensive compared to gasoline, as certified to the Secretary by the head of the agency.

"(ii) The Secretary shall monitor compliance with this subparagraph by all such fleets and shall report annually to Congress on the extent to which the requirements of this subparagraph are being achieved. The report shall include information on annual reductions achieved from the use of petroleum-based fuels and the problems, if any, encountered in acquiring alternative fuels.". Reports.

SEC. 702. INCREMENTAL COST ALLOCATION.

Section 303(c) of the Energy Policy Act of 1992 (42 U.S.C. 13212(c)) is amended by striking "may" and inserting "shall".

SEC. 703. ALTERNATIVE COMPLIANCE AND FLEXIBILITY.

(a) ALTERNATIVE COMPLIANCE.—Title V of the Energy Policy Act of 1992 (42 U.S.C. 13251 et seq.) is amended—

(1) by redesignating section 514 (42 U.S.C. 13264) as section 515; and

(2) by inserting after section 513 (42 U.S.C. 13263) the following:

"SEC. 514. ALTERNATIVE COMPLIANCE. 42 USC 13263a.

"(a) APPLICATION FOR WAIVER.—Any covered person subject to section 501 and any State subject to section 507(o) may petition the Secretary for a waiver of the applicable requirements of section 501 or 507(o).

"(b) GRANT OF WAIVER.—The Secretary shall grant a waiver of the requirements of section 501 or 507(o) on a showing that the fleet owned, operated, leased, or otherwise controlled by the State or covered person—

"(1) will achieve a reduction in the annual consumption of petroleum fuels by the fleet equal to—

"(A) the reduction in consumption of petroleum that would result from 100 percent cumulative compliance with the fuel use requirements of section 501; or

"(B) in the case of an entity covered under section 507(o), a reduction equal to the annual consumption by the State entity of alternative fuels if all of the cumulative alternative fuel vehicles of the State entity given credit under section 508 were to use alternative fuel 100 percent of the time; and

"(2) is in compliance with all applicable vehicle emission standards established by the Administrator of the Environmental Protection Agency under the Clean Air Act (42 U.S.C. 7401 et seq.).

"(c) REPORTING REQUIREMENT.—Not later than December 31 of a model year, any State or covered person granted a waiver under this section for the preceding model year shall submit to the Secretary an annual report that—

"(1) certifies the quantity of the petroleum motor fuel reduction of the State or covered person during the preceding model year; and Certification.

"(2) projects the baseline quantity of the petroleum motor fuel reduction of the State or covered person during the following model year.

"(d) REVOCATION OF WAIVER.—If a State or covered person that receives a waiver under this section fails to comply with this section, the Secretary—

"(1) shall revoke the waiver; and

"(2) may impose on the State or covered person a penalty under section 512.".

(b) CONFORMING AMENDMENT.—Section 511 of the Energy Policy Act of 1992 (42 U.S.C. 13261) is amended by striking "or 507" and inserting "507, or 514".

(c) TABLE OF CONTENTS AMENDMENT.—The table of contents of the Energy Policy Act of 1992 (42 U.S.C. prec. 13201) is amended by striking the item relating to section 514 and inserting the following:

"Sec. 514. Alternative compliance.
"Sec. 515. Authorization of appropriations.".

SEC. 704. REVIEW OF ENERGY POLICY ACT OF 1992 PROGRAMS.

Deadline.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary shall complete a study to determine the effect that titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.) have had on—

(1) the development of alternative fueled vehicle technology;

(2) the availability of that technology in the market; and

(3) the cost of alternative fueled vehicles.

(b) TOPICS.—As part of the study under subsection (a), the Secretary shall specifically identify—

(1) the number of alternative fueled vehicles acquired by fleets or covered persons required to acquire alternative fueled vehicles;

(2) the quantity, by type, of alternative fuel actually used in alternative fueled vehicles acquired by fleets or covered persons;

(3) the quantity of petroleum displaced by the use of alternative fuels in alternative fueled vehicles acquired by fleets or covered persons;

(4) the direct and indirect costs of compliance with requirements under titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.), including—

(A) vehicle acquisition requirements imposed on fleets or covered persons;

(B) administrative and recordkeeping expenses;

(C) fuel and fuel infrastructure costs;

(D) associated training and employee expenses; and

(E) any other factors or expenses the Secretary determines to be necessary to compile reliable estimates of the overall costs and benefits of complying with programs under those titles for fleets, covered persons, and the national economy;

(5) the existence of obstacles preventing compliance with vehicle acquisition requirements and increased use of alternative fuel in alternative fueled vehicles acquired by fleets or covered persons; and

(6) the projected impact of amendments to the Energy Policy Act of 1992 made by this title.

(c) REPORT.—Upon completion of the study under this section, the Secretary shall submit to Congress a report that describes the results of the study and includes any recommendations of the Secretary for legislative or administrative changes concerning the alternative fueled vehicle requirements under titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.).

SEC. 705. REPORT CONCERNING COMPLIANCE WITH ALTERNATIVE FUELED VEHICLE PURCHASING REQUIREMENTS.

Section 310(b)(1) of the Energy Policy Act of 1992 (42 U.S.C. 13218(b)(1)) is amended by striking "1 year after the date of enactment of this subsection" and inserting "February 15, 2006".

SEC. 706. JOINT FLEXIBLE FUEL/HYBRID VEHICLE COMMERCIALIZATION INITIATIVE.

42 USC 16051.

(a) DEFINITIONS.—In this section:

(1) ELIGIBLE ENTITY.—The term "eligible entity" means—

(A) a for-profit corporation;

(B) a nonprofit corporation; or

(C) an institution of higher education.

(2) PROGRAM.—The term "program" means a program established under subsection (b).

(b) ESTABLISHMENT.—The Secretary shall establish a program to improve technologies for the commercialization of—

(1) a combination hybrid/flexible fuel vehicle; or

(2) a plug-in hybrid/flexible fuel vehicle.

(c) GRANTS.—In carrying out the program, the Secretary shall provide grants that give preference to proposals that—

(1) achieve the greatest reduction in miles per gallon of petroleum fuel consumption;

(2) achieve not less than 250 miles per gallon of petroleum fuel consumption; and

(3) have the greatest potential of commercialization to the general public within 5 years.

(d) VERIFICATION.—Not later than 90 days after the date of enactment of this Act, the Secretary shall publish in the Federal Register procedures to verify—

Deadline.
Federal Register, publication.
Procedures.

(1) the hybrid/flexible fuel vehicle technologies to be demonstrated; and

(2) that grants are administered in accordance with this section.

(e) REPORT.—Not later than 260 days after the date of enactment of this Act, and annually thereafter, the Secretary shall submit to Congress a report that—

(1) identifies the grant recipients;

(2) describes the technologies to be funded under the program;

(3) assesses the feasibility of the technologies described in paragraph (2) in meeting the goals described in subsection (c);

(4) identifies applications submitted for the program that were not funded; and

(5) makes recommendations for Federal legislation to achieve commercialization of the technology demonstrated.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section, to remain available until expended—

(1) $3,000,000 for fiscal year 2006;

(2) $7,000,000 for fiscal year 2007;
(3) $10,000,000 for fiscal year 2008; and
(4) $20,000,000 for fiscal year 2009.

SEC. 707. EMERGENCY EXEMPTION.

Section 301 of the Energy Policy Act of 1992 (42 U.S.C. 13211) is amended in paragraph (9)(E) by inserting before the semicolon at the end ", including vehicles directly used in the emergency repair of transmission lines and in the restoration of electricity service following power outages, as determined by the Secretary".

Subtitle B—Hybrid Vehicles, Advanced Vehicles, and Fuel Cell Buses

PART 1—HYBRID VEHICLES

42 USC 16061.

SEC. 711. HYBRID VEHICLES.

The Secretary shall accelerate efforts directed toward the improvement of batteries and other rechargeable energy storage systems, power electronics, hybrid systems integration, and other technologies for use in hybrid vehicles.

42 USC 16062.

SEC. 712. EFFICIENT HYBRID AND ADVANCED DIESEL VEHICLES.

(a) PROGRAM.—The Secretary shall establish a program to encourage domestic production and sales of efficient hybrid and advanced diesel vehicles. The program shall include grants to automobile manufacturers to encourage domestic production of efficient hybrid and advanced diesel vehicles.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this section such sums as may be necessary for each of the fiscal years 2006 through 2015.

PART 2—ADVANCED VEHICLES

42 USC 16071.

SEC. 721. PILOT PROGRAM.

(a) ESTABLISHMENT.—The Secretary, in consultation with the Secretary of Transportation, shall establish a competitive grant pilot program (referred to in this part as the "pilot program"), to be administered through the Clean Cities Program of the Department, to provide not more than 30 geographically dispersed project grants to State governments, local governments, or metropolitan transportation authorities to carry out a project or projects for the purposes described in subsection (b).

(b) GRANT PURPOSES.—A grant under this section may be used for the following purposes:

(1) The acquisition of alternative fueled vehicles or fuel cell vehicles, including—

(A) passenger vehicles (including neighborhood electric vehicles); and

(B) motorized 2-wheel bicycles or other vehicles for use by law enforcement personnel or other State or local government or metropolitan transportation authority employees.

(2) The acquisition of alternative fueled vehicles, hybrid vehicles, or fuel cell vehicles, including—

(A) buses used for public transportation or transportation to and from schools;

(B) delivery vehicles for goods or services; and

(C) ground support vehicles at public airports (including vehicles to carry baggage or push or pull airplanes toward or away from terminal gates).

(3) The acquisition of ultra-low sulfur diesel vehicles.

(4) Installation or acquisition of infrastructure necessary to directly support an alternative fueled vehicle, fuel cell vehicle, or hybrid vehicle project funded by the grant, including fueling and other support equipment.

(5) Operation and maintenance of vehicles, infrastructure, and equipment acquired as part of a project funded by the grant.

(c) APPLICATIONS.—

(1) REQUIREMENTS.—

(A) IN GENERAL.—The Secretary shall issue requirements for applying for grants under the pilot program.

(B) MINIMUM REQUIREMENTS.—At a minimum, the Secretary shall require that an application for a grant—

(i) be submitted by the head of a State or local government or a metropolitan transportation authority, or any combination thereof, and a registered participant in the Clean Cities Program of the Department; and

(ii) include—

(I) a description of the project proposed in the application, including how the project meets the requirements of this part;

(II) an estimate of the ridership or degree of use of the project;

(III) an estimate of the air pollution emissions reduced and fossil fuel displaced as a result of the project, and a plan to collect and disseminate environmental data, related to the project to be funded under the grant, over the life of the project;

(IV) a description of how the project will be sustainable without Federal assistance after the completion of the term of the grant;

(V) a complete description of the costs of the project, including acquisition, construction, operation, and maintenance costs over the expected life of the project;

(VI) a description of which costs of the project will be supported by Federal assistance under this part; and

(VII) documentation to the satisfaction of the Secretary that diesel fuel containing sulfur at not more than 15 parts per million is available for carrying out the project, and a commitment by the applicant to use such fuel in carrying out the project.

(2) PARTNERS.—An applicant under paragraph (1) may carry out a project under the pilot program in partnership with public and private entities.

(d) SELECTION CRITERIA.—In evaluating applications under the pilot program, the Secretary shall—

(1) consider each applicant's previous experience with similar projects; and

(2) give priority consideration to applications that—

(A) are most likely to maximize protection of the environment;

(B) demonstrate the greatest commitment on the part of the applicant to ensure funding for the proposed project and the greatest likelihood that the project will be maintained or expanded after Federal assistance under this part is completed; and

(C) exceed the minimum requirements of subsection (c)(1)(B)(ii).

(e) PILOT PROJECT REQUIREMENTS.—

(1) MAXIMUM AMOUNT.—The Secretary shall not provide more than $15,000,000 in Federal assistance under the pilot program to any applicant.

(2) COST SHARING.—The Secretary shall not provide more than 50 percent of the cost, incurred during the period of the grant, of any project under the pilot program.

(3) MAXIMUM PERIOD OF GRANTS.—The Secretary shall not fund any applicant under the pilot program for more than 5 years.

(4) DEPLOYMENT AND DISTRIBUTION.—The Secretary shall seek to the maximum extent practicable to ensure a broad geographic distribution of project sites.

Procedures.

(5) TRANSFER OF INFORMATION AND KNOWLEDGE.—The Secretary shall establish mechanisms to ensure that the information and knowledge gained by participants in the pilot program are transferred among the pilot program participants and to other interested parties, including other applicants that submitted applications.

Deadlines.

(f) SCHEDULE.—

Federal Register, publication. Commerce Business Daily, publication.

(1) PUBLICATION.—Not later than 90 days after the date of enactment of this Act, the Secretary shall publish in the Federal Register, Commerce Business Daily, and elsewhere as appropriate, a request for applications to undertake projects under the pilot program. Applications shall be due not later than 180 days after the date of publication of the notice.

(2) SELECTION.—Not later than 180 days after the date by which applications for grants are due, the Secretary shall select by competitive, peer reviewed proposal, all applications for projects to be awarded a grant under the pilot program.

Regulations.

(g) DEFINITIONS.—For purposes of carrying out the pilot program, the Secretary shall issue regulations defining any term, as the Secretary determines to be necessary.

42 USC 16072.

SEC. 722. REPORTS TO CONGRESS.

(a) INITIAL REPORT.—Not later than 60 days after the date on which grants are awarded under this part, the Secretary shall submit to Congress a report containing—

(1) an identification of the grant recipients and a description of the projects to be funded;

(2) an identification of other applicants that submitted applications for the pilot program; and

(3) a description of the mechanisms used by the Secretary to ensure that the information and knowledge gained by participants in the pilot program are transferred among the pilot

program participants and to other interested parties, including other applicants that submitted applications.

(b) EVALUATION.—Not later than 3 years after the date of enactment of this Act, and annually thereafter until the pilot program ends, the Secretary shall submit to Congress a report containing an evaluation of the effectiveness of the pilot program, including—

(1) an assessment of the benefits to the environment derived from the projects included in the pilot program; and

(2) an estimate of the potential benefits to the environment to be derived from widespread application of alternative fueled vehicles and ultra-low sulfur diesel vehicles.

SEC. 723. AUTHORIZATION OF APPROPRIATIONS. 42 USC 16073.

There are authorized to be appropriated to the Secretary to carry out this part $200,000,000, to remain available until expended.

PART 3—FUEL CELL BUSES

SEC. 731. FUEL CELL TRANSIT BUS DEMONSTRATION. 42 USC 16081.

(a) IN GENERAL.—The Secretary, in consultation with the Secretary of Transportation, shall establish a transit bus demonstration program to make competitive, merit-based awards for 5-year projects to demonstrate not more than 25 fuel cell transit buses (and necessary infrastructure) in 5 geographically dispersed localities.

(b) PREFERENCE.—In selecting projects under this section, the Secretary shall give preference to projects that are most likely to mitigate congestion and improve air quality.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section $10,000,000 for each of fiscal years 2006 through 2010.

Subtitle C—Clean School Buses

SEC. 741. CLEAN SCHOOL BUS PROGRAM. 42 USC 16091.

(a) DEFINITIONS.—In this section:

(1) ADMINISTRATOR.—The term "Administrator" means the Administrator of the Environmental Protection Agency.

(2) ALTERNATIVE FUEL.—The term "alternative fuel" means—

(A) liquefied natural gas, compressed natural gas, liquefied petroleum gas, hydrogen, or propane;

(B) methanol or ethanol at no less than 85 percent by volume; or

(C) biodiesel conforming with standards published by the American Society for Testing and Materials as of the date of enactment of this Act.

(3) CLEAN SCHOOL BUS.—The term "clean school bus" means a school bus with a gross vehicle weight of greater than 14,000 pounds that—

(A) is powered by a heavy duty engine; and

(B) is operated solely on an alternative fuel or ultra-low sulfur diesel fuel.

(4) ELIGIBLE RECIPIENT.—

(A) IN GENERAL.—Subject to subparagraph (B), the term "eligible recipient" means—

(i) 1 or more local or State governmental entities responsible for—

(I) providing school bus service to 1 or more public school systems; or

(II) the purchase of school buses;

(ii) 1 or more contracting entities that provide school bus service to 1 or more public school systems; or

(iii) a nonprofit school transportation association.

(B) SPECIAL REQUIREMENTS.—In the case of eligible recipients identified under clauses (ii) and (iii), the Administrator shall establish timely and appropriate requirements for notice and may establish timely and appropriate requirements for approval by the public school systems that would be served by buses purchased or retrofit using grant funds made available under this section.

(5) RETROFIT TECHNOLOGY.—The term "retrofit technology" means a particulate filter or other emissions control equipment that is verified or certified by the Administrator or the California Air Resources Board as an effective emission reduction technology when installed on an existing school bus.

(6) ULTRA-LOW SULFUR DIESEL FUEL.—The term "ultra-low sulfur diesel fuel" means diesel fuel that contains sulfur at not more than 15 parts per million.

(b) PROGRAM FOR RETROFIT OR REPLACEMENT OF CERTAIN EXISTING SCHOOL BUSES WITH CLEAN SCHOOL BUSES.—

(1) ESTABLISHMENT.—

(A) IN GENERAL.—The Administrator, in consultation with the Secretary and other appropriate Federal departments and agencies, shall establish a program for awarding grants on a competitive basis to eligible recipients for the replacement, or retrofit (including repowering, aftertreatment, and remanufactured engines) of, certain existing school buses.

(B) BALANCING.—In awarding grants under this section, the Administrator shall, to the maximum extent practicable, achieve an appropriate balance between awarding grants—

(i) to replace school buses; and

(ii) to install retrofit technologies.

(2) PRIORITY OF GRANT APPLICATIONS.—

(A) REPLACEMENT.—In the case of grant applications to replace school buses, the Administrator shall give priority to applicants that propose to replace school buses manufactured before model year 1977.

(B) RETROFITTING.—In the case of grant applications to retrofit school buses, the Administrator shall give priority to applicants that propose to retrofit school buses manufactured in or after model year 1991.

(3) USE OF SCHOOL BUS FLEET.—

(A) IN GENERAL.—All school buses acquired or retrofitted with funds provided under this section shall be operated as part of the school bus fleet for which the grant was made for not less than 5 years.

(B) MAINTENANCE, OPERATION, AND FUELING.—New school buses and retrofit technology shall be maintained, operated, and fueled according to manufacturer recommendations or State requirements.

(4) RETROFIT GRANTS.—The Administrator may award grants for up to 100 percent of the retrofit technologies and installation costs.

(5) REPLACEMENT GRANTS.—

(A) ELIGIBILITY FOR 50 PERCENT GRANTS.—The Administrator may award grants for replacement of school buses in the amount of up to one-half of the acquisition costs (including fueling infrastructure) for—

(i) clean school buses with engines manufactured in model year 2005 or 2006 that emit not more than—

(I) 1.8 grams per brake horsepower-hour of non-methane hydrocarbons and oxides of nitrogen; and

(II) .01 grams per brake horsepower-hour of particulate matter; or

(ii) clean school buses with engines manufactured in model year 2007, 2008, or 2009 that satisfy regulatory requirements established by the Administrator for emissions of oxides of nitrogen and particulate matter to be applicable for school buses manufactured in model year 2010.

(B) ELIGIBILITY FOR 25 PERCENT GRANTS.—The Administrator may award grants for replacement of school buses in the amount of up to one-fourth of the acquisition costs (including fueling infrastructure) for—

(i) clean school buses with engines manufactured in model year 2005 or 2006 that emit not more than—

(I) 2.5 grams per brake horsepower-hour of non-methane hydrocarbons and oxides of nitrogen; and

(II) .01 grams per brake horsepower-hour of particulate matter; or

(ii) clean school buses with engines manufactured in model year 2007 or thereafter that satisfy regulatory requirements established by the Administrator for emissions of oxides of nitrogen and particulate matter from school buses manufactured in that model year.

(6) ULTRA-LOW SULFUR DIESEL FUEL.—

(A) IN GENERAL.—In the case of a grant recipient receiving a grant for the acquisition of ultra-low sulfur diesel fuel school buses with engines manufactured in model year 2005 or 2006, the grant recipient shall provide, to the satisfaction of the Administrator—

(i) documentation that diesel fuel containing sulfur at not more than 15 parts per million is available for carrying out the purposes of the grant; and

(ii) a commitment by the applicant to use that fuel in carrying out the purposes of the grant.

(7) DEPLOYMENT AND DISTRIBUTION.—The Administrator shall, to the maximum extent practicable—

(A) achieve nationwide deployment of clean school buses through the program under this section; and

(B) ensure a broad geographic distribution of grant awards, with no State receiving more than 10 percent of the grant funding made available under this section during a fiscal year.

(8) ANNUAL REPORT.—

(A) IN GENERAL.—Not later than January 31 of each year, the Administrator shall submit to Congress a report that—

(i) evaluates the implementation of this section; and

(ii) describes—

(I) the total number of grant applications received;

(II) the number and types of alternative fuel school buses, ultra-low sulfur diesel fuel school buses, and retrofitted buses requested in grant applications;

(III) grants awarded and the criteria used to select the grant recipients;

(IV) certified engine emission levels of all buses purchased or retrofitted under this section;

(V) an evaluation of the in-use emission level of buses purchased or retrofitted under this section; and

(VI) any other information the Administrator considers appropriate.

(c) EDUCATION.—

Deadline.

(1) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Administrator shall develop an education outreach program to promote and explain the grant program.

(2) COORDINATION WITH STAKEHOLDERS.—The outreach program shall be designed and conducted in conjunction with national school bus transportation associations and other stakeholders.

(3) COMPONENTS.—The outreach program shall—

(A) inform potential grant recipients on the process of applying for grants;

(B) describe the available technologies and the benefits of the technologies;

(C) explain the benefits of participating in the grant program; and

(D) include, as appropriate, information from the annual report required under subsection (b)(8).

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Administrator to carry out this section, to remain available until expended—

(1) $55,000,000 for each of fiscal years 2006 and 2007; and

(2) such sums as are necessary for each of fiscal years 2008, 2009, and 2010.

42 USC 16092.

SEC. 742. DIESEL TRUCK RETROFIT AND FLEET MODERNIZATION PROGRAM.

(a) ESTABLISHMENT.—The Administrator, in consultation with the Secretary, shall establish a program for awarding grants on

a competitive basis to public agencies and entities for fleet modernization programs including installation of retrofit technologies for diesel trucks.

(b) ELIGIBLE RECIPIENTS.—A grant shall be awarded under this section only to a State or local government or an agency or instrumentality of a State or local government or of two or more State or local governments who will allocate funds, with preference to ports and other major hauling operations.

(c) AWARDS.—

(1) IN GENERAL.—The Administrator shall seek, to the maximum extent practicable, to ensure a broad geographic distribution of grants under this section.

(2) PREFERENCES.—In making awards of grants under this section, the Administrator shall give preference to proposals that—

(A) will achieve the greatest reductions in emissions of nonmethane hydrocarbons, oxides of nitrogen, and/or particulate matter per proposal or per truck; or

(B) involve the use of Environmental Protection Agency or California Air Resources Board verified emissions control retrofit technology on diesel trucks that operate solely on ultra-low sulfur diesel fuel after September 2006.

(d) CONDITIONS OF GRANT.—A grant shall be provided under this section on the conditions that—

(1) trucks which are replacing scrapped trucks and on which retrofit emissions-control technology are to be demonstrated—

(A) will operate on ultra-low sulfur diesel fuel where such fuel is reasonably available or required for sale by State or local law or regulation;

(B) were manufactured in model year 1998 and before; and

(C) will be used for the transportation of cargo goods especially in port areas or used in goods movement and major hauling operations;

(2) grant funds will be used for the purchase of emission control retrofit technology, including State taxes and contract fees; and

(3) grant recipients will provide at least 50 percent of the total cost of the retrofit, including the purchase of emission control retrofit technology and all necessary labor for installation of the retrofit, from any source other than this section.

(e) VERIFICATION.—Not later than 90 days after the date of enactment of this Act, the Administrator shall publish in the Federal Register procedures to—

Deadline.
Federal Register, publication.
Procedures.

(1) make grants pursuant to this section;

(2) verify that trucks powered by ultra-low sulfur diesel fuel on which retrofit emissions-control technology are to be demonstrated will operate on diesel fuel containing not more than 15 parts per million of sulfur after September 2006; and

(3) verify that grants are administered in accordance with this section.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Administrator to carry out this section, to remain available until expended the following sums:

(1) $20,000,000 for fiscal year 2006.

(2) $35,000,000 for fiscal year 2007.

(3) $45,000,000 for fiscal year 2008.

(4) Such sums as are necessary for each of fiscal years 2009 and 2010.

42 USC 16093.

SEC. 743. FUEL CELL SCHOOL BUSES.

(a) ESTABLISHMENT.—The Secretary shall establish a program for entering into cooperative agreements—

(1) with private sector fuel cell bus developers for the development of fuel cell-powered school buses; and

(2) subsequently, with not less than 2 units of local government using natural gas-powered school buses and such private sector fuel cell bus developers to demonstrate the use of fuel cell-powered school buses.

(b) COST SHARING.—The non-Federal contribution for activities funded under this section shall be not less than—

(1) 20 percent for fuel infrastructure development activities; and

(2) 50 percent for demonstration activities and for development activities not described in paragraph (1).

(c) REPORTS TO CONGRESS.—Not later than 3 years after the date of enactment of this Act, the Secretary shall transmit to Congress a report that—

(1) evaluates the process of converting natural gas infrastructure to accommodate fuel cell-powered school buses; and

(2) assesses the results of the development and demonstration program under this section.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section $25,000,000 for the period of fiscal years 2006 through 2009.

Subtitle D—Miscellaneous

42 USC 16101.

SEC. 751. RAILROAD EFFICIENCY.

(a) ESTABLISHMENT.—The Secretary shall (in cooperation with the Secretary of Transportation and the Administrator of the Environmental Protection Agency) establish a cost-shared, public-private research partnership involving the Federal Government, railroad carriers, locomotive manufacturers and equipment suppliers, and the Association of American Railroads, to develop and demonstrate railroad locomotive technologies that increase fuel economy, reduce emissions, and lower costs of operation.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section—

(1) $15,000,000 for fiscal year 2006;

(2) $20,000,000 for fiscal year 2007; and

(3) $30,000,000 for fiscal year 2008.

SEC. 752. MOBILE EMISSION REDUCTIONS TRADING AND CREDITING.

Deadline.
Reports.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator of the Environmental Protection Agency shall submit to Congress a report on the experience of the Administrator with the trading of mobile source emission reduction credits for use by owners and operators of stationary source emission sources to meet emission offset requirements within a nonattainment area.

(b) CONTENTS.—The report shall describe—

(1) projects approved by the Administrator that include the trading of mobile source emission reduction credits for use by stationary sources in complying with offset requirements, including a description of—

(A) project and stationary sources location;

(B) volumes of emissions offset and traded;

(C) the sources of mobile emission reduction credits; and

(D) if available, the cost of the credits;

(2) the significant issues identified by the Administrator in consideration and approval of trading in the projects;

(3) the requirements for monitoring and assessing the air quality benefits of any approved project;

(4) the statutory authority on which the Administrator has based approval of the projects;

(5) an evaluation of how the resolution of issues in approved projects could be used in other projects and whether the emission reduction credits may be considered to be additional in relation to other requirements;

(6) the potential, for attainment purposes, of emission reduction credits relating to transit and land use policies; and

(7) any other issues that the Administrator considers relevant to the trading and generation of mobile source emission reduction credits for use by stationary sources or for other purposes.

SEC. 753. AVIATION FUEL CONSERVATION AND EMISSIONS.

(a) IN GENERAL.—Not later than 60 days after the date of enactment of this Act, the Administrator of the Federal Aviation Administration and the Administrator of the Environmental Protection Agency shall jointly initiate a study to identify— Deadline.

(1) the impact of aircraft emissions on air quality in non-attainment areas;

(2) ways to promote fuel conservation measures for aviation to enhance fuel efficiency and reduce emissions; and

(3) opportunities to reduce air traffic inefficiencies that increase fuel burn and emissions.

(b) FOCUS.—The study under subsection (a) shall focus on how air traffic management inefficiencies, such as aircraft idling at airports, result in unnecessary fuel burn and air emissions.

(c) REPORT.—Not later than 1 year after the date of the initiation of the study under subsection (a), the Administrator of the Federal Aviation Administration and the Administrator of the Environmental Protection Agency shall jointly submit to the Committee on Energy and Commerce and the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Environment and Public Works and the Committee on Commerce, Science, and Transportation of the Senate a report that—

(1) describes the results of the study; and

(2) includes any recommendations on ways in which unnecessary fuel use and emissions affecting air quality may be reduced—

(A) without adversely affecting safety and security and increasing individual aircraft noise; and

(B) while taking into account all aircraft emissions and the impact of those emissions on the human health.

(d) RISK ASSESSMENTS.—Any assessment of risk to human health and the environment prepared by the Administrator of the Federal Aviation Administration or the Administrator of the Environmental Protection Agency to support the report in this section shall be based on sound and objective scientific practices, shall consider the best available science, and shall present the weight of the scientific evidence concerning such risks.

42 USC 16102.

SEC. 754. DIESEL FUELED VEHICLES.

(a) DEFINITION OF TIER 2 EMISSION STANDARDS.—In this section, the term "tier 2 emission standards" means the motor vehicle emission standards that apply to passenger cars, light trucks, and larger passenger vehicles manufactured after the 2003 model year, as issued on February 10, 2000, by the Administrator of the Environmental Protection Agency under sections 202 and 211 of the Clean Air Act (42 U.S.C. 7521, 7545).

(b) DIESEL COMBUSTION AND AFTER-TREATMENT TECHNOLOGIES.—The Secretary shall accelerate efforts to improve diesel combustion and after-treatment technologies for use in diesel fueled motor vehicles.

(c) GOALS.—The Secretary shall carry out subsection (b) with a view toward achieving the following goals:

(1) Developing and demonstrating diesel technologies that, not later than 2010, meet the following standards:

(A) Tier 2 emission standards.

(B) The heavy-duty emissions standards of 2007 that are applicable to heavy-duty vehicles under regulations issued by the Administrator of the Environmental Protection Agency as of the date of enactment of this Act.

(2) Developing the next generation of low-emission, high efficiency diesel engine technologies, including homogeneous charge compression ignition technology.

42 USC 16103.

SEC. 755. CONSERVE BY BICYCLING PROGRAM.

(a) DEFINITIONS.—In this section:

(1) PROGRAM.—The term "program" means the Conserve by Bicycling Program established by subsection (b).

(2) SECRETARY.—The term "Secretary" means the Secretary of Transportation.

(b) ESTABLISHMENT.—There is established within the Department of Transportation a program to be known as the "Conserve by Bicycling Program".

(c) PROJECTS.—

(1) IN GENERAL.—In carrying out the program, the Secretary shall establish not more than 10 pilot projects that are—

(A) dispersed geographically throughout the United States; and

(B) designed to conserve energy resources by encouraging the use of bicycles in place of motor vehicles.

(2) REQUIREMENTS.—A pilot project described in paragraph (1) shall—

(A) use education and marketing to convert motor vehicle trips to bicycle trips;

(B) document project results and energy savings (in estimated units of energy conserved);

(C) facilitate partnerships among interested parties in at least 2 of the fields of—

(i) transportation;
(ii) law enforcement;
(iii) education;
(iv) public health;
(v) environment; and
(vi) energy;

(D) maximize bicycle facility investments;

(E) demonstrate methods that may be used in other regions of the United States; and

(F) facilitate the continuation of ongoing programs that are sustained by local resources.

(3) COST SHARING.—At least 20 percent of the cost of each pilot project described in paragraph (1) shall be provided from non-Federal sources.

(d) ENERGY AND BICYCLING RESEARCH STUDY.—

(1) IN GENERAL.—Not later than 2 years after the date of enactment of this Act, the Secretary shall enter into a contract with the National Academy of Sciences for, and the National Academy of Sciences shall conduct and submit to Congress a report on, a study on the feasibility of converting motor vehicle trips to bicycle trips.

Deadline. Contracts. Reports.

(2) COMPONENTS.—The study shall—

(A) document the results or progress of the pilot projects under subsection (c);

(B) determine the type and duration of motor vehicle trips that people in the United States may feasibly make by bicycle, taking into consideration factors such as—

(i) weather;
(ii) land use and traffic patterns;
(iii) the carrying capacity of bicycles; and
(iv) bicycle infrastructure;

(C) determine any energy savings that would result from the conversion of motor vehicle trips to bicycle trips;

(D) include a cost-benefit analysis of bicycle infrastructure investments; and

(E) include a description of any factors that would encourage more motor vehicle trips to be replaced with bicycle trips.

(e) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out this section $6,200,000, to remain available until expended, of which—

(1) $5,150,000 shall be used to carry out pilot projects described in subsection (c);

(2) $300,000 shall be used by the Secretary to coordinate, publicize, and disseminate the results of the program; and

(3) $750,000 shall be used to carry out subsection (d).

SEC. 756. REDUCTION OF ENGINE IDLING.

42 USC 16104.

(a) DEFINITIONS.—In this section:

(1) ADMINISTRATOR.—The term "Administrator" means the Administrator of the Environmental Protection Agency.

(2) ADVANCED TRUCK STOP ELECTRIFICATION SYSTEM.—The term "advanced truck stop electrification system" means a stationary system that delivers heat, air conditioning, electricity, or communications, and is capable of providing verifiable and auditable evidence of use of those services, to a heavy-duty vehicle and any occupants of the heavy-duty vehicle with or

without relying on components mounted onboard the heavy-duty vehicle for delivery of those services.

(3) AUXILIARY POWER UNIT.—The term "auxiliary power unit" means an integrated system that—

(A) provides heat, air conditioning, engine warming, or electricity to components on a heavy-duty vehicle; and

(B) is certified by the Administrator under part 89 of title 40, Code of Federal Regulations (or any successor regulation), as meeting applicable emission standards.

(4) HEAVY-DUTY VEHICLE.—The term "heavy-duty vehicle" means a vehicle that—

(A) has a gross vehicle weight rating greater than 8,500 pounds; and

(B) is powered by a diesel engine.

(5) IDLE REDUCTION TECHNOLOGY.—The term "idle reduction technology" means an advanced truck stop electrification system, auxiliary power unit, or other technology that—

(A) is used to reduce long-duration idling; and

(B) allows for the main drive engine or auxiliary refrigeration engine to be shut down.

(6) ENERGY CONSERVATION TECHNOLOGY.—the term "energy conservation technology" means any device, system of devices, or equipment that improves the fuel economy.

(7) LONG-DURATION IDLING.—

(A) IN GENERAL.—The term "long-duration idling" means the operation of a main drive engine or auxiliary refrigeration engine, for a period greater than 15 consecutive minutes, at a time at which the main drive engine is not engaged in gear.

(B) EXCLUSIONS.—The term "long-duration idling" does not include the operation of a main drive engine or auxiliary refrigeration engine during a routine stoppage associated with traffic movement or congestion.

(b) IDLE REDUCTION TECHNOLOGY BENEFITS, PROGRAMS, AND STUDIES.—

Deadline.

(1) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Administrator shall—

(A)(i) commence a review of the mobile source air emission models of the Environmental Protection Agency used under the Clean Air Act (42 U.S.C. 7401 et seq.) to determine whether the models accurately reflect the emissions resulting from long-duration idling of heavy-duty vehicles and other vehicles and engines; and

(ii) update those models as the Administrator determines to be appropriate; and

(B)(i) commence a review of the emission reductions achieved by the use of idle reduction technology; and

(ii) complete such revisions of the regulations and guidance of the Environmental Protection Agency as the Administrator determines to be appropriate.

(2) DEADLINE FOR COMPLETION.—Not later than 180 days after the date of enactment of this Act, the Administrator shall—

(A) complete the reviews under subparagraphs (A)(i) and (B)(i) of paragraph (1); and

(B) prepare and make publicly available one or more reports on the results of the reviews.

(3) DISCRETIONARY INCLUSIONS.—The reviews under subparagraphs (A)(i) and (B)(i) of paragraph (1) and the reports under paragraph (2)(B) may address the potential fuel savings resulting from use of idle reduction technology.

(4) IDLE REDUCTION AND ENERGY CONSERVATION DEPLOYMENT PROGRAM.—

(A) ESTABLISHMENT.—

(i) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Administrator, in consultation with the Secretary of Transportation shall, through the Environmental Protection Agency's SmartWay Transport Partnership, establish a program to support deployment of idle reduction and energy conservation technologies. Deadline.

(ii) PRIORITY.—The Administrator shall give priority to the deployment of idle reduction and energy conservation technologies based on the costs and beneficial effects on air quality and ability to lessen the emission of criteria air pollutants.

(B) FUNDING.—

(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Administrator to carry out subparagraph (A) for the purpose of reducing extended idling from heavy-duty vehicles $19,500,000 for fiscal year 2006, $30,000,000 for fiscal year 2007, and $45,000,000 for fiscal year 2008.

(ii) LOCOMOTIVES.—There are authorized to be appropriated to the administrator to carry out subparagraph (A) for the purpose of reducing extended idling from locomotives $10,000,000 for fiscal year 2006, $15,000,000 for fiscal year 2007, and $20,000,000 for fiscal year 2008.

(iii) COST SHARING.—Subject to clause (iv), the Administrator shall require at least 50 percent of the costs directly and specifically related to any project under this section to be provided from non-Federal sources.

(iv) NECESSARY AND APPROPRIATE REDUCTIONS.—The Administrator may reduce the non-Federal requirement under clause (iii) if the Administrator determines that the reduction is necessary and appropriate to meet the objectives of this section.

(5) IDLING LOCATION STUDY.—

(A) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Administrator, in consultation with the Secretary of Transportation, shall commence a study to analyze all locations at which heavy-duty vehicles stop for long-duration idling, including— Deadline.

(i) truck stops;

(ii) rest areas;

(iii) border crossings;

(iv) ports;

(v) transfer facilities; and

(vi) private terminals.

(B) DEADLINE FOR COMPLETION.—Not later than 180 days after the date of enactment of this Act, the Administrator shall—

(i) complete the study under subparagraph (A); and

(ii) prepare and make publicly available one or more reports of the results of the study.

(c) VEHICLE WEIGHT EXEMPTION.—Section 127(a) of title 23, United States Code, is amended—

(1) by designating the first through eleventh sentences as paragraphs (1) through (11), respectively; and

(2) by adding at the end the following:

"(12) HEAVY DUTY VEHICLES.—

"(A) IN GENERAL.—Subject to subparagraphs (B) and (C), in order to promote reduction of fuel use and emissions because of engine idling, the maximum gross vehicle weight limit and the axle weight limit for any heavy-duty vehicle equipped with an idle reduction technology shall be increased by a quantity necessary to compensate for the additional weight of the idle reduction system.

"(B) MAXIMUM WEIGHT INCREASE.—The weight increase under subparagraph (A) shall be not greater than 400 pounds.

"(C) PROOF.—On request by a regulatory agency or law enforcement agency, the vehicle operator shall provide proof (through demonstration or certification) that—

"(i) the idle reduction technology is fully functional at all times; and

"(ii) the 400-pound gross weight increase is not used for any purpose other than the use of idle reduction technology described in subparagraph (A).".

(d) REPORT.—Not later than 60 days after the date on which funds are initially awarded under this section, and on an annual basis thereafter, the Administrator shall submit to Congress a report containing—

(1) an identification of the grant recipients, a description of the projects to be funded and the amount of funding provided; and

(2) an identification of all other applicants that submitted applications under the program.

42 USC 16105.

SEC. 757. BIODIESEL ENGINE TESTING PROGRAM.

Deadline.

(a) IN GENERAL.—Not later that 180 days after the date of enactment of this Act, the Secretary shall initiate a partnership with diesel engine, diesel fuel injection system, and diesel vehicle manufacturers and diesel and biodiesel fuel providers, to include biodiesel testing in advanced diesel engine and fuel system technology.

(b) SCOPE.—The program shall provide for testing to determine the impact of biodiesel from different sources on current and future emission control technologies, with emphasis on—

(1) the impact of biodiesel on emissions warranty, in-use liability, and antitampering provisions;

(2) the impact of long-term use of biodiesel on engine operations;

(3) the options for optimizing these technologies for both emissions and performance when switching between biodiesel and diesel fuel; and

(4) the impact of using biodiesel in these fueling systems and engines when used as a blend with 2006 Environmental

Protection Agency-mandated diesel fuel containing a maximum of 15-parts-per-million sulfur content.

(c) REPORT.—Not later than 2 years after the date of enactment of this Act, the Secretary shall provide an interim report to Congress on the findings of the program, including a comprehensive analysis of impacts from biodiesel on engine operation for both existing and expected future diesel technologies, and recommendations for ensuring optimal emissions reductions and engine performance with biodiesel.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $5,000,000 for each of fiscal years 2006 through 2010 to carry out this section.

(e) DEFINITION.—For purposes of this section, the term "biodiesel" means a diesel fuel substitute produced from nonpetroleum renewable resources that meets the registration requirements for fuels and fuel additives established by the Environmental Protection Agency under section 211 of the Clean Air Act (42 U.S.C. 7545) and that meets the American Society for Testing and Materials D6751–02a Standard Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels.

SEC. 758. ULTRA-EFFICIENT ENGINE TECHNOLOGY FOR AIRCRAFT.

42 USC 16106.

Contracts.

(a) ULTRA-EFFICIENT ENGINE TECHNOLOGY PARTNERSHIP.—The Secretary shall enter into a cooperative agreement with the National Aeronautics and Space Administration for the development of ultra-efficient engine technology for aircraft.

(b) PERFORMANCE OBJECTIVE.—The Secretary shall establish the following performance objectives for the program set forth in subsection (a):

(1) A fuel efficiency increase of at least 10 percent.

(2) A reduction in the impact of landing and takeoff nitrogen oxides emissions on local air quality of 70 percent.

(3) Exploring advanced concepts, alternate propulsion, and power configurations, including hybrid fuel cell powered systems.

(4) Exploring the use of alternate fuel in conventional or nonconventional turbine-based systems.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this section $50,000,000 for each of the fiscal years 2006, 2007, 2008, 2009, and 2010.

SEC. 759. FUEL ECONOMY INCENTIVE REQUIREMENTS.

Section 32905 of title 49, United States Code, is amended by adding the following new subsection at the end thereof:

"(h) FUEL ECONOMY INCENTIVE REQUIREMENTS.—In order for any model of dual fueled automobile to be eligible to receive the fuel economy incentives included in section 32906(a) and (b), a label shall be attached to the fuel compartment of each dual fueled automobile of that model, notifying that the vehicle can be operated on an alternative fuel and on gasoline or diesel, with the form of alternative fuel stated on the notice. This requirement applies to dual fueled automobiles manufactured on or after September 1, 2006.".

Applicability.
Effective date.

Subtitle E—Automobile Efficiency

SEC. 771. AUTHORIZATION OF APPROPRIATIONS FOR IMPLEMENTATION AND ENFORCEMENT OF FUEL ECONOMY STANDARDS.

In addition to any other funds authorized by law, there are authorized to be appropriated to the National Highway Traffic Safety Administration to carry out its obligations with respect to average fuel economy standards $3,500,000 for each of the fiscal years 2006 through 2010.

SEC. 772. EXTENSION OF MAXIMUM FUEL ECONOMY INCREASE FOR ALTERNATIVE FUELED VEHICLES.

(a) MANUFACTURING INCENTIVES.—Section 32905 of title 49, United States Code, is amended—

(1) in each of subsections (b) and (d), by striking "1993–2004" and inserting "1993–2010";

(2) in subsection (f), by striking "2001" and inserting "2007"; and

(3) in subsection (f)(1), by striking "2004" and inserting "2010".

(b) MAXIMUM FUEL ECONOMY INCREASE.—Subsection (a)(1) of section 32906 of title 49, United States Code, is amended—

(1) in subparagraph (A), by striking "the model years 1993–2004" and inserting "model years 1993–2010"; and

(2) in subparagraph (B), by striking "the model years 2005–2008" and inserting "model years 2011–2014".

SEC. 773. STUDY OF FEASIBILITY AND EFFECTS OF REDUCING USE OF FUEL FOR AUTOMOBILES.

Deadline.

(a) IN GENERAL.—Not later than 30 days after the date of the enactment of this Act, the Administrator of the National Highway Traffic Safety Administration shall initiate a study of the feasibility and effects of reducing by model year 2014, by a significant percentage, the amount of fuel consumed by automobiles.

(b) SUBJECTS OF STUDY.—The study under this section shall include—

(1) examination of, and recommendation of alternatives to, the policy under current Federal law of establishing average fuel economy standards for automobiles and requiring each automobile manufacturer to comply with average fuel economy standards that apply to the automobiles it manufactures;

(2) examination of how automobile manufacturers could contribute toward achieving the reduction referred to in subsection (a);

(3) examination of the potential of fuel cell technology in motor vehicles in order to determine the extent to which such technology may contribute to achieving the reduction referred to in subsection (a); and

(4) examination of the effects of the reduction referred to in subsection (a) on—

(A) gasoline supplies;

(B) the automobile industry, including sales of automobiles manufactured in the United States;

(C) motor vehicle safety; and

(D) air quality.

(c) REPORT.—The Administrator shall submit to Congress a report on the findings, conclusion, and recommendations of the study under this section by not later than 1 year after the date of the enactment of this Act.

SEC. 774. UPDATE TESTING PROCEDURES.

The Administrator of the Environmental Protection Agency shall update or revise the adjustment factors in sections 600.209–85 and 600.209–95, of the Code of Federal Regulations, CFR Part 600 (1995) Fuel Economy Regulations for 1977 and Later Model Year Automobiles to take into consideration higher speed limits, faster acceleration rates, variations in temperature, use of air conditioning, shorter city test cycle lengths, current reference fuels, and the use of other fuel depleting features.

Subtitle F—Federal and State Procurement

SEC. 781. DEFINITIONS. 42 USC 16121.

In this subtitle:

(1) FUEL CELL.—The term "fuel cell" means a device that directly converts the chemical energy of a fuel and an oxidant into electricity by electrochemical processes occurring at separate electrodes in the device.

(2) LIGHT-DUTY OR HEAVY-DUTY VEHICLE FLEET.—The term "light-duty or heavy-duty vehicle fleet" does not include any vehicle designed or procured for combat or combat-related missions.

(3) STATIONARY; PORTABLE.—The terms "stationary" and "portable", when used in reference to a fuel cell, include—

(A) continuous electric power; and

(B) backup electric power.

(4) TASK FORCE.—The term "Task Force" means the Hydrogen and Fuel Cell Technical Task Force established under section 806 of this Act.

(5) TECHNICAL ADVISORY COMMITTEE.—The term "Technical Advisory Committee" means the independent Technical Advisory Committee selected under section 807 of this Act.

SEC. 782. FEDERAL AND STATE PROCUREMENT OF FUEL CELL VEHICLES AND HYDROGEN ENERGY SYSTEMS. 42 USC 16122.

(a) PURPOSES.—The purposes of this section are—

(1) to stimulate acceptance by the market of fuel cell vehicles and hydrogen energy systems;

(2) to support development of technologies relating to fuel cell vehicles, public refueling stations, and hydrogen energy systems; and

(3) to require the Federal government, which is the largest single user of energy in the United States, to adopt those technologies as soon as practicable after the technologies are developed, in conjunction with private industry partners.

(b) FEDERAL LEASES AND PURCHASES.—

(1) REQUIREMENT.—

(A) IN GENERAL.—Not later than January 1, 2010, the head of any Federal agency that uses a light-duty or heavy-duty vehicle fleet shall lease or purchase fuel cell vehicles Deadline.

and hydrogen energy systems to meet any applicable energy savings goal described in subsection (c).

(B) LEARNING DEMONSTRATION VEHICLES.—The Secretary may lease or purchase appropriate vehicles developed under subsections (a)(10) and (b)(1)(A) of section 808 to meet the requirement in subparagraph (A).

(2) COSTS OF LEASES AND PURCHASES.—

(A) IN GENERAL.—The Secretary, in cooperation with the Task Force and the Technical Advisory Committee, shall pay to Federal agencies (or share the cost under interagency agreements) the difference in cost between—

(i) the cost to the agencies of leasing or purchasing fuel cell vehicles and hydrogen energy systems under paragraph (1); and

(ii) the cost to the agencies of a feasible alternative to leasing or purchasing fuel cell vehicles and hydrogen energy systems, as determined by the Secretary.

(B) COMPETITIVE COSTS AND MANAGEMENT STRUCTURES.—In carrying out subparagraph (A), the Secretary, in consultation with the agency, may use the General Services Administration or any commercial vendor to ensure—

(i) a cost-effective purchase of a fuel cell vehicle or hydrogen energy system; or

(ii) a cost-effective management structure of the lease of a fuel cell vehicle or hydrogen energy system.

(3) EXCEPTION.—

(A) IN GENERAL.—If the Secretary determines that the head of an agency described in paragraph (1) cannot find an appropriately efficient and reliable fuel cell vehicle or hydrogen energy system in accordance with paragraph (1), that agency shall be excepted from compliance with paragraph (1).

(B) CONSIDERATION.—In making a determination under subparagraph (A), the Secretary shall consider—

(i) the needs of the agency; and

(ii) an evaluation performed by—

(I) the Task Force; or

(II) the Technical Advisory Committee.

(c) ENERGY SAVINGS GOALS.—

Deadlines.

(1) IN GENERAL.—

(A) REGULATIONS.—Not later than December 31, 2006, the Secretary shall—

(i) in cooperation with the Task Force, promulgate regulations for the period of 2008 through 2010 that extend and augment energy savings goals for each Federal agency, in accordance with any Executive order issued after March 2000; and

(ii) promulgate regulations to expand the minimum Federal fleet requirement and credit allowances for fuel cell vehicle systems under section 303 of the Energy Policy Act of 1992 (42 U.S.C. 13212).

(B) REVIEW, EVALUATION, AND NEW REGULATIONS.—Not later than December 31, 2010, the Secretary shall—

(i) review the regulations promulgated under subparagraph (A);

(ii) evaluate any progress made toward achieving energy savings by Federal agencies; and

(iii) promulgate new regulations for the period of 2011 through 2015 to achieve additional energy savings by Federal agencies relating to technical and cost-performance standards.

(2) OFFSETTING ENERGY SAVINGS GOALS.—An agency that leases or purchases a fuel cell vehicle or hydrogen energy system in accordance with subsection (b)(1) may use that lease or purchase to count toward an energy savings goal of the agency.

(d) COOPERATIVE PROGRAM WITH STATE AGENCIES.—

(1) IN GENERAL.—The Secretary may establish a cooperative program with State agencies managing motor vehicle fleets to encourage purchase of fuel cell vehicles by the agencies.

(2) INCENTIVES.—In carrying out the cooperative program, the Secretary may offer incentive payments to a State agency to assist with the cost of planning, differential purchases, and administration.

(e) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section—

(1) $15,000,000 for fiscal year 2008;

(2) $25,000,000 for fiscal year 2009;

(3) $65,000,000 for fiscal year 2010; and

(4) such sums as are necessary for each of fiscal years 2011 through 2015.

SEC. 783. FEDERAL PROCUREMENT OF STATIONARY, PORTABLE, AND MICRO FUEL CELLS. 42 USC 16123.

(a) PURPOSES.—The purposes of this section are—

(1) to stimulate acceptance by the market of stationary, portable, and micro fuel cells; and

(2) to support development of technologies relating to stationary, portable, and micro fuel cells.

(b) FEDERAL LEASES AND PURCHASES.—

(1) IN GENERAL.—Not later than January 1, 2006, the head of any Federal agency that uses electrical power from stationary, portable, or microportable devices shall lease or purchase a stationary, portable, or micro fuel cell to meet any applicable energy savings goal described in subsection (c). Deadline.

(2) COSTS OF LEASES AND PURCHASES.—

(A) IN GENERAL.—The Secretary, in cooperation with the Task Force and the Technical Advisory Committee, shall pay the cost to Federal agencies (or share the cost under interagency agreements) of leasing or purchasing stationary, portable, and micro fuel cells under paragraph (1).

(B) COMPETITIVE COSTS AND MANAGEMENT STRUCTURES.—In carrying out subparagraph (A), the Secretary, in consultation with the agency, may use the General Services Administration or any commercial vendor to ensure—

(i) a cost-effective purchase of a stationary, portable, or micro fuel cell; or

(ii) a cost-effective management structure of the lease of a stationary, portable, or micro fuel cell.

(3) EXCEPTION.—

(A) IN GENERAL.—If the Secretary determines that the head of an agency described in paragraph (1) cannot find an appropriately efficient and reliable stationary, portable,

or micro fuel cell in accordance with paragraph (1), that agency shall be excepted from compliance with paragraph (1).

(B) CONSIDERATION.—In making a determination under subparagraph (A), the Secretary shall consider—

(i) the needs of the agency; and

(ii) an evaluation performed by—

(I) the Task Force; or

(II) the Technical Advisory Committee of the Task Force.

(c) ENERGY SAVINGS GOALS.—An agency that leases or purchases a stationary, portable, or micro fuel cell in accordance with subsection (b)(1) may use that lease or purchase to count toward an energy savings goal described in section 808 of this Act that is applicable to the agency.

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section—

(1) $20,000,000 for fiscal year 2006;

(2) $50,000,000 for fiscal year 2007;

(3) $75,000,000 for fiscal year 2008;

(4) $100,000,000 for fiscal year 2009;

(5) $100,000,000 for fiscal year 2010; and

(6) such sums as are necessary for each of fiscal years 2011 through 2015.

Subtitle G—Diesel Emissions Reduction

42 USC 16131.

SEC. 791. DEFINITIONS.

In this subtitle:

(1) ADMINISTRATOR.—The term "Administrator" means the Administrator of the Environmental Protection Agency.

(2) CERTIFIED ENGINE CONFIGURATION.—The term "certified engine configuration" means a new, rebuilt, or remanufactured engine configuration—

(A) that has been certified or verified by—

(i) the Administrator; or

(ii) the California Air Resources Board;

(B) that meets or is rebuilt or remanufactured to a more stringent set of engine emission standards, as determined by the Administrator; and

(C) in the case of a certified engine configuration involving the replacement of an existing engine or vehicle, an engine configuration that replaced an engine that was—

(i) removed from the vehicle; and

(ii) returned to the supplier for remanufacturing to a more stringent set of engine emissions standards or for scrappage.

(3) ELIGIBLE ENTITY.—The term "eligible entity" means—

(A) a regional, State, local, or tribal agency or port authority with jurisdiction over transportation or air quality; and

(B) a nonprofit organization or institution that—

(i) represents or provides pollution reduction or educational services to persons or organizations that own or operate diesel fleets; or

(ii) has, as its principal purpose, the promotion of transportation or air quality.

(4) EMERGING TECHNOLOGY.—The term "emerging technology" means a technology that is not certified or verified by the Administrator or the California Air Resources Board but for which an approvable application and test plan has been submitted for verification to the Administrator or the California Air Resources Board.

(5) FLEET.—The term "fleet" means one or more diesel vehicles or mobile or stationary diesel engines.

(6) HEAVY-DUTY TRUCK.—The term "heavy-duty truck" has the meaning given the term "heavy duty vehicle" in section 202 of the Clean Air Act (42 U.S.C. 7521).

(7) MEDIUM-DUTY TRUCK.—The term "medium-duty truck" has such meaning as shall be determined by the Administrator, by regulation.

(8) VERIFIED TECHNOLOGY.—The term "verified technology" means a pollution control technology, including a retrofit technology, advanced truckstop electrification system, or auxiliary power unit, that has been verified by—

(A) the Administrator; or

(B) the California Air Resources Board.

SEC. 792. NATIONAL GRANT AND LOAN PROGRAMS. 42 USC 16132.

(a) IN GENERAL.—The Administrator shall use 70 percent of the funds made available to carry out this subtitle for each fiscal year to provide grants and low-cost revolving loans, as determined by the Administrator, on a competitive basis, to eligible entities to achieve significant reductions in diesel emissions in terms of—

(1) tons of pollution produced; and

(2) diesel emissions exposure, particularly from fleets operating in areas designated by the Administrator as poor air quality areas.

(b) DISTRIBUTION.—

(1) IN GENERAL.—The Administrator shall distribute funds made available for a fiscal year under this subtitle in accordance with this section.

(2) FLEETS.—The Administrator shall provide not less than 50 percent of funds available for a fiscal year under this section to eligible entities for the benefit of public fleets.

(3) ENGINE CONFIGURATIONS AND TECHNOLOGIES.—

(A) CERTIFIED ENGINE CONFIGURATIONS AND VERIFIED TECHNOLOGIES.—The Administrator shall provide not less than 90 percent of funds available for a fiscal year under this section to eligible entities for projects using—

(i) a certified engine configuration; or

(ii) a verified technology.

(B) EMERGING TECHNOLOGIES.—

(i) IN GENERAL.—The Administrator shall provide not more than 10 percent of funds available for a fiscal year under this section to eligible entities for the development and commercialization of emerging technologies.

(ii) APPLICATION AND TEST PLAN.—To receive funds under clause (i), a manufacturer, in consultation with an eligible entity, shall submit for verification to the Administrator or the California Air Resources Board

a test plan for the emerging technology, together with the application under subsection (c).

(c) APPLICATIONS.—

(1) IN GENERAL.—To receive a grant or loan under this section, an eligible entity shall submit to the Administrator an application at a time, in a manner, and including such information as the Administrator may require.

(2) INCLUSIONS.—An application under this subsection shall include—

(A) a description of the air quality of the area served by the eligible entity;

(B) the quantity of air pollution produced by the diesel fleets in the area served by the eligible entity;

(C) a description of the project proposed by the eligible entity, including—

(i) any certified engine configuration, verified technology, or emerging technology to be used or funded by the eligible entity; and

(ii) the means by which the project will achieve a significant reduction in diesel emissions;

(D) an evaluation (using methodology approved by the Administrator or the National Academy of Sciences) of the quantifiable and unquantifiable benefits of the emissions reductions of the proposed project;

(E) an estimate of the cost of the proposed project;

(F) a description of the age and expected lifetime control of the equipment used or funded by the eligible entity;

(G) a description of the diesel fuel available in the areas to be served by the eligible entity, including the sulfur content of the fuel; and

(H) provisions for the monitoring and verification of the project.

(3) PRIORITY.—In providing a grant or loan under this section, the Administrator shall give priority to proposed projects that, as determined by the Administrator—

(A) maximize public health benefits;

(B) are the most cost-effective;

(C) serve areas—

(i) with the highest population density;

(ii) that are poor air quality areas, including areas identified by the Administrator as—

(I) in nonattainment or maintenance of national ambient air quality standards for a criteria pollutant;

(II) Federal Class I areas; or

(III) areas with toxic air pollutant concerns;

(iii) that receive a disproportionate quantity of air pollution from a diesel fleets, including truckstops, ports, rail yards, terminals, and distribution centers; or

(iv) that use a community-based multistakeholder collaborative process to reduce toxic emissions;

(D) include a certified engine configuration, verified technology, or emerging technology that has a long expected useful life;

(E) will maximize the useful life of any certified engine configuration, verified technology, or emerging technology used or funded by the eligible entity;

(F) conserve diesel fuel; and

(G) use diesel fuel with a sulfur content of less than or equal to 15 parts per million, as the Administrator determines to be appropriate.

(d) USE OF FUNDS.—

(1) IN GENERAL.—An eligible entity may use a grant or loan provided under this section to fund the costs of—

(A) a retrofit technology (including any incremental costs of a repowered or new diesel engine) that significantly reduces emissions through development and implementation of a certified engine configuration, verified technology, or emerging technology for—

(i) a bus;

(ii) a medium-duty truck or a heavy-duty truck;

(iii) a marine engine;

(iv) a locomotive; or

(v) a nonroad engine or vehicle used in—

(I) construction;

(II) handling of cargo (including at a port or airport);

(III) agriculture;

(IV) mining; or

(V) energy production; or

(B) programs or projects to reduce long-duration idling using verified technology involving a vehicle or equipment described in subparagraph (A).

(2) REGULATORY PROGRAMS.—

(A) IN GENERAL.—Notwithstanding paragraph (1), no grant or loan provided under this section shall be used to fund the costs of emissions reductions that are mandated under Federal, State or local law.

(B) MANDATED.—For purposes of subparagraph (A), voluntary or elective emission reduction measures shall not be considered "mandated", regardless of whether the reductions are included in the State implementation plan of a State.

SEC. 793. STATE GRANT AND LOAN PROGRAMS. 42 USC 16133.

(a) IN GENERAL.—Subject to the availability of adequate appropriations, the Administrator shall use 30 percent of the funds made available for a fiscal year under this subtitle to support grant and loan programs administered by States that are designed to achieve significant reductions in diesel emissions.

(b) APPLICATIONS.—The Administrator shall—

(1) provide to States guidance for use in applying for grant or loan funds under this section, including information regarding— Guidelines.

(A) the process and forms for applications;

(B) permissible uses of funds received; and

(C) the cost-effectiveness of various emission reduction technologies eligible to be carried out using funds provided under this section; and

(2) establish, for applications described in paragraph (1)— Procedures.

Deadline.

(A) an annual deadline for submission of the applications;

(B) a process by which the Administrator shall approve or disapprove each application; and

(C) a streamlined process by which a State may renew an application described in paragraph (1) for subsequent fiscal years.

(c) ALLOCATION OF FUNDS.—

(1) IN GENERAL.—For each fiscal year, the Administrator shall allocate among States for which applications are approved by the Administrator under subsection (b)(2)(B) funds made available to carry out this section for the fiscal year.

(2) ALLOCATION.—Using not more than 20 percent of the funds made available to carry out this subtitle for a fiscal year, the Administrator shall provide to each State described in paragraph (1) for the fiscal year an allocation of funds that is equal to—

(A) if each of the 50 States qualifies for an allocation, an amount equal to 2 percent of the funds made available to carry out this section; or

(B) if fewer than 50 States qualifies for an allocation, an amount equal to the amount described in subparagraph (A), plus an additional amount equal to the product obtained by multiplying—

(i) the proportion that—

(I) the population of the State; bears to

(II) the population of all States described in paragraph (1); by

(ii) the amount of funds remaining after each State described in paragraph (1) receives the 2-percent allocation under this paragraph.

(3) STATE MATCHING INCENTIVE.—

(A) IN GENERAL.—If a State agrees to match the allocation provided to the State under paragraph (2) for a fiscal year, the Administrator shall provide to the State for the fiscal year an additional amount equal to 50 percent of the allocation of the State under paragraph (2).

(B) REQUIREMENTS.—A State—

(i) may not use funds received under this subtitle to pay a matching share required under this subsection; and

(ii) shall not be required to provide a matching share for any additional amount received under subparagraph (A).

(4) UNCLAIMED FUNDS.—Any funds that are not claimed by a State for a fiscal year under this subsection shall be used to carry out section 792.

(d) ADMINISTRATION.—

(1) IN GENERAL.—Subject to paragraphs (2) and (3) and, to the extent practicable, the priority areas listed in section 792(c)(3), a State shall use any funds provided under this section to develop and implement such grant and low-cost revolving loan programs in the State as are appropriate to meet State needs and goals relating to the reduction of diesel emissions.

(2) APPORTIONMENT OF FUNDS.—The Governor of a State that receives funding under this section may determine the portion of funds to be provided as grants or loans.

(3) USE OF FUNDS.—A grant or loan provided under this section may be used for a project relating to—

(A) a certified engine configuration; or

(B) a verified technology.

SEC. 794. EVALUATION AND REPORT. 42 USC 16134.

(a) IN GENERAL.—Not later than 1 year after the date on which funds are made available under this subtitle, and biennially thereafter, the Administrator shall submit to Congress a report evaluating the implementation of the programs under this subtitle.

(b) INCLUSIONS.—The report shall include a description of—

(1) the total number of grant applications received;

(2) each grant or loan made under this subtitle, including the amount of the grant or loan;

(3) each project for which a grant or loan is provided under this subtitle, including the criteria used to select the grant or loan recipients;

(4) the actual and estimated air quality and diesel fuel conservation benefits, cost-effectiveness, and cost-benefits of the grant and loan programs under this subtitle;

(5) the problems encountered by projects for which a grant or loan is provided under this subtitle; and

(6) any other information the Administrator considers to be appropriate.

SEC. 795. OUTREACH AND INCENTIVES. 42 USC 16135.

(a) DEFINITION OF ELIGIBLE TECHNOLOGY.—In this section, the term "eligible technology" means—

(1) a verified technology; or

(2) an emerging technology.

(b) TECHNOLOGY TRANSFER PROGRAM.—

(1) IN GENERAL.—The Administrator shall establish a program under which the Administrator—

(A) informs stakeholders of the benefits of eligible technologies; and

(B) develops nonfinancial incentives to promote the use of eligible technologies.

(2) ELIGIBLE STAKEHOLDERS.—Eligible stakeholders under this section include—

(A) equipment owners and operators;

(B) emission and pollution control technology manufacturers;

(C) engine and equipment manufacturers;

(D) State and local officials responsible for air quality management;

(E) community organizations; and

(F) public health, educational, and environmental organizations.

(c) STATE IMPLEMENTATION PLANS.—The Administrator shall develop appropriate guidance to provide credit to a State for emission reductions in the State created by the use of eligible technologies through a State implementation plan under section 110 of the Clean Air Act (42 U.S.C. 7410). Guidelines.

(d) INTERNATIONAL MARKETS.—The Administrator, in coordination with the Department of Commerce and industry stakeholders,

shall inform foreign countries with air quality problems of the potential of technology developed or used in the United States to provide emission reductions in those countries.

42 USC 16136.

SEC. 796. EFFECT OF SUBTITLE.

Nothing in this subtitle affects any authority under the Clean Air Act (42 U.S.C. 7401 et seq.) in existence on the day before the date of enactment of this Act.

42 USC 16137.

SEC. 797. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated to carry out this subtitle $200,000,000 for each of fiscal years 2007 through 2011, to remain available until expended.

TITLE VIII—HYDROGEN

Spark M. Matsunaga Hydrogen Act of 2005.
42 USC 15801 note.

SEC. 801. HYDROGEN AND FUEL CELL PROGRAM.

This title may be cited as the "Spark M. Matsunaga Hydrogen Act of 2005".

42 USC 16151.

SEC. 802. PURPOSES.

The purposes of this title are—

(1) to enable and promote comprehensive development, demonstration, and commercialization of hydrogen and fuel cell technology in partnership with industry;

(2) to make critical public investments in building strong links to private industry, institutions of higher education, National Laboratories, and research institutions to expand innovation and industrial growth;

(3) to build a mature hydrogen economy that creates fuel diversity in the massive transportation sector of the United States;

(4) to sharply decrease the dependency of the United States on imported oil, eliminate most emissions from the transportation sector, and greatly enhance our energy security; and

(5) to create, strengthen, and protect a sustainable national energy economy.

42 USC 16152.

SEC. 803. DEFINITIONS.

In this title:

(1) FUEL CELL.—The term "fuel cell" means a device that directly converts the chemical energy of a fuel, which is supplied from an external source, and an oxidant into electricity by electrochemical processes occurring at separate electrodes in the device.

(2) HEAVY-DUTY VEHICLE.—The term "heavy-duty vehicle" means a motor vehicle that—

(A) is rated at more than 8,500 pounds gross vehicle weight;

(B) has a curb weight of more than 6,000 pounds; or

(C) has a basic vehicle frontal area in excess of 45 square feet.

(3) INFRASTRUCTURE.—The term "infrastructure" means the equipment, systems, or facilities used to produce, distribute, deliver, or store hydrogen (except for onboard storage).

(4) LIGHT-DUTY VEHICLE.—The term "light-duty vehicle" means a motor vehicle that is rated at 8,500 or less pounds gross vehicle weight.

(5) STATIONARY; PORTABLE.—The terms "stationary" and "portable", when used in reference to a fuel cell, include—

(A) continuous electric power; and

(B) backup electric power.

(6) TASK FORCE.—The term "Task Force" means the Hydrogen and Fuel Cell Technical Task Force established under section 806.

(7) TECHNICAL ADVISORY COMMITTEE.—The term "Technical Advisory Committee" means the independent Technical Advisory Committee established under section 807.

SEC. 804. PLAN.

Deadline.
42 USC 16153.

Not later than 6 months after the date of enactment of this Act, the Secretary shall transmit to Congress a coordinated plan for the programs described in this title and any other programs of the Department that are directly related to fuel cells or hydrogen. The plan shall describe, at a minimum—

(1) the agenda for the next 5 years for the programs authorized under this title, including the agenda for each activity enumerated in section 805(e);

(2) the types of entities that will carry out the activities under this title and what role each entity is expected to play;

(3) the milestones that will be used to evaluate the programs for the next 5 years;

(4) the most significant technical and nontechnical hurdles that stand in the way of achieving the goals described in section 805, and how the programs will address those hurdles; and

(5) the policy assumptions that are implicit in the plan, including any assumptions that would affect the sources of hydrogen or the marketability of hydrogen-related products.

SEC. 805. PROGRAMS.

42 USC 16154.

(a) IN GENERAL.—The Secretary, in consultation with other Federal agencies and the private sector, shall conduct a research and development program on technologies relating to the production, purification, distribution, storage, and use of hydrogen energy, fuel cells, and related infrastructure.

(b) GOAL.—The goal of the program shall be to demonstrate and commercialize the use of hydrogen for transportation (in light-duty vehicles and heavy-duty vehicles), utility, industrial, commercial, and residential applications.

(c) FOCUS.—In carrying out activities under this section, the Secretary shall focus on factors that are common to the development of hydrogen infrastructure and the supply of vehicle and electric power for critical consumer and commercial applications, and that achieve continuous technical evolution and cost reduction, particularly for hydrogen production, the supply of hydrogen, storage of hydrogen, and end uses of hydrogen that—

(1) steadily increase production, distribution, and end use efficiency and reduce life-cycle emissions;

(2) resolve critical problems relating to catalysts, membranes, storage, lightweight materials, electronic controls, manufacturability, and other problems that emerge from the program;

(3) enhance sources of renewable fuels and biofuels for hydrogen production; and

(4) enable widespread use of distributed electricity generation and storage.

(d) PUBLIC EDUCATION AND RESEARCH.—In carrying out this section, the Secretary shall support enhanced public education and research conducted at institutions of higher education in fundamental sciences, application design, and systems concepts (including education and research relating to materials, subsystems, manufacturability, maintenance, and safety) relating to hydrogen and fuel cells.

(e) ACTIVITIES.—The Secretary, in partnership with the private sector, shall conduct programs to address—

(1) production of hydrogen from diverse energy sources, including—

(A) fossil fuels, which may include carbon capture and sequestration;

(B) hydrogen-carrier fuels (including ethanol and methanol);

(C) renewable energy resources, including biomass; and

(D) nuclear energy;

(2) use of hydrogen for commercial, industrial, and residential electric power generation;

(3) safe delivery of hydrogen or hydrogen-carrier fuels, including—

(A) transmission by pipeline and other distribution methods; and

(B) convenient and economic refueling of vehicles either at central refueling stations or through distributed onsite generation;

(4) advanced vehicle technologies, including—

(A) engine and emission control systems;

(B) energy storage, electric propulsion, and hybrid systems;

(C) automotive materials; and

(D) other advanced vehicle technologies;

(5) storage of hydrogen or hydrogen-carrier fuels, including development of materials for safe and economic storage in gaseous, liquid, or solid form at refueling facilities and onboard vehicles;

(6) development of safe, durable, affordable, and efficient fuel cells, including fuel-flexible fuel cell power systems, improved manufacturing processes, high-temperature membranes, cost-effective fuel processing for natural gas, fuel cell stack and system reliability, low temperature operation, and cold start capability; and

(7) the ability of domestic automobile manufacturers to manufacture commercially available competitive hybrid vehicle technologies in the United States.

(f) PROGRAM GOALS.—

(1) VEHICLES.—For vehicles, the goals of the program are—

(A) to enable a commitment by automakers no later than year 2015 to offer safe, affordable, and technically viable hydrogen fuel cell vehicles in the mass consumer market; and

(B) to enable production, delivery, and acceptance by consumers of model year 2020 hydrogen fuel cell and other

hydrogen-powered vehicles that will have, when compared to light duty vehicles in model year 2005—

(i) fuel economy that is substantially higher;

(ii) substantially lower emissions of air pollutants; and

(iii) equivalent or improved vehicle fuel system crash integrity and occupant protection.

(2) HYDROGEN ENERGY AND ENERGY INFRASTRUCTURE.—For hydrogen energy and energy infrastructure, the goals of the program are to enable a commitment not later than 2015 that will lead to infrastructure by 2020 that will provide—

(A) safe and convenient refueling;

(B) improved overall efficiency;

(C) widespread availability of hydrogen from domestic energy sources through—

(i) production, with consideration of emissions levels;

(ii) delivery, including transmission by pipeline and other distribution methods for hydrogen; and

(iii) storage, including storage in surface transportation vehicles;

(D) hydrogen for fuel cells, internal combustion engines, and other energy conversion devices for portable, stationary, micro, critical needs facilities, and transportation applications; and

(E) other technologies consistent with the Department's plan.

(3) FUEL CELLS.—The goals for fuel cells and their portable, stationary, and transportation applications are to enable—

(A) safe, economical, and environmentally sound hydrogen fuel cells;

(B) fuel cells for light duty and other vehicles; and

(C) other technologies consistent with the Department's plan.

(g) FUNDING.—

(1) IN GENERAL.—The Secretary shall carry out the programs under this section using a competitive, merit-based review process and consistent with the generally applicable Federal laws and regulations governing awards of financial assistance, contracts, or other agreements.

(2) RESEARCH CENTERS.—Activities under this section may be carried out by funding nationally recognized university-based or Federal laboratory research centers.

(h) HYDROGEN SUPPLY.—There are authorized to be appropriated to carry out projects and activities relating to hydrogen production, storage, distribution and dispensing, transport, education and coordination, and technology transfer under this section—

(1) $160,000,000 for fiscal year 2006;

(2) $200,000,000 for fiscal year 2007;

(3) $220,000,000 for fiscal year 2008;

(4) $230,000,000 for fiscal year 2009;

(5) $250,000,000 for fiscal year 2010; and

(6) such sums as are necessary for each of fiscal years 2011 through 2020.

(i) FUEL CELL TECHNOLOGIES.—There are authorized to be appropriated to carry out projects and activities relating to fuel cell technologies under this section—

(1) $150,000,000 for fiscal year 2006;

(2) $160,000,000 for fiscal year 2007;

(3) $170,000,000 for fiscal year 2008;

(4) $180,000,000 for fiscal year 2009;

(5) $200,000,000 for fiscal year 2010; and

(6) such sums as are necessary for each of fiscal years 2011 through 2020.

42 USC 16155.

SEC. 806. HYDROGEN AND FUEL CELL TECHNICAL TASK FORCE.

Deadline.
President.

(a) ESTABLISHMENT.—Not later than 120 days after the date of enactment of this Act, the President shall establish an interagency task force chaired by the Secretary with representatives from each of the following:

(1) The Office of Science and Technology Policy within the Executive Office of the President.

(2) The Department of Transportation.

(3) The Department of Defense.

(4) The Department of Commerce (including the National Institute of Standards and Technology).

(5) The Department of State.

(6) The Environmental Protection Agency.

(7) The National Aeronautics and Space Administration.

(8) Other Federal agencies as the Secretary determines appropriate.

(b) DUTIES.—

(1) PLANNING.—The Task Force shall work toward—

(A) a safe, economical, and environmentally sound fuel infrastructure for hydrogen and hydrogen-carrier fuels, including an infrastructure that supports buses and other fleet transportation;

(B) fuel cells in government and other applications, including portable, stationary, and transportation applications;

(C) distributed power generation, including the generation of combined heat, power, and clean fuels including hydrogen;

(D) uniform hydrogen codes, standards, and safety protocols; and

(E) vehicle hydrogen fuel system integrity safety performance.

(2) ACTIVITIES.—The Task Force may organize workshops and conferences, may issue publications, and may create databases to carry out its duties. The Task Force shall—

(A) foster the exchange of generic, nonproprietary information and technology among industry, academia, and government;

(B) develop and maintain an inventory and assessment of hydrogen, fuel cells, and other advanced technologies, including the commercial capability of each technology for the economic and environmentally safe production, distribution, delivery, storage, and use of hydrogen;

(C) integrate technical and other information made available as a result of the programs and activities under this title;

(D) promote the marketplace introduction of infrastructure for hydrogen fuel vehicles; and

(E) conduct an education program to provide hydrogen and fuel cell information to potential end-users.

(c) AGENCY COOPERATION.—The heads of all agencies, including those whose agencies are not represented on the Task Force, shall cooperate with and furnish information to the Task Force, the Technical Advisory Committee, and the Department.

SEC. 807. TECHNICAL ADVISORY COMMITTEE. 42 USC 16156.

(a) ESTABLISHMENT.—The Hydrogen Technical and Fuel Cell Advisory Committee is established to advise the Secretary on the programs and activities under this title.

(b) MEMBERSHIP.—

(1) MEMBERS.—The Technical Advisory Committee shall be comprised of not fewer than 12 nor more than 25 members. The members shall be appointed by the Secretary to represent domestic industry, academia, professional societies, government agencies, Federal laboratories, previous advisory panels, and financial, environmental, and other appropriate organizations based on the Department's assessment of the technical and other qualifications of Technical Advisory Committee members and the needs of the Technical Advisory Committee.

(2) TERMS.—The term of a member of the Technical Advisory Committee shall not be more than 3 years. The Secretary may appoint members of the Technical Advisory Committee in a manner that allows the terms of the members serving at any time to expire at spaced intervals so as to ensure continuity in the functioning of the Technical Advisory Committee. A member of the Technical Advisory Committee whose term is expiring may be reappointed.

(3) CHAIRPERSON.—The Technical Advisory Committee shall have a chairperson, who shall be elected by the members from among their number.

(c) REVIEW.—The Technical Advisory Committee shall review and make recommendations to the Secretary on—

(1) the implementation of programs and activities under this title;

(2) the safety, economical, and environmental consequences of technologies for the production, distribution, delivery, storage, or use of hydrogen energy and fuel cells; and

(3) the plan under section 804.

(d) RESPONSE.—

(1) CONSIDERATION OF RECOMMENDATIONS.—The Secretary shall consider, but need not adopt, any recommendations of the Technical Advisory Committee under subsection (c).

(2) BIENNIAL REPORT.—The Secretary shall transmit a biennial report to Congress describing any recommendations made by the Technical Advisory Committee since the previous report. The report shall include a description of how the Secretary has implemented or plans to implement the recommendations, or an explanation of the reasons that a recommendation will not be implemented. The report shall be transmitted along with the President's budget proposal.

(e) SUPPORT.—The Secretary shall provide resources necessary in the judgment of the Secretary for the Technical Advisory Committee to carry out its responsibilities under this title.

42 USC 16157.

SEC. 808. DEMONSTRATION.

(a) IN GENERAL.—In carrying out the programs under this section, the Secretary shall fund a limited number of demonstration projects, consistent with this title and a determination of the maturity, cost-effectiveness, and environmental impacts of technologies supporting each project. In selecting projects under this subsection, the Secretary shall, to the extent practicable and in the public interest, select projects that—

(1) involve using hydrogen and related products at existing facilities or installations, such as existing office buildings, military bases, vehicle fleet centers, transit bus authorities, or units of the National Park System;

(2) depend on reliable power from hydrogen to carry out essential activities;

(3) lead to the replication of hydrogen technologies and draw such technologies into the marketplace;

(4) include vehicle, portable, and stationary demonstrations of fuel cell and hydrogen-based energy technologies;

(5) address the interdependency of demand for hydrogen fuel cell applications and hydrogen fuel infrastructure;

(6) raise awareness of hydrogen technology among the public;

(7) facilitate identification of an optimum technology among competing alternatives;

(8) address distributed generation using renewable sources;

(9) carry out demonstrations of evolving hydrogen and fuel cell technologies in national parks, remote island areas, and on Indian tribal land, as selected by the Secretary;

(10) carry out a program to demonstrate developmental hydrogen and fuel cell systems for mobile, portable, and stationary uses, using improved versions of the learning demonstrations program concept of the Department including demonstrations involving—

(A) light-duty vehicles;

(B) heavy-duty vehicles;

(C) fleet vehicles;

(D) specialty industrial and farm vehicles; and

(E) commercial and residential portable, continuous, and backup electric power generation;

(11) in accordance with any code or standards developed in a region, fund prototype, pilot fleet, and infrastructure regional hydrogen supply corridors along the interstate highway system in varied climates across the United States; and

(12) fund demonstration programs that explore the use of hydrogen blends, hybrid hydrogen, and hydrogen reformed from renewable agricultural fuels, including the use of hydrogen in hybrid electric, heavier duty, and advanced internal combustion-powered vehicles.

The Secretary shall give preference to projects which address multiple elements contained in paragraphs (1) through (12).

(b) SYSTEM DEMONSTRATIONS.—

Grants.

(1) IN GENERAL.—As a component of the demonstration program under this section, the Secretary shall provide grants, on a cost share basis as appropriate, to eligible entities (as determined by the Secretary) for use in—

(A) devising system design concepts that provide for the use of advanced composite vehicles in programs under section 782 that—

(i) have as a primary goal the reduction of drive energy requirements;

(ii) after 2010, add another research and development phase, as defined in subsection (c), including the vehicle and infrastructure partnerships developed under the learning demonstrations program concept of the Department; and

(iii) are managed through an enhanced FreedomCAR program within the Department that encourages involvement in cost-shared projects by manufacturers and governments; and

(B) designing a local distributed energy system that—

(i) incorporates renewable hydrogen production, off-grid electricity production, and fleet applications in industrial or commercial service;

(ii) integrates energy or applications described in clause (i), such as stationary, portable, micro, and mobile fuel cells, into a high-density commercial or residential building complex or agricultural community; and

(iii) is managed in cooperation with industry, State, tribal, and local governments, agricultural organizations, and nonprofit generators and distributors of electricity.

(c) IDENTIFICATION OF NEW PROGRAM REQUIREMENTS.—In carrying out the demonstrations under subsection (a), the Secretary, in consultation with the Task Force and the Technical Advisory Committee, shall—

(1) after 2008 for stationary and portable applications, and after 2010 for vehicles, identify new requirements that refine technological concepts, planning, and applications; and

(2) during the second phase of the learning demonstrations under subsection (b)(1)(A)(ii), redesign subsequent program work to incorporate those requirements.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section—

(1) $185,000,000 for fiscal year 2006;

(2) $200,000,000 for fiscal year 2007;

(3) $250,000,000 for fiscal year 2008;

(4) $300,000,000 for fiscal year 2009;

(5) $375,000,000 for fiscal year 2010; and

(6) such sums as are necessary for each of fiscal years 2011 through 2020.

SEC. 809. CODES AND STANDARDS.

42 USC 16158.

Grants.
Contracts.

(a) IN GENERAL.—The Secretary, in cooperation with the Task Force, shall provide grants to, or offer to enter into contracts with, such professional organizations, public service organizations, and government agencies as the Secretary determines appropriate to support timely and extensive development of safety codes and standards relating to fuel cell vehicles, hydrogen energy systems, and stationary, portable, and micro fuel cells.

(b) EDUCATIONAL EFFORTS.—The Secretary shall support educational efforts by organizations and agencies described in subsection (a) to share information, including information relating to best practices, among those organizations and agencies.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section—

(1) $4,000,000 for fiscal year 2006;

(2) $7,000,000 for fiscal year 2007;

(3) $8,000,000 for fiscal year 2008;

(4) $10,000,000 for fiscal year 2009;

(5) $9,000,000 for fiscal year 2010; and

(6) such sums as are necessary for each of fiscal years 2011 through 2020.

Applicability.
42 USC 16159.

SEC. 810. DISCLOSURE.

Section 623 of the Energy Policy Act of 1992 (42 U.S.C. 13293) shall apply to any project carried out through a grant, cooperative agreement, or contract under this title.

42 USC 16160.

SEC. 811. REPORTS.

(a) SECRETARY.—Subject to subsection (c), not later than 2 years after the date of enactment of this Act, and triennially thereafter, the Secretary shall submit to Congress a report describing—

(1) activities carried out by the Department under this title, for hydrogen and fuel cell technology;

(2) measures the Secretary has taken during the preceding 3 years to support the transition of primary industry (or a related industry) to a fully commercialized hydrogen economy;

(3) any change made to the strategy relating to hydrogen and fuel cell technology to reflect the results of a learning demonstrations;

(4) progress, including progress in infrastructure, made toward achieving the goal of producing and deploying not less than—

(A) 100,000 hydrogen-fueled vehicles in the United States by 2010; and

(B) 2,500,000 hydrogen-fueled vehicles in the United States by 2020;

(5) progress made toward achieving the goal of supplying hydrogen at a sufficient number of fueling stations in the United States by 2010 including by integrating—

(A) hydrogen activities; and

(B) associated targets and timetables for the development of hydrogen technologies;

(6) any problem relating to the design, execution, or funding of a program under this title;

(7) progress made toward and goals achieved in carrying out this title and updates to the developmental roadmap, including the results of the reviews conducted by the National Academy of Sciences under subsection (b) for the fiscal years covered by the report; and

(8) any updates to strategic plans that are necessary to meet the goals described in paragraph (4).

Deadlines.

(b) EXTERNAL REVIEW.—The Secretary shall enter into an arrangement with the National Academy of Sciences under which the Academy will review the programs under sections 805 and 808 every fourth year following the date of enactment of this Act. The Academy's review shall include the program priorities and

technical milestones, and evaluate the progress toward achieving them. The first review shall be completed not later than 5 years after the date of enactment of this Act. Not later than 45 days after receiving the review, the Secretary shall transmit the review to Congress along with a plan to implement the review's recommendations or an explanation for the reasons that a recommendation will not be implemented.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $1,500,000 for each of fiscal years 2006 through 2020.

SEC. 812. SOLAR AND WIND TECHNOLOGIES. 42 USC 16161.

(a) SOLAR ENERGY TECHNOLOGIES.—The Secretary shall—

(1) prepare a detailed roadmap for carrying out the provisions in this title related to solar energy technologies and for implementing the recommendations related to solar energy technologies that are included in the report transmitted under subsection (e);

(2) provide for the establishment of 5 projects in geographic areas that are regionally and climatically diverse to demonstrate the production of hydrogen at solar energy facilities, including one demonstration project at a National Laboratory or institution of higher education;

(3) establish a program—

(A) to develop optimized concentrating solar power devices that may be used for the production of both electricity and hydrogen; and

(B) to evaluate the use of thermochemical cycles for hydrogen production at the temperatures attainable with concentrating solar power devices;

(4) coordinate with activities sponsored by the Department's Office of Nuclear Energy, Science, and Technology on high-temperature materials, thermochemical cycles, and economic issues related to solar energy;

(5) provide for the construction and operation of new concentrating solar power devices or solar power cogeneration facilities that produce hydrogen either concurrently with, or independently of, the production of electricity;

(6) support existing facilities and programs of study related to concentrating solar power devices; and

(7) establish a program—

(A) to develop methods that use electricity from photovoltaic devices for the onsite production of hydrogen, such that no intermediate transmission or distribution infrastructure is required or used and future demand growth may be accommodated;

(B) to evaluate the economics of small-scale electrolysis for hydrogen production; and

(C) to study the potential of modular photovoltaic devices for the development of a hydrogen infrastructure, the security implications of a hydrogen infrastructure, and the benefits potentially derived from a hydrogen infrastructure.

(b) WIND ENERGY TECHNOLOGIES.—The Secretary shall—

(1) prepare a detailed roadmap for carrying out the provisions in this title related to wind energy technologies and for implementing the recommendations related to wind energy

technologies that are included in the report transmitted under subsection (e); and

(2) provide for the establishment of 5 projects in geographic areas that are regionally and climatically diverse to demonstrate the production of hydrogen at existing wind energy facilities, including one demonstration project at a National Laboratory or institution of higher education.

(c) PROGRAM SUPPORT.—The Secretary shall support programs at institutions of higher education for the development of solar energy technologies and wind energy technologies for the production of hydrogen. The programs supported under this subsection shall—

(1) enhance fellowship and faculty assistance programs;

(2) provide support for fundamental research;

(3) encourage collaborative research among industry, National Laboratories, and institutions of higher education;

(4) support communication and outreach; and

(5) to the greatest extent possible—

(A) be located in geographic areas that are regionally and climatically diverse; and

(B) be located at part B institutions, minority institutions, and institutions of higher education located in States participating in the Experimental Program to Stimulate Competitive Research of the Department.

(d) INSTITUTIONS OF HIGHER EDUCATION AND NATIONAL LABORATORY INTERACTIONS.—In conjunction with the programs supported under this section, the Secretary shall develop sabbatical, fellowship, and visiting scientist programs to encourage National Laboratories and institutions of higher education to share and exchange personnel.

(e) REPORT.—The Secretary shall transmit to the Congress not later than 120 days after the date of enactment of this Act a report containing detailed summaries of the roadmaps prepared under subsections (a)(1) and (b)(1), descriptions of the Secretary's progress in establishing the projects and other programs required under this section, and recommendations for promoting the availability of advanced solar and wind energy technologies for the production of hydrogen.

(f) DEFINITIONS.—For purposes of this section—

(1) the term "concentrating solar power devices" means devices that concentrate the power of the sun by reflection or refraction to improve the efficiency of a photovoltaic or thermal generation process;

(2) the term "minority institution" has the meaning given to that term in section 365 of the Higher Education Act of 1965 (20 U.S.C. 1067k);

(3) the term "part B institution" has the meaning given to that term in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061); and

(4) the term "photovoltaic devices" means devices that convert light directly into electricity through a solid-state, semiconductor process.

(g) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated such sums as are necessary for carrying out the activities under this section for each of fiscal years 2006 through 2020.

SEC. 813. TECHNOLOGY TRANSFER. 42 USC 16162.

In carrying out this title, the Secretary shall carry out programs that—

(1) provide for the transfer of critical hydrogen and fuel cell technologies to the private sector;

(2) accelerate wider application of those technologies in the global market;

(3) foster the exchange of generic, nonproprietary information; and

(4) assess technical and commercial viability of technologies relating to the production, distribution, storage, and use of hydrogen energy and fuel cells.

SEC. 814. MISCELLANEOUS PROVISIONS. 42 USC 16163.

(a) REPRESENTATION.—The Secretary may represent the United States interests with respect to activities and programs under this title, in coordination with the Department of Transportation, the National Institute of Standards and Technology, and other relevant Federal agencies, before governments and nongovernmental organizations including—

(1) other Federal, State, regional, and local governments and their representatives;

(2) industry and its representatives, including members of the energy and transportation industries; and

(3) in consultation with the Department of State, foreign governments and their representatives including international organizations.

(b) REGULATORY AUTHORITY.—Nothing in this title shall be construed to alter the regulatory authority of the Department.

SEC. 815. COST SHARING. 42 USC 16164.

The costs of carrying out projects and activities under this title shall be shared in accordance with section 988.

SEC. 816. SAVINGS CLAUSE. 42 USC 16165.

Nothing in this title shall be construed to affect the authority of the Secretary of Transportation that may exist prior to the date of enactment of this Act with respect to—

(1) research into, and regulation of, hydrogen-powered vehicles fuel systems integrity, standards, and safety under subtitle VI of title 49, United States Code;

(2) regulation of hazardous materials transportation under chapter 51 of title 49, United States Code;

(3) regulation of pipeline safety under chapter 601 of title 49, United States Code;

(4) encouragement and promotion of research, development, and deployment activities relating to advanced vehicle technologies under section 5506 of title 49, United States Code;

(5) regulation of motor vehicle safety under chapter 301 of title 49, United States Code;

(6) automobile fuel economy under chapter 329 of title 49, United States Code; or

(7) representation of the interests of the United States with respect to the activities and programs under the authority of title 49, United States Code.

Energy Research, Development, Demonstration, and Commercial Application Act of 2005.
42 USC 15801 note.

TITLE IX—RESEARCH AND DEVELOPMENT

SEC. 901. SHORT TITLE.

This title may be cited as the "Energy Research, Development, Demonstration, and Commercial Application Act of 2005".

42 USC 16181.

SEC. 902. GOALS.

(a) IN GENERAL.—In order to achieve the purposes of this title, the Secretary shall conduct a balanced set of programs of energy research, development, demonstration, and commercial application with the general goals of—

(1) increasing the efficiency of all energy intensive sectors through conservation and improved technologies;

(2) promoting diversity of energy supply;

(3) decreasing the dependence of the United States on foreign energy supplies;

(4) improving the energy security of the United States; and

(5) decreasing the environmental impact of energy-related activities.

Publication.

(b) GOALS.—The Secretary shall publish measurable cost and performance-based goals, comparable over time, with each annual budget submission in at least the following areas:

(1) Energy efficiency for buildings, energy-consuming industries, and vehicles.

(2) Electric energy generation (including distributed generation), transmission, and storage.

(3) Renewable energy technologies, including wind power, photovoltaics, solar thermal systems, geothermal energy, hydrogen-fueled systems, biomass-based systems, biofuels, and hydropower.

(4) Fossil energy, including power generation, onshore and offshore oil and gas resource recovery, and transportation fuels.

(5) Nuclear energy, including programs for existing and advanced reactors, and education of future specialists.

(c) PUBLIC COMMENT.—The Secretary shall provide mechanisms for input on the annually published goals from industry, institutions of higher education, and other public sources.

(d) EFFECT OF GOALS.—Nothing in subsection (a) or the annually published goals creates any new authority for any Federal agency, or may be used by any Federal agency, to support the establishment of regulatory standards or regulatory requirements.

42 USC 16182.

SEC. 903. DEFINITIONS.

In this title:

(1) DEPARTMENTAL MISSION.—The term "departmental mission" means any of the functions vested in the Secretary by the Department of Energy Organization Act (42 U.S.C. 7101 et seq.) or other law.

(2) HISPANIC-SERVING INSTITUTION.—The term "Hispanic-serving institution" has the meaning given the term in section 502(a) of the Higher Education Act of 1965 (20 U.S.C. 1101a(a)).

(3) NONMILITARY ENERGY LABORATORY.—The term "nonmilitary energy laboratory" means a National Laboratory other

than a National Laboratory listed in subparagraph (G), (H), or (N) of section 2(3).

(4) PART B INSTITUTION.—The term "part B institution" has the meaning given the term in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

(5) SINGLE-PURPOSE RESEARCH FACILITY.—The term "single-purpose research facility" means—

(A) any of the primarily single-purpose entities owned by the Department; or

(B) any other organization of the Department designated by the Secretary.

(6) UNIVERSITY.—The term "university" has the meaning given the term "institution of higher education" in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

Subtitle A—Energy Efficiency

SEC. 911. ENERGY EFFICIENCY. 42 USC 16191.

(a) IN GENERAL.—

(1) OBJECTIVES.—The Secretary shall conduct programs of energy efficiency research, development, demonstration, and commercial application, including activities described in this subtitle. Such programs shall take into consideration the following objectives:

(A) Increasing the energy efficiency of vehicles, buildings, and industrial processes.

(B) Reducing the demand of the United States for energy, especially energy from foreign sources.

(C) Reducing the cost of energy and making the economy more efficient and competitive.

(D) Improving the energy security of the United States.

(E) Reducing the environmental impact of energy-related activities.

(2) PROGRAMS.—Programs under this subtitle shall include research, development, demonstration, and commercial application of—

(A) advanced, cost-effective technologies to improve the energy efficiency and environmental performance of vehicles, including—

(i) hybrid and electric propulsion systems;

(ii) plug-in hybrid systems;

(iii) advanced combustion engines;

(iv) weight and drag reduction technologies;

(v) whole-vehicle design optimization; and

(vi) advanced drive trains;

(B) cost-effective technologies, for new construction and retrofit, to improve the energy efficiency and environmental performance of buildings, using a whole-buildings approach, including onsite renewable energy generation;

(C) advanced technologies to improve the energy efficiency, environmental performance, and process efficiency of energy-intensive and waste-intensive industries; and

(D) advanced control devices to improve the energy efficiency of electric motors, including those used in industrial processes, heating, ventilation, and cooling.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out energy efficiency and conservation research, development, demonstration, and commercial application activities, including activities authorized under this subtitle—

(1) $783,000,000 for fiscal year 2007;

(2) $865,000,000 for fiscal year 2008; and

(3) $952,000,000 for fiscal year 2009.

(c) ALLOCATIONS.—From amounts authorized under subsection (b), the following sums are authorized:

(1) For activities under section 912, $50,000,000 for each of fiscal years 2007 through 2009.

(2) For activities under section 915, $7,000,000 for each of fiscal years 2007 through 2009.

(3) For activities under subsection (a)(2)(A)—

(A) $200,000,000 for fiscal year 2007;

(B) $270,000,000 for fiscal year 2008; and

(C) $310,000,000 for fiscal year 2009.

(4) For activities under subsection (a)(2)(D), $2,000,000 for each of fiscal years 2007 and 2008.

(d) EXTENDED AUTHORIZATION.—There are authorized to be appropriated to the Secretary to carry out section 912 $50,000,000 for each of fiscal years 2010 through 2013.

(e) LIMITATIONS.—None of the funds authorized to be appropriated under this section may be used for—

(1) the issuance or implementation of energy efficiency regulations;

(2) the weatherization program established under part A of title IV of the Energy Conservation and Production Act (42 U.S.C. 6861 et seq.);

(3) a State energy conservation plan established under part D of title III of the Energy Policy and Conservation Act (42 U.S.C. 6321 et seq.); or

(4) a Federal energy management measure carried out under part 3 of title V of the National Energy Conservation Policy Act (42 U.S.C. 8251 et seq.).

42 USC 16192.

SEC. 912. NEXT GENERATION LIGHTING INITIATIVE.

(a) DEFINITIONS.—In this section:

(1) ADVANCED SOLID-STATE LIGHTING.—The term "advanced solid-state lighting" means a semiconducting device package and delivery system that produces white light using externally applied voltage.

(2) INDUSTRY ALLIANCE.—The term "Industry Alliance" means an entity selected by the Secretary under subsection (d).

(3) INITIATIVE.—The term "Initiative" means the Next Generation Lighting Initiative carried out under this section.

(4) RESEARCH.—The term "research" includes research on the technologies, materials, and manufacturing processes required for white light emitting diodes.

(5) WHITE LIGHT EMITTING DIODE.—The term "white light emitting diode" means a semiconducting package, using either organic or inorganic materials, that produces white light using externally applied voltage.

(b) INITIATIVE.—The Secretary shall carry out a Next Generation Lighting Initiative in accordance with this section to support

research, development, demonstration, and commercial application activities related to advanced solid-state lighting technologies based on white light emitting diodes.

(c) OBJECTIVES.—The objectives of the Initiative shall be to develop advanced solid-state organic and inorganic lighting technologies based on white light emitting diodes that, compared to incandescent and fluorescent lighting technologies, are longer lasting, are more energy-efficient and cost-competitive, and have less environmental impact.

(d) INDUSTRY ALLIANCE.—Not later than 90 days after the date of enactment of this Act, the Secretary shall competitively select an Industry Alliance to represent participants who are private, for-profit firms, open to large and small businesses, that, as a group, are broadly representative of United States solid-state lighting research, development, infrastructure, and manufacturing expertise as a whole. Deadline.

(e) RESEARCH.—

(1) GRANTS.—The Secretary shall carry out the research activities of the Initiative through competitively awarded grants to—

(A) researchers, including Industry Alliance participants;

(B) small businesses;

(C) National Laboratories; and

(D) institutions of higher education.

(2) INDUSTRY ALLIANCE.—The Secretary shall annually solicit from the Industry Alliance—

(A) comments to identify solid-state lighting technology needs;

(B) an assessment of the progress of the research activities of the Initiative; and

(C) assistance in annually updating solid-state lighting technology roadmaps.

(3) AVAILABILITY TO PUBLIC.—The information and roadmaps under paragraph (2) shall be available to the public.

(f) DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION.— Grants.

(1) IN GENERAL.—The Secretary shall carry out a development, demonstration, and commercial application program for the Initiative through competitively selected awards.

(2) PREFERENCE.—In making the awards, the Secretary may give preference to participants in the Industry Alliance.

(g) COST SHARING.—In carrying out this section, the Secretary shall require cost sharing in accordance with section 988.

(h) INTELLECTUAL PROPERTY.—The Secretary may require (in accordance with section 202(a)(ii) of title 35, United States Code, section 152 of the Atomic Energy Act of 1954 (42 U.S.C. 2182), and section 9 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5908)) that for any new invention developed under subsection (e)—

(1) that the Industry Alliance participants who are active participants in research, development, and demonstration activities related to the advanced solid-state lighting technologies that are covered by this section shall be granted the first option to negotiate with the invention owner, at least in the field of solid-state lighting, nonexclusive licenses and royalties on terms that are reasonable under the circumstances;

(2)(A) that, for 1 year after a United States patent is issued for the invention, the patent holder shall not negotiate any license or royalty with any entity that is not a participant in the Industry Alliance described in paragraph (1); and

(B) that, during the year described in subparagraph (A), the patent holder shall negotiate nonexclusive licenses and royalties in good faith with any interested participant in the Industry Alliance described in paragraph (1); and

(3) such other terms as the Secretary determines are required to promote accelerated commercialization of inventions made under the Initiative.

(i) NATIONAL ACADEMY REVIEW.—The Secretary shall enter into an arrangement with the National Academy of Sciences to conduct periodic reviews of the Initiative.

42 USC 16193.

SEC. 913. NATIONAL BUILDING PERFORMANCE INITIATIVE.

(a) INTERAGENCY GROUP.—

Deadline. Establishment.

(1) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Director of the Office of Science and Technology Policy shall establish an interagency group to develop, in coordination with the advisory committee established under subsection (e), a National Building Performance Initiative (referred to in this section as the "Initiative").

(2) COCHAIRS.—The interagency group shall be co-chaired by appropriate officials of the Department and the Department of Commerce, who shall jointly arrange for the provision of necessary administrative support to the group.

(b) INTEGRATION OF EFFORTS.—The Initiative shall integrate Federal, State, and voluntary private sector efforts to reduce the costs of construction, operation, maintenance, and renovation of commercial, industrial, institutional, and residential buildings.

(c) PLAN.—

Deadline.

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the interagency group shall submit to Congress a plan for carrying out the appropriate Federal role in the Initiative.

(2) INCLUSIONS.—The plan shall include—

(A) research, development, demonstration, and commercial application of energy technology systems and materials for new construction and retrofit relating to the building envelope and building system components;

(B) research, development, demonstration, and commercial application of energy technology and infrastructure enabling the energy efficient, automated operation of buildings and building equipment; and

(C) the collection, analysis, and dissemination of research results and other pertinent information on enhancing building performance to industry, government entities, and the public.

(d) DEPARTMENT OF ENERGY ROLE.—Within the Federal portion of the Initiative, the Department shall be the lead agency for all aspects of building performance related to use and conservation of energy.

Establishment.

(e) ADVISORY COMMITTEE.—The Director of the Office of Science and Technology Policy shall establish an advisory committee to—

(1) analyze and provide recommendations on potential private sector roles and participation in the Initiative; and

(2) review and provide recommendations on the plan described in subsection (c).

(f) ADMINISTRATION.—Nothing in this section provides any Federal agency with new authority to regulate building performance.

SEC. 914. BUILDING STANDARDS. 42 USC 16194.

(a) DEFINITION OF HIGH PERFORMANCE BUILDING.—In this section, the term "high performance building" means a building that integrates and optimizes all major high-performance building attributes, including energy efficiency, durability, life-cycle performance, and occupant productivity.

(b) ASSESSMENT.—Not later than 120 days after the date of enactment of this Act, the Secretary shall enter into an agreement with the National Institute of Building Sciences to— Deadline. Contracts.

(1) conduct an assessment (in cooperation with industry, standards development organizations, and other entities, as appropriate) of whether the current voluntary consensus standards and rating systems for high performance buildings are consistent with the current technological state of the art, including relevant results from the research, development and demonstration activities of the Department;

(2) determine if additional research is required, based on the findings of the assessment; and

(3) recommend steps for the Secretary to accelerate the development of voluntary consensus-based standards for high performance buildings that are based on the findings of the assessment.

(c) GRANT AND TECHNICAL ASSISTANCE PROGRAM.—Consistent with subsection (b) and section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note), the Secretary shall establish a grant and technical assistance program to support the development of voluntary consensus-based standards for high performance buildings.

SEC. 915. SECONDARY ELECTRIC VEHICLE BATTERY USE PROGRAM. 42 USC 16195.

(a) DEFINITIONS.—In this section:

(1) BATTERY.—The term "battery" means an energy storage device that previously has been used to provide motive power in a vehicle powered in whole or in part by electricity.

(2) ASSOCIATED EQUIPMENT.—The term "associated equipment" means equipment located where the batteries will be used that is necessary to enable the use of the energy stored in the batteries.

(b) PROGRAM.—

(1) IN GENERAL.—The Secretary shall establish and conduct a program of research, development, demonstration, and commercial application of energy technology for the secondary use of batteries, if the Secretary finds that there are sufficient numbers of batteries to support the program.

(2) ADMINISTRATION.—The program shall be—

(A) designed to demonstrate the use of batteries in secondary applications, including utility and commercial power storage and power quality;

(B) structured to evaluate the performance, including useful service life and costs, of such batteries in field operations, and the necessary supporting infrastructure, including reuse and disposal of batteries; and

(C) coordinated with ongoing secondary battery use programs at the National Laboratories and in industry.

(c) SOLICITATION.—

Deadline.

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall solicit proposals to demonstrate the secondary use of batteries and associated equipment and supporting infrastructure in geographic locations throughout the United States.

(2) ADDITIONAL SOLICITATIONS.—The Secretary may make additional solicitations for proposals if the Secretary determines that the solicitations are necessary to carry out this section.

(d) SELECTION OF PROPOSALS.—

Deadline.

(1) IN GENERAL.—Not later than 90 days after the closing date established by the Secretary for receipt of proposals under subsection (c), the Secretary shall select up to five proposals that may receive financial assistance under this section once the Department receives appropriated funds to carry out this section.

(2) FACTORS.—In selecting proposals, the Secretary shall consider—

(A) the diversity of battery type;

(B) geographic and climatic diversity; and

(C) life-cycle environmental effects of the approaches.

(3) LIMITATION.—No one project selected under this section shall receive more than 25 percent of the funds made available to carry out the program under this section.

(4) NON-FEDERAL INVOLVEMENT.—In selecting proposals, the Secretary shall consider the extent of involvement of State or local government and other persons in each demonstration project to optimize use of Federal resources.

(5) OTHER CRITERIA.—In selecting proposals, the Secretary may consider such other criteria as the Secretary considers appropriate.

(e) CONDITIONS.—In carrying out this section, the Secretary shall require that—

(1) relevant information be provided to—

(A) the Department;

(B) the users of the batteries;

(C) the proposers of a project under this section; and

(D) the battery manufacturers; and

(2) the costs of carrying out projects and activities under this section are shared in accordance with section 988.

42 USC 16196.

SEC. 916. ENERGY EFFICIENCY SCIENCE INITIATIVE.

(a) ESTABLISHMENT.—The Secretary shall establish an Energy Efficiency Science Initiative to be managed by the Assistant Secretary in the Department with responsibility for energy conservation under section 203(a)(9) of the Department of Energy Organization Act (42 U.S.C. 7133(a)(9)), in consultation with the Director of the Office of Science, for grants to be competitively awarded and subject to peer review for research relating to energy efficiency.

(b) REPORT.—The Secretary shall submit to Congress, along with the annual budget request of the President submitted to Congress, a report on the activities of the Energy Efficiency Science Initiative, including a description of the process used to award the funds and an explanation of how the research relates to energy efficiency.

SEC. 917. ADVANCED ENERGY EFFICIENCY TECHNOLOGY TRANSFER CENTERS. 42 USC 16197.

(a) GRANTS.—Not later than 18 months after the date of enactment of this Act, the Secretary shall make grants to nonprofit institutions, State and local governments, or universities (or consortia thereof), to establish a geographically dispersed network of Advanced Energy Efficiency Technology Transfer Centers, to be located in areas the Secretary determines have the greatest need of the services of such Centers. In establishing the network, the Secretary shall consider the special needs and opportunities for increased energy efficiency for manufactured and site-built housing. Deadline. Establishment.

(b) ACTIVITIES.—

(1) IN GENERAL.—Each Center shall operate a program to encourage demonstration and commercial application of advanced energy methods and technologies through education and outreach to building and industrial professionals, and to other individuals and organizations with an interest in efficient energy use.

(2) ADVISORY PANEL.—Each Center shall establish an advisory panel to advise the Center on how best to accomplish the activities under paragraph (1). Establishment.

(c) APPLICATION.—A person seeking a grant under this section shall submit to the Secretary an application in such form and containing such information as the Secretary may require. The Secretary may award a grant under this section to an entity already in existence if the entity is otherwise eligible under this section.

(d) SELECTION CRITERIA.—The Secretary shall award grants under this section on the basis of the following criteria, at a minimum:

(1) The ability of the applicant to carry out the activities described in subsection (b)(1).

(2) The extent to which the applicant will coordinate the activities of the Center with other entities, such as State and local governments, utilities, and educational and research institutions.

(e) COST-SHARING.—In carrying out this section, the Secretary shall require cost-sharing in accordance with the requirements of section 988 for commercial application activities.

(f) ADVISORY COMMITTEE.—The Secretary shall establish an advisory committee to advise the Secretary on the establishment of Centers under this section. The advisory committee shall be composed of individuals with expertise in the area of advanced energy methods and technologies, including at least one representative from— Establishment.

(1) State or local energy offices;
(2) energy professionals;
(3) trade or professional associations;
(4) architects, engineers, or construction professionals;
(5) manufacturers;
(6) the research community; and
(7) nonprofit energy or environmental organizations.

(g) DEFINITIONS.—For purposes of this section:

(1) ADVANCED ENERGY METHODS AND TECHNOLOGIES.—The term "advanced energy methods and technologies" means all methods and technologies that promote energy efficiency and conservation, including distributed generation technologies, and life-cycle analysis of energy use.

(2) CENTER.—The term "Center" means an Advanced Energy Technology Transfer Center established pursuant to this section.

(3) DISTRIBUTED GENERATION.—The term "distributed generation" means an electric power generation facility that is designed to serve retail electric consumers at or near the facility site.

(h) AUTHORIZATION OF APPROPRIATIONS.—In addition to amounts otherwise authorized to be appropriated in section 911, there are authorized to be appropriated for the program under this section such sums as may be appropriated.

Subtitle B—Distributed Energy and Electric Energy Systems

42 USC 16211.

SEC. 921. DISTRIBUTED ENERGY AND ELECTRIC ENERGY SYSTEMS.

(a) IN GENERAL.—The Secretary shall carry out programs of research, development, demonstration, and commercial application on distributed energy resources and systems reliability and efficiency, to improve the reliability and efficiency of distributed energy resources and systems, integrating advanced energy technologies with grid connectivity, including activities described in this subtitle. The programs shall address advanced energy technologies and systems and advanced grid reliability technologies.

(b) AUTHORIZATION OF APPROPRIATIONS.—

(1) DISTRIBUTED ENERGY AND ELECTRIC ENERGY SYSTEMS ACTIVITIES.—There are authorized to be appropriated to the Secretary to carry out distributed energy and electric energy systems activities, including activities authorized under this subtitle—

(A) $240,000,000 for fiscal year 2007;

(B) $255,000,000 for fiscal year 2008; and

(C) $273,000,000 for fiscal year 2009.

(2) POWER DELIVERY RESEARCH INITIATIVE.—There are authorized to be appropriated to the Secretary to carry out the Power Delivery Research Initiative under subsection 925(e) such sums as may be necessary for each of fiscal years 2007 through 2009.

(c) MICRO-COGENERATION ENERGY TECHNOLOGY.—From amounts authorized under subsection (b), $20,000,000 for each of fiscal years 2007 and 2008 shall be available to carry out activities under section 923.

(d) HIGH-VOLTAGE TRANSMISSION LINES.—From amounts authorized under subsection (b), $2,000,000 for fiscal year 2007 shall be available to carry out activities under section 925(g).

42 USC 16212.

SEC. 922. HIGH POWER DENSITY INDUSTRY PROGRAM.

(a) IN GENERAL.—The Secretary shall establish a comprehensive research, development, demonstration, and commercial application to improve the energy efficiency of high power density facilities, including data centers, server farms, and telecommunications facilities.

(b) TECHNOLOGIES.—The program shall consider technologies that provide significant improvement in thermal controls, metering, load management, peak load reduction, or the efficient cooling of electronics.

SEC. 923. MICRO-COGENERATION ENERGY TECHNOLOGY. 42 USC 16213.

(a) IN GENERAL.—The Secretary shall make competitive, merit-based grants to consortia for the development of micro-cogeneration energy technology.

(b) USES.—The consortia shall explore—

(1) the use of small-scale combined heat and power in residential heating appliances;

(2) the use of excess power to operate other appliances within the residence; and

(3) the supply of excess generated power to the power grid.

SEC. 924. DISTRIBUTED ENERGY TECHNOLOGY DEMONSTRATION PROGRAMS. 42 USC 16214.

(a) COORDINATING CONSORTIA PROGRAM.—The Secretary may provide financial assistance to coordinating consortia of interdisciplinary participants for demonstrations designed to accelerate the use of distributed energy technologies (such as fuel cells, microturbines, reciprocating engines, thermally activated technologies, and combined heat and power systems) in high-energy intensive commercial applications.

(b) SMALL-SCALE PORTABLE POWER PROGRAM.—

(1) IN GENERAL.—The Secretary shall—

(A) establish a research, development, and demonstration program to develop working models of small scale portable power devices; and

(B) to the fullest extent practicable, identify and utilize the resources of universities that have shown expertise with respect to advanced portable power devices for either civilian or military use.

(2) ORGANIZATION.—The universities identified and utilized under paragraph (1)(B) are authorized to establish an organization to promote small scale portable power devices.

(3) DEFINITION.—For purposes of this subsection, the term "small scale portable power device" means a field-deployable portable mechanical or electromechanical device that can be used for applications such as communications, computation, mobility enhancement, weapons systems, optical devices, cooling, sensors, medical devices, and active biological agent detection systems.

SEC. 925. ELECTRIC TRANSMISSION AND DISTRIBUTION PROGRAMS. 42 USC 16215.

(a) PROGRAM.—The Secretary shall establish a comprehensive research, development, and demonstration program to ensure the reliability, efficiency, and environmental integrity of electrical transmission and distribution systems, which shall include—

(1) advanced energy delivery technologies, energy storage technologies, materials, and systems, giving priority to new transmission technologies, including composite conductor materials and other technologies that enhance reliability, operational flexibility, or power-carrying capability;

(2) advanced grid reliability and efficiency technology development;

(3) technologies contributing to significant load reductions;

(4) advanced metering, load management, and control technologies;

(5) technologies to enhance existing grid components;

(6) the development and use of high-temperature superconductors to—

(A) enhance the reliability, operational flexibility, or power-carrying capability of electric transmission or distribution systems; or

(B) increase the efficiency of electric energy generation, transmission, distribution, or storage systems;

(7) integration of power systems, including systems to deliver high-quality electric power, electric power reliability, and combined heat and power;

(8) supply of electricity to the power grid by small scale, distributed and residential-based power generators;

(9) the development and use of advanced grid design, operation, and planning tools;

(10) any other infrastructure technologies, as appropriate; and

(11) technology transfer and education.

(b) PROGRAM PLAN.—

Deadline.

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with other appropriate Federal agencies, shall prepare and submit to Congress a 5-year program plan to guide activities under this section.

(2) CONSULTATION.—In preparing the program plan, the Secretary shall consult with—

(A) utilities;

(B) energy service providers;

(C) manufacturers;

(D) institutions of higher education;

(E) other appropriate State and local agencies;

(F) environmental organizations;

(G) professional and technical societies; and

(H) any other persons the Secretary considers appropriate.

(c) IMPLEMENTATION.—The Secretary shall consider implementing the program under this section using a consortium of participants from industry, institutions of higher education, and National Laboratories.

(d) REPORT.—Not later than 2 years after the submission of the plan under subsection (b), the Secretary shall submit to Congress a report—

(1) describing the progress made under this section; and

(2) identifying any additional resources needed to continue the development and commercial application of transmission and distribution of infrastructure technologies.

(e) POWER DELIVERY RESEARCH INITIATIVE.—

(1) IN GENERAL.—The Secretary shall establish a research, development, and demonstration initiative specifically focused on power delivery using components incorporating high temperature superconductivity.

(2) GOALS.—The goals of the Initiative shall be—

(A) to establish world-class facilities to develop high temperature superconductivity power applications in partnership with manufacturers and utilities;

(B) to provide technical leadership for establishing reliability for high temperature superconductivity power applications, including suitable modeling and analysis;

(C) to facilitate the commercial transition toward direct current power transmission, storage, and use for high power systems using high temperature superconductivity; and

(D) to facilitate the integration of very low impedance high temperature superconducting wires and cables in existing electric networks to improve system performance, power flow control, and reliability.

(3) INCLUSIONS.—The Initiative shall include—

(A) feasibility analysis, planning, research, and design to construct demonstrations of superconducting links in high power, direct current, and controllable alternating current transmission systems;

(B) public-private partnerships to demonstrate deployment of high temperature superconducting cable into testbeds simulating a realistic transmission grid and under varying transmission conditions, including actual grid insertions; and

(C) testbeds developed in cooperation with National Laboratories, industries, and institutions of higher education to—

(i) demonstrate those technologies;

(ii) prepare the technologies for commercial introduction; and

(iii) address cost or performance roadblocks to successful commercial use.

(f) TRANSMISSION AND DISTRIBUTION GRID PLANNING AND OPERATIONS INITIATIVE.—

(1) IN GENERAL.—The Secretary shall establish a research, development, and demonstration initiative specifically focused on tools needed to plan, operate, and expand the transmission and distribution grids in the presence of competitive market mechanisms for energy, load demand, customer response, and ancillary services.

(2) GOALS.—The goals of the Initiative shall be—

(A)(i) to develop and use a geographically distributed center, consisting of institutions of higher education, and National Laboratories, with expertise and facilities to develop the underlying theory and software for power system application; and

(ii) to ensure commercial development in partnership with software vendors and utilities;

(B) to provide technical leadership in engineering and economic analysis for the reliability and efficiency of power systems planning and operations in the presence of competitive markets for electricity;

(C) to model, simulate, and experiment with new market mechanisms and operating practices to understand and optimize those new methods before actual use; and

(D) to provide technical support and technology transfer to electric utilities and other participants in the domestic electric industry and marketplace.

Grants.

(g) HIGH-VOLTAGE TRANSMISSION LINES.—As part of the program described in subsection (a), the Secretary shall award a grant to a university research program to design and test, in consultation with the Tennessee Valley Authority, state-of-the-art optimization

techniques for power flow through existing high voltage transmission lines.

Subtitle C—Renewable Energy

42 USC 16231.

SEC. 931. RENEWABLE ENERGY.

(a) IN GENERAL.—

(1) OBJECTIVES.—The Secretary shall conduct programs of renewable energy research, development, demonstration, and commercial application, including activities described in this subtitle. Such programs shall take into consideration the following objectives:

(A) Increasing the conversion efficiency of all forms of renewable energy through improved technologies.

(B) Decreasing the cost of renewable energy generation and delivery.

(C) Promoting the diversity of the energy supply.

(D) Decreasing the dependence of the United States on foreign energy supplies.

(E) Improving United States energy security.

(F) Decreasing the environmental impact of energy-related activities.

(G) Increasing the export of renewable generation equipment from the United States.

(2) PROGRAMS.—

(A) SOLAR ENERGY.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for solar energy, including—

(i) photovoltaics;

(ii) solar hot water and solar space heating;

(iii) concentrating solar power;

(iv) lighting systems that integrate sunlight and electrical lighting in complement to each other in common lighting fixtures for the purpose of improving energy efficiency;

(v) manufacturability of low cost, high quality solar systems; and

(vi) development of products that can be easily integrated into new and existing buildings.

(B) WIND ENERGY.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for wind energy, including—

(i) low speed wind energy;

(ii) offshore wind energy;

(iii) testing and verification (including construction and operation of a research and testing facility capable of testing wind turbines); and

(iv) distributed wind energy generation.

(C) GEOTHERMAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for geothermal energy. The program shall focus on developing improved technologies for reducing the costs of geothermal energy installations, including technologies for—

(i) improving detection of geothermal resources;

(ii) decreasing drilling costs;

(iii) decreasing maintenance costs through improved materials;

(iv) increasing the potential for other revenue sources, such as mineral production; and

(v) increasing the understanding of reservoir life cycle and management.

(D) HYDROPOWER.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for cost competitive technologies that enable the development of new and incremental hydropower capacity, adding to the diversity of the energy supply of the United States, including:

(i) Fish-friendly large turbines.

(ii) Advanced technologies to enhance environmental performance and yield greater energy efficiencies.

(E) MISCELLANEOUS PROJECTS.—The Secretary shall conduct research, development, demonstration, and commercial application programs for—

(i) ocean energy, including wave energy;

(ii) the combined use of renewable energy technologies with one another and with other energy technologies, including the combined use of wind power and coal gasification technologies;

(iii) renewable energy technologies for cogeneration of hydrogen and electricity; and

(iv) kinetic hydro turbines.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out renewable energy research, development, demonstration, and commercial application activities, including activities authorized under this subtitle—

(1) $632,000,000 for fiscal year 2007;

(2) $743,000,000 for fiscal year 2008; and

(3) $852,000,000 for fiscal year 2009.

(c) BIOENERGY.—From the amounts authorized under subsection (b), there are authorized to be appropriated to carry out section 932—

(1) $213,000,000 for fiscal year 2007, of which $100,000,000 shall be for section 932(d);

(2) $251,000,000 for fiscal year 2008, of which $125,000,000 shall be for section 932(d); and

(3) $274,000,000 for fiscal year 2009, of which $150,000,000 shall be for section 932(d).

(d) SOLAR POWER.—From amounts authorized under subsection (b), there is authorized to be appropriated to carry out activities under subsection (a)(2)(A)—

(1) $140,000,000 for fiscal year 2007, of which $40,000,000 shall be for activities under section 935;

(2) $200,000,000 for fiscal year 2008, of which $50,000,000 shall be for activities under section 935; and

(3) $250,000,000 for fiscal year 2009, of which $50,000,000 shall be for activities under section 935.

(e) ADMINISTRATION.—Of the funds authorized under subsection (c), not less than $5,000,000 for each fiscal year shall be made available for grants to—

(1) part B institutions;

(2) Tribal Colleges or Universities (as defined in section 316(b) of the Higher Education Act of 1965 (20 U.S.C. 1059c(b))); and

(3) Hispanic-serving institutions.

(f) RURAL DEMONSTRATION PROJECTS.—In carrying out this section, the Secretary, in consultation with the Secretary of Agriculture, shall demonstrate the use of renewable energy technologies to assist in delivering electricity to rural and remote locations including —

(1) advanced wind power technology, including combined use with coal gasification;

(2) biomass; and

(3) geothermal energy systems.

(g) ANALYSIS AND EVALUATION.—

(1) IN GENERAL.—The Secretary shall conduct analysis and evaluation in support of the renewable energy programs under this subtitle. These activities shall be used to guide budget and program decisions, and shall include—

(A) economic and technical analysis of renewable energy potential, including resource assessment;

(B) analysis of past program performance, both in terms of technical advances and in market introduction of renewable energy; and

(C) any other analysis or evaluation that the Secretary considers appropriate.

(2) FUNDING.—The Secretary may designate up to 1 percent of the funds appropriated for carrying out this subtitle for analysis and evaluation activities under this subsection.

42 USC 16232.

SEC. 932. BIOENERGY PROGRAM.

(a) DEFINITIONS.—In this section:

(1) BIOMASS.—The term "biomass" means—

(A) any organic material grown for the purpose of being converted to energy;

(B) any organic byproduct of agriculture (including wastes from food production and processing) that can be converted into energy; or

(C) any waste material that can be converted to energy, is segregated from other waste materials, and is derived from—

(i) any of the following forest-related resources: mill residues, precommercial thinnings, slash, brush, or otherwise nonmerchantable material; or

(ii) wood waste materials, including waste pallets, crates, dunnage, manufacturing and construction wood wastes (other than pressure-treated, chemically-treated, or painted wood wastes), and landscape or right-of-way tree trimmings, but not including municipal solid waste, gas derived from the biodegradation of municipal solid waste, or paper that is commonly recycled.

(2) LIGNOCELLULOSIC FEEDSTOCK.—The term "lignocellulosic feedstock" means any portion of a plant or co-product from conversion, including crops, trees, forest residues, and agricultural residues not specifically grown for food, including from barley grain, grapeseed, rice bran, rice hulls, rice straw, soybean matter, and sugarcane bagasse.

(b) PROGRAM.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for bioenergy, including—

(1) biopower energy systems;

(2) biofuels;

(3) bioproducts;

(4) integrated biorefineries that may produce biopower, biofuels, and bioproducts;

(5) cross-cutting research and development in feedstocks; and

(6) economic analysis.

(c) BIOFUELS AND BIOPRODUCTS.—The goals of the biofuels and bioproducts programs shall be to develop, in partnership with industry and institutions of higher education—

(1) advanced biochemical and thermochemical conversion technologies capable of making fuels from lignocellulosic feedstocks that are price-competitive with gasoline or diesel in either internal combustion engines or fuel cell-powered vehicles;

(2) advanced biotechnology processes capable of making biofuels and bioproducts with emphasis on development of biorefinery technologies using enzyme-based processing systems;

(3) advanced biotechnology processes capable of increasing energy production from lignocellulosic feedstocks, with emphasis on reducing the dependence of industry on fossil fuels in manufacturing facilities; and

(4) other advanced processes that will enable the development of cost-effective bioproducts, including biofuels.

(d) INTEGRATED BIOREFINERY DEMONSTRATION PROJECTS.—

(1) IN GENERAL.—The Secretary shall carry out a program to demonstrate the commercial application of integrated biorefineries. The Secretary shall ensure geographical distribution of biorefinery demonstrations under this subsection. The Secretary shall not provide more than $100,000,000 under this subsection for any single biorefinery demonstration. In making awards under this subsection, the Secretary shall encourage—

(A) the demonstration of a wide variety of lignocellulosic feedstocks;

(B) the commercial application of biomass technologies for a variety of uses, including—

(i) liquid transportation fuels;

(ii) high-value biobased chemicals;

(iii) substitutes for petroleum-based feedstocks and products; and

(iv) energy in the form of electricity or useful heat; and

(C) the demonstration of the collection and treatment of a variety of biomass feedstocks.

(2) PROPOSALS.—Not later than 6 months after the date of enactment of this Act, the Secretary shall solicit proposals for demonstration of advanced biorefineries. The Secretary shall select only proposals that— Deadline.

(A) demonstrate that the project will be able to operate profitably without direct Federal subsidy after initial construction costs are paid; and

(B) enable the biorefinery to be easily replicated.

(e) UNIVERSITY BIODIESEL PROGRAM.—The Secretary shall establish a demonstration program to determine the feasibility of

the operation of diesel electric power generators, using biodiesel fuels with ratings as high as B100, at electric generation facilities owned by institutions of higher education. The program shall examine—

(1) heat rates of diesel fuels with large quantities of cellulosic content;

(2) the reliability of operation of various fuel blends;

(3) performance in cold or freezing weather;

(4) stability of fuel after extended storage; and

(5) other criteria, as determined by the Secretary.

42 USC 16233.

SEC. 933. LOW-COST RENEWABLE HYDROGEN AND INFRASTRUCTURE FOR VEHICLE PROPULSION.

The Secretary shall—

(1) establish a research, development, and demonstration program to determine the feasibility of using hydrogen propulsion in light-weight vehicles and the integration of the associated hydrogen production infrastructure using off-the-shelf components; and

(2) identify universities and institutions that—

(A) have expertise in researching and testing vehicles fueled by hydrogen, methane, and other fuels;

(B) have expertise in integrating off-the-shelf components to minimize cost; and

(C) within 2 years can test a vehicle based on an existing commercially available platform with a curb weight of not less than 2,000 pounds before modifications, that—

(i) operates solely on hydrogen;

(ii) qualifies as a light-duty passenger vehicle; and

(iii) uses hydrogen produced from water using only solar energy.

42 USC 16234.

SEC. 934. CONCENTRATING SOLAR POWER RESEARCH PROGRAM.

(a) IN GENERAL.—The Secretary shall conduct a program of research and development to evaluate the potential for concentrating solar power for hydrogen production, including cogeneration approaches for both hydrogen and electricity.

(b) ADMINISTRATION.—The program shall take advantage of existing facilities to the extent practicable and shall include—

(1) development of optimized technologies that are common to both electricity and hydrogen production;

(2) evaluation of thermochemical cycles for hydrogen production at the temperatures attainable with concentrating solar power;

(3) evaluation of materials issues for the thermochemical cycles described in paragraph (2);

(4) cogeneration of solar thermal electric power and photosynthetic-based hydrogen production;

(5) system architectures and economics studies; and

(6) coordination with activities under the Next Generation Nuclear Plant Project established under subtitle C of title VI on high temperature materials, thermochemical cycles, and economic issues.

(c) ASSESSMENT.—In carrying out the program under this section, the Secretary shall—

(1) assess conflicting guidance on the economic potential of concentrating solar power for electricity production received from the National Research Council in the report entitled

"Renewable Power Pathways: A Review of the U.S. Department of Energy's Renewable Energy Programs" and dated 2000 and subsequent reviews of that report funded by the Department; and

(2) provide an assessment of the potential impact of technology used to concentrate solar power for electricity before, or concurrent with, submission of the budget for fiscal year 2008.

(d) REPORT.—Not later than 5 years after the date of enactment of this Act, the Secretary shall provide to Congress a report on the economic and technical potential for electricity or hydrogen production, with or without cogeneration, with concentrating solar power, including the economic and technical feasibility of potential construction of a pilot demonstration facility suitable for commercial production of electricity or hydrogen from concentrating solar power.

SEC. 935. RENEWABLE ENERGY IN PUBLIC BUILDINGS. 42 USC 16235.

(a) DEMONSTRATION AND TECHNOLOGY TRANSFER PROGRAM.—The Secretary shall establish a program for the demonstration of innovative technologies for solar and other renewable energy sources in buildings owned or operated by a State or local government, and for the dissemination of information resulting from such demonstration to interested parties.

(b) LIMIT ON FEDERAL FUNDING.—Notwithstanding section 988, the Secretary shall provide under this section no more than 40 percent of the incremental costs of the solar or other renewable energy source project funded.

(c) REQUIREMENTS.—As part of the application for awards under this section, the Secretary shall require all applicants—-

(1) to demonstrate a continuing commitment to the use of solar and other renewable energy sources in buildings they own or operate; and

(2) to state how they expect any award to further their transition to the significant use of renewable energy.

Subtitle D—Agricultural Biomass Research and Development Programs

SEC. 941. AMENDMENTS TO THE BIOMASS RESEARCH AND DEVELOPMENT ACT OF 2000. 7 USC 8101 note.

(a) DEFINITIONS.—Section 303 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) by striking paragraphs (2), (9), and (10);

(2) by redesignating paragraphs (3), (4), (5), (6), (7), and (8) as paragraphs (4), (5), (7), (8), (9), and (10), respectively;

(3) by inserting after paragraph (1) the following:

"(2) BIOBASED FUEL.—The term 'biobased fuel' means any transportation fuel produced from biomass.

"(3) BIOBASED PRODUCT.—The term 'biobased product' means an industrial product (including chemicals, materials, and polymers) produced from biomass, or a commercial or industrial product (including animal feed and electric power) derived in connection with the conversion of biomass to fuel.";

(4) by inserting after paragraph (5) (as redesignated by paragraph (2)) the following:

"(6) DEMONSTRATION.—The term 'demonstration' means demonstration of technology in a pilot plant or semi-works scale facility."; and

(5) by striking paragraph (9) (as redesignated by paragraph (2)) and inserting the following:

"(9) NATIONAL LABORATORY.—The term 'National Laboratory' has the meaning given that term in section 2 of the Energy Policy Act of 2005."

(b) COOPERATION AND COORDINATION IN BIOMASS RESEARCH AND DEVELOPMENT.—Section 304 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) in subsections (a) and (d), by striking "industrial products" each place it appears and inserting "fuels and biobased products";

(2) by striking subsections (b) and (c); and

(3) by redesignating subsection (d) as subsection (b).

(c) BIOMASS RESEARCH AND DEVELOPMENT BOARD.—Section 305 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) in subsections (a) and (c), by striking "industrial products" each place it appears and inserting "fuels and biobased products";

(2) in subsection (b)—

(A) in paragraph (1), by striking "304(d)(1)(B)" and inserting "304(b)(1)(B)"; and

(B) in paragraph (2), by striking "304(d)(1)(A)" and inserting "304(b)(1)(A)"; and

(3) in subsection (c)—

(A) in paragraph (1)(B), by striking "and" at the end;

(B) in paragraph (2), by striking the period at the end and inserting a semicolon; and

(C) by adding at the end the following:

"(3) ensure that—

"(A) solicitations are open and competitive with awards made annually; and

"(B) objectives and evaluation criteria of the solicitations are clearly stated and minimally prescriptive, with no areas of special interest; and

"(4) ensure that the panel of scientific and technical peers assembled under section 307(g)(1)(C) to review proposals is composed predominantly of independent experts selected from outside the Departments of Agriculture and Energy.".

(d) BIOMASS RESEARCH AND DEVELOPMENT TECHNICAL ADVISORY COMMITTEE.—Section 306 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) in subsection (b)(1)—

(A) in subparagraph (A), by striking "biobased industrial products" and inserting "biofuels";

(B) by redesignating subparagraphs (B) through (J) as subparagraphs (C) through (K), respectively;

(C) by inserting after subparagraph (A) the following:

"(B) an individual affiliated with the biobased industrial and commercial products industry;";

(D) in subparagraph (F) (as redesignated by subparagraph (B)) by striking "an individual has" and inserting "2 individuals have";

(E) in subparagraphs (C), (D), (G), and (I) (as redesignated by subparagraph (B)) by striking "industrial products" each place it appears and inserting "fuels and biobased products"; and

(F) in subparagraph (H) (as redesignated by subparagraph (B)), by inserting "and environmental" before "analysis";

(2) in subsection (c)(2)—

(A) in subparagraph (A), by striking "goals" and inserting "objectives, purposes, and considerations";

(B) by redesignating subparagraphs (B) and (C) as subparagraphs (C) and (D), respectively;

(C) by inserting after subparagraph (A) the following:

"(B) solicitations are open and competitive with awards made annually and that objectives and evaluation criteria of the solicitations are clearly stated and minimally prescriptive, with no areas of special interest;"; and

(D) in subparagraph (C) (as redesignated by subparagraph (B)) by inserting "predominantly from outside the Departments of Agriculture and Energy" after "technical peers".

(e) BIOMASS RESEARCH AND DEVELOPMENT INITIATIVE.—Section 307 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) in subsection (a), by striking "research on biobased industrial products" and inserting "research on, and development and demonstration of, biobased fuels and biobased products, and the methods, practices and technologies, for their production"; and

(2) by striking subsections (b) through (e) and inserting the following:

"(b) OBJECTIVES.—The objectives of the Initiative are to develop—

"(1) technologies and processes necessary for abundant commercial production of biobased fuels at prices competitive with fossil fuels;

"(2) high-value biobased products—

"(A) to enhance the economic viability of biobased fuels and power; and

"(B) as substitutes for petroleum-based feedstocks and products; and

"(3) a diversity of sustainable domestic sources of biomass for conversion to biobased fuels and biobased products.

"(c) PURPOSES.—The purposes of the Initiative are—

"(1) to increase the energy security of the United States;

"(2) to create jobs and enhance the economic development of the rural economy;

"(3) to enhance the environment and public health; and

"(4) to diversify markets for raw agricultural and forestry products.

"(d) TECHNICAL AREAS.—To advance the objectives and purposes of the Initiative, the Secretary of Agriculture and the Secretary

of Energy, in consultation with the Administrator of the Environmental Protection Agency and heads of other appropriate departments and agencies (referred to in this section as the 'Secretaries'), shall direct research and development toward—

"(1) feedstock production through the development of crops and cropping systems relevant to production of raw materials for conversion to biobased fuels and biobased products, including—

"(A) development of advanced and dedicated crops with desired features, including enhanced productivity, broader site range, low requirements for chemical inputs, and enhanced processing;

"(B) advanced crop production methods to achieve the features described in subparagraph (A);

"(C) feedstock harvest, handling, transport, and storage; and

"(D) strategies for integrating feedstock production into existing managed land;

"(2) overcoming recalcitrance of cellulosic biomass through developing technologies for converting cellulosic biomass into intermediates that can subsequently be converted into biobased fuels and biobased products, including—

"(A) pretreatment in combination with enzymatic or microbial hydrolysis; and

"(B) thermochemical approaches, including gasification and pyrolysis;

"(3) product diversification through technologies relevant to production of a range of biobased products (including chemicals, animal feeds, and cogenerated power) that eventually can increase the feasibility of fuel production in a biorefinery, including—

"(A) catalytic processing, including thermochemical fuel production;

"(B) metabolic engineering, enzyme engineering, and fermentation systems for biological production of desired products or cogeneration of power;

"(C) product recovery;

"(D) power production technologies; and

"(E) integration into existing biomass processing facilities, including starch ethanol plants, paper mills, and power plants; and

"(4) analysis that provides strategic guidance for the application of biomass technologies in accordance with realization of improved sustainability and environmental quality, cost effectiveness, security, and rural economic development, usually featuring system-wide approaches.

"(e) ADDITIONAL CONSIDERATIONS.—Within the technical areas described in subsection (d), and in addition to advancing the purposes described in subsection (c) and the objectives described in subsection (b), the Secretaries shall support research and development—

"(1) to create continuously expanding opportunities for participants in existing biofuels production by seeking synergies and continuity with current technologies and practices, such as the use of dried distillers grains as a bridge feedstock;

"(2) to maximize the environmental, economic, and social benefits of production of biobased fuels and biobased products

on a large scale through life-cycle economic and environmental analysis and other means; and

"(3) to assess the potential of Federal land and land management programs as feedstock resources for biobased fuels and biobased products, consistent with the integrity of soil and water resources and with other environmental considerations.

"(f) ELIGIBLE ENTITIES.—To be eligible for a grant, contract, or assistance under this section, an applicant shall be—

"(1) an institution of higher education;

"(2) a National Laboratory;

"(3) a Federal research agency;

"(4) a State research agency;

"(5) a private sector entity;

"(6) a nonprofit organization; or

"(7) a consortium of two or more entities described in paragraphs (1) through (6).

"(g) ADMINISTRATION.—

"(1) IN GENERAL.—After consultation with the Board, the points of contact shall—

"(A) publish annually one or more joint requests for proposals for grants, contracts, and assistance under this section;

"(B) require that grants, contracts, and assistance under this section be awarded competitively, on the basis of merit, after the establishment of procedures that provide for scientific peer review by an independent panel of scientific and technical peers; and

"(C) give some preference to applications that—

"(i) involve a consortia of experts from multiple institutions;

"(ii) encourage the integration of disciplines and application of the best technical resources; and

"(iii) increase the geographic diversity of demonstration projects.

"(2) DISTRIBUTION OF FUNDING BY TECHNICAL AREA.—Of the funds authorized to be appropriated for activities described in this section, funds shall be distributed for each of fiscal years 2007 through 2010 so as to achieve an approximate distribution of—

"(A) 20 percent of the funds to carry out activities for feedstock production under subsection (d)(1);

"(B) 45 percent of the funds to carry out activities for overcoming recalcitrance of cellulosic biomass under subsection (d)(2);

"(C) 30 percent of the funds to carry out activities for product diversification under subsection (d)(3); and

"(D) 5 percent of the funds to carry out activities for strategic guidance under subsection (d)(4).

"(3) DISTRIBUTION OF FUNDING WITHIN EACH TECHNICAL AREA.—Within each technical area described in paragraphs (1) through (3) of subsection (d), funds shall be distributed for each of fiscal years 2007 through 2010 so as to achieve an approximate distribution of—

"(A) 15 percent of the funds for applied fundamentals;

"(B) 35 percent of the funds for innovation; and

"(C) 50 percent of the funds for demonstration.

"(4) MATCHING FUNDS.—

"(A) IN GENERAL.—A minimum 20 percent funding match shall be required for demonstration projects under this title.

"(B) COMMERCIAL APPLICATIONS.—A minimum of 50 percent funding match shall be required for commercial application projects under this title.

"(5) TECHNOLOGY AND INFORMATION TRANSFER TO AGRICULTURAL USERS.—The Administrator of the Cooperative State Research, Education, and Extension Service and the Chief of the Natural Resources Conservation Service shall ensure that applicable research results and technologies from the Initiative are adapted, made available, and disseminated through those services, as appropriate.".

(f) ANNUAL REPORTS.—Section 309 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended—

(1) in subsection (b)—

(A) in paragraph (1)—

(i) in subparagraph (A), by striking "purposes described in section 307(b)" and inserting "objectives, purposes, and additional considerations described in subsections (b) through (e) of section 307";

(ii) in subparagraph (B), by striking "and" at the end;

(iii) by redesignating subparagraph (C) as subparagraph (D); and

(iv) by inserting after subparagraph (B) the following:

"(C) achieves the distribution of funds described in paragraphs (2) and (3) of section 307(g); and"; and

(B) in paragraph (2), by striking "industrial products" and inserting "fuels and biobased products"; and

(2) by adding at the end the following:

"(c) UPDATES.—The Secretary and the Secretary of Energy shall update the Vision and Roadmap documents prepared for Federal biomass research and development activities.".

(g) AUTHORIZATION OF APPROPRIATIONS.—Section 310(b) of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is amended by striking "title $54,000,000 for each of fiscal years 2002 through 2007" and inserting "title $200,000,000 for each of fiscal years 2006 through 2015".

(h) REPEAL OF SUNSET PROVISION.—Section 311 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note) is repealed.

42 USC 16251.

SEC. 942. PRODUCTION INCENTIVES FOR CELLULOSIC BIOFUELS.

(a) PURPOSE.—The purpose of this section is to—

(1) accelerate deployment and commercialization of biofuels;

(2) deliver the first 1,000,000,000 gallons in annual cellulosic biofuels production by 2015;

(3) ensure biofuels produced after 2015 are cost competitive with gasoline and diesel; and

(4) ensure that small feedstock producers and rural small businesses are full participants in the development of the cellulosic biofuels industry.

(b) DEFINITIONS.—In this section:

(1) CELLULOSIC BIOFUELS.—The term "cellulosic biofuels" means any fuel that is produced from cellulosic feedstocks.

(2) ELIGIBLE ENTITY.—The term "eligible entity" means a producer of fuel from cellulosic biofuels the production facility of which—

(A) is located in the United States;

(B) meets all applicable Federal and State permitting requirements; and

(C) meets any financial criteria established by the Secretary.

(c) PROGRAM.—

(1) ESTABLISHMENT.—The Secretary, in consultation with the Secretary of Agriculture, the Secretary of Defense, and the Administrator of the Environmental Protection Agency, shall establish an incentive program for the production of cellulosic biofuels.

(2) BASIS OF INCENTIVES.—Under the program, the Secretary shall award production incentives on a per gallon basis of cellulosic biofuels from eligible entities, through—

(A) set payments per gallon of cellulosic biofuels produced in an amount determined by the Secretary, until initiation of the first reverse auction; and

(B) reverse auction thereafter.

(3) FIRST REVERSE AUCTION.—The first reverse auction shall be held on the earlier of— Deadlines.

(A) not later than 1 year after the first year of annual production in the United States of 100,000,000 gallons of cellulosic biofuels, as determined by the Secretary; or

(B) not later than 3 years after the date of enactment of this Act.

(4) REVERSE AUCTION PROCEDURE.—

(A) IN GENERAL.—On initiation of the first reverse auction, and each year thereafter until the earlier of the first year of annual production in the United States of 1,000,000,000 gallons of cellulosic biofuels, as determined by the Secretary, or 10 years after the date of enactment of this Act, the Secretary shall conduct a reverse auction at which—

(i) the Secretary shall solicit bids from eligible entities;

(ii) eligible entities shall submit—

(I) a desired level of production incentive on a per gallon basis; and

(II) an estimated annual production amount in gallons; and

(iii) the Secretary shall issue awards for the production amount submitted, beginning with the eligible entity submitting the bid for the lowest level of production incentive on a per gallon basis and meeting such other criteria as are established by the Secretary, until the amount of funds available for the reverse auction is committed.

(B) AMOUNT OF INCENTIVE RECEIVED.—An eligible entity selected by the Secretary through a reverse auction shall receive the amount of performance incentive

requested in the auction for each gallon produced and sold by the entity during the first 6 years of operation.

Deadline.
Contracts.

(C) COMMENCEMENT OF PRODUCTION OF CELLULOSIC BIOFUELS.—As a condition of the receipt of an award under this section, an eligible entity shall enter into an agreement with the Secretary under which the eligible entity agrees to begin production of cellulosic biofuels not later than 3 years after the date of the reverse auction in which the eligible entity participates.

(d) LIMITATIONS.—Awards under this section shall be limited to—

(1) a per gallon amount determined by the Secretary during the first 4 years of the program;

(2) a declining per gallon cap over the remaining lifetime of the program, to be established by the Secretary so that cellulosic biofuels produced after the first year of annual cellulosic biofuels production in the United States in excess of 1,000,000,000 gallons are cost competitive with gasoline and diesel;

(3) not more than 25 percent of the funds committed within each reverse auction to any 1 project;

(4) not more than $100,000,000 in any 1 year; and

(5) not more than $1,000,000,000 over the lifetime of the program.

(e) PRIORITY.—In selecting a project under the program, the Secretary shall give priority to projects that—

(1) demonstrate outstanding potential for local and regional economic development;

(2) include agricultural producers or cooperatives of agricultural producers as equity partners in the ventures; and

(3) have a strategic agreement in place to fairly reward feedstock suppliers.

(f) AUTHORIZATIONS OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $250,000,000.

SEC. 943. PROCUREMENT OF BIOBASED PRODUCTS.

(a) FEDERAL PROCUREMENT.—

(1) DEFINITION OF PROCURING AGENCY.—Section 9001 of the Farm Security and Rural Investment Act of 2002 (7 U.S.C. 8101) is amended—

(A) by redesignating paragraphs (4), (5), and (6) as paragraphs (5), (6), and (7), respectively; and

(B) by inserting after paragraph (3) the following:

"(4) PROCURING AGENCY.—The term 'procuring agency' means—

"(A) any Federal agency that is using Federal funds for procurement; or

"(B) any person contracting with any Federal agency with respect to work performed under the contract.".

(2) PROCUREMENT.—Section 9002 of the Farm Security and Rural Investment Act of 2002 (7 U.S.C. 8102) is amended—

(A) by striking "Federal agency" each place it appears (other than in subsections (f) and (g)) and inserting "procuring agency";

(B) in subsection (c)(2)—

(i) by striking "(2)" and all that follows through "Notwithstanding" and inserting the following:

"(2) FLEXIBILITY.—Notwithstanding";

(ii) by striking "an agency" and inserting "a procuring agency"; and

(iii) by striking "the agency" and inserting "the procuring agency";

(C) in subsection (d), by striking "procured by Federal agencies" and inserting "procured by procuring agencies"; and

(D) in subsection (f), by striking "Federal agencies" and inserting "procuring agencies".

(b) CAPITOL COMPLEX PROCUREMENT.—Section 9002 of the Farm Security and Rural Investment Act of 2002 (7 U.S.C. 8102) (as amended by subsection (a)(2)) is amended—

(1) by redesignating subsection (j) as subsection (k); and

(2) by inserting after subsection (i) the following:

"(j) INCLUSION.—Not later than 90 days after the date of enactment of the Energy Policy Act of 2005, the Architect of the Capitol, the Sergeant at Arms of the Senate, and the Chief Administrative Officer of the House of Representatives shall establish procedures that apply the requirements of this section to procurement for the Capitol Complex.". Deadline. Procedures.

(c) EDUCATION.— 42 USC 16252.

(1) IN GENERAL.—The Architect of the Capitol shall establish in the Capitol Complex a program of public education regarding use by the Architect of the Capitol of biobased products.

(2) PURPOSES.—The purposes of the program shall be—

(A) to establish the Capitol Complex as a showcase for the existence and benefits of biobased products; and

(B) to provide access to further information on biobased products to occupants and visitors.

(d) PROCEDURE.—Requirements issued under the amendments made by subsection (b) shall be made in accordance with directives issued by the Committee on Rules and Administration of the Senate and the Committee on House Administration of the House of Representatives. 7 USC 8102 note.

SEC. 944. SMALL BUSINESS BIOPRODUCT MARKETING AND CERTIFICATION GRANTS. 42 USC 16253.

(a) IN GENERAL.—Using amounts made available under subsection (g), the Secretary of Agriculture (referred to in this section as the "Secretary") shall make available on a competitive basis grants to eligible entities described in subsection (b) for the biobased product marketing and certification purposes described in subsection (c).

(b) ELIGIBLE ENTITIES.—

(1) IN GENERAL.—An entity eligible for a grant under this section is any manufacturer of biobased products that—

(A) proposes to use the grant for the biobased product marketing and certification purposes described in subsection (c); and

(B) has not previously received a grant under this section.

(2) PREFERENCE.—In making grants under this section, the Secretary shall provide a preference to an eligible entity that has fewer than 50 employees.

(c) BIOBASED PRODUCT MARKETING AND CERTIFICATION GRANT PURPOSES.—A grant made under this section shall be used—

(1) to provide working capital for marketing of biobased products; and

(2) to provide for the certification of biobased products to—

(A) qualify for the label described in section 9002(h)(1) of the Farm Security and Rural Investment Act of 2002 (7 U.S.C. 8102(h)(1)); or

(B) meet other biobased standards determined appropriate by the Secretary.

(d) MATCHING FUNDS.—

(1) IN GENERAL.—Grant recipients shall provide matching non-Federal funds equal to the amount of the grant received.

(2) EXPENDITURE.—Matching funds shall be expended in advance of grant funding, so that for every dollar of grant that is advanced, an equal amount of matching funds shall have been funded prior to submitting the request for reimbursement.

(e) AMOUNT.—A grant made under this section shall not exceed $100,000.

(f) ADMINISTRATION.—The Secretary shall establish such administrative requirements for grants under this section, including requirements for applications for the grants, as the Secretary considers appropriate.

(g) AUTHORIZATIONS OF APPROPRIATIONS.—There are authorized to be appropriated to make grants under this section—

(1) $1,000,000 for fiscal year 2006; and

(2) such sums as are necessary for each of fiscal years 2007 through 2015.

42 USC 16254.

SEC. 945. REGIONAL BIOECONOMY DEVELOPMENT GRANTS.

(a) IN GENERAL.—Using amounts made available under subsection (g), the Secretary of Agriculture (referred to in this section as the "Secretary") shall make available on a competitive basis grants to eligible entities described in subsection (b) for the purposes described in subsection (c).

(b) ELIGIBLE ENTITIES.—An entity eligible for a grant under this section is any regional bioeconomy development association, agricultural or energy trade association, or Land Grant institution that—

(1) proposes to use the grant for the purposes described in subsection (c); and

(2) has not previously received a grant under this section.

(c) REGIONAL BIOECONOMY DEVELOPMENT ASSOCIATION GRANT PURPOSES.—A grant made under this section shall be used to support and promote the growth and development of the bioeconomy within the region served by the eligible entity, through coordination, education, outreach, and other endeavors by the eligible entity.

(d) MATCHING FUNDS.—

(1) IN GENERAL.—Grant recipients shall provide matching non-Federal funds equal to the amount of the grant received.

(2) EXPENDITURE.—Matching funds shall be expended in advance of grant funding, so that for every dollar of grant that is advanced, an equal amount of matching funds shall have been funded prior to submitting the request for reimbursement.

(e) ADMINISTRATION.—The Secretary shall establish such administrative requirements for grants under this section, including requirements for applications for the grants, as the Secretary considers appropriate. Requirements.

(f) AMOUNT.—A grant made under this section shall not exceed $500,000.

(g) AUTHORIZATIONS OF APPROPRIATIONS.—There are authorized to be appropriated to make grants under this section—

(1) $1,000,000 for fiscal year 2006; and

(2) such sums as are necessary for each of fiscal years 2007 through 2015.

SEC. 946. PREPROCESSING AND HARVESTING DEMONSTRATION GRANTS. 42 USC 16255.

(a) IN GENERAL.—The Secretary of Agriculture (referred to in this section as the "Secretary") shall make grants available on a competitive basis to enterprises owned by agricultural producers, for the purposes of demonstrating cost-effective, cellulosic biomass innovations in—

(1) preprocessing of feedstocks, including cleaning, separating and sorting, mixing or blending, and chemical or biochemical treatments, to add value and lower the cost of feedstock processing at a biorefinery; or

(2) 1-pass or other efficient, multiple crop harvesting techniques.

(b) LIMITATIONS ON GRANTS.—

(1) NUMBER OF GRANTS.—Not more than 5 demonstration projects per fiscal year shall be funded under this section.

(2) NON-FEDERAL COST SHARE.—The non-Federal cost share of a project under this section shall be not less than 20 percent, as determined by the Secretary.

(c) CONDITION OF GRANT.—To be eligible for a grant for a project under this section, a recipient of a grant or a participating entity shall agree to use the material harvested under the project—

(1) to produce ethanol; or

(2) for another energy purpose, such as the generation of heat or electricity.

(d) AUTHORIZATION FOR APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $5,000,000 for each of fiscal years 2006 through 2010.

SEC. 947. EDUCATION AND OUTREACH. 42 USC 16256.

(a) IN GENERAL.—The Secretary of Agriculture shall establish, within the Department of Agriculture or through an independent contracting entity, a program of education and outreach on biobased fuels and biobased products consisting of—

(1) training and technical assistance programs for feedstock producers to promote producer ownership, investment, and participation in the operation of processing facilities; and

(2) public education and outreach to familiarize consumers with the biobased fuels and biobased products.

(b) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $1,000,000 for each of fiscal years 2006 through 2010.

SEC. 948. REPORTS.

(a) BIOBASED PRODUCT POTENTIAL.—Not later than 1 year after the date of enactment of this Act, the Secretary of Agriculture

(referred to in this section as the "Secretary") shall submit to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate a report that—

(1) describes the economic potential for the United States of the widespread production and use of commercial and industrial biobased products through calendar year 2025; and

(2) as the maximum extent practicable, identifies the economic potential by product area.

Deadline.

(b) ANALYSIS OF ECONOMIC INDICATORS.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress an analysis of economic indicators of the biobased economy.

Subtitle E—Nuclear Energy

42 USC 16271.

SEC. 951. NUCLEAR ENERGY.

(a) IN GENERAL.—The Secretary shall conduct programs of civilian nuclear energy research, development, demonstration, and commercial application, including activities described in this subtitle. Programs under this subtitle shall take into consideration the following objectives:

(1) Enhancing nuclear power's viability as part of the United States energy portfolio.

(2) Providing the technical means to reduce the likelihood of nuclear proliferation.

(3) Maintaining a cadre of nuclear scientists and engineers.

(4) Maintaining National Laboratory and university nuclear programs, including their infrastructure.

(5) Supporting both individual researchers and multidisciplinary teams of researchers to pioneer new approaches in nuclear energy, science, and technology.

(6) Developing, planning, constructing, acquiring, and operating special equipment and facilities for the use of researchers.

(7) Supporting technology transfer and other appropriate activities to assist the nuclear energy industry, and other users of nuclear science and engineering, including activities addressing reliability, availability, productivity, component aging, safety, and security of nuclear power plants.

(8) Reducing the environmental impact of nuclear energy-related activities.

(b) AUTHORIZATION OF APPROPRIATIONS FOR CORE PROGRAMS.—There are authorized to be appropriated to the Secretary to carry out nuclear energy research, development, demonstration, and commercial application activities, including activities authorized under this subtitle, other than those described in subsection (c)—

(1) $330,000,000 for fiscal year 2007;

(2) $355,000,000 for fiscal year 2008; and

(3) $495,000,000 for fiscal year 2009.

(c) NUCLEAR INFRASTRUCTURE AND FACILITIES.—There are authorized to be appropriated to the Secretary to carry out activities under section 955—

(1) $135,000,000 for fiscal year 2007;

(2) $140,000,000 for fiscal year 2008; and

(3) $145,000,000 for fiscal year 2009.

(d) ALLOCATIONS.—From amounts authorized under subsection (a), the following sums are authorized:

(1) For activities under section 953—

(A) $150,000,000 for fiscal year 2007;

(B) $155,000,000 for fiscal year 2008; and

(C) $275,000,000 for fiscal year 2009.

(2) For activities under section 954—

(A) $43,600,000 for fiscal year 2007;

(B) $50,100,000 for fiscal year 2008; and

(C) $56,000,000 for fiscal year 2009.

(3) For activities under section 957, $6,000,000 for each of fiscal years 2007 through 2009.

(e) LIMITATION.—None of the funds authorized under this section may be used to decommission the Fast Flux Test Facility.

SEC. 952. NUCLEAR ENERGY RESEARCH PROGRAMS. 42 USC 16272.

(a) NUCLEAR ENERGY RESEARCH INITIATIVE.—The Secretary shall carry out a Nuclear Energy Research Initiative for research and development related to nuclear energy.

(b) NUCLEAR ENERGY SYSTEMS SUPPORT PROGRAM.—The Secretary shall carry out a Nuclear Energy Systems Support Program to support research and development activities addressing reliability, availability, productivity, component aging, safety, and security of existing nuclear power plants.

(c) NUCLEAR POWER 2010 PROGRAM.—

(1) IN GENERAL.—The Secretary shall carry out a Nuclear Power 2010 Program, consistent with recommendations of the Nuclear Energy Research Advisory Committee of the Department in the report entitled "A Roadmap to Deploy New Nuclear Power Plants in the United States by 2010" and dated October 2001.

(2) ADMINISTRATION.—The Program shall include—

(A) use of the expertise and capabilities of industry, institutions of higher education, and National Laboratories in evaluation of advanced nuclear fuel cycles and fuels testing;

(B) consideration of a variety of reactor designs suitable for both developed and developing nations;

(C) participation of international collaborators in research, development, and design efforts, as appropriate; and

(D) encouragement for participation by institutions of higher education and industry.

(d) GENERATION IV NUCLEAR ENERGY SYSTEMS INITIATIVE.—

(1) IN GENERAL.—The Secretary shall carry out a Generation IV Nuclear Energy Systems Initiative to develop an overall technology plan for and to support research and development necessary to make an informed technical decision about the most promising candidates for eventual commercial application.

(2) ADMINISTRATION.—In conducting the Initiative, the Secretary shall examine advanced proliferation-resistant and passively safe reactor designs, including designs that—

(A) are economically competitive with other electric power generation plants;

(B) have higher efficiency, lower cost, and improved safety compared to reactors in operation on the date of enactment of this Act;

(C) use fuels that are proliferation resistant and have substantially reduced production of high-level waste per unit of output; and

(D) use improved instrumentation.

(e) REACTOR PRODUCTION OF HYDROGEN.—The Secretary shall carry out research to examine designs for high-temperature reactors capable of producing large-scale quantities of hydrogen.

42 USC 16273.

SEC. 953. ADVANCED FUEL CYCLE INITIATIVE.

(a) IN GENERAL.—The Secretary, acting through the Director of the Office of Nuclear Energy, Science and Technology, shall conduct an advanced fuel recycling technology research, development, and demonstration program (referred to in this section as the "program") to evaluate proliferation-resistant fuel recycling and transmutation technologies that minimize environmental and public health and safety impacts as an alternative to aqueous reprocessing technologies deployed as of the date of enactment of this Act in support of evaluation of alternative national strategies for spent nuclear fuel and the Generation IV advanced reactor concepts.

(b) ANNUAL REVIEW.—The program shall be subject to annual review by the Nuclear Energy Research Advisory Committee of the Department or other independent entity, as appropriate.

(c) INTERNATIONAL COOPERATION.—In carrying out the program, the Secretary is encouraged to seek opportunities to enhance the progress of the program through international cooperation.

(d) REPORTS.—The Secretary shall submit, as part of the annual budget submission of the Department, a report on the activities of the program.

42 USC 16274.

SEC. 954. UNIVERSITY NUCLEAR SCIENCE AND ENGINEERING SUPPORT.

(a) IN GENERAL.—The Secretary shall conduct a program to invest in human resources and infrastructure in the nuclear sciences and related fields, including health physics, nuclear engineering, and radiochemistry, consistent with missions of the Department related to civilian nuclear research, development, demonstration, and commercial application.

(b) REQUIREMENTS.—In carrying out the program under this section, the Secretary shall—

(1) conduct a graduate and undergraduate fellowship program to attract new and talented students, which may include fellowships for students to spend time at National Laboratories in the areas of nuclear science, engineering, and health physics with a member of the National Laboratory staff acting as a mentor;

(2) conduct a junior faculty research initiation grant program to assist universities in recruiting and retaining new faculty in the nuclear sciences and engineering by awarding grants to junior faculty for research on issues related to nuclear energy engineering and science;

(3) support fundamental nuclear sciences, engineering, and health physics research through a nuclear engineering education and research program;

(4) encourage collaborative nuclear research among industry, National Laboratories, and universities; and

(5) support communication and outreach related to nuclear science, engineering, and health physics.

(c) UNIVERSITY-NATIONAL LABORATORY INTERACTIONS.—The Secretary shall conduct—

(1) a fellowship program for professors at universities to spend sabbaticals at National Laboratories in the areas of nuclear science and technology; and

(2) a visiting scientist program in which National Laboratory staff can spend time in academic nuclear science and engineering departments.

(d) STRENGTHENING UNIVERSITY RESEARCH AND TRAINING REACTORS AND ASSOCIATED INFRASTRUCTURE.—In carrying out the program under this section, the Secretary may support—

(1) converting research reactors from high-enrichment fuels to low-enrichment fuels and upgrading operational instrumentation;

(2) consortia of universities to broaden access to university research reactors;

(3) student training programs, in collaboration with the United States nuclear industry, in relicensing and upgrading reactors, including through the provision of technical assistance; and

(4) reactor improvements as part of a taking into consideration effort that emphasizes research, training, and education, including through the Innovations in Nuclear Infrastructure and Education Program or any similar program.

(e) OPERATIONS AND MAINTENANCE.—Funding for a project provided under this section may be used for a portion of the operating and maintenance costs of a research reactor at a university used in the project.

(f) DEFINITION.—In this section, the term "junior faculty" means a faculty member who was awarded a doctorate less than 10 years before receipt of an award from the grant program described in subsection (b)(2).

SEC. 955. DEPARTMENT OF ENERGY CIVILIAN NUCLEAR INFRASTRUCTURE AND FACILITIES. 42 USC 16275.

(a) IN GENERAL.—The Secretary shall operate and maintain infrastructure and facilities to support the nuclear energy research, development, demonstration, and commercial application programs, including radiological facilities management, isotope production, and facilities management.

(b) DUTIES.—In carrying out this section, the Secretary shall—

(1) develop an inventory of nuclear science and engineering facilities, equipment, expertise, and other assets at all of the National Laboratories;

(2) develop a prioritized list of nuclear science and engineering plant and equipment improvements needed at each of the National Laboratories;

(3) consider the available facilities and expertise at all National Laboratories and emphasize investments which complement rather than duplicate capabilities; and

(4) develop a timeline and a proposed budget for the completion of deferred maintenance on plant and equipment, with the goal of ensuring that Department programs under this subtitle will be generally recognized to be among the best in the world.

(c) PLAN.—The Secretary shall develop a comprehensive plan for the facilities at the Idaho National Laboratory, especially taking

into account the resources available at other National Laboratories. In developing the plan, the Secretary shall—

(1) evaluate the facilities planning processes utilized by other physical science and engineering research and development institutions, both in the United States and abroad, that are generally recognized as being among the best in the world, and consider how those processes might be adapted toward developing such facilities plan;

(2) avoid duplicating, moving, or transferring nuclear science and engineering facilities, equipment, expertise, and other assets that currently exist at other National Laboratories;

(3) consider the establishment of a national transuranic analytic chemistry laboratory as a user facility at the Idaho National Laboratory;

(4) include a plan to develop, if feasible, the Advanced Test Reactor and Test Reactor Area into a user facility that is more readily accessible to academic and industrial researchers;

(5) consider the establishment of a fast neutron source as a user facility;

(6) consider the establishment of new hot cells and the configuration of hot cells most likely to advance research, development, demonstration, and commercial application in nuclear science and engineering, especially in the context of the condition and availability of these facilities elsewhere in the National Laboratories; and

(7) include a timeline and a proposed budget for the completion of deferred maintenance on plant and equipment.

Deadline.

(d) TRANSMITTAL TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall transmit the plan under subsection (c) to Congress.

42 USC 16276.

SEC. 956. SECURITY OF NUCLEAR FACILITIES.

The Secretary, acting through the Director of the Office of Nuclear Energy, Science and Technology, shall conduct a research and development program on cost-effective technologies for increasing—

(1) the safety of nuclear facilities from natural phenomena; and

(2) the security of nuclear facilities from deliberate attacks.

42 USC 16277.

SEC. 957. ALTERNATIVES TO INDUSTRIAL RADIOACTIVE SOURCES.

(a) SURVEY.—

Deadline.

(1) IN GENERAL.—Not later than August 1, 2006, the Secretary shall submit to Congress the results of a survey of industrial applications of large radioactive sources.

(2) ADMINISTRATION.—The survey shall—

(A) consider well-logging sources as one class of industrial sources;

(B) include information on current domestic and international Department, Department of Defense, State Department, and commercial programs to manage and dispose of radioactive sources; and

(C) analyze available disposal options for currently deployed or future sources and, if deficiencies are noted for either deployed or future sources, recommend legislative options that Congress may consider to remedy identified deficiencies.

(b) PLAN.—

(1) IN GENERAL.—In conjunction with the survey conducted under subsection (a), the Secretary shall establish a research and development program to develop alternatives to sources described in subsection (a) that reduce safety, environmental, or proliferation risks to either workers using the sources or the public.

(2) ACCELERATORS.—Miniaturized particle accelerators for well-logging or other industrial applications and portable accelerators for production of short-lived radioactive materials at an industrial site shall be considered as part of the research and development efforts.

(3) REPORT.—Not later than August 1, 2006, the Secretary shall submit to Congress a report describing the details of the program plan.

Subtitle F—Fossil Energy

SEC. 961. FOSSIL ENERGY. 42 USC 16291.

(a) IN GENERAL.—The Secretary shall carry out research, development, demonstration, and commercial application programs in fossil energy, including activities under this subtitle, with the goal of improving the efficiency, effectiveness, and environmental performance of fossil energy production, upgrading, conversion, and consumption. Such programs take into consideration the following objectives:

(1) Increasing the energy conversion efficiency of all forms of fossil energy through improved technologies.

(2) Decreasing the cost of all fossil energy production, generation, and delivery.

(3) Promoting diversity of energy supply.

(4) Decreasing the dependence of the United States on foreign energy supplies.

(5) Improving United States energy security.

(6) Decreasing the environmental impact of energy-related activities.

(7) Increasing the export of fossil energy-related equipment, technology, and services from the United States.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out fossil energy research, development, demonstration, and commercial application activities, including activities authorized under this subtitle—

(1) $611,000,000 for fiscal year 2007;

(2) $626,000,000 for fiscal year 2008; and

(3) $641,000,000 for fiscal year 2009.

(c) ALLOCATIONS.—From amounts authorized under subsection (a), the following sums are authorized:

(1) For activities under section 962—

(A) $367,000,000 for fiscal year 2007;

(B) $376,000,000 for fiscal year 2008; and

(C) $394,000,000 for fiscal year 2009.

(2) For activities under section 964—

(A) $20,000,000 for fiscal year 2007;

(B) $25,000,000 for fiscal year 2008; and

(C) $30,000,000 for fiscal year 2009.

(3) For activities under section 966—

(A) $1,500,000 for fiscal year 2007; and

(B) $450,000 for each of fiscal years 2008 and 2009.

(4) For the Office of Arctic Energy under section 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (42 U.S.C. 7144d) $25,000,000 for each of fiscal years 2007 through 2009.

(d) EXTENDED AUTHORIZATION.—There are authorized to be appropriated to the Secretary for the Office of Arctic Energy established under section 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (42 U.S.C. 7144d) $25,000,000 for each of fiscal years 2010 through 2012.

(e) LIMITATIONS.—

(1) USES.—None of the funds authorized under this section may be used for Fossil Energy Environmental Restoration or Import/Export Authorization.

(2) INSTITUTIONS OF HIGHER EDUCATION.—Of the funds authorized under subsection (c)(2), not less than 20 percent of the funds appropriated for each fiscal year shall be dedicated to research and development carried out at institutions of higher education.

42 USC 16292.

SEC. 962. COAL AND RELATED TECHNOLOGIES PROGRAM.

(a) IN GENERAL.—In addition to the programs authorized under title IV, the Secretary shall conduct a program of technology research, development, demonstration, and commercial application for coal and power systems, including programs to facilitate production and generation of coal-based power through—

(1) innovations for existing plants (including mercury removal);

(2) gasification systems;

(3) advanced combustion systems;

(4) turbines for synthesis gas derived from coal;

(5) carbon capture and sequestration research and development;

(6) coal-derived chemicals and transportation fuels;

(7) liquid fuels derived from low rank coal water slurry;

(8) solid fuels and feedstocks;

(9) advanced coal-related research;

(10) advanced separation technologies; and

(11) fuel cells for the operation of synthesis gas derived from coal.

(b) COST AND PERFORMANCE GOALS.—

(1) IN GENERAL.—In carrying out programs authorized by this section, during each of calendar years 2008, 2010, 2012, and 2016, and during each fiscal year beginning after September 30, 2021, the Secretary shall identify cost and performance goals for coal-based technologies that would permit the continued cost-competitive use of coal for the production of electricity, chemical feedstocks, and transportation fuels.

(2) ADMINISTRATION.—In establishing the cost and performance goals, the Secretary shall—

(A) consider activities and studies undertaken as of the date of enactment of this Act by industry in cooperation with the Department in support of the identification of the goals;

(B) consult with interested entities, including—

(i) coal producers;

(ii) industries using coal;

(iii) organizations that promote coal and advanced coal technologies;

(iv) environmental organizations;

(v) organizations representing workers; and

(vi) organizations representing consumers;

(C) not later than 120 days after the date of enactment of this Act, publish in the Federal Register proposed draft cost and performance goals for public comments; and

Deadline. Federal Register, publication.

(D) not later than 180 days after the date of enactment of this Act and every 4 years thereafter, submit to Congress a report describing the final cost and performance goals for the technologies that includes—

Deadline. Reports.

(i) a list of technical milestones; and

(ii) an explanation of how programs authorized in this section will not duplicate the activities authorized under the Clean Coal Power Initiative authorized under title IV.

(c) POWDER RIVER BASIN AND FORT UNION LIGNITE COAL MERCURY REMOVAL.—

(1) IN GENERAL.—In addition to the programs authorized by subsection (a), the Secretary shall establish a program to test and develop technologies to control and remove mercury emissions from subbituminous coal mined in the Powder River Basin, and Fort Union lignite coals, that are used for the generation of electricity.

(2) EFFICACY OF MERCURY REMOVAL TECHNOLOGY.—In carrying out the program under paragraph (1), the Secretary shall examine the efficacy of mercury removal technologies on coals described in that paragraph that are blended with other types of coal.

(d) FUEL CELLS.—

(1) IN GENERAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application on fuel cells for low-cost, high-efficiency, fuel-flexible, modular power systems.

(2) DEMONSTRATIONS.—The demonstrations referred to in paragraph (1) shall include solid oxide fuel cell technology for commercial, residential, and transportation applications, and distributed generation systems, using improved manufacturing production and processes.

SEC. 963. CARBON CAPTURE RESEARCH AND DEVELOPMENT PROGRAM.

42 USC 16293.

(a) IN GENERAL.—The Secretary shall carry out a 10-year carbon capture research and development program to develop carbon dioxide capture technologies on combustion-based systems for use—

(1) in new coal utilization facilities; and

(2) on the fleet of coal-based units in existence on the date of enactment of this Act.

(b) OBJECTIVES.—The objectives of the program under subsection (a) shall be—

(1) to develop carbon dioxide capture technologies, including adsorption and absorption techniques and chemical processes, to remove the carbon dioxide from gas streams containing carbon dioxide potentially amenable to sequestration;

(2) to develop technologies that would directly produce concentrated streams of carbon dioxide potentially amenable to sequestration;

(3) to increase the efficiency of the overall system to reduce the quantity of carbon dioxide emissions released from the system per megawatt generated; and

(4) in accordance with the carbon dioxide capture program, to promote a robust carbon sequestration program and continue the work of the Department, in conjunction with the private sector, through regional carbon sequestration partnerships.

(c) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized under section 961(b), the following sums are authorized for activities described in subsection (a)(2):

(1) $25,000,000 for fiscal year 2006;

(2) $30,000,000 for fiscal year 2007; and

(3) $35,000,000 for fiscal year 2008.

42 USC 16294.

SEC. 964. RESEARCH AND DEVELOPMENT FOR COAL MINING TECHNOLOGIES.

(a) ESTABLISHMENT.—The Secretary shall carry out a program for research and development on coal mining technologies.

(b) COOPERATION.—In carrying out the program, the Secretary shall cooperate with appropriate Federal agencies, coal producers, trade associations, equipment manufacturers, institutions of higher education with mining engineering departments, and other relevant entities.

(c) PROGRAM.—The research and development activities carried out under this section shall—

(1) be guided by the mining research and development priorities identified by the Mining Industry of the Future Program and in the recommendations from relevant reports of the National Academy of Sciences on mining technologies;

(2) include activities exploring minimization of contaminants in mined coal that contribute to environmental concerns including development and demonstration of electromagnetic wave imaging ahead of mining operations;

(3) develop and demonstrate coal bed electromagnetic wave imaging, spectroscopic reservoir analysis technology, and techniques for horizontal drilling in order to—

(A) identify areas of high coal gas content;

(B) increase methane recovery efficiency;

(C) prevent spoilage of domestic coal reserves; and

(D) minimize water disposal associated with methane extraction; and

(4) expand mining research capabilities at institutions of higher education.

42 USC 16295.

SEC. 965. OIL AND GAS RESEARCH PROGRAMS.

(a) IN GENERAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application of oil and gas, including—

(1) exploration and production;

(2) gas hydrates;

(3) reservoir life and extension;

(4) transportation and distribution infrastructure;

(5) ultraclean fuels;

(6) heavy oil, oil shale, and tar sands; and

(7) related environmental research.

(b) OBJECTIVES.—The objectives of this program shall include advancing the science and technology available to domestic petroleum producers, particularly independent operators, to minimize the economic dislocation caused by the decline of domestic supplies of oil and natural gas resources.

(c) NATURAL GAS AND OIL DEPOSITS REPORT.—Not later than 2 years after the date of enactment of this Act and every 2 years thereafter, the Secretary of the Interior, in consultation with other appropriate Federal agencies, shall submit to Congress a report on the latest estimates of natural gas and oil reserves, reserves growth, and undiscovered resources in Federal and State waters off the coast of Louisiana, Texas, Alabama, and Mississippi.

(d) INTEGRATED CLEAN POWER AND ENERGY RESEARCH.—

(1) ESTABLISHMENT OF CENTER.—The Secretary shall establish a national center or consortium of excellence in clean energy and power generation, using the resources of the Clean Power and Energy Research Consortium in existence on the date of enactment of this Act, to address the critical dependence of the United States on energy and the need to reduce emissions.

(2) FOCUS AREAS.—The center or consortium shall conduct a program of research, development, demonstration, and commercial application on integrating the following 6 focus areas:

(A) Efficiency and reliability of gas turbines for power generation.

(B) Reduction in emissions from power generation.

(C) Promotion of energy conservation issues.

(D) Effectively using alternative fuels and renewable energy.

(E) Development of advanced materials technology for oil and gas exploration and use in harsh environments.

(F) Education on energy and power generation issues.

SEC. 966. LOW-VOLUME OIL AND GAS RESERVOIR RESEARCH PROGRAM. 42 USC 16296.

(a) DEFINITION OF GIS.—In this section, the term "GIS" means geographic information systems technology that facilitates the organization and management of data with a geographic component.

(b) PROGRAM.—The Secretary shall establish a program of research, development, demonstration, and commercial application to maximize the productive capacity of marginal wells and reservoirs.

(c) DATA COLLECTION.—Under the program, the Secretary shall collect data on—

(1) the status and location of marginal wells and oil and gas reservoirs;

(2) the production capacity of marginal wells and oil and gas reservoirs;

(3) the location of low-pressure gathering facilities and pipelines; and

(4) the quantity of natural gas vented or flared in association with crude oil production.

(d) ANALYSIS.—Under the program, the Secretary shall—

(1) estimate the remaining producible reserves based on variable pipeline pressures; and

(2) recommend measures that will enable the continued production of those resources.

(e) STUDY.—

(1) IN GENERAL.—The Secretary may award a grant to an organization of States that contain significant numbers of marginal oil and natural gas wells to conduct an annual study of low-volume natural gas reservoirs.

(2) ORGANIZATION WITH NO GIS CAPABILITIES.—If an organization receiving a grant under paragraph (1) does not have GIS capabilities, the organization shall contract with an institution of higher education with GIS capabilities.

(3) STATE GEOLOGISTS.—The organization receiving a grant under paragraph (1) shall collaborate with the State geologist of each State being studied.

(f) PUBLIC INFORMATION.—The Secretary may use the data collected and analyzed under this section to produce maps and literature to disseminate to States to promote conservation of natural gas reserves.

Establishment.
42 USC 16297.

SEC. 967. COMPLEX WELL TECHNOLOGY TESTING FACILITY.

The Secretary, in coordination with industry leaders in extended research drilling technology, shall establish a Complex Well Technology Testing Facility at the Rocky Mountain Oilfield Testing Center to increase the range of extended drilling technologies.

30 USC 1902
note.

SEC. 968. METHANE HYDRATE RESEARCH.

(a) IN GENERAL.—The Methane Hydrate Research and Development Act of 2000 (30 U.S.C. 1902 note; Public Law 106–193) is amended to read as follows:

"SECTION 1. SHORT TITLE.

"This Act may be cited as the 'Methane Hydrate Research and Development Act of 2000'.

"SEC. 2. FINDINGS.

"Congress finds that—

"(1) in order to promote energy independence and meet the increasing demand for energy, the United States will require a diversified portfolio of substantially increased quantities of electricity, natural gas, and transportation fuels;

"(2) according to the report submitted to Congress by the National Research Council entitled 'Charting the Future of Methane Hydrate Research in the United States', the total United States resources of gas hydrates have been estimated to be on the order of 200,000 trillion cubic feet;

"(3) according to the report of the National Commission on Energy Policy entitled 'Ending the Energy Stalemate—A Bipartisan Strategy to Meet America's Energy Challenge', and dated December 2004, the United States may be endowed with over one-fourth of the methane hydrate deposits in the world;

"(4) according to the Energy Information Administration, a shortfall in natural gas supply from conventional and unconventional sources is expected to occur in or about 2020; and

"(5) the National Academy of Sciences states that methane hydrate may have the potential to alleviate the projected shortfall in the natural gas supply.

"SEC. 3. DEFINITIONS.

"In this Act:

"(1) CONTRACT.—The term 'contract' means a procurement contract within the meaning of section 6303 of title 31, United States Code.

"(2) COOPERATIVE AGREEMENT.—The term 'cooperative agreement' means a cooperative agreement within the meaning of section 6305 of title 31, United States Code.

"(3) DIRECTOR.—The term 'Director' means the Director of the National Science Foundation.

"(4) GRANT.—The term 'grant' means a grant awarded under a grant agreement (within the meaning of section 6304 of title 31, United States Code).

"(5) INDUSTRIAL ENTERPRISE.—The term 'industrial enterprise' means a private, nongovernmental enterprise that has an expertise or capability that relates to methane hydrate research and development.

"(6) INSTITUTION OF HIGHER EDUCATION.—The term 'institution of higher education' means an institution of higher education (as defined in section 102 of the Higher Education Act of 1965 (20 U.S.C. 1002)).

"(7) SECRETARY.—The term 'Secretary' means the Secretary of Energy, acting through the Assistant Secretary for Fossil Energy.

"(8) SECRETARY OF COMMERCE.—The term 'Secretary of Commerce' means the Secretary of Commerce, acting through the Administrator of the National Oceanic and Atmospheric Administration.

"(9) SECRETARY OF DEFENSE.—The term 'Secretary of Defense' means the Secretary of Defense, acting through the Secretary of the Navy.

"(10) SECRETARY OF THE INTERIOR.—The term 'Secretary of the Interior' means the Secretary of the Interior, acting through the Director of the United States Geological Survey, the Director of the Bureau of Land Management, and the Director of the Minerals Management Service.

"SEC. 4. METHANE HYDRATE RESEARCH AND DEVELOPMENT PROGRAM.

"(a) IN GENERAL.—

"(1) COMMENCEMENT OF PROGRAM.—Not later than 90 days after the date of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005, the Secretary, in consultation with the Secretary of Commerce, the Secretary of Defense, the Secretary of the Interior, and the Director, shall commence a program of methane hydrate research and development in accordance with this section. Deadline.

"(2) DESIGNATIONS.—The Secretary, the Secretary of Commerce, the Secretary of Defense, the Secretary of the Interior, and the Director shall designate individuals to carry out this section.

"(3) COORDINATION.—The individual designated by the Secretary shall coordinate all activities within the Department of Energy relating to methane hydrate research and development.

"(4) MEETINGS.—The individuals designated under paragraph (2) shall meet not later than 180 days after the date Deadlines.

of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005 and not less frequently than every 180 days thereafter to—

"(A) review the progress of the program under paragraph (1); and

"(B) coordinate interagency research and partnership efforts in carrying out the program.

"(b) GRANTS, CONTRACTS, COOPERATIVE AGREEMENTS, INTERAGENCY FUNDS TRANSFER AGREEMENTS, AND FIELD WORK PROPOSALS.—

"(1) ASSISTANCE AND COORDINATION.—In carrying out the program of methane hydrate research and development authorized by this section, the Secretary may award grants to, or enter into contracts or cooperative agreements with, institutions of higher education, oceanographic institutions, and industrial enterprises to—

"(A) conduct basic and applied research to identify, explore, assess, and develop methane hydrate as a commercially viable source of energy;

"(B) identify methane hydrate resources through remote sensing;

"(C) acquire and reprocess seismic data suitable for characterizing methane hydrate accumulations;

"(D) assist in developing technologies required for efficient and environmentally sound development of methane hydrate resources;

"(E) promote education and training in methane hydrate resource research and resource development through fellowships or other means for graduate education and training;

"(F) conduct basic and applied research to assess and mitigate the environmental impact of hydrate degassing (including both natural degassing and degassing associated with commercial development);

"(G) develop technologies to reduce the risks of drilling through methane hydrates; and

"(H) conduct exploratory drilling, well testing, and production testing operations on permafrost and non-permafrost gas hydrates in support of the activities authorized by this paragraph, including drilling of one or more full-scale production test wells.

"(2) COMPETITIVE PEER REVIEW.—Funds made available under paragraph (1) shall be made available based on a competitive process using external scientific peer review of proposed research.

"(c) METHANE HYDRATES ADVISORY PANEL.—

Establishment.

"(1) IN GENERAL.—The Secretary shall establish an advisory panel (including the hiring of appropriate staff) consisting of representatives of industrial enterprises, institutions of higher education, oceanographic institutions, State agencies, and environmental organizations with knowledge and expertise in the natural gas hydrates field, to—

"(A) assist in developing recommendations and broad programmatic priorities for the methane hydrate research and development program carried out under subsection (a)(1);

"(B) provide scientific oversight for the methane hydrates program, including assessing progress toward program goals, evaluating program balance, and providing recommendations to enhance the quality of the program over time; and

"(C) not later than 2 years after the date of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005, and at such later dates as the panel considers advisable, submit to Congress— Deadline.

"(i) an assessment of the methane hydrate research program; and

"(ii) an assessment of the 5-year research plan of the Department of Energy.

"(2) CONFLICTS OF INTEREST.—In appointing each member of the advisory panel established under paragraph (1), the Secretary shall ensure, to the maximum extent practicable, that the appointment of the member does not pose a conflict of interest with respect to the duties of the member under this Act.

"(3) MEETINGS.—The advisory panel shall—

"(A) hold the initial meeting of the advisory panel not later than 180 days after the date of establishment of the advisory panel; and Deadline.

"(B) meet biennially thereafter.

"(4) COORDINATION.—The advisory panel shall coordinate activities of the advisory panel with program managers of the Department of Energy at appropriate National Laboratories.

"(d) CONSTRUCTION COSTS.—None of the funds made available to carry out this section may be used for the construction of a new building or the acquisition, expansion, remodeling, or alteration of an existing building (including site grading and improvement and architect fees).

"(e) RESPONSIBILITIES OF THE SECRETARY.—In carrying out subsection (b)(1), the Secretary shall—

"(1) facilitate and develop partnerships among government, industrial enterprises, and institutions of higher education to research, identify, assess, and explore methane hydrate resources;

"(2) undertake programs to develop basic information necessary for promoting long-term interest in methane hydrate resources as an energy source;

"(3) ensure that the data and information developed through the program are accessible and widely disseminated as needed and appropriate;

"(4) promote cooperation among agencies that are developing technologies that may hold promise for methane hydrate resource development;

"(5) report annually to Congress on the results of actions taken to carry out this Act; and Reports.

"(6) ensure, to the maximum extent practicable, greater participation by the Department of Energy in international cooperative efforts.

"SEC. 5. NATIONAL RESEARCH COUNCIL STUDY.

"(a) AGREEMENT FOR STUDY.—The Secretary shall offer to enter into an agreement with the National Research Council under which the National Research Council shall—

"(1) conduct a study of the progress made under the methane hydrate research and development program implemented under this Act; and

"(2) make recommendations for future methane hydrate research and development needs.

"(b) REPORT.—Not later than September 30, 2009, the Secretary shall submit to Congress a report containing the findings and recommendations of the National Research Council under this section.

"SEC. 6. REPORTS AND STUDIES FOR CONGRESS.

"The Secretary shall provide to the Committee on Science of the House of Representatives and the Committee on Energy and Natural Resources of the Senate copies of any report or study that the Department of Energy prepares at the direction of any committee of Congress relating to the methane hydrate research and development program implemented under this Act.

"SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

"There are authorized to be appropriated to the Secretary to carry out this Act, to remain available until expended—

"(1) $15,000,000 for fiscal year 2006;

"(2) $20,000,000 for fiscal year 2007;

"(3) $30,000,000 for fiscal year 2008;

"(4) $40,000,000 for fiscal year 2009; and

"(5) $50,000,000 for fiscal year 2010.".

30 USC 2001 note.

(b) RECLASSIFICATION.—The Law Revision Counsel shall reclassify the Methane Hydrate Research and Development Act of 2000 (30 U.S.C. 1902 note; Public Law 106–193) to a new chapter at the end of title 30, United States Code.

Subtitle G—Science

42 USC 16311.

SEC. 971. SCIENCE.

(a) IN GENERAL.—The Secretary shall conduct, through the Office of Science, programs of research, development, demonstration, and commercial application in high energy physics, nuclear physics, biological and environmental research, basic energy sciences, advanced scientific computing research, and fusion energy sciences, including activities described in this subtitle. The programs shall include support for facilities and infrastructure, education, outreach, information, analysis, and coordination activities.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out research, development, demonstration, and commercial application activities of the Office of Science, including activities authorized under this subtitle (including the amounts authorized under the amendment made by section 976(b) and including basic energy sciences, advanced scientific and computing research, biological and environmental research, fusion energy sciences, high energy physics, nuclear physics, research analysis, and infrastructure support)—

(1) $4,153,000,000 for fiscal year 2007;

(2) $4,586,000,000 for fiscal year 2008; and

(3) $5,200,000,000 for fiscal year 2009.

(c) ALLOCATIONS.—From amounts authorized under subsection (b), the following sums are authorized:

(1) For activities under the Fusion Energy Sciences program (including activities under section 972)—

(A) $355,500,000 for fiscal year 2007;

(B) $369,500,000 for fiscal year 2008;

(C) $384,800,000 for fiscal year 2009; and

(D) in addition to the amounts authorized under subparagraphs (A), (B), and (C), such sums as may be necessary for ITER construction, consistent with the limitations of section 972(c)(5).

(2) For activities under the catalysis research program under section 973—

(A) $36,500,000 for fiscal year 2007;

(B) $38,200,000 for fiscal year 2008; and

(C) such sums as may be necessary for fiscal year 2009.

(3) For activities under the Systems Biology Program under section 977 such sums as may be necessary for each of fiscal years 2007 through 2009.

(4) For activities under the Energy and Water Supplies program under section 979, $30,000,000 for each of fiscal years 2007 through 2009.

(5) For the energy research fellowships programs under section 984, $40,000,000 for each of fiscal years 2007 through 2009.

(6) For the advanced scientific computing activities under section 976—

(A) $270,000,000 for fiscal year 2007;

(B) $350,000,000 for fiscal year 2008; and

(C) $375,000,000 for fiscal year 2009.

(7) For the science and engineering education pilot program under section 983—

(A) $4,000,000 for each of fiscal years 2007 and 2008; and

(B) $8,000,000 for fiscal year 2009.

(d) INTEGRATED BIOENERGY RESEARCH AND DEVELOPMENT.—In addition to amounts otherwise authorized by this section, there are authorized to be appropriated to the Secretary for integrated bioenergy research and development programs, projects, and activities, $49,000,000 for each of the fiscal years 2005 through 2009. Activities funded under this subsection shall be coordinated with ongoing related programs of other Federal agencies, including the Plant Genome Program of the National Science Foundation. Of the funds authorized under this subsection, at least $5,000,000 for each fiscal year shall be for training and education targeted to minority and socially disadvantaged farmers and ranchers.

SEC. 972. FUSION ENERGY SCIENCES PROGRAM. 42 USC 16312.

(a) DECLARATION OF POLICY.—It shall be the policy of the United States to conduct research, development, demonstration, and commercial applications to provide for the scientific, engineering, and commercial infrastructure necessary to ensure that the United States is competitive with other countries in providing fusion energy for its own needs and the needs of other countries, including by demonstrating electric power or hydrogen

production for the United States energy grid using fusion energy at the earliest date.

(b) PLANNING.—

Deadline.

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to Congress a plan (with proposed cost estimates, budgets, and lists of potential international partners) for the implementation of the policy described in subsection (a) in a manner that ensures that—

(A) existing fusion research facilities are more fully used;

(B) fusion science, technology, theory, advanced computation, modeling, and simulation are strengthened;

(C) new magnetic and inertial fusion research and development facilities are selected based on scientific innovation and cost effectiveness, and the potential of the facilities to advance the goal of practical fusion energy at the earliest date practicable;

(D) facilities that are selected are funded at a cost-effective rate;

(E) communication of scientific results and methods between the fusion energy science community and the broader scientific and technology communities is improved;

(F) inertial confinement fusion facilities are used to the extent practicable for the purpose of inertial fusion energy research and development;

(G) attractive alternative inertial and magnetic fusion energy approaches are more fully explored; and

(H) to the extent practicable, the recommendations of the Fusion Energy Sciences Advisory Committee in the report on workforce planning, dated March 2004, are carried out, including periodic reassessment of program needs.

(2) COSTS AND SCHEDULES.—The plan shall also address the status of and, to the extent practicable, costs and schedules for—

(A) the design and implementation of international or national facilities for the testing of fusion materials; and

(B) the design and implementation of international or national facilities for the testing and development of key fusion technologies.

(c) UNITED STATES PARTICIPATION IN ITER.—

(1) DEFINITIONS.—In this subsection:

(A) CONSTRUCTION.—

(i) IN GENERAL.—The term "construction" means—

(I) the physical construction of the ITER facility; and

(II) the physical construction, purchase, or manufacture of equipment or components that are specifically designed for the ITER facility.

(ii) EXCLUSIONS.—The term "construction" does not include the design of the facility, equipment, or components.

(B) ITER.—The term "ITER" means the international burning plasma fusion research project in which the President announced United States participation on January 30, 2003, or any similar international project.

(2) PARTICIPATION.—The United States may participate in the ITER only in accordance with this subsection.

(3) AGREEMENT.—

(A) IN GENERAL.—The Secretary may negotiate an agreement for United States participation in the ITER.

(B) CONTENTS.—Any agreement for United States participation in the ITER shall, at a minimum—

(i) clearly define the United States financial contribution to construction and operating costs, as well as any other costs associated with a project;

(ii) ensure that the share of high-technology components of the ITER manufactured in the United States is at least proportionate to the United States financial contribution to the ITER;

(iii) ensure that the United States will not be financially responsible for cost overruns in components manufactured in other ITER participating countries;

(iv) guarantee the United States full access to all data generated by the ITER;

(v) enable United States researchers to propose and carry out an equitable share of the experiments at the ITER;

(vi) provide the United States with a role in all collective decisionmaking related to the ITER; and

(vii) describe the process for discontinuing or decommissioning the ITER and any United States role in that process.

(4) PLAN.—

(A) DEVELOPMENT.—The Secretary, in consultation with the Fusion Energy Sciences Advisory Committee, shall develop a plan for the participation of United States scientists in the ITER that shall include—

(i) the United States research agenda for the ITER;

(ii) methods to evaluate whether the ITER is promoting progress toward making fusion a reliable and affordable source of power; and

(iii) a description of how work at the ITER will relate to other elements of the United States fusion program.

(B) REVIEW.—The Secretary shall request a review of the plan by the National Academy of Sciences.

(5) LIMITATION.—No Federal funds shall be expended for the construction of the ITER until the Secretary has submitted to Congress— Reports. Deadlines.

(A) the agreement negotiated in accordance with paragraph (3) and 120 days have elapsed since that submission;

(B) a report describing the management structure of the ITER and providing a fixed dollar estimate of the cost of United States participation in the construction of the ITER, and 120 days have elapsed since that submission;

(C) a report describing how United States participation in the ITER will be funded without reducing funding for other programs in the Office of Science (including other fusion programs), and 60 days have elapsed since that submission; and

(D) the plan required by paragraph (4) (but not the National Academy of Sciences review of that plan), and 60 days have elapsed since that submission.

(6) ALTERNATIVE TO ITER.—

(A) IN GENERAL.—If at any time during the negotiations on the ITER, the Secretary determines that construction and operation of the ITER is unlikely or infeasible, the Secretary shall submit to Congress, along with the budget request of the President submitted to Congress for the following fiscal year, a plan for implementing a domestic burning plasma experiment such as the Fusion Ignition Research Experiment, including costs and schedules for the plan.

(B) ADMINISTRATION.—The Secretary shall—

(i) refine the plan in full consultation with the Fusion Energy Sciences Advisory Committee; and

(ii) transmit the plan to the National Academy of Sciences for review.

42 USC 16313.

SEC. 973. CATALYSIS RESEARCH PROGRAM.

(a) ESTABLISHMENT.—The Secretary, acting through the Office of Science, shall support a program of research and development in catalysis science consistent with the statutory authorities of the Department related to research and development.

(b) COMPONENTS.—The program shall include efforts to—

(1) enable catalyst design using combinations of experimental and mechanistic methodologies coupled with computational modeling of catalytic reactions at the molecular level;

(2) develop techniques for high throughput synthesis, assay, and characterization at nanometer and subnanometer scales in-situ under actual operating conditions;

(3) synthesize catalysts with specific site architectures;

(4) conduct research on the use of precious metals for catalysis; and

(5) translate molecular understanding to the design of catalytic compounds.

(c) DUTIES OF THE OFFICE OF SCIENCE.—In carrying out the program, the Director of the Office of Science shall—

(1) support both individual investigators and multidisciplinary teams of investigators to pioneer new approaches in catalytic design;

(2) develop, plan, construct, acquire, share, or operate special equipment or facilities for the use of investigators in collaboration with national user facilities, such as nanoscience and engineering centers;

(3) support technology transfer activities to benefit industry and other users of catalysis science and engineering; and

(4) coordinate research and development activities with industry and other Federal agencies.

Deadline.

(d) ASSESSMENT.—Not later than 3 years after the date of enactment of this Act, the Secretary shall enter into an arrangement with the National Academy of Sciences to—

(1) review the catalysis program to measure—

(A) gains made in the fundamental science of catalysis; and

(B) progress towards developing new fuels for energy production and material fabrication processes; and

(2) submit to Congress a report describing the results of the review. Reports.

SEC. 974. HYDROGEN. 42 USC 16314.

(a) IN GENERAL.—The Secretary shall conduct a program of fundamental research and development in support of programs authorized under title VIII.

(b) METHODS.—The program shall include support for methods of generating hydrogen without the use of natural gas.

SEC. 975. SOLID STATE LIGHTING. 42 USC 16315.

The Secretary shall conduct a program of fundamental research on solid state lighting in support of the Next Generation Lighting Initiative carried out under section 912.

SEC. 976. ADVANCED SCIENTIFIC COMPUTING FOR ENERGY MISSIONS. 42 USC 16316.

(a) PROGRAM.—

(1) IN GENERAL.—The Secretary shall conduct an advanced scientific computing research and development program that includes activities related to applied mathematics and activities authorized by the Department of Energy High-End Computing Revitalization Act of 2004 (15 U.S.C. 5541 et seq.).

(2) GOAL.—The Secretary shall carry out the program with the goal of supporting departmental missions, and providing the high-performance computational, networking, advanced visualization technologies, and workforce resources, that are required for world leadership in science.

(b) HIGH-PERFORMANCE COMPUTING.—Section 203 of the High-Performance Computing Act of 1991 (15 U.S.C. 5523) is amended to read as follows:

"SEC. 203. DEPARTMENT OF ENERGY ACTIVITIES.

"(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the Secretary of Energy shall—

"(1) conduct and support basic and applied research in high-performance computing and networking to support fundamental research in science and engineering disciplines related to energy applications; and

"(2) provide computing and networking infrastructure support, including—

"(A) the provision of high-performance computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems; and

"(B) support for advanced software and applications development for science and engineering disciplines related to energy applications.

"(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Energy such sums as are necessary to carry out this section.".

SEC. 977. SYSTEMS BIOLOGY PROGRAM. 42 USC 16317.

(a) PROGRAM.—

(1) ESTABLISHMENT.—The Secretary shall establish a research, development, and demonstration program in microbial and plant systems biology, protein science, and computational biology to support the energy, national security, and environmental missions of the Department.

(2) GRANTS.—The program shall support individual researchers and multidisciplinary teams of researchers through competitive, merit-reviewed grants.

(3) CONSULTATION.—In carrying out the program, the Secretary shall consult with other Federal agencies that conduct genetic and protein research.

(b) GOALS.—The program shall have the goal of developing technologies and methods based on the biological functions of genomes, microbes, and plants that—

(1) can facilitate the production of fuels, including hydrogen;

(2) convert carbon dioxide to organic carbon;

(3) detoxify soils and water, including at facilities of the Department, contaminated with heavy metals and radiological materials; and

(4) address other Department missions as identified by the Secretary.

(c) PLAN.—

Deadline.

(1) DEVELOPMENT OF PLAN.—Not later than 1 year after the date of enactment of this Act, the Secretary shall prepare and transmit to Congress a research plan describing how the program authorized pursuant to this section will be undertaken to accomplish the program goals established in subsection (b).

Contracts.

Deadline.

(2) REVIEW OF PLAN.—The Secretary shall contract with the National Academy of Sciences to review the research plan developed under this subsection. The Secretary shall transmit the review to Congress not later than 18 months after transmittal of the research plan under paragraph (1), along with the Secretary's response to the recommendations contained in the review.

(d) USER FACILITIES AND ANCILLARY EQUIPMENT.—Within the funds authorized to be appropriated pursuant to this subtitle, amounts shall be available for projects to develop, plan, construct, acquire, or operate special equipment, instrumentation, or facilities, including user facilities at National Laboratories, for researchers conducting research, development, demonstration, and commercial application in systems biology and proteomics and associated biological disciplines.

(e) PROHIBITION ON BIOMEDICAL AND HUMAN CELL AND HUMAN SUBJECT RESEARCH.—

(1) NO BIOMEDICAL RESEARCH.—In carrying out the program under this section, the Secretary shall not conduct biomedical research.

(2) LIMITATIONS.—Nothing in this section shall authorize the Secretary to conduct any research or demonstrations—

(A) on human cells or human subjects; or

(B) designed to have direct application with respect to human cells or human subjects.

42 USC 16318.

SEC. 978. FISSION AND FUSION ENERGY MATERIALS RESEARCH PROGRAM.

(a) IN GENERAL.—Along with the budget request of the President submitted to Congress for fiscal year 2007, the Secretary shall establish a research and development program on material science issues presented by advanced fission reactors and the fusion energy program of the Department.

(b) ADMINISTRATION.—In carrying out the program, the Secretary shall develop—

(1) a catalog of material properties required for applications described in subsection (a);

(2) theoretical models for materials possessing the required properties;

(3) benchmark models against existing data; and

(4) a roadmap to guide further research and development in the area covered by the program.

SEC. 979. ENERGY AND WATER SUPPLIES. 42 USC 16319.

(a) IN GENERAL.—The Secretary shall carry out a program of research, development, demonstration, and commercial application to—

(1) address energy-related issues associated with provision of adequate water supplies, optimal management, and efficient use of water;

(2) address water-related issues associated with the provision of adequate supplies, optimal management, and efficient use of energy; and

(3) assess the effectiveness of existing programs within the Department and other Federal agencies to address these energy and water related issues.

(b) PROGRAM ELEMENTS.—The program under this section shall include—

(1) arsenic treatment;

(2) desalination; and

(3) planning, analysis, and modeling of energy and water supply and demand.

(c) COLLABORATION.—In carrying out this section, the Secretary shall consult with the Administrator of the Environmental Protection Agency, the Secretary of the Interior, the Chief Engineer of the Army Corps of Engineers, the Secretary of Commerce, the Secretary of Defense, and other Federal agencies as appropriate.

(d) FACILITIES.—The Secretary may utilize all existing facilities within the Department and may design and construct additional facilities as needed to carry out the purposes of this program.

(e) ADVISORY COMMITTEE.—The Secretary shall establish or utilize an advisory committee to provide independent advice and review of the program. Establishment.

(f) REPORTS.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress a report on the assessment described in subsection (b) and recommendations for future actions.

SEC. 980. SPALLATION NEUTRON SOURCE. 42 USC 16320.

(a) DEFINITIONS.—In this section:

(1) SING.—The term "SING" means the Spallation Neutron Source Instruments Next Generation major item of equipment.

(2) SNS POWER UPGRADE.—The term "SNS power upgrade" means the Spallation Neutron Source power upgrade described in the 20-year facilities plan of the Office of Science of the Department.

(3) SNS SECOND TARGET STATION.—The term "SNS second target station" means the Spallation Neutron Source second target station described in the 20-year facilities plan of the Office of Science of the Department.

(4) SPALLATION NEUTRON SOURCE FACILITY.—The terms "Spallation Neutron Source Facility" and "Facility" mean the completed Spallation Neutron Source scientific user facility located at Oak Ridge National Laboratory, Oak Ridge, Tennessee.

(5) SPALLATION NEUTRON SOURCE PROJECT.—The terms "Spallation Neutron Source Project" and "Project" means Department Project 99–E–334, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

(b) SPALLATION NEUTRON SOURCE PROJECT.—

Reports.

(1) IN GENERAL.—The Secretary shall submit to Congress, as part of the annual budget request of the President submitted to Congress, a report on progress on the Spallation Neutron Source Project.

(2) CONTENTS.—The report shall include for the Project—

(A) a description of the achievement of milestones;

(B) a comparison of actual costs to estimated costs; and

(C) any changes in estimated Project costs or schedule.

(c) SPALLATION NEUTRON SOURCE FACILITY PLAN.—

(1) IN GENERAL.—The Secretary shall develop an operational plan for the Spallation Neutron Source Facility that ensures that the Facility is employed to the full capability of the Facility in support of the study of advanced materials, nanoscience, and other missions of the Office of Science of the Department.

(2) PLAN.—The operational plan shall—

(A) include a plan for the operation of an effective scientific user program that—

(i) is based on peer review of proposals submitted for use of the Facility;

(ii) includes scientific and technical support to ensure that external users, including researchers based at institutions of higher education, are able to make full use of a variety of high quality scientific instruments; and

(iii) phases in systems upgrades to ensure that the Facility remains at the forefront of international scientific endeavors in the field of the Facility throughout the operating life of the Facility;

(B) include an ongoing program to develop new instruments that builds on the high performance neutron source and that allows neutron scattering techniques to be applied to a growing range of scientific problems and disciplines; and

(C) address the status of and, to the maximum extent practicable, costs and schedules for—

(i) full user mode operations of the Facility;

(ii) instrumentation built at the Facility during the operating phase through full use of the experimental hall, including the SING;

(iii) the SNS power upgrade; and

(iv) the SNS second target station.

(d) AUTHORIZATION OF APPROPRIATIONS.—

(1) SPALLATION NEUTRON SOURCE PROJECT.—There is authorized to be appropriated to carry out the Spallation Neutron Source Project for the lifetime of the Project $1,411,700,000 for total project costs, of which—

(A) $1,192,700,000 shall be used for the costs of construction; and

(B) $219,000,000 shall be used for other Project costs.

(2) SPALLATION NEUTRON SOURCE FACILITY.—

(A) IN GENERAL.—Except as provided in subparagraph (B), there is authorized to be appropriated for the Spallation Neutron Source Facility for—

(i) the SING, $75,000,000 for each of fiscal year 2007 through 2009; and

(ii) the SNS power upgrade, $160,000,000, to remain available until expended.

(B) INSUFFICIENT STOCKPILES OF HEAVY WATER.—If stockpiles of heavy water of the Department are insufficient to meet the needs of the Facility, there is authorized to be appropriated for the Facility $12,000,000 for fiscal year 2007.

SEC. 981. RARE ISOTOPE ACCELERATOR. 42 USC 16321.

(a) ESTABLISHMENT.—The Secretary shall construct and operate a Rare Isotope Accelerator. The Secretary shall commence construction no later than September 30, 2008. Deadline.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary such sums as may be necessary to carry out this section. The Secretary shall not spend more than $1,100,000,000 in Federal funds for all activities associated with the Rare Isotope Accelerator, prior to operation of the Accelerator.

SEC. 982. OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION. 42 USC 16322.

The Secretary, through the Office of Scientific and Technical Information, shall maintain within the Department publicly available collections of scientific and technical information resulting from research, development, demonstration, and commercial applications activities supported by the Department.

SEC. 983. SCIENCE AND ENGINEERING EDUCATION PILOT PROGRAM. 42 USC 16323.

(a) ESTABLISHMENT OF PILOT PROGRAM.—The Secretary shall award a grant to a Southeastern United States consortium of major research universities that currently advances science and education by partnering with National Laboratories, to establish a regional pilot program of its SEEK–16 program for enhancing scientific, technological, engineering, and mathematical literacy, creativity, and decision-making. The consortium shall include leading research universities, one or more universities that train substantial numbers of elementary and secondary school teachers, and (where appropriate) National Laboratories. Grants.

(b) PROGRAM ELEMENTS.—The regional pilot program shall include—

(1) expanding strategic, formal partnerships among universities with strength in research, universities that train substantial numbers of elementary and secondary school teachers, and the private sector;

(2) combining Department expertise with one or more National Aeronautics and Space Administration Educator Resource Centers;

(3) developing programs to permit current and future teachers to participate in ongoing research projects at National Laboratories and research universities and to adapt lessons learned to the classroom;

(4) designing and implementing course work;

(5) designing and implementing a strategy for measuring and assessing progress under the program; and

(6) developing models for transferring knowledge gained under the pilot program to other institutions and areas of the United States.

(c) CATEGORIZATION.—A grant under this section shall be considered an authorized activity under section 3165 of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381b).

(d) REPORT.—No later than 2 years after the award of the grant, the Secretary shall transmit to Congress a report outlining lessons learned and, if determined appropriate by the Secretary, containing a plan for expanding the program throughout the United States.

42 USC 16324.

SEC. 984. ENERGY RESEARCH FELLOWSHIPS.

(a) POSTDOCTORAL FELLOWSHIP PROGRAM.—The Secretary shall establish a program under which the Secretary provides fellowships to encourage outstanding young scientists and engineers to pursue postdoctoral research appointments in energy research and development at institutions of higher education of their choice.

(b) SENIOR RESEARCH FELLOWSHIPS.—

(1) IN GENERAL.—The Secretary shall establish a program under which the Secretary provides fellowships to allow outstanding senior researchers and their research groups in energy research and development to explore research and development topics of their choosing for a period of not less than 3 years, to be determined by the Secretary.

(2) CONSIDERATION.—In providing a fellowship under the program described in paragraph (1), the Secretary shall consider—

(A) the past scientific or technical accomplishment of a senior researcher; and

(B) the potential for continued accomplishment by the researcher during the period of the fellowship.

42 USC 16325.

SEC. 984A. SCIENCE AND TECHNOLOGY SCHOLARSHIP PROGRAM.

(a) IN GENERAL.—The Secretary is authorized to establish a Science and Technology Scholarship Program to award scholarships to individuals that is designed to recruit and prepare students for careers in the Department and National Laboratories.

(b) SERVICE REQUIREMENT.—The Secretary may require that an individual receiving a scholarship under this section serve as a full-time employee of the Department or a National Laboratory for a fixed period in return for receiving the scholarship.

Subtitle H—International Cooperation

42 USC 16341.

SEC. 985. WESTERN HEMISPHERE ENERGY COOPERATION.

(a) PROGRAM.—The Secretary shall carry out a program to promote cooperation on energy issues with countries of the Western Hemisphere.

(b) ACTIVITIES.—Under the program, the Secretary shall fund activities to work with countries of the Western Hemisphere to—

(1) increase the production of energy supplies;

(2) improve energy efficiency; and

(3) assist in the development and transfer of energy supply and efficiency technologies that would have a beneficial impact on world energy markets.

(c) PARTICIPATION BY INSTITUTIONS OF HIGHER EDUCATION.—To the extent practicable, the Secretary shall carry out the program under this section with the participation of institutions of higher education so as to take advantage of the acceptance of institutions of higher education by countries of the Western Hemisphere as sources of unbiased technical and policy expertise when assisting the Secretary in—

(1) evaluating new technologies;

(2) resolving technical issues;

(3) working with those countries in the development of new policies; and

(4) training policymakers, particularly in the case of institutions of higher education that involve the participation of minority students, such as—

(A) Hispanic-serving institutions; and

(B) part B institutions.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section—

(1) $10,000,000 for fiscal year 2007;

(2) $13,000,000 for fiscal year 2008; and

(3) $16,000,000 for fiscal year 2009.

SEC. 986. COOPERATION BETWEEN UNITED STATES AND ISRAEL.

(a) FINDINGS.—Congress finds that—

(1) on February 1, 1996, the United States and Israel signed the agreement entitled "Agreement between the Department of Energy of the United States of America and the Ministry of Energy and Infrastructure of Israel Concerning Energy Cooperation" (referred to in this section as the "Agreement"), to establish a framework for collaboration between the United States and Israel in energy research and development activities;

(2) the Agreement entered into force in February 2000;

(3) in February 2005, the Agreement was automatically renewed for 1 additional 5-year period pursuant to Article X of the Agreement; and

(4) under the Agreement, the United States and Israel may cooperate in energy research and development in a variety of alternative and advanced energy sectors.

(b) REPORT TO CONGRESS.—Not later than 90 days after the date of enactment of this Act, the Secretary shall submit to the Committee on Energy and Natural Resources and the Committee on Foreign Relations of the Senate and the Committee on Energy and Commerce and the Committee on International Relations of the House of Representatives a report that describes—

(1) the ways in which the United States and Israel have cooperated on energy research and development activities under the Agreement;

(2) projects initiated pursuant to the Agreement; and

(3) plans for future cooperation and joint projects under the Agreement.

(c) SENSE OF CONGRESS.—It is the sense of Congress that energy cooperation between the Governments of the United States and Israel is mutually beneficial in the development of energy technology.

42 USC 16342.

SEC. 986A. INTERNATIONAL ENERGY TRAINING.

(a) IN GENERAL.—The Secretary, in consultation with the Secretary of Commerce, the Secretary of the Interior, and Secretary of State, and the Federal Energy Regulatory Commission, shall coordinate training and outreach efforts for international commercial energy markets in countries with developing and restructuring economies.

(b) COMPONENTS.—The training and outreach efforts referred to in subsection (a) may include—

(1) production-related fiscal regimes;
(2) grid and network issues;
(3) energy user and demand side response;
(4) international trade of energy; and
(5) international transportation of energy.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $1,500,000 for each of fiscal years 2007 through 2010.

Subtitle I—Research Administration and Operations

42 USC 16351.

SEC. 987. AVAILABILITY OF FUNDS.

Funds authorized to be appropriated to the Department under this Act or an amendment made by this Act shall remain available until expended.

42 USC 16352.

SEC. 988. COST SHARING.

(a) APPLICABILITY.—Notwithstanding any other provision of law, in carrying out a research, development, demonstration, or commercial application program or activity that is initiated after the date of enactment of this section, the Secretary shall require cost-sharing in accordance with this section.

(b) RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—Except as provided in paragraphs (2) and (3) and subsection (f), the Secretary shall require not less than 20 percent of the cost of a research or development activity described in subsection (a) to be provided by a non-Federal source.

(2) EXCLUSION.—Paragraph (1) shall not apply to a research or development activity described in subsection (a) that is of a basic or fundamental nature, as determined by the appropriate officer of the Department.

(3) REDUCTION.—The Secretary may reduce or eliminate the requirement of paragraph (1) for a research and development activity of an applied nature if the Secretary determines that the reduction is necessary and appropriate.

(c) DEMONSTRATION AND COMMERCIAL APPLICATION.—

(1) IN GENERAL.—Except as provided in paragraph (2) and subsection (f), the Secretary shall require that not less than

50 percent of the cost of a demonstration or commercial application activity described in subsection (a) to be provided by a non-Federal source.

(2) REDUCTION OF NON-FEDERAL SHARE.—The Secretary may reduce the non-Federal share required under paragraph (1) if the Secretary determines the reduction to be necessary and appropriate, taking into consideration any technological risk relating to the activity.

(d) CALCULATION OF AMOUNT.—In calculating the amount of a non-Federal contribution under this section, the Secretary—

(1) may include allowable costs in accordance with the applicable cost principles, including—

(A) cash;

(B) personnel costs;

(C) the value of a service, other resource, or third party in-kind contribution determined in accordance with the applicable circular of the Office of Management and Budget;

(D) indirect costs or facilities and administrative costs; or

(E) any funds received under the power program of the Tennessee Valley Authority (except to the extent that such funds are made available under an annual appropriation Act); and

(2) shall not include—

(A) revenues or royalties from the prospective operation of an activity beyond the time considered in the award;

(B) proceeds from the prospective sale of an asset of an activity; or

(C) other appropriated Federal funds.

(e) REPAYMENT OF FEDERAL SHARE.—The Secretary shall not require repayment of the Federal share of a cost-shared activity under this section as a condition of making an award.

(f) EXCLUSIONS.—This section shall not apply to—

(1) a cooperative research and development agreement under the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.);

(2) a fee charged for the use of a Department facility; or

(3) an award under—

(A) the small business innovation research program under section 9 of the Small Business Act (15 U.S.C. 638); or

(B) the small business technology transfer program under that section.

SEC. 989. MERIT REVIEW OF PROPOSALS. 42 USC 16353.

(a) AWARDS.—Awards of funds authorized under this Act or an amendment made by this Act shall be made only after an impartial review of the scientific and technical merit of the proposals for the awards has been carried out by or for the Department.

(b) COMPETITION.—Competitive awards under this Act shall involve competitions open to all qualified entities within one or more of the following categories:

(1) Institutions of higher education.

(2) National Laboratories.

(3) Nonprofit and for-profit private entities.

(4) State and local governments.

(5) Consortia of entities described in paragraphs (1) through (4).

(c) SENSE OF CONGRESS.—It is the sense of Congress that research, development, demonstration, and commercial application activities carried out by the Department should be awarded using competitive procedures, to the maximum extent practicable.

42 USC 16354.

SEC. 990. EXTERNAL TECHNICAL REVIEW OF DEPARTMENTAL PROGRAMS.

(a) NATIONAL ENERGY RESEARCH AND DEVELOPMENT ADVISORY BOARDS.—

(1) ESTABLISHMENT.—The Secretary shall establish one or more advisory boards to review research, development, demonstration, and commercial application programs of the Department in energy efficiency, renewable energy, nuclear energy, and fossil energy.

(2) ALTERNATIVES.—The Secretary may—

(A) designate an existing advisory board within the Department to fulfill the responsibilities of an advisory board under this section; and

(B) enter into appropriate arrangements with the National Academy of Sciences to establish such an advisory board.

(b) USE OF EXISTING COMMITTEES.—The Secretary shall continue to use the scientific program advisory committees chartered under the Federal Advisory Committee Act (5 U.S.C. App.) by the Office of Science to oversee research and development programs under that Office.

(c) MEMBERSHIP.—Each advisory board under this section shall consist of persons with appropriate expertise representing a diverse range of interests.

(d) MEETINGS AND GOALS.—

(1) MEETINGS.—Each advisory board under this section shall meet at least semiannually to review and advise on the progress made by the respective one or more research, development, demonstration, and commercial application programs.

(2) GOALS.—The advisory board shall review the measurable cost and performance-based goals for the programs as established under section 902, and the progress on meeting the goals.

(e) PERIODIC REVIEWS AND ASSESSMENTS.—

(1) IN GENERAL.—The Secretary shall enter into appropriate arrangements with the National Academy of Sciences to conduct periodic reviews and assessments of—

(A) the research, development, demonstration, and commercial application programs authorized by this Act and amendments made by this Act;

(B) the measurable cost and performance-based goals for the programs as established under section 902, if any; and

(C) the progress on meeting the goals.

(2) TIMING.—The reviews and assessments shall be conducted every 5 years or more often as the Secretary considers necessary.

(3) REPORTS.—The Secretary shall submit to Congress reports describing the results of all the reviews and assessments.

SEC. 991. NATIONAL LABORATORY DESIGNATION. 42 USC 16355.

After the date of enactment of this Act, the Secretary shall not designate a facility that is not listed in section 2(3) as a National Laboratory.

SEC. 992. REPORT ON EQUAL EMPLOYMENT OPPORTUNITY PRACTICES. 42 USC 16356.

Not later than 12 months after the date of enactment of this Act, and biennially thereafter, the Secretary shall transmit to Congress a report on the equal employment opportunity practices at National Laboratories. Such report shall include—

(1) a thorough review of each National Laboratory contractor's equal employment opportunity policies, including promotion to management and professional positions and pay raises;

(2) a statistical report on complaints and their disposition in the National Laboratories;

(3) a description of how equal employment opportunity practices at the National Laboratories are treated in the contract and in calculating award fees for each contractor;

(4) a summary of disciplinary actions and their disposition by either the Department or the relevant contractors for each National Laboratory;

(5) a summary of outreach efforts to attract women and minorities to the National Laboratories;

(6) a summary of efforts to retain women and minorities in the National Laboratories; and

(7) a summary of collaboration efforts with the Office of Federal Contract Compliance Programs to improve equal employment opportunity practices at the National Laboratories.

SEC. 993. STRATEGY AND PLAN FOR SCIENCE AND ENERGY FACILITIES AND INFRASTRUCTURE. 42 USC 16357.

(a) FACILITY AND INFRASTRUCTURE POLICY.—

(1) IN GENERAL.—The Secretary shall develop and implement a strategy for facilities and infrastructure supported primarily from the Office of Science, the Office of Energy Efficiency and Renewable Energy, the Office of Fossil Energy, or the Office of Nuclear Energy, Science and Technology Programs at all National Laboratories and single-purpose research facilities.

(2) STRATEGY.—The strategy shall provide cost-effective means for—

(A) maintaining existing facilities and infrastructure;

(B) closing unneeded facilities;

(C) making facility modifications; and

(D) building new facilities.

(b) REPORT.—

(1) IN GENERAL.—The Secretary shall prepare and submit, along with the budget request of the President submitted to Congress for fiscal year 2008, a report describing the strategy developed under subsection (a).

(2) CONTENTS.—For each National Laboratory and single-purpose research facility that is primarily used for science and energy research, the report shall contain—

(A) the current priority list of proposed facilities and infrastructure projects, including cost and schedule requirements;

(B) a current 10-year plan that demonstrates the reconfiguration of its facilities and infrastructure to meet its missions and to address its long-term operational costs and return on investment;

(C) the total current budget for all facilities and infrastructure funding; and

(D) the current status of each facility and infrastructure project compared to the original baseline cost, schedule, and scope.

42 USC 16358.

SEC. 994. STRATEGIC RESEARCH PORTFOLIO ANALYSIS AND COORDINATION PLAN.

(a) IN GENERAL.—The Secretary shall periodically review all of the science and technology activities of the Department in a strategic framework that takes into account both the frontiers of science to which the Department can contribute and the national needs relevant to the Department's statutory missions.

(b) COORDINATION ANALYSIS AND PLAN.—As part of the review under subsection (a), the Secretary shall develop a coordination plan to improve coordination and collaboration in research, development, demonstration, and commercial application activities across Department organizational boundaries.

(c) PLAN CONTENTS.—The plan shall describe—

(1) cross-cutting scientific and technical issues and research questions that span more than one program or major office of the Department;

(2) how the applied technology programs of the Department are coordinating their activities, and addressing those questions;

(3) ways in which the technical interchange within the Department, particularly between the Office of Science and the applied technology programs, can be enhanced, including ways in which the research agendas of the Office of Science and the applied programs can interact and assist each other;

(4) a description of how the Secretary will ensure that the Department's overall research agenda include, in addition to fundamental, curiosity-driven research, fundamental research related to topics of concern to the applied programs, and applications in Departmental technology programs of research results generated by fundamental, curiosity-driven research.

Deadlines.

(d) PLAN TRANSMITTAL.—Not later than 12 months after the date of enactment of this Act, and every 4 years thereafter, the Secretary shall transmit to Congress the results of the review under subsection (a) and the coordination plan under subsection (b).

42 USC 16359.

SEC. 995. COMPETITIVE AWARD OF MANAGEMENT CONTRACTS.

None of the funds authorized to be appropriated to the Secretary by this title may be used to award a management and operating contract for a National Laboratory (excluding those named in subparagraphs (G), (H), (N), and (O) of section 2 (3)), unless

such contract is competitively awarded, or the Secretary grants, on a case-by-case basis, a waiver. The Secretary may not delegate the authority to grant such a waiver and shall submit to Congress a report notifying it of the waiver, and setting forth the reasons for the waiver, at least 60 days prior to the date of the award of such contract.

Reports.
Deadline.

SEC. 996. WESTERN MICHIGAN DEMONSTRATION PROJECT.

42 USC 16360.

The Administrator of the Environmental Protection Agency, in consultation with the State of Michigan and affected local officials, shall conduct a demonstration project to address the effect of transported ozone and ozone precursors in Southwestern Michigan. The demonstration program shall address projected non-attainment areas in Southwestern Michigan that include counties with design values for ozone of less than .095 based on years 2000 to 2002 or the most current 3-year period of air quality data. The Administrator shall assess any difficulties such areas may experience in meeting the 8-hour national ambient air quality standard for ozone due to the effect of transported ozone or ozone precursors into the areas. The Administrator shall work with State and local officials to determine the extent of ozone and ozone precursor transport, to assess alternatives to achieve compliance with the 8-hour standard apart from local controls, and to determine the timeframe in which such compliance could take place. The Administrator shall complete this demonstration project no later than 2 years after the date of enactment of this section and shall not impose any requirement or sanction under the Clean Air Act (42 U.S.C. 7401 et seq.) that might otherwise apply during the pendency of the demonstration project.

Deadline.

SEC. 997. ARCTIC ENGINEERING RESEARCH CENTER.

42 USC 16361.

(a) IN GENERAL.—The Secretary of Transportation, in consultation with the Secretary and the United States Arctic Research Commission, shall provide annual grants to a university located adjacent to the Arctic Energy Office of the Department of Energy, to establish and operate a university research center to be headquartered in Fairbanks and to be known as the "Arctic Engineering Research Center" (referred to in this section as the "Center").

Establishment.
Grants.

(b) PURPOSE.—The purpose of the Center shall be to conduct research on, and develop improved methods of, construction and use of materials to improve the overall performance of roads, bridges, residential, commercial, and industrial structures, and other infrastructure in the Arctic region, with an emphasis on developing—

(1) new construction techniques for roads, bridges, rail, and related transportation infrastructure and residential, commercial, and industrial infrastructure that are capable of withstanding the Arctic environment and using limited energy resources as efficiently as practicable;

(2) technologies and procedures for increasing road, bridge, rail, and related transportation infrastructure and residential, commercial, and industrial infrastructure safety, reliability, and integrity in the Arctic region;

(3) new materials and improving the performance and energy efficiency of existing materials for the construction of roads, bridges, rail, and related transportation infrastructure

and residential, commercial, and industrial infrastructure in the Arctic region; and

(4) recommendations for new local, regional, and State permitting and building codes to ensure transportation and building safety and efficient energy use when constructing, using, and occupying such infrastructure in the Arctic region.

(c) OBJECTIVES.—The Center shall carry out—

(1) basic and applied research in the subjects described in subsection (b), the products of which shall be judged by peers or other experts in the field to advance the body of knowledge in road, bridge, rail, and infrastructure engineering in the Arctic region; and

(2) an ongoing program of technology transfer that makes research results available to potential users in a form that can be implemented.

(d) AMOUNT OF GRANT.—For each of fiscal years 2006 through 2011, the Secretary shall provide a grant in the amount of $3,000,000 to the institution specified in subsection (a) to carry out this section.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $3,000,000 for each of fiscal years 2006 through 2011.

42 USC 16362.

SEC. 998. BARROW GEOPHYSICAL RESEARCH FACILITY.

(a) ESTABLISHMENT.—The Secretary of Commerce, in consultation with the Secretaries of Energy and the Interior, the Director of the National Science Foundation, and the Administrator of the Environmental Protection Agency, shall establish a joint research facility in Barrow, Alaska, to be known as the "Barrow Geophysical Research Facility", to support scientific research activities in the Arctic.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretaries of Commerce, Energy, and the Interior, the Director of the National Science Foundation, and the Administrator of the Environmental Protection Agency for the planning, design, construction, and support of the Barrow Geophysical Research Facility, $61,000,000.

Subtitle J—Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources

42 USC 16371.

SEC. 999A. PROGRAM AUTHORITY.

(a) IN GENERAL.—The Secretary shall carry out a program under this subtitle of research, development, demonstration, and commercial application of technologies for ultra-deepwater and unconventional natural gas and other petroleum resource exploration and production, including addressing the technology challenges for small producers, safe operations, and environmental mitigation (including reduction of greenhouse gas emissions and sequestration of carbon).

(b) PROGRAM ELEMENTS.—The program under this subtitle shall address the following areas, including improving safety and minimizing environmental impacts of activities within each area:

(1) Ultra-deepwater architecture and technology, including drilling to formations in the Outer Continental Shelf to depths greater than 15,000 feet.

(2) Unconventional natural gas and other petroleum resource exploration and production technology.

(3) The technology challenges of small producers.

(4) Complementary research performed by the National Energy Technology Laboratory for the Department.

(c) LIMITATION ON LOCATION OF FIELD ACTIVITIES.—Field activities under the program under this subtitle shall be carried out only—

(1) in—

(A) areas in the territorial waters of the United States not under any Outer Continental Shelf moratorium as of September 30, 2002;

(B) areas onshore in the United States on public land administered by the Secretary of the Interior available for oil and gas leasing, where consistent with applicable law and land use plans; and

(C) areas onshore in the United States on State or private land, subject to applicable law; and

(2) with the approval of the appropriate Federal or State land management agency or private land owner.

(d) ACTIVITIES AT THE NATIONAL ENERGY TECHNOLOGY LABORATORY.—The Secretary, through the National Energy Technology Laboratory, shall carry out a program of research and other activities complementary to and supportive of the research programs under subsection (b).

(e) CONSULTATION WITH SECRETARY OF THE INTERIOR.—In carrying out this subtitle, the Secretary shall consult regularly with the Secretary of the Interior.

SEC. 999B. ULTRA-DEEPWATER AND UNCONVENTIONAL ONSHORE NATURAL GAS AND OTHER PETROLEUM RESEARCH AND DEVELOPMENT PROGRAM. 42 USC 16372.

(a) IN GENERAL.—The Secretary shall carry out the activities under section 999A, to maximize the value of natural gas and other petroleum resources of the United States, by increasing the supply of such resources, through reducing the cost and increasing the efficiency of exploration for and production of such resources, while improving safety and minimizing environmental impacts.

(b) ROLE OF THE SECRETARY.—The Secretary shall have ultimate responsibility for, and oversight of, all aspects of the program under this section.

(c) ROLE OF THE PROGRAM CONSORTIUM.—

(1) IN GENERAL.—The Secretary shall contract with a corporation that is structured as a consortium to administer the programmatic activities outlined in this chapter. The program consortium shall—

(A) administer the program pursuant to subsection (f)(3), utilizing program administration funds only;

(B) issue research project solicitations upon approval of the Secretary or the Secretary's designee;

(C) make project awards to research performers upon approval of the Secretary or the Secretary's designee;

(D) disburse research funds to research performers awarded under subsection (f) as directed by the Secretary

in accordance with the annual plan under subsection (e); and

(E) carry out other activities assigned to the program consortium by this section.

(2) LIMITATION.—The Secretary may not assign any activities to the program consortium except as specifically authorized under this section.

(3) CONFLICT OF INTEREST.—

(A) PROCEDURES.—The Secretary shall establish procedures—

(i) to ensure that each board member, officer, or employee of the program consortium who is in a decisionmaking capacity under subsection (f)(3) shall disclose to the Secretary any financial interests in, or financial relationships with, applicants for or recipients of awards under this section, including those of his or her spouse or minor child, unless such relationships or interests would be considered to be remote or inconsequential; and

(ii) to require any board member, officer, or employee with a financial relationship or interest disclosed under clause (i) to recuse himself or herself from any oversight under subsection (f)(4) with respect to such applicant or recipient.

(B) FAILURE TO COMPLY.—The Secretary may disqualify an application or revoke an award under this section if a board member, officer, or employee has failed to comply with procedures required under subparagraph (A)(ii).

(d) SELECTION OF THE PROGRAM CONSORTIUM.—

(1) IN GENERAL.—The Secretary shall select the program consortium through an open, competitive process.

(2) MEMBERS.—The program consortium may include corporations, trade associations, institutions of higher education, National Laboratories, or other research institutions. After submitting a proposal under paragraph (4), the program consortium may not add members without the consent of the Secretary.

(3) REQUIREMENT OF SECTION 501(c)(3) STATUS.—The Secretary shall not select a consortium under this section unless such consortium is an organization described in section 501(c)(3) of the Internal Revenue Code of 1986 and exempt from tax under such section 501(a) of such Code.

Deadlines.

(4) SCHEDULE.—Not later than 90 days after the date of enactment of this Act, the Secretary shall solicit proposals from eligible consortia to perform the duties in subsection (c)(1), which shall be submitted not later than 180 days after the date of enactment of this Act. The Secretary shall select the program consortium not later than 270 days after such date of enactment.

(5) APPLICATION.—Applicants shall submit a proposal including such information as the Secretary may require. At a minimum, each proposal shall—

(A) list all members of the consortium;

(B) fully describe the structure of the consortium, including any provisions relating to intellectual property; and

(C) describe how the applicant would carry out the activities of the program consortium under this section.

(6) ELIGIBILITY.—To be eligible to be selected as the program consortium, an applicant must be an entity whose members have collectively demonstrated capabilities and experience in planning and managing research, development, demonstration, and commercial application programs for ultra-deepwater and unconventional natural gas or other petroleum exploration or production.

(7) FOCUS AREAS FOR AWARDS.—

(A) ULTRA-DEEPWATER RESOURCES.—Awards from allocations under section 999H(d)(1) shall focus on the development and demonstration of individual exploration and production technologies as well as integrated systems technologies including new architectures for production in ultra-deepwater.

(B) UNCONVENTIONAL RESOURCES.—Awards from allocations under section 999H(d)(2) shall focus on areas including advanced coalbed methane, deep drilling, natural gas production from tight sands, natural gas production from gas shales, stranded gas, innovative exploration and production techniques, enhanced recovery techniques, and environmental mitigation of unconventional natural gas and other petroleum resources exploration and production.

(C) SMALL PRODUCERS.—Awards from allocations under section 999H(d)(3) shall be made to consortia consisting of small producers or organized primarily for the benefit of small producers, and shall focus on areas including complex geology involving rapid changes in the type and quality of the oil and gas reservoirs across the reservoir; low reservoir pressure; unconventional natural gas reservoirs in coalbeds, deep reservoirs, tight sands, or shales; and unconventional oil reservoirs in tar sands and oil shales.

(e) ANNUAL PLAN.—

(1) IN GENERAL.—The program under this section shall be carried out pursuant to an annual plan prepared by the Secretary in accordance with paragraph (2).

(2) DEVELOPMENT.—

(A) SOLICITATION OF RECOMMENDATIONS.—Before drafting an annual plan under this subsection, the Secretary shall solicit specific written recommendations from the program consortium for each element to be addressed in the plan, including those described in paragraph (4). The program consortium shall submit its recommendations in the form of a draft annual plan.

(B) SUBMISSION OF RECOMMENDATIONS; OTHER COMMENT.—The Secretary shall submit the recommendations of the program consortium under subparagraph (A) to the Ultra-Deepwater Advisory Committee established under section 999D(a) and to the Unconventional Resources Technology Advisory Committee established under section 999D(b), and such Advisory Committees shall provide to the Secretary written comments by a date determined by the Secretary. The Secretary may also solicit comments from any other experts.

(C) CONSULTATION.—The Secretary shall consult regularly with the program consortium throughout the preparation of the annual plan.

Federal Register, publication.

(3) PUBLICATION.—The Secretary shall transmit to Congress and publish in the Federal Register the annual plan, along with any written comments received under paragraph (2)(A) and (B).

(4) CONTENTS.—The annual plan shall describe the ongoing and prospective activities of the program under this section and shall include—

(A) a list of any solicitations for awards to carry out research, development, demonstration, or commercial application activities, including the topics for such work, who would be eligible to apply, selection criteria, and the duration of awards; and

(B) a description of the activities expected of the program consortium to carry out subsection (f)(3).

Reports.

(5) ESTIMATES OF INCREASED ROYALTY RECEIPTS.—The Secretary, in consultation with the Secretary of the Interior, shall provide an annual report to Congress with the President's budget on the estimated cumulative increase in Federal royalty receipts (if any) resulting from the implementation of this subtitle. The initial report under this paragraph shall be submitted in the first President's budget following the completion of the first annual plan required under this subsection.

(f) AWARDS.—

(1) IN GENERAL.—Upon approval of the Secretary the program consortium shall make awards to research performers to carry out research, development, demonstration, and commercial application activities under the program under this section. The program consortium shall not be eligible to receive such awards, but provided that conflict of interest procedures in section 999B(c)(3) are followed, entities who are members of the program consortium are not precluded from receiving research awards as either individual research performers or as research performers who are members of a research collaboration.

(2) PROPOSALS.—Upon approval of the Secretary the program consortium shall solicit proposals for awards under this subsection in such manner and at such time as the Secretary may prescribe, in consultation with the program consortium.

(3) OVERSIGHT.—

(A) IN GENERAL.—The program consortium shall oversee the implementation of awards under this subsection, consistent with the annual plan under subsection (e), including disbursing funds and monitoring activities carried out under such awards for compliance with the terms and conditions of the awards.

(B) EFFECT.—Nothing in subparagraph (A) shall limit the authority or responsibility of the Secretary to oversee awards, or limit the authority of the Secretary to review or revoke awards.

(g) ADMINISTRATIVE COSTS.—

(1) IN GENERAL.—To compensate the program consortium for carrying out its activities under this section, the Secretary shall provide to the program consortium funds sufficient to administer the program. This compensation may include a

management fee consistent with Department of Energy contracting practices and procedures.

(2) ADVANCE.—The Secretary shall advance funds to the program consortium upon selection of the consortium, which shall be deducted from amounts to be provided under paragraph (1).

(h) AUDIT.—The Secretary shall retain an independent auditor, which shall include a review by the General Accountability Office, to determine the extent to which funds provided to the program consortium, and funds provided under awards made under subsection (f), have been expended in a manner consistent with the purposes and requirements of this subtitle. The auditor shall transmit a report (including any review by the General Accountability Office) annually to the Secretary, who shall transmit the report to Congress, along with a plan to remedy any deficiencies cited in the report. Reports.

(i) ACTIVITIES BY THE UNITED STATES GEOLOGICAL SURVEY.—The Secretary of the Interior, through the United States Geological Survey, shall, where appropriate, carry out programs of long-term research to complement the programs under this section.

(j) PROGRAM REVIEW AND OVERSIGHT.—The National Energy Technology Laboratory, on behalf of the Secretary, shall (1) issue a competitive solicitation for the program consortium, (2) evaluate, select, and award a contract or other agreement to a qualified program consortium, and (3) have primary review and oversight responsibility for the program consortium, including review and approval of research awards proposed to be made by the program consortium, to ensure that its activities are consistent with the purposes and requirements described in this subtitle. Up to 5 percent of program funds allocated under paragraphs (1) through (3) of section 999H(d) may be used for this purpose, including program direction and the establishment of a site office if determined to be necessary to carry out the purposes of this subsection. Contracts.

SEC. 999C. ADDITIONAL REQUIREMENTS FOR AWARDS. 42 USC 16373.

(a) DEMONSTRATION PROJECTS.—An application for an award under this subtitle for a demonstration project shall describe with specificity the intended commercial use of the technology to be demonstrated.

(b) FLEXIBILITY IN LOCATING DEMONSTRATION PROJECTS.—Subject to the limitation in section 999A(c), a demonstration project under this subtitle relating to an ultra-deepwater technology or an ultra-deepwater architecture may be conducted in deepwater depths.

(c) INTELLECTUAL PROPERTY AGREEMENTS.—If an award under this subtitle is made to a consortium (other than the program consortium), the consortium shall provide to the Secretary a signed contract agreed to by all members of the consortium describing the rights of each member to intellectual property used or developed under the award.

(d) TECHNOLOGY TRANSFER.—Two and one-half percent of the amount of each award made under this subtitle shall be designated for technology transfer and outreach activities under this subtitle.

(e) COST SHARING REDUCTION FOR INDEPENDENT PRODUCERS.—In applying the cost sharing requirements under section 988 to an award under this subtitle the Secretary may reduce or eliminate the non-Federal requirement if the Secretary determines that the

reduction is necessary and appropriate considering the technological risks involved in the project.

(f) INFORMATION SHARING.—All results of the research administered by the program consortium shall be made available to the public consistent with Department policy and practice on information sharing and intellectual property agreements.

42 USC 16374.

SEC. 999D. ADVISORY COMMITTEES.

(a) ULTRA-DEEPWATER ADVISORY COMMITTEE.—

Deadline.

(1) ESTABLISHMENT.—Not later than 270 days after the date of enactment of this Act, the Secretary shall establish an advisory committee to be known as the Ultra-Deepwater Advisory Committee.

(2) MEMBERSHIP.—The Advisory Committee under this subsection shall be composed of members appointed by the Secretary, including—

(A) individuals with extensive research experience or operational knowledge of offshore natural gas and other petroleum exploration and production;

(B) individuals broadly representative of the affected interests in ultra-deepwater natural gas and other petroleum production, including interests in environmental protection and safe operations;

(C) no individuals who are Federal employees; and

(D) no individuals who are board members, officers, or employees of the program consortium.

(3) DUTIES.—The Advisory Committee under this subsection shall—

(A) advise the Secretary on the development and implementation of programs under this subtitle related to ultra-deepwater natural gas and other petroleum resources; and

(B) carry out section 999B(e)(2)(B).

(4) COMPENSATION.—A member of the Advisory Committee under this subsection shall serve without compensation but shall receive travel expenses in accordance with applicable provisions under subchapter I of chapter 57 of title 5, United States Code.

(b) UNCONVENTIONAL RESOURCES TECHNOLOGY ADVISORY COMMITTEE.—

Deadline.

(1) ESTABLISHMENT.—Not later than 270 days after the date of enactment of this Act, the Secretary shall establish an advisory committee to be known as the Unconventional Resources Technology Advisory Committee.

(2) MEMBERSHIP.—The Secretary shall endeavor to have a balanced representation of members on the Advisory Committee to reflect the breadth of geographic areas of potential gas supply. The Advisory Committee under this subsection shall be composed of members appointed by the Secretary, including—

(A) a majority of members who are employees or representatives of independent producers of natural gas and other petroleum, including small producers;

(B) individuals with extensive research experience or operational knowledge of unconventional natural gas and other petroleum resource exploration and production;

(C) individuals broadly representative of the affected interests in unconventional natural gas and other petroleum resource exploration and production, including interests in environmental protection and safe operations;

(D) individuals with expertise in the various geographic areas of potential supply of unconventional onshore natural gas and other petroleum in the United States;

(E) no individuals who are Federal employees; and

(F) no individuals who are board members, officers, or employees of the program consortium.

(3) DUTIES.—The Advisory Committee under this subsection shall—

(A) advise the Secretary on the development and implementation of activities under this subtitle related to unconventional natural gas and other petroleum resources; and

(B) carry out section 999B(e)(2)(B).

(4) COMPENSATION.—A member of the Advisory Committee under this subsection shall serve without compensation but shall receive travel expenses in accordance with applicable provisions under subchapter I of chapter 57 of title 5, United States Code.

(c) PROHIBITION.—No advisory committee established under this section shall make recommendations on funding awards to particular consortia or other entities, or for specific projects.

SEC. 999E. LIMITS ON PARTICIPATION. 42 USC 16375.

An entity shall be eligible to receive an award under this subtitle only if the Secretary finds—

(1) that the entity's participation in the program under this subtitle would be in the economic interest of the United States; and

(2) that either—

(A) the entity is a United States-owned entity organized under the laws of the United States; or

(B) the entity is organized under the laws of the United States and has a parent entity organized under the laws of a country that affords—

(i) to United States-owned entities opportunities, comparable to those afforded to any other entity, to participate in any cooperative research venture similar to those authorized under this subtitle;

(ii) to United States-owned entities local investment opportunities comparable to those afforded to any other entity; and

(iii) adequate and effective protection for the intellectual property rights of United States-owned entities.

SEC. 999F. SUNSET. 42 USC 16376.

The authority provided by this subtitle shall terminate on September 30, 2014.

SEC. 999G. DEFINITIONS. 42 USC 16377.

In this subtitle:

(1) DEEPWATER.—The term "deepwater" means a water depth that is greater than 200 but less than 1,500 meters.

(2) INDEPENDENT PRODUCER OF OIL OR GAS.—

(A) IN GENERAL.—The term "independent producer of oil or gas" means any person that produces oil or gas other than a person to whom subsection (c) of section 613A of the Internal Revenue Code of 1986 does not apply by reason of paragraph (2) (relating to certain retailers) or paragraph (4) (relating to certain refiners) of section 613A(d) of such Code.

(B) RULES FOR APPLYING PARAGRAPHS (2) AND (4) OF SECTION 613A(d).—For purposes of subparagraph (A), paragraphs (2) and (4) of section 613A(d) of the Internal Revenue Code of 1986 shall be applied by substituting "calendar year" for "taxable year" each place it appears in such paragraphs.

(3) PROGRAM ADMINISTRATION FUNDS.—The term "program administration funds" means funds used by the program consortium to administer the program under this subtitle, but not to exceed 10 percent of the total funds allocated under paragraphs (1) through (3) of section 999H(d).

(4) PROGRAM CONSORTIUM.—The term "program consortium" means the consortium selected under section 999B(d).

(5) PROGRAM RESEARCH FUNDS.—The term "program research funds" means funds awarded to research performers by the program consortium consistent with the annual plan.

(6) REMOTE OR INCONSEQUENTIAL.—The term "remote or inconsequential" has the meaning given that term in regulations issued by the Office of Government Ethics under section 208(b)(2) of title 18, United States Code.

(7) SMALL PRODUCER.—The term "small producer" means an entity organized under the laws of the United States with production levels of less than 1,000 barrels per day of oil equivalent.

(8) ULTRA-DEEPWATER.—The term "ultra-deepwater" means a water depth that is equal to or greater than 1,500 meters.

(9) ULTRA-DEEPWATER ARCHITECTURE.—The term "ultra-deepwater architecture" means the integration of technologies for the exploration for, or production of, natural gas or other petroleum resources located at ultra-deepwater depths.

(10) ULTRA-DEEPWATER TECHNOLOGY.—The term "ultra-deepwater technology" means a discrete technology that is specially suited to address one or more challenges associated with the exploration for, or production of, natural gas or other petroleum resources located at ultra-deepwater depths.

(11) UNCONVENTIONAL NATURAL GAS AND OTHER PETROLEUM RESOURCE.—The term "unconventional natural gas and other petroleum resource" means natural gas and other petroleum resource located onshore in an economically inaccessible geological formation, including resources of small producers.

42 USC 16378.

SEC. 999H. FUNDING.

(a) OIL AND GAS LEASE INCOME.—For each of fiscal years 2007 through 2017, from any Federal royalties, rents, and bonuses derived from Federal onshore and offshore oil and gas leases issued under the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.) and the Mineral Leasing Act (30 U.S.C. 181 et seq.) which are deposited in the Treasury, and after distribution of any such funds as described in subsection (c), $50,000,000 shall be deposited into the Ultra-Deepwater and Unconventional Natural Gas and

Other Petroleum Research Fund (in this section referred to as the "Fund"). For purposes of this section, the term "royalties" excludes proceeds from the sale of royalty production taken in kind and royalty production that is transferred under section 27(a)(3) of the Outer Continental Shelf Lands Act (43 U.S.C. 1353(a)(3)).

(b) OBLIGATIONAL AUTHORITY.—Monies in the Fund shall be available to the Secretary for obligation under this part without fiscal year limitation, to remain available until expended.

(c) PRIOR DISTRIBUTIONS.—The distributions described in subsection (a) are those required by law—

(1) to States and to the Reclamation Fund under the Mineral Leasing Act (30 U.S.C. 191(a)); and

(2) to other funds receiving monies from Federal oil and gas leasing programs, including—

(A) any recipients pursuant to section 8(g) of the Outer Continental Shelf Lands Act (43 U.S.C. 1337(g));

(B) the Land and Water Conservation Fund, pursuant to section 2(c) of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601–5(c));

(C) the Historic Preservation Fund, pursuant to section 108 of the National Historic Preservation Act (16 U.S.C. 470h); and

(D) the coastal impact assistance program established under section 31 of the Outer Continental Shelf Lands Act (as amended by section 384).

(d) ALLOCATION.—Amounts obligated from the Fund under subsection (a)(1) in each fiscal year shall be allocated as follows:

(1) 35 percent shall be for activities under section 999A(b)(1).

(2) 32.5 percent shall be for activities under section 999A(b)(2).

(3) 7.5 percent shall be for activities under section 999A(b)(3).

(4) 25 percent shall be for complementary research under section 999A(b)(4) and other activities under section 999A(b) to include program direction funds, overall program oversight, contract management, and the establishment and operation of a technical committee to ensure that in-house research activities funded under section 999A(b)(4) are technically complementary to, and not duplicative of, research conducted under paragraphs (1), (2), and (3) of section 999A(b).

(e) AUTHORIZATION OF APPROPRIATIONS.—In addition to other amounts that are made available to carry out this section, there is authorized to be appropriated to carry out this section $100,000,000 for each of fiscal years 2007 through 2016.

(f) FUND.—There is hereby established in the Treasury of the United States a separate fund to be known as the "Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund".

TITLE X—DEPARTMENT OF ENERGY MANAGEMENT

42 USC 16391.

SEC. 1001. IMPROVED TECHNOLOGY TRANSFER OF ENERGY TECHNOLOGIES.

Establishment.

(a) TECHNOLOGY TRANSFER COORDINATOR.—The Secretary shall appoint a Technology Transfer Coordinator to be the principal advisor to the Secretary on all matters relating to technology transfer and commercialization.

(b) QUALIFICATIONS.—The Coordinator shall be an individual who, by reason of professional background and experience, is specially qualified to advise the Secretary on matters pertaining to technology transfer at the Department.

(c) DUTIES OF THE COORDINATOR.—The Coordinator shall oversee—

(1) the activities of the Technology Transfer Working Group established under subsection (d);

(2) the expenditure of funds allocated for technology transfer within the Department;

(3) the activities of each technology partnership ombudsman appointed under section 11 of the Technology Transfer Commercialization Act of 2000 (42 U.S.C. 7261c); and

(4) efforts to engage private sector entities, including venture capital companies.

Establishment.

(d) TECHNOLOGY TRANSFER WORKING GROUP.—The Secretary shall establish a Technology Transfer Working Group, which shall consist of representatives of the National Laboratories and single-purpose research facilities, to—

(1) coordinate technology transfer activities occurring at National Laboratories and single-purpose research facilities;

(2) exchange information about technology transfer practices, including alternative approaches to resolution of disputes involving intellectual property rights and other technology transfer matters; and

(3) develop and disseminate to the public and prospective technology partners information about opportunities and procedures for technology transfer with the Department, including opportunities and procedures related to alternative approaches to resolution of disputes involving intellectual property rights and other technology transfer matters.

(e) TECHNOLOGY COMMERCIALIZATION FUND.—The Secretary shall establish an Energy Technology Commercialization Fund, using 0.9 percent of the amount made available to the Department for applied energy research, development, demonstration, and commercial application for each fiscal year, to be used to provide matching funds with private partners to promote promising energy technologies for commercial purposes.

(f) TECHNOLOGY TRANSFER RESPONSIBILITY.—Nothing in this section affects the technology transfer responsibilities of Federal employees under the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.).

(g) PLANNING AND REPORTING.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to Congress a technology transfer execution plan.

(2) UPDATES.—Each year after the submission of the plan under paragraph (1), the Secretary shall submit to Congress an updated execution plan and reports that describe progress toward meeting goals set forth in the execution plan and the funds expended under subsection (e).

SEC. 1002. TECHNOLOGY INFRASTRUCTURE PROGRAM. 42 USC 16392.

(a) DEFINITIONS.—In this section:

(1) PROGRAM.—The term "Program" means the Technology Infrastructure Program established under subsection (b).

(2) TECHNOLOGY CLUSTER.—The term "technology cluster" means a concentration of technology-related business concerns, institutions of higher education, or nonprofit institutions, that reinforce each other's performance in the areas of technology development through formal or informal relationships.

(3) TECHNOLOGY-RELATED BUSINESS CONCERN.—The term "technology-related business concern" means a for-profit corporation, company, association, firm, partnership, or small business concern that—

(A) conducts scientific or engineering research;

(B) develops new technologies;

(C) manufactures products based on new technologies; or

(D) performs technological services.

(b) ESTABLISHMENT.—The Secretary shall establish a Technology Infrastructure Program in accordance with this section.

(c) PURPOSE.—The purpose of the Program shall be to improve the ability of National Laboratories and single-purpose research facilities to support departmental missions by—

(1) stimulating the development of technology clusters that can support departmental missions at the National Laboratories or single-purpose research facilities;

(2) improving the ability of National Laboratories and single-purpose research facilities to leverage and benefit from commercial research, technology, products, processes, and services; and

(3) encouraging the exchange of scientific and technological expertise between—

(A) National Laboratories or single-purpose research facilities; and

(B) entities that can support departmental missions at the National Laboratories or single-purpose research facilities, such as—

(i) institutions of higher education;

(ii) technology-related business concerns;

(iii) nonprofit institutions; and

(iv) agencies of State, tribal, or local governments.

(d) PROJECTS.—The Secretary shall authorize the director of each National Laboratory or single-purpose research facility to implement the Program at the National Laboratory or facility through one or more projects that meet the requirements of subsections (e) and (f).

(e) PROGRAM REQUIREMENTS.—

(1) IN GENERAL.—Each project funded under this section shall meet the requirements of this subsection.

(2) ENTITIES.—Each project shall include at least one of each of the following entities:

(A) A business.

(B) An institution of higher education.

(C) A nonprofit institution.

(D) An agency of a State, local, or tribal government.

(3) COST-SHARING.—

(A) IN GENERAL.—The costs of carrying out projects under this section shall be shared in accordance with section 988.

(B) SOURCES.—The calculation of costs paid by the non-Federal sources for a project shall include cash, personnel, services, equipment, and other resources expended on the project after the commencement of the project.

(C) RESEARCH AND DEVELOPMENT EXPENSES.—Independent research and development expenses of Government contractors that qualify for reimbursement under section 31.205–18(e) of title 48, Code of Federal Regulations, issued pursuant to section 25(c)(1) of the Office of Federal Procurement Policy Act (41 U.S.C. 421(c)(1)), may be credited towards costs paid by non-Federal sources to a project, if the expenses meet the other requirements of this section.

(4) COMPETITIVE SELECTION.—A project under this section shall be competitively selected using procedures determined by the Secretary.

(5) ACCOUNTING.—Any participant that receives funds under this section may use generally accepted accounting principles for maintaining accounts, books, and records relating to the project.

(6) DURATION.—No Federal funds shall be made available under this section for a construction project or for any project with a duration of more than 5 years.

(f) SELECTION CRITERIA.—

(1) DEPARTMENTAL MISSIONS.—The Secretary shall allocate funds under this section only if the Director of the National Laboratory or single-purpose research facility managing the project determines that the project is likely to improve the ability of the National Laboratory or single-purpose research facility to achieve technical success in meeting departmental missions.

(2) OTHER CRITERIA.—In selecting a project to receive Federal funds, the Secretary shall consider—

(A) the potential of the project to promote the development of a commercially sustainable technology cluster following the period of investment by the Department, which will derive most of the demand for its products or services from the private sector, and which will support departmental missions at the participating National Laboratory or single-purpose research facility;

(B) the potential of the project to promote the use of commercial research, technology, products, processes, and services by the participating National Laboratory or single-purpose research facility to achieve its mission or the commercial development of technological innovations made at the participating National Laboratory or single-purpose research facility;

(C) the extent to which the project involves a wide variety and number of institutions of higher education,

nonprofit institutions, and technology-related business concerns that can support the missions of the participating National Laboratory or single-purpose research facility and that will make substantive contributions to achieving the goals of the project;

(D) the extent to which the project focuses on promoting the development of technology-related business concerns that are small businesses or involves such small businesses substantively in the project; and

(E) such other criteria as the Secretary determines to be appropriate.

(g) ALLOCATION.—In allocating funds for projects approved under this section, the Secretary shall provide—

(1) the Federal share of the project costs; and

(2) additional funds to the National Laboratory or single-purpose research facility managing the project to permit the National Laboratory or single-purpose research facility to carry out activities relating to the project, and to coordinate the activities with the project.

(h) REPORT TO CONGRESS.—Not later than July 1, 2008, the Secretary shall submit to Congress a report on whether the Program should be continued and, if so, how the program should be managed.

(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for activities under this section $10,000,000 for each of fiscal years 2006 through 2008.

SEC. 1003. SMALL BUSINESS ADVOCACY AND ASSISTANCE. 42 USC 16393.

(a) SMALL BUSINESS ADVOCATE.—The Secretary shall require the Director of each National Laboratory, and may require the Director of a single-purpose research facility, to designate a small business advocate to—

(1) increase the participation of small business concerns, including socially and economically disadvantaged small business concerns (as defined in section 8(a)(4) of the Small Business Act (15 U.S.C. 637(a)(4))), in procurement, collaborative research, technology licensing, and technology transfer activities conducted by the National Laboratory or single-purpose research facility;

(2) report to the Director of the National Laboratory or single-purpose research facility on the actual participation of small business concerns in procurement and collaborative research along with recommendations, if appropriate, on how to improve participation; Reports.

(3) make available to small business concerns training, mentoring, and information on how to participate in procurement and collaborative research activities;

(4) increase the awareness inside the National Laboratory or single-purpose research facility of the capabilities and opportunities presented by small business concerns; and

(5) establish guidelines for the program under subsection (b) and report on the effectiveness of the program to the Director of the National Laboratory or single-purpose research facility. Guidelines. Reports.

(b) ESTABLISHMENT OF SMALL BUSINESS ASSISTANCE PROGRAM.—The Secretary shall require the Director of each National Laboratory, and may require the Director of a single-purpose

research facility, to establish a program to provide small business concerns with—

(1) assistance directed at making the small business concerns more effective and efficient subcontractors or suppliers to the National Laboratory or single-purpose research facilities; or

(2) general technical assistance, the cost of which shall not exceed $10,000 per instance of assistance, to improve the products or services of the small business concern.

(c) USE OF FUNDS.—None of the funds expended under subsection (b) may be used for direct grants to small business concerns.

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary for activities under this section $5,000,000 for each of fiscal years 2006 through 2008.

42 USC 16394.

SEC. 1004. OUTREACH.

The Secretary shall ensure that each program authorized by this Act or an amendment made by this Act includes an outreach component to provide information, as appropriate, to manufacturers, consumers, engineers, architects, builders, energy service companies, institutions of higher education, facility planners and managers, State and local governments, and other entities.

Applicability.
42 USC 16395.

SEC. 1005. RELATIONSHIP TO OTHER LAWS.

Except as otherwise provided in this Act or an amendment made by this Act, the Secretary shall carry out the research, development, demonstration, and commercial application programs, projects, and activities authorized by this Act or an amendment made by this Act in accordance with the applicable provisions of—

(1) the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.);

(2) the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5901 et seq.);

(3) the Energy Policy Act of 1992 (42 U.S.C. 13201 et seq.);

(4) the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.);

(5) chapter 18 of title 35, United States Code (commonly known as the "Bayh-Dole Act"); and

(6) any other Act under which the Secretary is authorized to carry out the programs, projects, and activities.

Government organization and employees.

SEC. 1006. IMPROVED COORDINATION AND MANAGEMENT OF CIVILIAN SCIENCE AND TECHNOLOGY PROGRAMS.

(a) EFFECTIVE TOP-LEVEL COORDINATION OF RESEARCH AND DEVELOPMENT PROGRAMS.—Section 202 of the Department of Energy Organization Act (42 U.S.C. 7132) is amended by striking subsection (b) and inserting the following:

President.

"(b)(1) There shall be in the Department an Under Secretary for Science, who shall be appointed by the President, by and with the advice and consent of the Senate.

"(2) The Under Secretary shall be compensated at the rate provided for level III of the Executive Schedule under section 5314 of title 5, United States Code.

"(3) The Under Secretary for Science shall be appointed from among persons who—

"(A) have extensive background in scientific or engineering fields; and

"(B) are well qualified to manage the civilian research and development programs of the Department.

"(4) The Under Secretary for Science shall—

"(A) serve as the Science and Technology Advisor to the Secretary;

"(B) monitor the research and development programs of the Department in order to advise the Secretary with respect to any undesirable duplication or gaps in the programs;

"(C) advise the Secretary with respect to the well-being and management of the multipurpose laboratories under the jurisdiction of the Department;

"(D) advise the Secretary with respect to education and training activities required for effective short- and long-term basic and applied research activities of the Department;

"(E) advise the Secretary with respect to grants and other forms of financial assistance required for effective short- and long-term basic and applied research activities of the Department;

"(F) advise the Secretary with respect to long-term planning, coordination, and development of a strategic framework for Department research and development activities; and

"(G) carry out such additional duties assigned to the Under Secretary by the Secretary relating to basic and applied research, including supervision or support of research activities carried out by any of the Assistant Secretaries designated by section 203 of this Act, as the Secretary considers advantageous.".

(b) ADDITIONAL ASSISTANT SECRETARY POSITION.—

(1) IN GENERAL.—Section 203(a) of the Department of Energy Organization Act (42 U.S.C. 7133(a)) is amended in the first sentence by striking "six Assistant Secretaries" and inserting "7 Assistant Secretaries".

(2) ASSISTANT SECRETARY LEVEL.—It is the sense of Congress that the leadership for departmental missions in nuclear energy should be at the Assistant Secretary level.

(c) TECHNICAL AND CONFORMING AMENDMENTS.—

(1) Section 202 of the Department of Energy Organization Act (42 U.S.C. 7132) is amended by adding at the end the following:

"(d)(1) There shall be in the Department an Under Secretary, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall perform such functions and duties as the Secretary shall prescribe, consistent with this section. President.

"(2) The Under Secretary shall be compensated at the rate provided for level III of the Executive Schedule under section 5314 of title 5, United States Code.

"(e)(1) There shall be in the Department a General Counsel, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall perform such functions and duties as the Secretary shall prescribe. President.

"(2) The General Counsel shall be compensated at the rate provided for level IV of the Executive Schedule under section 5315 of title 5, United States Code.".

(2) Section 5314 of title 5, United States Code, is amended by striking "Under Secretaries of Energy (2)" and inserting "Under Secretaries of Energy (3)".

(3) Section 5315 of title 5, United States Code, is amended by striking "Assistant Secretaries of Energy (6)" and inserting "Assistant Secretaries of Energy (7)".

(4) Section 209(b) of the Department of Energy Organization Act (42 U.S.C. 7139(b)) is amended by striking paragraph (6) and inserting the following:

"(6) to carry out such additional duties assigned to the Office by the Secretary.".

SEC. 1007. OTHER TRANSACTIONS AUTHORITY.

Section 646 of the Department of Energy Organization Act (42 U.S.C. 7256) is amended by adding at the end the following:

"(g)(1) In addition to authority granted to the Secretary under any other provision of law, the Secretary may exercise the same authority to enter into transactions (other than contracts, cooperative agreements, and grants), subject to the same terms and conditions as the Secretary of Defense under section 2371 of title 10, United States Code (other than subsections (b) and (f) of that section).

"(2) In applying section 2371 of title 10, United States Code, to the Secretary under paragraph (1)—

"(A) the term 'basic' shall be replaced by the term 'research';

"(B) the term 'applied' shall be replaced by the term 'development'; and

"(C) the terms 'advanced research projects' and 'advanced research' shall be replaced by the term 'demonstration projects'.

"(3) The authority of the Secretary under paragraph (1) shall not be subject to—

"(A) section 9 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5908); or

"(B) section 152 of the Atomic Energy Act of 1954 (42 U.S.C. 2182).

"(4)(A) The Secretary shall use such competitive, merit-based selection procedures in entering into transactions under paragraph (1), as the Secretary determines in writing to be practicable.

"(B) A transaction under paragraph (1) shall relate to a research, development, or demonstration project only if the Secretary determines in writing that the use of a standard contract, grant, or cooperative agreement for the project is not feasible or appropriate.

"(5) The Secretary may protect from disclosure, for up to 5 years after the date on which the information is developed, any information developed pursuant to a transaction under paragraph (1) that would be protected from disclosure under section 552(b)(4) of title 5, United States Code, if obtained from a person other than a Federal agency.

Deadline. Guidelines.

"(6)(A) Not later than 90 days after the date of enactment of this subsection, the Secretary shall issue guidelines for transactions under paragraph (1).

Federal Register, publication.

"(B) The guidelines shall be published in the Federal Register for public comment in accordance with rulemaking procedures of the Department.

"(C) The Secretary shall not have authority to carry out transactions under paragraph (1) until the guidelines for transactions required under subparagraph (A) are final.

"(7) The annual report of the head of an executive agency under section 2371(h) of title 10, United States Code, shall be submitted to Congress. Reports.

"(8)(A) In this paragraph, the term 'nontraditional Government contractor' has the meaning given the term 'nontraditional defense contractor' in section 845(f) of the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103–160; 10 U.S.C. 2371 note).

"(B) Not later than 1 year after the date on which the final guidelines are published under paragraph (6), the Comptroller General of the United States shall submit to Congress a report describing— Deadline. Reports.

"(i) the use by the Department of authorities under this section, including the ability to attract nontraditional Government contractors; and

"(ii) whether additional safeguards are necessary to carry out the authorities.

"(9) The authority of the Secretary under this subsection may be delegated only to an officer of the Department who is appointed by the President by and with the advice and consent of the Senate.

"(10) Notwithstanding any other provision of law, the authority to enter into transactions under paragraph (1) shall terminate on September 30, 2010.". Termination date.

SEC. 1008. PRIZES FOR ACHIEVEMENT IN GRAND CHALLENGES OF SCIENCE AND TECHNOLOGY. 42 USC 16396.

(a) AUTHORITY.—The Secretary may carry out a program to award cash prizes in recognition of breakthrough achievements in research, development, demonstration, and commercial application that have the potential for application to the performance of the mission of the Department.

(b) COMPETITION REQUIREMENTS.—The program under subsection (a) may include prizes for the achievement of goals articulated by the Secretary in a specific area through a widely advertised solicitation of submission of results for research, development, demonstration, or commercial application projects.

(c) PRIZES FOR PROCESSES AND TECHNOLOGIES TO REDUCE DEPENDENCE ON IMPORTED OIL.—The Secretary, in cooperation with the Freedom Prize Foundation, shall support a program of awarding prizes, to be known as Freedom Prizes, to encourage and recognize the development and deployment of processes and technologies that serve to reduce the dependence of the United States on imported oil.

(d) RELATIONSHIP TO OTHER AUTHORITY.—The program under subsection (a) may be carried out in conjunction with or in addition to the exercise of any other authority of the Secretary to acquire, support, or stimulate research, development, demonstration, or commercial application projects.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated—

(1) $10,000,000 to carry out the program under subsection (a); and

(2) $5,000,000 to carry out the program under subsection (c).

SEC. 1009. TECHNICAL CORRECTIONS.

(a) COAL RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—Public Law 86–599 (30 U.S.C. 661 et seq.) is amended—

(A) by striking the first section (30 U.S.C. 661) and inserting the following:

"SEC. 1. (a) This Act may be cited as the 'Coal Research and Development Act of 1960'.

"(b) In this Act:

"(1) The term 'research' means scientific, technical, and economic research and the practical application of that research.

"(2) The term 'Secretary' means the Secretary of Energy.";

(B) in section 2 (30 U.S.C. 662), by striking "shall establish within" and all that follows through "such Office";

(C) by striking sections 3, 4, and 7 (30 U.S.C. 663, 664, 667); and

(D) by redesignating sections 5, 6, and 8 (30 U.S.C. 665, 666, 668) as sections 3, 4, and 5, respectively.

(2) PATENTS.—Section 210(a)(8) of title 35, United States Code, is amended by striking "Coal Research Development Act of 1960" and inserting "Coal Research and Development Act of 1960".

(b) NONNUCLEAR ENERGY RESEARCH AND DEVELOPMENT.—

(1) SHORT TITLE; DEFINITIONS.—Section 1 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5902) is amended to read as follows:

"SHORT TITLE AND DEFINITIONS

42 USC 5901 note.

"SEC. 1. (a) This Act may be cited as the 'Federal Nonnuclear Energy Research and Development Act of 1974'.

"(b) In this Act:

"(1) The term 'Department' means the Department of Energy.

"(2) The term 'Secretary' means the Secretary of Energy.".

(2) STATEMENT OF POLICY.—Section 3(b) of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5902(b)) is amended—

(A) in paragraph (1), by striking "Energy Research and Development Administration" and inserting "Department";

(B) in paragraph (2), by striking "Administrator of the Energy Research and Development Administration (hereinafter in this Act referred to as the 'Administrator')" and inserting "Secretary"; and

(C) in paragraph (3)—

(i) by striking "Administrator" and inserting "Secretary"; and

(ii) by inserting "Demonstration" after "Cooling".

(3) DUTIES AND AUTHORITIES.—Section 4 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5903) is amended—

(A) by striking the section heading and inserting the following: "DUTIES AND AUTHORITIES OF THE SECRETARY"; and

(B) in the matter preceding subsection (a), by striking "Administrator" and inserting "Secretary".

(4) COMPREHENSIVE PLANNING AND PROGRAMMING.—Section 6 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5905) is amended—

(A) by striking "Administrator" each place it appears and inserting "Secretary"; and

(B) in subsection (b)(3)—

(i) in subparagraph (I), by inserting "Demonstration" after "Cooling"; and

(ii) in subparagraph (L), by inserting "Energy" after "Solar".

(5) FORMS OF FEDERAL ASSISTANCE.—Section 7 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5906) is amended—

(A) by striking "Administrator" each place it appears and inserting "Secretary"; and

(B) in subsection (a)(4), by striking "of the section".

(6) DEMONSTRATIONS.—Section 8 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5907) is amended—

(A) in subsections (a) through (c), by striking "Administrator" each place it appears and inserting "Secretary";

(B) in subsection (d)—

(i) in the first sentence of paragraph (1), by inserting "of the Energy Research and Development Administration" after "Administrator"; and

(ii) in paragraph (3), by striking "Administrator" and inserting "Secretary"; and

(C) in subsection (f)—

(i) by striking "Administrator" each place it appears and inserting "Secretary"; and

(ii) in the proviso of the first sentence, by striking "Administrator's" and inserting "Secretary's".

(7) PATENT POLICY.—Section 9 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5908) is amended—

(A) by striking "Administration" each place it appears and inserting "Department";

(B) by striking "Administrator" each place it appears and inserting "Secretary"; and

(C) in subsection (c)(3), by striking "Administration's" and inserting "Department's".

(8) ACQUISITION OF ESSENTIAL MATERIALS.—Section 12 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5911) is amended by striking subsection (b) and inserting the following:

"(b) A rule or order under subsection (a) shall be considered to be a major rule subject to chapter 8 of title 5, United States Code.".

(9) WATER RESOURCE EVALUATION.—Section 13 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5912) is amended by striking "Administrator" each place it appears and inserting "Secretary".

(10) AUTHORIZATION OF APPROPRIATIONS.—Section 16 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5915) is amended—

(A) by striking the section heading and inserting the following: "AUTHORIZATION OF APPROPRIATIONS";

(B) by striking "(a) There may be appropriated to the Administrator" and inserting "There may be appropriated to the Secretary"; and

(C) by striking subsections (b) and (c).

(11) CENTRAL SOURCE OF NONNUCLEAR ENERGY INFORMATION.—Section 17 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5916) is amended—

(A) by striking "Administrator" each place it appears and inserting "Secretary";

(B) in the first sentence, by striking "Administrator's";

(C) in the second sentence, by striking "he" and inserting "the Secretary";

(D) in the third sentence—

(i) in paragraph (2) of the first proviso, by striking "section 1905 or title 18" and inserting "section 1905 of title 18"; and

(ii) in subparagraph (B) of the second proviso—

(I) by striking "the Federal Energy Administration,";

(II) by striking "the Federal Power Commission," and inserting "the Federal Energy Regulatory Commission"; and

(III) by striking "General Accounting Office" and inserting "Government Accountability Office"; and

(E) in the last sentence, by inserting "or ranking minority member" after "chairman".

(12) ENERGY INFORMATION, LOAN GUARANTEES, AND FINANCIAL SUPPORT.—Sections 18 through 20 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5917 through 5920) are repealed.

(c) STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT OF 1980.—Section 20 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3712) is amended by striking "and the National Science Foundation" and inserting ", the Secretary of Energy, and the Director of the National Science Foundation".

Deadline. Reports.

SEC. 1010. UNIVERSITY COLLABORATION.

Not later than 2 years after the date of enactment of this Act, the Secretary shall transmit to the Congress a report that examines the feasibility of promoting collaborations between major universities and other colleges and universities in grants, contracts, and cooperative agreements made by the Secretary for energy projects. For purposes of this section, major universities are schools listed by the Carnegie Foundation as Doctoral Research Extensive Universities. The Secretary shall also consider providing incentives to increase the inclusion of small institutions of higher education, including minority-serving institutions, in energy grants, contracts, and cooperative agreements.

SEC. 1011. SENSE OF CONGRESS.

It is the sense of Congress that—

(1) the Secretary should develop and implement more stringent procurement and inventory controls, including controls on the purchase card program, to prevent waste, fraud, and abuse of taxpayer funds by employees and contractors of the Department; and

(2) the Department's Inspector General should continue to closely review purchase card purchases and other procurement and inventory practices at the Department.

TITLE XI—PERSONNEL AND TRAINING

SEC. 1101. WORKFORCE TRENDS AND TRAINEESHIP GRANTS. 42 USC 16411.

(a) DEFINITIONS.—In this section:

(1) ENERGY TECHNOLOGY INDUSTRY.—The term "energy technology industry" includes—

(A) a renewable energy industry;

(B) a company that develops or commercializes a device to increase energy efficiency;

(C) the oil and gas industry;

(D) the nuclear power industry;

(E) the coal industry;

(F) the electric utility industry; and

(G) any other industrial sector, as the Secretary determines to be appropriate.

(2) SKILLED TECHNICAL PERSONNEL.—The term "skilled technical personnel" means—

(A) journey- and apprentice-level workers who are enrolled in, or have completed, a federally-recognized or State-recognized apprenticeship program; and

(B) other skilled workers in energy technology industries, as determined by the Secretary.

(b) WORKFORCE TRENDS.—

(1) MONITORING.—The Secretary, in consultation with, and using data collected by, the Secretary of Labor, shall monitor trends in the workforce of—

(A) skilled technical personnel that support energy technology industries; and

(B) electric power and transmission engineers.

(2) REPORT ON TRENDS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report on current trends under paragraph (1), with recommendations (as appropriate) to meet the future labor requirements for the energy technology industries.

(3) REPORT ON SHORTAGE.—As soon as practicable after the date on which the Secretary identifies or predicts a significant national shortage of skilled technical personnel in one or more energy technology industries, the Secretary shall submit to Congress a report describing the shortage.

(c) TRAINEESHIP GRANTS FOR SKILLED TECHNICAL PERSONNEL.—The Secretary, in consultation with the Secretary of Labor, may establish programs in the appropriate offices of the Department under which the Secretary provides grants to enhance training (including distance learning) for any workforce category for which a shortage is identified or predicted under subsection (b)(2).

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $20,000,000 for each of fiscal years 2006 through 2008.

SEC. 1102. EDUCATIONAL PROGRAMS IN SCIENCE AND MATHEMATICS.

(a) SCIENCE EDUCATION ENHANCEMENT FUND.—Section 3164 of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381a) is amended by adding at the end:

"(c) SCIENCE EDUCATION ENHANCEMENT FUND.—The Secretary shall use not less than 0.3 percent of the amount made available to the Department for research, development, demonstration, and commercial application for fiscal year 2006 and each fiscal year thereafter to carry out activities authorized by this part.".

(b) AUTHORIZED EDUCATION ACTIVITIES.—Section 3165 of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381b) is amended by adding at the end the following:

"(14) Support competitive events for students under the supervision of teachers, designed to encourage student interest and knowledge in science and mathematics.

"(15) Support competitively-awarded, peer-reviewed programs to promote professional development for mathematics teachers and science teachers who teach in grades from kindergarten through grade 12 at Department research and development facilities.

"(16) Support summer internships at Department research and development facilities, for mathematics teachers and science teachers who teach in grades from kindergarten through grade 12.

"(17) Sponsor and assist in educational and training activities identified as critical skills needs for future workforce development at Department research and development facilities.".

(c) EDUCATIONAL PARTNERSHIPS.—Section 3166(b) of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381c(b)) is amended—

(1) by striking paragraph (1) and inserting the following:

"(1) loaning or transferring equipment to the institution;";

(2) in paragraph (5), by striking "and" at the end;

(3) in paragraph (6), by striking the period at the end and inserting "; and"; and

(4) by adding at the end the following:

"(7) providing funds to educational institutions to hire personnel to facilitate interactions between local school systems, Department research and development facilities, and corporate and governmental entities.".

(d) DEFINITION OF DEPARTMENT RESEARCH AND DEVELOPMENT FACILITIES.—Section 3167(3) of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381d(3)) is amended by striking "from the Office of Science of the Department of Energy" and inserting "by the Department of Energy".

(e) STUDY.—

(1) IN GENERAL.—The Secretary, in consultation with the Secretary of Education, shall enter into an arrangement with the National Academy of Public Administration to conduct a study of the priorities, quality, local and regional flexibility, and plans for educational programs at Department research and development facilities.

(2) INCLUSION.—The study shall recommend measures that the Secretary may take to improve Department-wide coordination of educational, workforce development, and critical skills development activities.

(3) REPORT.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress a report on the results of the study conducted under this subsection.

SEC. 1103. TRAINING GUIDELINES FOR NONNUCLEAR ELECTRIC ENERGY INDUSTRY PERSONNEL. 42 USC 16412.

(a) IN GENERAL.—The Secretary of Labor, in consultation with the Secretary and in conjunction with the electric industry and recognized employee representatives, shall develop model personnel training guidelines to support the reliability and safety of the nonnuclear electric system.

(b) REQUIREMENTS.—The training guidelines under subsection (a) shall, at a minimum—

(1) include training requirements for workers engaged in the construction, operation, inspection, or maintenance of nonnuclear electric generation, transmission, or distribution systems, including requirements relating to—

(A) competency;

(B) certification; and

(C) assessment, including—

(i) initial and continuous evaluation of workers;

(ii) recertification procedures; and

(iii) methods for examining or testing the qualification of an individual who performs a covered task; and

(2) consolidate training guidelines in existence on the date on which the guidelines under subsection (a) are developed relating to the construction, operation, maintenance, and inspection of nonnuclear electric generation, transmission, and distribution facilities, such as guidelines established by the National Electric Safety Code and other industry consensus standards.

SEC. 1104. NATIONAL CENTER FOR ENERGY MANAGEMENT AND BUILDING TECHNOLOGIES. 42 USC 16413.

The Secretary shall support the ongoing activities of and explore opportunities for expansion of the National Center for Energy Management and Building Technologies to carry out research, education, and training activities to facilitate the improvement of energy efficiency, indoor environmental quality, and security of industrial, commercial, residential, and public buildings.

SEC. 1105. IMPROVED ACCESS TO ENERGY-RELATED SCIENTIFIC AND TECHNICAL CAREERS.

(a) SCIENCE EDUCATION PROGRAMS.—Section 3164 of the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381a) (as amended by section 1102(a)) is amended by adding at the end the following:

"(d) PROGRAMS FOR STUDENTS FROM UNDER-REPRESENTED GROUPS.—In carrying out a program under subsection (a), the Secretary shall give priority to activities that are designed to encourage students from under-represented groups to pursue scientific and technical careers.".

(b) PARTNERSHIPS WITH HISTORICALLY BLACK COLLEGES AND UNIVERSITIES, HISPANIC-SERVICING INSTITUTIONS, AND TRIBAL COLLEGES.—The Department of Energy Science Education Enhancement Act (42 U.S.C. 7381 et seq.) is amended—

42 USC 7381d, 7381e.

(1) by redesignating sections 3167 and 3168 as sections 3168 and 3169, respectively; and

(2) by inserting after section 3166 the following:

42 USC 7381c–1.

"SEC. 3167. PARTNERSHIPS WITH HISTORICALLY BLACK COLLEGES AND UNIVERSITIES, HISPANIC-SERVING INSTITUTIONS, AND TRIBAL COLLEGES.

"(a) DEFINITIONS.—In this section:

"(1) HISPANIC-SERVING INSTITUTION.—The term 'Hispanic-serving institution' has the meaning given the term in section 502(a) of the Higher Education Act of 1965 (20 U.S.C. 1101a(a)).

"(2) HISTORICALLY BLACK COLLEGE OR UNIVERSITY.—The term 'historically Black college or university' has the meaning given the term 'part B institution' in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

"(3) NATIONAL LABORATORY.—The term 'National Laboratory' has the meaning given the term in section 2 of the Energy Policy Act of 2005.

"(4) SCIENCE FACILITY.—The term 'science facility' has the meaning given the term 'single-purpose research facility' in section 903 of the Energy Policy Act of 2005.

"(5) TRIBAL COLLEGE.—The term 'tribal college' has the meaning given the term 'tribally controlled college or university' in section 2(a) of the Tribally Controlled College Assistance Act of 1978 (25 U.S.C. 1801(a)).

"(b) EDUCATION PARTNERSHIP.—The Secretary shall require the director of each National Laboratory, and may require the head of any science facility, to increase the participation of historically Black colleges or universities, Hispanic-serving institutions, or tribal colleges in any activity that increases the capacity of the historically Black colleges or universities, Hispanic-serving institutions, or tribal colleges to train personnel in science or engineering.

"(c) ACTIVITIES.—An activity described in subsection (b) includes—

"(1) collaborative research;

"(2) equipment transfer;

"(3) training activities carried out at a National Laboratory or science facility; and

"(4) mentoring activities carried out at a National Laboratory or science facility.

"(d) REPORT.—Not later than 2 years after the date of enactment of this subsection, the Secretary shall submit to Congress a report describing the activities carried out under this section.".

42 USC 16414.

SEC. 1106. NATIONAL POWER PLANT OPERATIONS TECHNOLOGY AND EDUCATIONAL CENTER.

(a) ESTABLISHMENT.—The Secretary shall support the establishment of a National Power Plant Operations Technology and Education Center (referred to in this section as the "Center"), to address the need for training and educating certified operators and technicians for the electric power industry.

(b) LOCATION OF CENTER.—The Secretary shall support the establishment of the Center at an institution of higher education that has—

(1) expertise in providing degree programs in electric power generation, transmission, and distribution technologies;

(2) expertise in providing onsite and Internet-based training; and

(3) demonstrated responsiveness to workforce and training requirements in the electric power industry.

(c) TRAINING AND CONTINUING EDUCATION.—

(1) IN GENERAL.—The Center shall provide training and continuing education in electric power generation, transmission, and distribution technologies and operations.

(2) LOCATION.—The Center shall carry out training and education activities under paragraph (1)—

(A) at the Center; and

(B) through Internet-based information technologies that allow for learning at remote sites.

TITLE XII—ELECTRICITY

Electricity Modernization Act of 2005. 42 USC 15801 note.

SEC. 1201. SHORT TITLE.

This title may be cited as the "Electricity Modernization Act of 2005".

Subtitle A—Reliability Standards

SEC. 1211. ELECTRIC RELIABILITY STANDARDS.

(a) IN GENERAL.—Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

"SEC. 215. ELECTRIC RELIABILITY. 16 USC 824o.

"(a) DEFINITIONS.—For purposes of this section:

"(1) The term 'bulk-power system' means—

"(A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and

"(B) electric energy from generation facilities needed to maintain transmission system reliability.

The term does not include facilities used in the local distribution of electric energy.

"(2) The terms 'Electric Reliability Organization' and 'ERO' mean the organization certified by the Commission under subsection (c) the purpose of which is to establish and enforce reliability standards for the bulk-power system, subject to Commission review.

"(3) The term 'reliability standard' means a requirement, approved by the Commission under this section, to provide for reliable operation of the bulk-power system. The term includes requirements for the operation of existing bulk-power system facilities, including cybersecurity protection, and the design of planned additions or modifications to such facilities to the extent necessary to provide for reliable operation of the bulk-power system, but the term does not include any requirement to enlarge such facilities or to construct new transmission capacity or generation capacity.

"(4) The term 'reliable operation' means operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.

"(5) The term 'Interconnection' means a geographic area in which the operation of bulk-power system components is synchronized such that the failure of one or more of such components may adversely affect the ability of the operators of other components within the system to maintain reliable operation of the facilities within their control.

"(6) The term 'transmission organization' means a Regional Transmission Organization, Independent System Operator, independent transmission provider, or other transmission organization finally approved by the Commission for the operation of transmission facilities.

"(7) The term 'regional entity' means an entity having enforcement authority pursuant to subsection (e)(4).

"(8) The term 'cybersecurity incident' means a malicious act or suspicious event that disrupts, or was an attempt to disrupt, the operation of those programmable electronic devices and communication networks including hardware, software and data that are essential to the reliable operation of the bulk power system.

"(b) JURISDICTION AND APPLICABILITY.—(1) The Commission shall have jurisdiction, within the United States, over the ERO certified by the Commission under subsection (c), any regional entities, and all users, owners and operators of the bulk-power system, including but not limited to the entities described in section 201(f), for purposes of approving reliability standards established under this section and enforcing compliance with this section. All users, owners and operators of the bulk-power system shall comply with reliability standards that take effect under this section.

Regulations. Deadline.

"(2) The Commission shall issue a final rule to implement the requirements of this section not later than 180 days after the date of enactment of this section.

"(c) CERTIFICATION.—Following the issuance of a Commission rule under subsection (b)(2), any person may submit an application to the Commission for certification as the Electric Reliability Organization. The Commission may certify one such ERO if the Commission determines that such ERO—

"(1) has the ability to develop and enforce, subject to subsection (e)(2), reliability standards that provide for an adequate level of reliability of the bulk-power system; and

"(2) has established rules that—

"(A) assure its independence of the users and owners and operators of the bulk-power system, while assuring fair stakeholder representation in the selection of its directors and balanced decisionmaking in any ERO committee or subordinate organizational structure;

"(B) allocate equitably reasonable dues, fees, and other charges among end users for all activities under this section;

"(C) provide fair and impartial procedures for enforcement of reliability standards through the imposition of penalties in accordance with subsection (e) (including limitations on activities, functions, or operations, or other appropriate sanctions);

"(D) provide for reasonable notice and opportunity for public comment, due process, openness, and balance of interests in developing reliability standards and otherwise exercising its duties; and

"(E) provide for taking, after certification, appropriate steps to gain recognition in Canada and Mexico.

"(d) RELIABILITY STANDARDS.—(1) The Electric Reliability Organization shall file each reliability standard or modification to a reliability standard that it proposes to be made effective under this section with the Commission.

"(2) The Commission may approve, by rule or order, a proposed reliability standard or modification to a reliability standard if it determines that the standard is just, reasonable, not unduly discriminatory or preferential, and in the public interest. The Commission shall give due weight to the technical expertise of the Electric Reliability Organization with respect to the content of a proposed standard or modification to a reliability standard and to the technical expertise of a regional entity organized on an Interconnection-wide basis with respect to a reliability standard to be applicable within that Interconnection, but shall not defer with respect to the effect of a standard on competition. A proposed standard or modification shall take effect upon approval by the Commission.

"(3) The Electric Reliability Organization shall rebuttably presume that a proposal from a regional entity organized on an Interconnection-wide basis for a reliability standard or modification to a reliability standard to be applicable on an Interconnection-wide basis is just, reasonable, and not unduly discriminatory or preferential, and in the public interest.

"(4) The Commission shall remand to the Electric Reliability Organization for further consideration a proposed reliability standard or a modification to a reliability standard that the Commission disapproves in whole or in part.

"(5) The Commission, upon its own motion or upon complaint, may order the Electric Reliability Organization to submit to the Commission a proposed reliability standard or a modification to a reliability standard that addresses a specific matter if the Commission considers such a new or modified reliability standard appropriate to carry out this section.

"(6) The final rule adopted under subsection (b)(2) shall include fair processes for the identification and timely resolution of any conflict between a reliability standard and any function, rule, order, tariff, rate schedule, or agreement accepted, approved, or ordered by the Commission applicable to a transmission organization. Such transmission organization shall continue to comply with such function, rule, order, tariff, rate schedule or agreement accepted, approved, or ordered by the Commission until—

"(A) the Commission finds a conflict exists between a reliability standard and any such provision;

"(B) the Commission orders a change to such provision pursuant to section 206 of this part; and

"(C) the ordered change becomes effective under this part.

If the Commission determines that a reliability standard needs to be changed as a result of such a conflict, it shall order the ERO to develop and file with the Commission a modified reliability standard under paragraph (4) or (5) of this subsection.

"(e) ENFORCEMENT.—(1) The ERO may impose, subject to paragraph (2), a penalty on a user or owner or operator of the bulk-power system for a violation of a reliability standard approved by the Commission under subsection (d) if the ERO, after notice and an opportunity for a hearing—

"(A) finds that the user or owner or operator has violated a reliability standard approved by the Commission under subsection (d); and

"(B) files notice and the record of the proceeding with the Commission.

"(2) A penalty imposed under paragraph (1) may take effect not earlier than the 31st day after the ERO files with the Commission notice of the penalty and the record of proceedings. Such penalty shall be subject to review by the Commission, on its own motion or upon application by the user, owner or operator that is the subject of the penalty filed within 30 days after the date such notice is filed with the Commission. Application to the Commission for review, or the initiation of review by the Commission on its own motion, shall not operate as a stay of such penalty unless the Commission otherwise orders upon its own motion or upon application by the user, owner or operator that is the subject of such penalty. In any proceeding to review a penalty imposed under paragraph (1), the Commission, after notice and opportunity for hearing (which hearing may consist solely of the record before the ERO and opportunity for the presentation of supporting reasons to affirm, modify, or set aside the penalty), shall by order affirm, set aside, reinstate, or modify the penalty, and, if appropriate, remand to the ERO for further proceedings. The Commission shall implement expedited procedures for such hearings.

"(3) On its own motion or upon complaint, the Commission may order compliance with a reliability standard and may impose a penalty against a user or owner or operator of the bulk-power system if the Commission finds, after notice and opportunity for a hearing, that the user or owner or operator of the bulk-power system has engaged or is about to engage in any acts or practices that constitute or will constitute a violation of a reliability standard.

Regulations. Contracts.

"(4) The Commission shall issue regulations authorizing the ERO to enter into an agreement to delegate authority to a regional entity for the purpose of proposing reliability standards to the ERO and enforcing reliability standards under paragraph (1) if—

"(A) the regional entity is governed by—

"(i) an independent board;

"(ii) a balanced stakeholder board; or

"(iii) a combination independent and balanced stakeholder board.

"(B) the regional entity otherwise satisfies the provisions of subsection (c)(1) and (2); and

"(C) the agreement promotes effective and efficient administration of bulk-power system reliability.

The Commission may modify such delegation. The ERO and the Commission shall rebuttably presume that a proposal for delegation to a regional entity organized on an Interconnection-wide basis promotes effective and efficient administration of bulk-power system reliability and should be approved. Such regulation may provide that the Commission may assign the ERO's authority to enforce reliability standards under paragraph (1) directly to a regional entity consistent with the requirements of this paragraph.

"(5) The Commission may take such action as is necessary or appropriate against the ERO or a regional entity to ensure compliance with a reliability standard or any Commission order affecting the ERO or a regional entity.

"(6) Any penalty imposed under this section shall bear a reasonable relation to the seriousness of the violation and shall take into consideration the efforts of such user, owner, or operator to remedy the violation in a timely manner.

"(f) CHANGES IN ELECTRIC RELIABILITY ORGANIZATION RULES.—The Electric Reliability Organization shall file with the Commission for approval any proposed rule or proposed rule change, accompanied by an explanation of its basis and purpose. The Commission, upon its own motion or complaint, may propose a change to the rules of the ERO. A proposed rule or proposed rule change shall take effect upon a finding by the Commission, after notice and opportunity for comment, that the change is just, reasonable, not unduly discriminatory or preferential, is in the public interest, and satisfies the requirements of subsection (c).

"(g) RELIABILITY REPORTS.—The ERO shall conduct periodic assessments of the reliability and adequacy of the bulk-power system in North America.

"(h) COORDINATION WITH CANADA AND MEXICO.—The President is urged to negotiate international agreements with the governments of Canada and Mexico to provide for effective compliance with reliability standards and the effectiveness of the ERO in the United States and Canada or Mexico.

"(i) SAVINGS PROVISIONS.—(1) The ERO shall have authority to develop and enforce compliance with reliability standards for only the bulk-power system.

"(2) This section does not authorize the ERO or the Commission to order the construction of additional generation or transmission capacity or to set and enforce compliance with standards for adequacy or safety of electric facilities or services.

"(3) Nothing in this section shall be construed to preempt any authority of any State to take action to ensure the safety, adequacy, and reliability of electric service within that State, as long as such action is not inconsistent with any reliability standard, except that the State of New York may establish rules that result in greater reliability within that State, as long as such action does not result in lesser reliability outside the State than that provided by the reliability standards.

Deadline.
Standards.

"(4) Within 90 days of the application of the Electric Reliability Organization or other affected party, and after notice and opportunity for comment, the Commission shall issue a final order determining whether a State action is inconsistent with a reliability standard, taking into consideration any recommendation of the ERO.

"(5) The Commission, after consultation with the ERO and the State taking action, may stay the effectiveness of any State action, pending the Commission's issuance of a final order.

Establishment.

"(j) REGIONAL ADVISORY BODIES.—The Commission shall establish a regional advisory body on the petition of at least two-thirds of the States within a region that have more than one-half of their electric load served within the region. A regional advisory body shall be composed of one member from each participating State in the region, appointed by the Governor of each State, and may include representatives of agencies, States, and provinces outside the United States. A regional advisory body may provide advice to the Electric Reliability Organization, a regional entity, or the Commission regarding the governance of an existing or proposed regional entity within the same region, whether a standard

proposed to apply within the region is just, reasonable, not unduly discriminatory or preferential, and in the public interest, whether fees proposed to be assessed within the region are just, reasonable, not unduly discriminatory or preferential, and in the public interest and any other responsibilities requested by the Commission. The Commission may give deference to the advice of any such regional advisory body if that body is organized on an Interconnection-wide basis.

"(k) ALASKA AND HAWAII.—The provisions of this section do not apply to Alaska or Hawaii.".

16 USC 824o note.

(b) STATUS OF ERO.—The Electric Reliability Organization certified by the Federal Energy Regulatory Commission under section 215(c) of the Federal Power Act and any regional entity delegated enforcement authority pursuant to section 215(e)(4) of that Act are not departments, agencies, or instrumentalities of the United States Government.

16 USC 824o note.

(c) ACCESS APPROVALS BY FEDERAL AGENCIES.—Federal agencies responsible for approving access to electric transmission or distribution facilities located on lands within the United States shall, in accordance with applicable law, expedite any Federal agency approvals that are necessary to allow the owners or operators of such facilities to comply with any reliability standard, approved by the Commission under section 215 of the Federal Power Act, that pertains to vegetation management, electric service restoration, or resolution of situations that imminently endanger the reliability or safety of the facilities.

Subtitle B—Transmission Infrastructure Modernization

SEC. 1221. SITING OF INTERSTATE ELECTRIC TRANSMISSION FACILITIES.

(a) IN GENERAL.—Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

16 USC 824p.

"SEC. 216. SITING OF INTERSTATE ELECTRIC TRANSMISSION FACILITIES.

Deadlines.

"(a) DESIGNATION OF NATIONAL INTEREST ELECTRIC TRANSMISSION CORRIDORS.—(1) Not later than 1 year after the date of enactment of this section and every 3 years thereafter, the Secretary of Energy (referred to in this section as the 'Secretary'), in consultation with affected States, shall conduct a study of electric transmission congestion.

Reports.

"(2) After considering alternatives and recommendations from interested parties (including an opportunity for comment from affected States), the Secretary shall issue a report, based on the study, which may designate any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers as a national interest electric transmission corridor.

"(3) The Secretary shall conduct the study and issue the report in consultation with any appropriate regional entity referred to in section 215.

"(4) In determining whether to designate a national interest electric transmission corridor under paragraph (2), the Secretary may consider whether—

"(A) the economic vitality and development of the corridor, or the end markets served by the corridor, may be constrained by lack of adequate or reasonably priced electricity;

"(B)(i) economic growth in the corridor, or the end markets served by the corridor, may be jeopardized by reliance on limited sources of energy; and

"(ii) a diversification of supply is warranted;

"(C) the energy independence of the United States would be served by the designation;

"(D) the designation would be in the interest of national energy policy; and

"(E) the designation would enhance national defense and homeland security.

"(b) CONSTRUCTION PERMIT.—Except as provided in subsection (i), the Commission may, after notice and an opportunity for hearing, issue one or more permits for the construction or modification of electric transmission facilities in a national interest electric transmission corridor designated by the Secretary under subsection (a) if the Commission finds that—

"(1)(A) a State in which the transmission facilities are to be constructed or modified does not have authority to—

"(i) approve the siting of the facilities; or

"(ii) consider the interstate benefits expected to be achieved by the proposed construction or modification of transmission facilities in the State;

"(B) the applicant for a permit is a transmitting utility under this Act but does not qualify to apply for a permit or siting approval for the proposed project in a State because the applicant does not serve end-use customers in the State; or

"(C) a State commission or other entity that has authority to approve the siting of the facilities has—

"(i) withheld approval for more than 1 year after the filing of an application seeking approval pursuant to applicable law or 1 year after the designation of the relevant national interest electric transmission corridor, whichever is later; or

"(ii) conditioned its approval in such a manner that the proposed construction or modification will not significantly reduce transmission congestion in interstate commerce or is not economically feasible;

"(2) the facilities to be authorized by the permit will be used for the transmission of electric energy in interstate commerce;

"(3) the proposed construction or modification is consistent with the public interest;

"(4) the proposed construction or modification will significantly reduce transmission congestion in interstate commerce and protects or benefits consumers;

"(5) the proposed construction or modification is consistent with sound national energy policy and will enhance energy independence; and

"(6) the proposed modification will maximize, to the extent reasonable and economical, the transmission capabilities of existing towers or structures.

"(c) PERMIT APPLICATIONS.—(1) Permit applications under subsection (b) shall be made in writing to the Commission.

Regulations.

"(2) The Commission shall issue rules specifying—

"(A) the form of the application;

"(B) the information to be contained in the application; and

"(C) the manner of service of notice of the permit application on interested persons.

"(d) COMMENTS.—In any proceeding before the Commission under subsection (b), the Commission shall afford each State in which a transmission facility covered by the permit is or will be located, each affected Federal agency and Indian tribe, private property owners, and other interested persons, a reasonable opportunity to present their views and recommendations with respect to the need for and impact of a facility covered by the permit.

"(e) RIGHTS-OF-WAY.—(1) In the case of a permit under subsection (b) for electric transmission facilities to be located on property other than property owned by the United States or a State, if the permit holder cannot acquire by contract, or is unable to agree with the owner of the property to the compensation to be paid for, the necessary right-of-way to construct or modify the transmission facilities, the permit holder may acquire the right-of-way by the exercise of the right of eminent domain in the district court of the United States for the district in which the property concerned is located, or in the appropriate court of the State in which the property is located.

"(2) Any right-of-way acquired under paragraph (1) shall be used exclusively for the construction or modification of electric transmission facilities within a reasonable period of time after the acquisition.

"(3) The practice and procedure in any action or proceeding under this subsection in the district court of the United States shall conform as nearly as practicable to the practice and procedure in a similar action or proceeding in the courts of the State in which the property is located.

"(4) Nothing in this subsection shall be construed to authorize the use of eminent domain to acquire a right-of-way for any purpose other than the construction, modification, operation, or maintenance of electric transmission facilities and related facilities. The right-of-way cannot be used for any other purpose, and the right-of-way shall terminate upon the termination of the use for which the right-of-way was acquired.

"(f) COMPENSATION.—(1) Any right-of-way acquired pursuant to subsection (e) shall be considered a taking of private property for which just compensation is due.

"(2) Just compensation shall be an amount equal to the fair market value (including applicable severance damages) of the property taken on the date of the exercise of eminent domain authority.

"(g) STATE LAW.—Nothing in this section precludes any person from constructing or modifying any transmission facility in accordance with State law.

"(h) COORDINATION OF FEDERAL AUTHORIZATIONS FOR TRANSMISSION FACILITIES.—(1) In this subsection:

"(A) The term 'Federal authorization' means any authorization required under Federal law in order to site a transmission facility.

"(B) The term 'Federal authorization' includes such permits, special use authorizations, certifications, opinions, or other

approvals as may be required under Federal law in order to site a transmission facility.

"(2) The Department of Energy shall act as the lead agency for purposes of coordinating all applicable Federal authorizations and related environmental reviews of the facility.

"(3) To the maximum extent practicable under applicable Federal law, the Secretary shall coordinate the Federal authorization and review process under this subsection with any Indian tribes, multistate entities, and State agencies that are responsible for conducting any separate permitting and environmental reviews of the facility, to ensure timely and efficient review and permit decisions.

"(4)(A) As head of the lead agency, the Secretary, in consultation with agencies responsible for Federal authorizations and, as appropriate, with Indian tribes, multistate entities, and State agencies that are willing to coordinate their own separate permitting and environmental reviews with the Federal authorization and environmental reviews, shall establish prompt and binding intermediate milestones and ultimate deadlines for the review of, and Federal authorization decisions relating to, the proposed facility.

"(B) The Secretary shall ensure that, once an application has been submitted with such data as the Secretary considers necessary, all permit decisions and related environmental reviews under all applicable Federal laws shall be completed— Deadline.

"(i) within 1 year; or

"(ii) if a requirement of another provision of Federal law does not permit compliance with clause (i), as soon thereafter as is practicable.

"(C) The Secretary shall provide an expeditious pre-application mechanism for prospective applicants to confer with the agencies involved to have each such agency determine and communicate to the prospective applicant not later than 60 days after the prospective applicant submits a request for such information concerning— Deadline.

"(i) the likelihood of approval for a potential facility; and

"(ii) key issues of concern to the agencies and public.

"(5)(A) As lead agency head, the Secretary, in consultation with the affected agencies, shall prepare a single environmental review document, which shall be used as the basis for all decisions on the proposed project under Federal law.

"(B) The Secretary and the heads of other agencies shall streamline the review and permitting of transmission within corridors designated under section 503 of the Federal Land Policy and Management Act (43 U.S.C. 1763) by fully taking into account prior analyses and decisions relating to the corridors.

"(C) The document shall include consideration by the relevant agencies of any applicable criteria or other matters as required under applicable law.

"(6)(A) If any agency has denied a Federal authorization required for a transmission facility, or has failed to act by the deadline established by the Secretary pursuant to this section for deciding whether to issue the authorization, the applicant or any State in which the facility would be located may file an appeal with the President, who shall, in consultation with the affected agency, review the denial or failure to take action on the pending application.

"(B) Based on the overall record and in consultation with the affected agency, the President may—

"(i) issue the necessary authorization with any appropriate conditions; or

"(ii) deny the application.

President. Deadline.

"(C) The President shall issue a decision not later than 90 days after the date of the filing of the appeal.

President.

"(D) In making a decision under this paragraph, the President shall comply with applicable requirements of Federal law, including any requirements of—

"(i) the National Forest Management Act of 1976 (16 U.S.C. 472a et seq.);

"(ii) the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.);

"(iii) the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.);

"(iv) the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.); and

"(v) the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.).

Deadline. Regulations.

"(7)(A) Not later than 18 months after the date of enactment of this section, the Secretary shall issue any regulations necessary to implement this subsection.

Deadline. Memorandum.

"(B)(i) Not later than 1 year after the date of enactment of this section, the Secretary and the heads of all Federal agencies with authority to issue Federal authorizations shall enter into a memorandum of understanding to ensure the timely and coordinated review and permitting of electricity transmission facilities.

"(ii) Interested Indian tribes, multistate entities, and State agencies may enter the memorandum of understanding.

"(C) The head of each Federal agency with authority to issue a Federal authorization shall designate a senior official responsible for, and dedicate sufficient other staff and resources to ensure, full implementation of the regulations and memorandum required under this paragraph.

"(8)(A) Each Federal land use authorization for an electricity transmission facility shall be issued—

"(i) for a duration, as determined by the Secretary, commensurate with the anticipated use of the facility; and

"(ii) with appropriate authority to manage the right-of-way for reliability and environmental protection.

"(B) On the expiration of the authorization (including an authorization issued before the date of enactment of this section), the authorization shall be reviewed for renewal taking fully into account reliance on such electricity infrastructure, recognizing the importance of the authorization for public health, safety, and economic welfare and as a legitimate use of Federal land.

"(9) In exercising the responsibilities under this section, the Secretary shall consult regularly with—

"(A) the Federal Energy Regulatory Commission;

"(B) electric reliability organizations (including related regional entities) approved by the Commission; and

"(C) Transmission Organizations approved by the Commission.

"(i) INTERSTATE COMPACTS.—(1) The consent of Congress is given for three or more contiguous States to enter into an interstate compact, subject to approval by Congress, establishing regional transmission siting agencies to—

"(A) facilitate siting of future electric energy transmission facilities within those States; and

"(B) carry out the electric energy transmission siting responsibilities of those States.

"(2) The Secretary may provide technical assistance to regional transmission siting agencies established under this subsection.

"(3) The regional transmission siting agencies shall have the authority to review, certify, and permit siting of transmission facilities, including facilities in national interest electric transmission corridors (other than facilities on property owned by the United States).

"(4) The Commission shall have no authority to issue a permit for the construction or modification of an electric transmission facility within a State that is a party to a compact, unless the members of the compact are in disagreement and the Secretary makes, after notice and an opportunity for a hearing, the finding described in subsection (b)(1)(C).

"(j) RELATIONSHIP TO OTHER LAWS.—(1) Except as specifically provided, nothing in this section affects any requirement of an environmental law of the United States, including the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

"(2) Subsection (h)(6) shall not apply to any unit of the National Park System, the National Wildlife Refuge System, the National Wild and Scenic Rivers System, the National Trails System, the National Wilderness Preservation System, or a National Monument.

"(k) ERCOT.—This section shall not apply within the area referred to in section 212(k)(2)(A).".

(b) REPORTS TO CONGRESS ON CORRIDORS AND RIGHTS-OF-WAY ON FEDERAL LANDS.—Not later than 90 days after the date of enactment of this Act, the Secretary of the Interior, the Secretary, the Secretary of Agriculture, and the Chairman of the Council on Environmental Quality shall submit to Congress a joint report identifying—

(1)(A) all existing designated transmission and distribution corridors on Federal land and the status of work related to proposed transmission and distribution corridor designations under title V of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1761 et seq.);

(B) the schedule for completing the work;

(C) any impediments to completing the work; and

(D) steps that Congress could take to expedite the process;

(2)(A) the number of pending applications to locate transmission facilities on Federal land;

(B) key information relating to each such facility;

(C) how long each application has been pending;

(D) the schedule for issuing a timely decision as to each facility; and

(E) progress in incorporating existing and new such rights-of-way into relevant land use and resource management plans or the equivalent of those plans; and

(3)(A) the number of existing transmission and distribution rights-of-way on Federal land that will come up for renewal within the following 5-, 10-, and 15-year periods; and

(B) a description of how the Secretaries plan to manage the renewals.

42 USC 16421.

SEC. 1222. THIRD-PARTY FINANCE.

(a) EXISTING FACILITIES.—The Secretary, acting through the Administrator of the Western Area Power Administration (hereinafter in this section referred to as "WAPA"), or through the Administrator of the Southwestern Power Administration (hereinafter in this section referred to as "SWPA"), or both, may design, develop, construct, operate, maintain, or own, or participate with other entities in designing, developing, constructing, operating, maintaining, or owning, an electric power transmission facility and related facilities ("Project") needed to upgrade existing transmission facilities owned by SWPA or WAPA if the Secretary, in consultation with the applicable Administrator, determines that the proposed Project—

(1)(A) is located in a national interest electric transmission corridor designated under section 216(a) of the Federal Power Act and will reduce congestion of electric transmission in interstate commerce; or

(B) is necessary to accommodate an actual or projected increase in demand for electric transmission capacity;

(2) is consistent with—

(A) transmission needs identified, in a transmission expansion plan or otherwise, by the appropriate Transmission Organization (as defined in the Federal Power Act), if any, or approved regional reliability organization; and

(B) efficient and reliable operation of the transmission grid; and

(3) would be operated in conformance with prudent utility practice.

(b) NEW FACILITIES.—The Secretary, acting through WAPA or SWPA, or both, may design, develop, construct, operate, maintain, or own, or participate with other entities in designing, developing, constructing, operating, maintaining, or owning, a new electric power transmission facility and related facilities ("Project") located within any State in which WAPA or SWPA operates if the Secretary, in consultation with the applicable Administrator, determines that the proposed Project—

(1)(A) is located in an area designated under section 216(a) of the Federal Power Act and will reduce congestion of electric transmission in interstate commerce; or

(B) is necessary to accommodate an actual or projected increase in demand for electric transmission capacity;

(2) is consistent with—

(A) transmission needs identified, in a transmission expansion plan or otherwise, by the appropriate Transmission Organization (as defined in the Federal Power Act) if any, or approved regional reliability organization; and

(B) efficient and reliable operation of the transmission grid;

(3) will be operated in conformance with prudent utility practice;

(4) will be operated by, or in conformance with the rules of, the appropriate (A) Transmission Organization, if any, or (B) if such an organization does not exist, regional reliability organization; and

(5) will not duplicate the functions of existing transmission facilities or proposed facilities which are the subject of ongoing or approved siting and related permitting proceedings.

(c) OTHER FUNDS.—

(1) IN GENERAL.—In carrying out a Project under subsection (a) or (b), the Secretary may accept and use funds contributed by another entity for the purpose of carrying out the Project.

(2) AVAILABILITY.—The contributed funds shall be available for expenditure for the purpose of carrying out the Project—

(A) without fiscal year limitation; and

(B) as if the funds had been appropriated specifically for that Project.

(3) ALLOCATION OF COSTS.—In carrying out a Project under subsection (a) or (b), any costs of the Project not paid for by contributions from another entity shall be collected through rates charged to customers using the new transmission capability provided by the Project and allocated equitably among these project beneficiaries using the new transmission capability.

(d) RELATIONSHIP TO OTHER LAWS.—Nothing in this section affects any requirement of—

(1) any Federal environmental law, including the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.);

(2) any Federal or State law relating to the siting of energy facilities; or

(3) any existing authorizing statutes.

(e) SAVINGS CLAUSE.—Nothing in this section shall constrain or restrict an Administrator in the utilization of other authority delegated to the Administrator of WAPA or SWPA.

(f) SECRETARIAL DETERMINATIONS.—Any determination made pursuant to subsections (a) or (b) shall be based on findings by the Secretary using the best available data.

(g) MAXIMUM FUNDING AMOUNT.—The Secretary shall not accept and use more than $100,000,000 under subsection (c)(1) for the period encompassing fiscal years 2006 through 2015.

SEC. 1223. ADVANCED TRANSMISSION TECHNOLOGIES. 42 USC 16422.

(a) DEFINITION OF ADVANCED TRANSMISSION TECHNOLOGY.—In this section, the term "advanced transmission technology" means a technology that increases the capacity, efficiency, or reliability of an existing or new transmission facility, including—

(1) high-temperature lines (including superconducting cables);

(2) underground cables;

(3) advanced conductor technology (including advanced composite conductors, high-temperature low-sag conductors, and fiber optic temperature sensing conductors);

(4) high-capacity ceramic electric wire, connectors, and insulators;

(5) optimized transmission line configurations (including multiple phased transmission lines);

(6) modular equipment;

(7) wireless power transmission;

(8) ultra-high voltage lines;

(9) high-voltage DC technology;

(10) flexible AC transmission systems;

(11) energy storage devices (including pumped hydro, compressed air, superconducting magnetic energy storage, flywheels, and batteries);

(12) controllable load;

(13) distributed generation (including PV, fuel cells, and microturbines);

(14) enhanced power device monitoring;

(15) direct system state sensors;

(16) fiber optic technologies;

(17) power electronics and related software (including real time monitoring and analytical software);

(18) mobile transformers and mobile substations; and

(19) any other technologies the Commission considers appropriate.

(b) AUTHORITY.—In carrying out the Federal Power Act (16 U.S.C. 791a et seq.) and the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2601 et seq.), the Commission shall encourage, as appropriate, the deployment of advanced transmission technologies.

42 USC 16423.

SEC. 1224. ADVANCED POWER SYSTEM TECHNOLOGY INCENTIVE PROGRAM.

(a) PROGRAM.—The Secretary is authorized to establish an Advanced Power System Technology Incentive Program to support the deployment of certain advanced power system technologies and to improve and protect certain critical governmental, industrial, and commercial processes. Funds provided under this section shall be used by the Secretary to make incentive payments to eligible owners or operators of advanced power system technologies to increase power generation through enhanced operational, economic, and environmental performance. Payments under this section may only be made upon receipt by the Secretary of an incentive payment application establishing an applicant as either—

(1) a qualifying advanced power system technology facility; or

(2) a qualifying security and assured power facility.

(b) INCENTIVES.—Subject to availability of funds, a payment of 1.8 cents per kilowatt-hour shall be paid to the owner or operator of a qualifying advanced power system technology facility under this section for electricity generated at such facility. An additional 0.7 cents per kilowatt-hour shall be paid to the owner or operator of a qualifying security and assured power facility for electricity generated at such facility. Any facility qualifying under this section shall be eligible for an incentive payment for up to, but not more than, the first 10,000,000 kilowatt-hours produced in any fiscal year.

(c) ELIGIBILITY.—For purposes of this section:

(1) QUALIFYING ADVANCED POWER SYSTEM TECHNOLOGY FACILITY.—The term "qualifying advanced power system technology facility" means a facility using an advanced fuel cell, turbine, or hybrid power system or power storage system to generate or store electric energy.

(2) QUALIFYING SECURITY AND ASSURED POWER FACILITY.—The term "qualifying security and assured power facility" means a qualifying advanced power system technology facility determined by the Secretary, in consultation with the Secretary of Homeland Security, to be in critical need of secure, reliable,

rapidly available, high-quality power for critical governmental, industrial, or commercial applications.

(d) AUTHORIZATION.—There are authorized to be appropriated to the Secretary for the purposes of this section, $10,000,000 for each of the fiscal years 2006 through 2012.

Subtitle C—Transmission Operation Improvements

SEC. 1231. OPEN NONDISCRIMINATORY ACCESS.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by inserting after section 211 (16 U.S.C. 824j) the following:

"SEC. 211A. OPEN ACCESS BY UNREGULATED TRANSMITTING UTILITIES. 16 USC 824j–1.

"(a) DEFINITION OF UNREGULATED TRANSMITTING UTILITY.—In this section, the term 'unregulated transmitting utility' means an entity that—

"(1) owns or operates facilities used for the transmission of electric energy in interstate commerce; and

"(2) is an entity described in section 201(f).

"(b) TRANSMISSION OPERATION SERVICES.—Subject to section 212(h), the Commission may, by rule or order, require an unregulated transmitting utility to provide transmission services—

"(1) at rates that are comparable to those that the unregulated transmitting utility charges itself; and

"(2) on terms and conditions (not relating to rates) that are comparable to those under which the unregulated transmitting utility provides transmission services to itself and that are not unduly discriminatory or preferential.

"(c) EXEMPTION.—The Commission shall exempt from any rule or order under this section any unregulated transmitting utility that—

"(1) sells not more than 4,000,000 megawatt hours of electricity per year;

"(2) does not own or operate any transmission facilities that are necessary for operating an interconnected transmission system (or any portion of the system); or

"(3) meets other criteria the Commission determines to be in the public interest.

"(d) LOCAL DISTRIBUTION FACILITIES.—The requirements of subsection (b) shall not apply to facilities used in local distribution.

"(e) EXEMPTION TERMINATION.—If the Commission, after an evidentiary hearing held on a complaint and after giving consideration to reliability standards established under section 215, finds on the basis of a preponderance of the evidence that any exemption granted pursuant to subsection (c) unreasonably impairs the continued reliability of an interconnected transmission system, the Commission shall revoke the exemption granted to the transmitting utility.

"(f) APPLICATION TO UNREGULATED TRANSMITTING UTILITIES.—The rate changing procedures applicable to public utilities under subsections (c) and (d) of section 205 are applicable to unregulated transmitting utilities for purposes of this section.

"(g) REMAND.—In exercising authority under subsection (b)(1), the Commission may remand transmission rates to an unregulated transmitting utility for review and revision if necessary to meet the requirements of subsection (b).

"(h) OTHER REQUESTS.—The provision of transmission services under subsection (b) does not preclude a request for transmission services under section 211.

"(i) LIMITATION.—The Commission may not require a State or municipality to take action under this section that would violate a private activity bond rule for purposes of section 141 of the Internal Revenue Code of 1986.

"(j) TRANSFER OF CONTROL OF TRANSMITTING FACILITIES.—Nothing in this section authorizes the Commission to require an unregulated transmitting utility to transfer control or operational control of its transmitting facilities to a Transmission Organization that is designated to provide nondiscriminatory transmission access.".

42 USC 16431.

SEC. 1232. FEDERAL UTILITY PARTICIPATION IN TRANSMISSION ORGANIZATIONS.

(a) DEFINITIONS.—In this section:

(1) APPROPRIATE FEDERAL REGULATORY AUTHORITY.—The term "appropriate Federal regulatory authority" means—

(A) in the case of a Federal power marketing agency, the Secretary, except that the Secretary may designate the Administrator of a Federal power marketing agency to act as the appropriate Federal regulatory authority with respect to the transmission system of the Federal power marketing agency; and

(B) in the case of the Tennessee Valley Authority, the Board of Directors of the Tennessee Valley Authority.

(2) FEDERAL POWER MARKETING AGENCY.—The term "Federal power marketing agency" has the meaning given the term in section 3 of the Federal Power Act (16 U.S.C. 796).

(3) FEDERAL UTILITY.—The term "Federal utility" means—

(A) a Federal power marketing agency; or

(B) the Tennessee Valley Authority.

(4) TRANSMISSION ORGANIZATION.—The term "Transmission Organization" has the meaning given the term in section 3 of the Federal Power Act (16 U.S.C. 796).

(5) TRANSMISSION SYSTEM.—The term "transmission system" means an electric transmission facility owned, leased, or contracted for by the United States and operated by a Federal utility.

(b) TRANSFER.—The appropriate Federal regulatory authority may enter into a contract, agreement, or other arrangement transferring control and use of all or part of the transmission system of a Federal utility to a Transmission Organization.

(c) CONTENTS.—The contract, agreement, or arrangement shall include—

(1) performance standards for operation and use of the transmission system that the head of the Federal utility determines are necessary or appropriate, including standards that ensure—

(A) recovery of all of the costs and expenses of the Federal utility related to the transmission facilities that

are the subject of the contract, agreement, or other arrangement;

(B) consistency with existing contracts and third-party financing arrangements; and

(C) consistency with the statutory authorities, obligations, and limitations of the Federal utility;

(2) provisions for monitoring and oversight by the Federal utility of the Transmission Organization's terms and conditions of the contract, agreement, or other arrangement, including a provision for the resolution of disputes through arbitration or other means with the Transmission Organization or with other participants, notwithstanding the obligations and limitations of any other law regarding arbitration; and

(3) a provision that allows the Federal utility to withdraw from the Transmission Organization and terminate the contract, agreement, or other arrangement in accordance with its terms.

(d) COMMISSION.—Neither this section, actions taken pursuant to this section, nor any other transaction of a Federal utility participating in a Transmission Organization shall confer on the Commission jurisdiction or authority over—

(1) the electric generation assets, electric capacity, or energy of the Federal utility that the Federal utility is authorized by law to market; or

(2) the power sales activities of the Federal utility.

(e) EXISTING STATUTORY AND OTHER OBLIGATIONS.—

(1) SYSTEM OPERATION REQUIREMENTS.—No statutory provision requiring or authorizing a Federal utility to transmit electric power or to construct, operate, or maintain the transmission system of the Federal utility prohibits a transfer of control and use of the transmission system pursuant to, and subject to, the requirements of this section.

(2) OTHER OBLIGATIONS.—This subsection does not—

(A) suspend, or exempt any Federal utility from, any provision of Federal law in effect on the date of enactment of this Act, including any requirement or direction relating to the use of the transmission system of the Federal utility, environmental protection, fish and wildlife protection, flood control, navigation, water delivery, or recreation; or

(B) authorize abrogation of any contract or treaty obligation.

(3) CONFORMING AMENDMENT.—Section 311 of the Energy and Water Development Appropriations Act, 2001 (16 U.S.C. 824n) is repealed.

SEC. 1233. NATIVE LOAD SERVICE OBLIGATION.

(a) IN GENERAL.—Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

"SEC. 217. NATIVE LOAD SERVICE OBLIGATION. 16 USC 824q.

"(a) DEFINITIONS.—In this section:

"(1) The term 'distribution utility' means an electric utility that has a service obligation to end-users or to a State utility or electric cooperative that, directly or indirectly, through one or more additional State utilities or electric cooperatives, provides electric service to end-users.

"(2) The term 'load-serving entity' means a distribution utility or an electric utility that has a service obligation.

"(3) The term 'service obligation' means a requirement applicable to, or the exercise of authority granted to, an electric utility under Federal, State, or local law or under long-term contracts to provide electric service to end-users or to a distribution utility.

"(4) The term 'State utility' means a State or any political subdivision of a State, or any agency, authority, or instrumentality of any one or more of the foregoing, or a corporation that is wholly owned, directly or indirectly, by any one or more of the foregoing, competent to carry on the business of developing, transmitting, utilizing, or distributing power.

Applicability.

"(b) MEETING SERVICE OBLIGATIONS.—(1) Paragraph (2) applies to any load-serving entity that, as of the date of enactment of this section—

"(A) owns generation facilities, markets the output of Federal generation facilities, or holds rights under one or more wholesale contracts to purchase electric energy, for the purpose of meeting a service obligation; and

"(B) by reason of ownership of transmission facilities, or one or more contracts or service agreements for firm transmission service, holds firm transmission rights for delivery of the output of the generation facilities or the purchased energy to meet the service obligation.

"(2) Any load-serving entity described in paragraph (1) is entitled to use the firm transmission rights, or, equivalent tradable or financial transmission rights, in order to deliver the output or purchased energy, or the output of other generating facilities or purchased energy to the extent deliverable using the rights, to the extent required to meet the service obligation of the load-serving entity.

"(3)(A) To the extent that all or a portion of the service obligation covered by the firm transmission rights or equivalent tradable or financial transmission rights is transferred to another load-serving entity, the successor load-serving entity shall be entitled to use the firm transmission rights or equivalent tradable or financial transmission rights associated with the transferred service obligation.

"(B) Subsequent transfers to another load-serving entity, or back to the original load-serving entity, shall be entitled to the same rights.

"(4) The Commission shall exercise the authority of the Commission under this Act in a manner that facilitates the planning and expansion of transmission facilities to meet the reasonable needs of load-serving entities to satisfy the service obligations of the load-serving entities, and enables load-serving entities to secure firm transmission rights (or equivalent tradable or financial rights) on a long-term basis for long-term power supply arrangements made, or planned, to meet such needs.

"(c) ALLOCATION OF TRANSMISSION RIGHTS.—Nothing in subsections (b)(1), (b)(2), and (b)(3) of this section shall affect any existing or future methodology employed by a Transmission Organization for allocating or auctioning transmission rights if such Transmission Organization was authorized by the Commission to allocate or auction financial transmission rights on its system as of January 1, 2005, and the Commission determines that any future allocation or auction is just, reasonable and not unduly discriminatory or preferential, provided, however, that if such a Transmission

Organization never allocated financial transmission rights on its system that pertained to a period before January 1, 2005, with respect to any application by such Transmission Organization that would change its methodology the Commission shall exercise its authority in a manner consistent with the Act and that takes into account the policies expressed in subsections (b)(1), (b)(2), and (b)(3) as applied to firm transmission rights held by a load-serving entity as of January 1, 2005, to the extent the associated generation ownership or power purchase arrangements remain in effect.

"(d) CERTAIN TRANSMISSION RIGHTS.—The Commission may exercise authority under this Act to make transmission rights not used to meet an obligation covered by subsection (b) available to other entities in a manner determined by the Commission to be just, reasonable, and not unduly discriminatory or preferential.

"(e) OBLIGATION TO BUILD.—Nothing in this Act relieves a load-serving entity from any obligation under State or local law to build transmission or distribution facilities adequate to meet the service obligations of the load-serving entity.

"(f) CONTRACTS.—Nothing in this section shall provide a basis for abrogating any contract or service agreement for firm transmission service or rights in effect as of the date of the enactment of this subsection. If an ISO in the Western Interconnection had allocated financial transmission rights prior to the date of enactment of this section but had not done so with respect to one or more load-serving entities' firm transmission rights held under contracts to which the preceding sentence applies (or held by reason of ownership or future ownership of transmission facilities), such load-serving entities may not be required, without their consent, to convert such firm transmission rights to tradable or financial rights, except where the load-serving entity has voluntarily joined the ISO as a participating transmission owner (or its successor) in accordance with the ISO tariff.

"(g) WATER PUMPING FACILITIES.—The Commission shall ensure that any entity described in section 201(f) that owns transmission facilities used predominately to support its own water pumping facilities shall have, with respect to the facilities, protections for transmission service comparable to those provided to load-serving entities pursuant to this section.

"(h) ERCOT.—This section shall not apply within the area referred to in section 212(k)(2)(A).

"(i) JURISDICTION.—This section does not authorize the Commission to take any action not otherwise within the jurisdiction of the Commission.

"(j) TVA AREA.—(1) Subject to paragraphs (2) and (3), for purposes of subsection (b)(1)(B), a load-serving entity that is located within the service area of the Tennessee Valley Authority and that has a firm wholesale power supply contract with the Tennessee Valley Authority shall be considered to hold firm transmission rights for the transmission of the power provided.

"(2) Nothing in this subsection affects the requirements of section 212(j).

"(3) The Commission shall not issue an order on the basis of this subsection that is contrary to the purposes of section 212(j).

"(k) EFFECT OF EXERCISING RIGHTS.—An entity that to the extent required to meet its service obligations exercises rights

described in subsection (b) shall not be considered by such action as engaging in undue discrimination or preference under this Act.".

Deadline. 16 USC 824q note.

(b) FERC RULEMAKING ON LONG-TERM TRANSMISSION RIGHTS IN ORGANIZED MARKETS.—Within 1 year after the date of enactment of this section and after notice and an opportunity for comment, the Commission shall by rule or order, implement section 217(b)(4) of the Federal Power Act in Transmission Organizations, as defined by that Act with organized electricity markets.

42 USC 16432.

SEC. 1234. STUDY ON THE BENEFITS OF ECONOMIC DISPATCH.

(a) STUDY.—The Secretary, in coordination and consultation with the States, shall conduct a study on—

(1) the procedures currently used by electric utilities to perform economic dispatch;

(2) identifying possible revisions to those procedures to improve the ability of nonutility generation resources to offer their output for sale for the purpose of inclusion in economic dispatch; and

(3) the potential benefits to residential, commercial, and industrial electricity consumers nationally and in each State if economic dispatch procedures were revised to improve the ability of nonutility generation resources to offer their output for inclusion in economic dispatch.

(b) DEFINITION.—The term "economic dispatch" when used in this section means the operation of generation facilities to produce energy at the lowest cost to reliably serve consumers, recognizing any operational limits of generation and transmission facilities.

(c) REPORT TO CONGRESS AND THE STATES.—Not later than 90 days after the date of enactment of this Act, and on a yearly basis following, the Secretary shall submit a report to Congress and the States on the results of the study conducted under subsection (a), including recommendations to Congress and the States for any suggested legislative or regulatory changes.

SEC. 1235. PROTECTION OF TRANSMISSION CONTRACTS IN THE PACIFIC NORTHWEST.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

16 USC 824r.

"SEC. 218. PROTECTION OF TRANSMISSION CONTRACTS IN THE PACIFIC NORTHWEST.

"(a) DEFINITION OF ELECTRIC UTILITY OR PERSON.—In this section, the term 'electric utility or person' means an electric utility or person that—

"(1) as of the date of enactment of the Energy Policy Act of 2005 holds firm transmission rights pursuant to contract or by reason of ownership of transmission facilities; and

"(2) is located—

"(A) in the Pacific Northwest, as that region is defined in section 3 of the Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. 839a); or

"(B) in that portion of a State included in the geographic area proposed for a regional transmission organization in Commission Docket Number RT01–35 on the date on which that docket was opened.

"(b) PROTECTION OF TRANSMISSION CONTRACTS.—Nothing in this Act confers on the Commission the authority to require an electric utility or person to convert to tradable or financial rights—

"(1) firm transmission rights described in subsection (a); or

"(2) firm transmission rights obtained by exercising contract or tariff rights associated with the firm transmission rights described in subsection (a).".

SEC. 1236. SENSE OF CONGRESS REGARDING LOCATIONAL INSTALLED CAPACITY MECHANISM.

(a) FINDINGS.—Congress finds that—

(1) in regard to a proposal to develop and implement a specific type of locational installed capacity mechanism in New England pending before the Federal Energy Regulatory Commission; and

(2) the Governors of the States have objected to the proposed mechanism, arguing that the mechanism—

(A) would not provide adequate assurance that necessary electric generation capacity or reliability will be provided; and

(B) would impose a high cost on consumers and have a significant negative economic impact.

(b) SENSE OF CONGRESS.—Congress—

(1) notes the concerns of the New England States to the proposed mechanism; and

(2) declares that it is the sense of Congress that the Federal Energy Regulatory Commission should carefully consider the States' objections.

Subtitle D—Transmission Rate Reform

SEC. 1241. TRANSMISSION INFRASTRUCTURE INVESTMENT.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

"SEC. 219. TRANSMISSION INFRASTRUCTURE INVESTMENT.

16 USC 824s.

"(a) RULEMAKING REQUIREMENT.—Not later than 1 year after the date of enactment of this section, the Commission shall establish, by rule, incentive-based (including performance-based) rate treatments for the transmission of electric energy in interstate commerce by public utilities for the purpose of benefitting consumers by ensuring reliability and reducing the cost of delivered power by reducing transmission congestion.

Deadline.

"(b) CONTENTS.—The rule shall—

"(1) promote reliable and economically efficient transmission and generation of electricity by promoting capital investment in the enlargement, improvement, maintenance, and operation of all facilities for the transmission of electric energy in interstate commerce, regardless of the ownership of the facilities;

"(2) provide a return on equity that attracts new investment in transmission facilities (including related transmission technologies);

"(3) encourage deployment of transmission technologies and other measures to increase the capacity and efficiency of existing transmission facilities and improve the operation of the facilities; and

"(4) allow recovery of—

"(A) all prudently incurred costs necessary to comply with mandatory reliability standards issued pursuant to section 215; and

"(B) all prudently incurred costs related to transmission infrastructure development pursuant to section 216.

"(c) INCENTIVES.—In the rule issued under this section, the Commission shall, to the extent within its jurisdiction, provide for incentives to each transmitting utility or electric utility that joins a Transmission Organization. The Commission shall ensure that any costs recoverable pursuant to this subsection may be recovered by such utility through the transmission rates charged by such utility or through the transmission rates charged by the Transmission Organization that provides transmission service to such utility.

"(d) JUST AND REASONABLE RATES.—All rates approved under the rules adopted pursuant to this section, including any revisions to the rules, are subject to the requirements of sections 205 and 206 that all rates, charges, terms, and conditions be just and reasonable and not unduly discriminatory or preferential.".

42 USC 16441.

SEC. 1242. FUNDING NEW INTERCONNECTION AND TRANSMISSION UPGRADES.

The Commission may approve a participant funding plan that allocates costs related to transmission upgrades or new generator interconnection, without regard to whether an applicant is a member of a Commission-approved Transmission Organization, if the plan results in rates that—

(1) are just and reasonable;

(2) are not unduly discriminatory or preferential; and

(3) are otherwise consistent with sections 205 and 206 of the Federal Power Act (16 U.S.C. 824d, 824e).

Subtitle E—Amendments to PURPA

SEC. 1251. NET METERING AND ADDITIONAL STANDARDS.

(a) ADOPTION OF STANDARDS.—Section 111(d) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2621(d)) is amended by adding at the end the following:

"(11) NET METERING.—Each electric utility shall make available upon request net metering service to any electric consumer that the electric utility serves. For purposes of this paragraph, the term 'net metering service' means service to an electric consumer under which electric energy generated by that electric consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period.

"(12) FUEL SOURCES.—Each electric utility shall develop a plan to minimize dependence on 1 fuel source and to ensure that the electric energy it sells to consumers is generated using a diverse range of fuels and technologies, including renewable technologies.

"(13) FOSSIL FUEL GENERATION EFFICIENCY.—Each electric utility shall develop and implement a 10-year plan to increase the efficiency of its fossil fuel generation.".

(b) COMPLIANCE.—

(1) TIME LIMITATIONS.—Section 112(b) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(b)) is amended by adding at the end the following: Deadlines.

"(3)(A) Not later than 2 years after the enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority) and each nonregulated electric utility shall commence the consideration referred to in section 111, or set a hearing date for such consideration, with respect to each standard established by paragraphs (11) through (13) of section 111(d).

"(B) Not later than 3 years after the date of the enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority), and each nonregulated electric utility, shall complete the consideration, and shall make the determination, referred to in section 111 with respect to each standard established by paragraphs (11) through (13) of section 111(d).".

(2) FAILURE TO COMPLY.—Section 112(c) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(c)) is amended by adding at the end the following: "In the case of each standard established by paragraphs (11) through (13) of section 111(d), the reference contained in this subsection to the date of enactment of this Act shall be deemed to be a reference to the date of enactment of such paragraphs (11) through (13).".

(3) PRIOR STATE ACTIONS.—

(A) IN GENERAL.—Section 112 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622) is amended by adding at the end the following:

"(d) PRIOR STATE ACTIONS.—Subsections (b) and (c) of this section shall not apply to the standards established by paragraphs (11) through (13) of section 111(d) in the case of any electric utility in a State if, before the enactment of this subsection—

"(1) the State has implemented for such utility the standard concerned (or a comparable standard);

"(2) the State regulatory authority for such State or relevant nonregulated electric utility has conducted a proceeding to consider implementation of the standard concerned (or a comparable standard) for such utility; or

"(3) the State legislature has voted on the implementation of such standard (or a comparable standard) for such utility.".

(B) CROSS REFERENCE.—Section 124 of such Act (16 U.S.C. 2634) is amended by adding the following at the end thereof: "In the case of each standard established by paragraphs (11) through (13) of section 111(d), the reference contained in this subsection to the date of enactment of this Act shall be deemed to be a reference to the date of enactment of such paragraphs (11) through (13).".

SEC. 1252. SMART METERING.

(a) IN GENERAL.—Section 111(d) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2621(d)) is amended by adding at the end the following:

"(14) TIME-BASED METERING AND COMMUNICATIONS.—(A) Not later than 18 months after the date of enactment of this paragraph, each electric utility shall offer each of its customer Deadline.

classes, and provide individual customers upon customer request, a time-based rate schedule under which the rate charged by the electric utility varies during different time periods and reflects the variance, if any, in the utility's costs of generating and purchasing electricity at the wholesale level. The time-based rate schedule shall enable the electric consumer to manage energy use and cost through advanced metering and communications technology.

"(B) The types of time-based rate schedules that may be offered under the schedule referred to in subparagraph (A) include, among others—

"(i) time-of-use pricing whereby electricity prices are set for a specific time period on an advance or forward basis, typically not changing more often than twice a year, based on the utility's cost of generating and/or purchasing such electricity at the wholesale level for the benefit of the consumer. Prices paid for energy consumed during these periods shall be pre-established and known to consumers in advance of such consumption, allowing them to vary their demand and usage in response to such prices and manage their energy costs by shifting usage to a lower cost period or reducing their consumption overall;

"(ii) critical peak pricing whereby time-of-use prices are in effect except for certain peak days, when prices may reflect the costs of generating and/or purchasing electricity at the wholesale level and when consumers may receive additional discounts for reducing peak period energy consumption;

"(iii) real-time pricing whereby electricity prices are set for a specific time period on an advanced or forward basis, reflecting the utility's cost of generating and/or purchasing electricity at the wholesale level, and may change as often as hourly; and

"(iv) credits for consumers with large loads who enter into pre-established peak load reduction agreements that reduce a utility's planned capacity obligations.

"(C) Each electric utility subject to subparagraph (A) shall provide each customer requesting a time-based rate with a time-based meter capable of enabling the utility and customer to offer and receive such rate, respectively.

"(D) For purposes of implementing this paragraph, any reference contained in this section to the date of enactment of the Public Utility Regulatory Policies Act of 1978 shall be deemed to be a reference to the date of enactment of this paragraph.

"(E) In a State that permits third-party marketers to sell electric energy to retail electric consumers, such consumers shall be entitled to receive the same time-based metering and communications device and service as a retail electric consumer of the electric utility.

Deadline.

"(F) Notwithstanding subsections (b) and (c) of section 112, each State regulatory authority shall, not later than 18 months after the date of enactment of this paragraph conduct an investigation in accordance with section 115(i) and issue a decision whether it is appropriate to implement the standards set out in subparagraphs (A) and (C).".

(b) STATE INVESTIGATION OF DEMAND RESPONSE AND TIME-BASED METERING.—Section 115 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2625) is amended as follows:

(1) By inserting in subsection (b) after the phrase "the standard for time-of-day rates established by section 111(d)(3)" the following: "and the standard for time-based metering and communications established by section 111(d)(14)".

(2) By inserting in subsection (b) after the phrase "are likely to exceed the metering" the following: "and communications".

(3) By adding at the end the following:

"(i) TIME-BASED METERING AND COMMUNICATIONS.—In making a determination with respect to the standard established by section 111(d)(14), the investigation requirement of section 111(d)(14)(F) shall be as follows: Each State regulatory authority shall conduct an investigation and issue a decision whether or not it is appropriate for electric utilities to provide and install time-based meters and communications devices for each of their customers which enable such customers to participate in time-based pricing rate schedules and other demand response programs.".

(c) FEDERAL ASSISTANCE ON DEMAND RESPONSE.—Section 132(a) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2642(a)) is amended by striking "and" at the end of paragraph (3), striking the period at the end of paragraph (4) and inserting "; and", and by adding the following at the end thereof:

"(5) technologies, techniques, and rate-making methods related to advanced metering and communications and the use of these technologies, techniques and methods in demand response programs.".

(d) FEDERAL GUIDANCE.—Section 132 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2642) is amended by adding the following at the end thereof:

"(d) DEMAND RESPONSE.—The Secretary shall be responsible for—

"(1) educating consumers on the availability, advantages, and benefits of advanced metering and communications technologies, including the funding of demonstration or pilot projects;

"(2) working with States, utilities, other energy providers and advanced metering and communications experts to identify and address barriers to the adoption of demand response programs; and

"(3) not later than 180 days after the date of enactment of the Energy Policy Act of 2005, providing Congress with a report that identifies and quantifies the national benefits of demand response and makes a recommendation on achieving specific levels of such benefits by January 1, 2007.". Deadline. Reports.

(e) DEMAND RESPONSE AND REGIONAL COORDINATION.— 16 USC 2642 note.

(1) IN GENERAL.—It is the policy of the United States to encourage States to coordinate, on a regional basis, State energy policies to provide reliable and affordable demand response services to the public.

(2) TECHNICAL ASSISTANCE.—The Secretary shall provide technical assistance to States and regional organizations formed by two or more States to assist them in—

(A) identifying the areas with the greatest demand response potential;

(B) identifying and resolving problems in transmission and distribution networks, including through the use of demand response;

(C) developing plans and programs to use demand response to respond to peak demand or emergency needs; and

(D) identifying specific measures consumers can take to participate in these demand response programs.

(3) REPORT.—Not later than 1 year after the date of enactment of the Energy Policy Act of 2005, the Commission shall prepare and publish an annual report, by appropriate region, that assesses demand response resources, including those available from all consumer classes, and which identifies and reviews—

(A) saturation and penetration rate of advanced meters and communications technologies, devices and systems;

(B) existing demand response programs and time-based rate programs;

(C) the annual resource contribution of demand resources;

(D) the potential for demand response as a quantifiable, reliable resource for regional planning purposes;

(E) steps taken to ensure that, in regional transmission planning and operations, demand resources are provided equitable treatment as a quantifiable, reliable resource relative to the resource obligations of any load-serving entity, transmission provider, or transmitting party; and

(F) regulatory barriers to improve customer participation in demand response, peak reduction and critical period pricing programs.

(f) FEDERAL ENCOURAGEMENT OF DEMAND RESPONSE DEVICES.—It is the policy of the United States that time-based pricing and other forms of demand response, whereby electricity customers are provided with electricity price signals and the ability to benefit by responding to them, shall be encouraged, the deployment of such technology and devices that enable electricity customers to participate in such pricing and demand response systems shall be facilitated, and unnecessary barriers to demand response participation in energy, capacity and ancillary service markets shall be eliminated. It is further the policy of the United States that the benefits of such demand response that accrue to those not deploying such technology and devices, but who are part of the same regional electricity entity, shall be recognized.

Deadlines.

(g) TIME LIMITATIONS.—Section 112(b) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(b)) is amended by adding at the end the following:

"(4)(A) Not later than 1 year after the enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority) and each nonregulated electric utility shall commence the consideration referred to in section 111, or set a hearing date for such consideration, with respect to the standard established by paragraph (14) of section 111(d).

"(B) Not later than 2 years after the date of the enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority),

and each nonregulated electric utility, shall complete the consideration, and shall make the determination, referred to in section 111 with respect to the standard established by paragraph (14) of section 111(d).".

(h) FAILURE TO COMPLY.—Section 112(c) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(c)) is amended by adding at the end the following:

"In the case of the standard established by paragraph (14) of section 111(d), the reference contained in this subsection to the date of enactment of this Act shall be deemed to be a reference to the date of enactment of such paragraph (14).".

(i) PRIOR STATE ACTIONS REGARDING SMART METERING STANDARDS.—

(1) IN GENERAL.—Section 112 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622) is amended by adding at the end the following:

"(e) PRIOR STATE ACTIONS.—Subsections (b) and (c) of this section shall not apply to the standard established by paragraph (14) of section 111(d) in the case of any electric utility in a State if, before the enactment of this subsection—

"(1) the State has implemented for such utility the standard concerned (or a comparable standard);

"(2) the State regulatory authority for such State or relevant nonregulated electric utility has conducted a proceeding to consider implementation of the standard concerned (or a comparable standard) for such utility within the previous 3 years; or

"(3) the State legislature has voted on the implementation of such standard (or a comparable standard) for such utility within the previous 3 years.".

(2) CROSS REFERENCE.—Section 124 of such Act (16 U.S.C. 2634) is amended by adding the following at the end thereof: "In the case of the standard established by paragraph (14) of section 111(d), the reference contained in this subsection to the date of enactment of this Act shall be deemed to be a reference to the date of enactment of such paragraph (14).".

SEC. 1253. COGENERATION AND SMALL POWER PRODUCTION PURCHASE AND SALE REQUIREMENTS.

(a) TERMINATION OF MANDATORY PURCHASE AND SALE REQUIREMENTS.—Section 210 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 824a–3) is amended by adding at the end the following:

"(m) TERMINATION OF MANDATORY PURCHASE AND SALE REQUIREMENTS.—

"(1) OBLIGATION TO PURCHASE.—After the date of enactment of this subsection, no electric utility shall be required to enter into a new contract or obligation to purchase electric energy from a qualifying cogeneration facility or a qualifying small power production facility under this section if the Commission finds that the qualifying cogeneration facility or qualifying small power production facility has nondiscriminatory access to—

"(A)(i) independently administered, auction-based day ahead and real time wholesale markets for the sale of electric energy; and (ii) wholesale markets for long-term sales of capacity and electric energy; or

"(B)(i) transmission and interconnection services that are provided by a Commission-approved regional transmission entity and administered pursuant to an open access transmission tariff that affords nondiscriminatory treatment to all customers; and (ii) competitive wholesale markets that provide a meaningful opportunity to sell capacity, including long-term and short-term sales, and electric energy, including long-term, short-term and real-time sales, to buyers other than the utility to which the qualifying facility is interconnected. In determining whether a meaningful opportunity to sell exists, the Commission shall consider, among other factors, evidence of transactions within the relevant market; or

"(C) wholesale markets for the sale of capacity and electric energy that are, at a minimum, of comparable competitive quality as markets described in subparagraphs (A) and (B).

"(2) REVISED PURCHASE AND SALE OBLIGATION FOR NEW FACILITIES.—(A) After the date of enactment of this subsection, no electric utility shall be required pursuant to this section to enter into a new contract or obligation to purchase from or sell electric energy to a facility that is not an existing qualifying cogeneration facility unless the facility meets the criteria for qualifying cogeneration facilities established by the Commission pursuant to the rulemaking required by subsection (n).

"(B) For the purposes of this paragraph, the term 'existing qualifying cogeneration facility' means a facility that—

"(i) was a qualifying cogeneration facility on the date of enactment of subsection (m); or

"(ii) had filed with the Commission a notice of self-certification, self recertification or an application for Commission certification under 18 CFR 292.207 prior to the date on which the Commission issues the final rule required by subsection (n).

"(3) COMMISSION REVIEW.—Any electric utility may file an application with the Commission for relief from the mandatory purchase obligation pursuant to this subsection on a service territory-wide basis. Such application shall set forth the factual basis upon which relief is requested and describe why the conditions set forth in subparagraph (A), (B), or (C) of paragraph (1) of this subsection have been met. After notice, including sufficient notice to potentially affected qualifying cogeneration facilities and qualifying small power production facilities, and an opportunity for comment, the Commission shall make a final determination within 90 days of such application regarding whether the conditions set forth in subparagraph (A), (B), or (C) of paragraph (1) have been met.

Notice.
Deadline.

"(4) REINSTATEMENT OF OBLIGATION TO PURCHASE.—At any time after the Commission makes a finding under paragraph (3) relieving an electric utility of its obligation to purchase electric energy, a qualifying cogeneration facility, a qualifying small power production facility, a State agency, or any other affected person may apply to the Commission for an order reinstating the electric utility's obligation to purchase electric energy under this section. Such application shall set forth the factual basis upon which the application is based and describe

why the conditions set forth in subparagraph (A), (B), or (C) of paragraph (1) of this subsection are no longer met. After notice, including sufficient notice to potentially affected utilities, and opportunity for comment, the Commission shall issue an order within 90 days of such application reinstating the electric utility's obligation to purchase electric energy under this section if the Commission finds that the conditions set forth in subparagraphs (A), (B) or (C) of paragraph (1) which relieved the obligation to purchase, are no longer met.

Notice. Deadline.

"(5) OBLIGATION TO SELL.—After the date of enactment of this subsection, no electric utility shall be required to enter into a new contract or obligation to sell electric energy to a qualifying cogeneration facility or a qualifying small power production facility under this section if the Commission finds that—

"(A) competing retail electric suppliers are willing and able to sell and deliver electric energy to the qualifying cogeneration facility or qualifying small power production facility; and

"(B) the electric utility is not required by State law to sell electric energy in its service territory.

"(6) NO EFFECT ON EXISTING RIGHTS AND REMEDIES.—Nothing in this subsection affects the rights or remedies of any party under any contract or obligation, in effect or pending approval before the appropriate State regulatory authority or non-regulated electric utility on the date of enactment of this subsection, to purchase electric energy or capacity from or to sell electric energy or capacity to a qualifying cogeneration facility or qualifying small power production facility under this Act (including the right to recover costs of purchasing electric energy or capacity).

"(7) RECOVERY OF COSTS.—(A) The Commission shall issue and enforce such regulations as are necessary to ensure that an electric utility that purchases electric energy or capacity from a qualifying cogeneration facility or qualifying small power production facility in accordance with any legally enforceable obligation entered into or imposed under this section recovers all prudently incurred costs associated with the purchase.

"(B) A regulation under subparagraph (A) shall be enforceable in accordance with the provisions of law applicable to enforcement of regulations under the Federal Power Act (16 U.S.C. 791a et seq.).

"(n) RULEMAKING FOR NEW QUALIFYING FACILITIES.—(1)(A) Not later than 180 days after the date of enactment of this section, the Commission shall issue a rule revising the criteria in 18 CFR 292.205 for new qualifying cogeneration facilities seeking to sell electric energy pursuant to section 210 of this Act to ensure—

Deadline.

"(i) that the thermal energy output of a new qualifying cogeneration facility is used in a productive and beneficial manner;

"(ii) the electrical, thermal, and chemical output of the cogeneration facility is used fundamentally for industrial, commercial, or institutional purposes and is not intended fundamentally for sale to an electric utility, taking into account technological, efficiency, economic, and variable thermal energy requirements, as well as State laws applicable to sales of electric energy from a qualifying facility to its host facility; and

"(iii) continuing progress in the development of efficient electric energy generating technology.

Applicability.

"(B) The rule issued pursuant to paragraph (1)(A) of this subsection shall be applicable only to facilities that seek to sell electric energy pursuant to section 210 of this Act. For all other purposes, except as specifically provided in subsection (m)(2)(A), qualifying facility status shall be determined in accordance with the rules and regulations of this Act.

Applicability.

"(2) Notwithstanding rule revisions under paragraph (1), the Commission's criteria for qualifying cogeneration facilities in effect prior to the date on which the Commission issues the final rule required by paragraph (1) shall continue to apply to any cogeneration facility that—

"(A) was a qualifying cogeneration facility on the date of enactment of subsection (m), or

"(B) had filed with the Commission a notice of self-certification, self-recertification or an application for Commission certification under 18 CFR 292.207 prior to the date on which the Commission issues the final rule required by paragraph (1).".

(b) ELIMINATION OF OWNERSHIP LIMITATIONS.—

(1) QUALIFYING SMALL POWER PRODUCTION FACILITY.—Section 3(17)(C) of the Federal Power Act (16 U.S.C. 796(17)(C)) is amended to read as follows:

"(C) 'qualifying small power production facility' means a small power production facility that the Commission determines, by rule, meets such requirements (including requirements respecting fuel use, fuel efficiency, and reliability) as the Commission may, by rule, prescribe;".

(2) QUALIFYING COGENERATION FACILITY.—Section 3(18)(B) of the Federal Power Act (16 U.S.C. 796(18)(B)) is amended to read as follows:

"(B) 'qualifying cogeneration facility' means a cogeneration facility that the Commission determines, by rule, meets such requirements (including requirements respecting minimum size, fuel use, and fuel efficiency) as the Commission may, by rule, prescribe;".

SEC. 1254. INTERCONNECTION.

(a) ADOPTION OF STANDARDS.—Section 111(d) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2621(d)) is amended by adding at the end the following:

"(15) INTERCONNECTION.—Each electric utility shall make available, upon request, interconnection service to any electric consumer that the electric utility serves. For purposes of this paragraph, the term 'interconnection service' means service to an electric consumer under which an on-site generating facility on the consumer's premises shall be connected to the local distribution facilities. Interconnection services shall be offered based upon the standards developed by the Institute of Electrical and Electronics Engineers: IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems, as they may be amended from time to time. In addition, agreements and procedures shall be established whereby the services are offered shall promote current best practices of interconnection for distributed generation, including but not limited to practices stipulated in model codes adopted by

associations of state regulatory agencies. All such agreements and procedures shall be just and reasonable, and not unduly discriminatory or preferential.".

(b) COMPLIANCE.—

(1) TIME LIMITATIONS.—Section 112(b) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(b)) is amended by adding at the end the following: Deadlines.

"(5)(A) Not later than 1 year after the enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority) and each nonregulated utility shall commence the consideration referred to in section 111, or set a hearing date for consideration, with respect to the standard established by paragraph (15) of section 111(d).

"(B) Not later than two years after the date of the enactment of the this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority), and each nonregulated electric utility, shall complete the consideration, and shall make the determination, referred to in section 111 with respect to each standard established by paragraph (15) of section 111(d).".

(2) FAILURE TO COMPLY.—Section 112(d) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(c)) is amended by adding at the end the following: "In the case of the standard established by paragraph (15), the reference contained in this subsection to the date of enactment of this Act shall be deemed to be a reference to the date of enactment of paragraph (15).".

(3) PRIOR STATE ACTIONS.—

(A) IN GENERAL.—Section 112 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622) is amended by adding at the end the following:

"(f) PRIOR STATE ACTIONS.—Subsections (b) and (c) of this section shall not apply to the standard established by paragraph (15) of section 111(d) in the case of any electric utility in a State if, before the enactment of this subsection—

"(1) the State has implemented for such utility the standard concerned (or a comparable standard);

"(2) the State regulatory authority for such State or relevant nonregulated electric utility has conducted a proceeding to consider implementation of the standard concerned (or a comparable standard) for such utility; or

"(3) the State legislature has voted on the implementation of such standard (or a comparable standard) for such utility.".

(B) CROSS REFERENCE.—Section 124 of such Act (16 U.S.C. 2634) is amended by adding the following at the end thereof: "In the case of each standard established by paragraph (15) of section 111(d), the reference contained in this subsection to the date of enactment of the Act shall be deemed to be a reference to the date of enactment of paragraph (15).".

Public Utility Holding Company Act of 2005.
42 USC 15801 note.

Subtitle F—Repeal of PUHCA

SEC. 1261. SHORT TITLE.

This subtitle may be cited as the "Public Utility Holding Company Act of 2005".

42 USC 16451.

SEC. 1262. DEFINITIONS.

For purposes of this subtitle:

(1) AFFILIATE.—The term "affiliate" of a company means any company, 5 percent or more of the outstanding voting securities of which are owned, controlled, or held with power to vote, directly or indirectly, by such company.

(2) ASSOCIATE COMPANY.—The term "associate company" of a company means any company in the same holding company system with such company.

(3) COMMISSION.—The term "Commission" means the Federal Energy Regulatory Commission.

(4) COMPANY.—The term "company" means a corporation, partnership, association, joint stock company, business trust, or any organized group of persons, whether incorporated or not, or a receiver, trustee, or other liquidating agent of any of the foregoing.

(5) ELECTRIC UTILITY COMPANY.—The term "electric utility company" means any company that owns or operates facilities used for the generation, transmission, or distribution of electric energy for sale.

(6) EXEMPT WHOLESALE GENERATOR AND FOREIGN UTILITY COMPANY.—The terms "exempt wholesale generator" and "foreign utility company" have the same meanings as in sections 32 and 33, respectively, of the Public Utility Holding Company Act of 1935 (15 U.S.C. 79z–5a, 79z–5b), as those sections existed on the day before the effective date of this subtitle.

(7) GAS UTILITY COMPANY.—The term "gas utility company" means any company that owns or operates facilities used for distribution at retail (other than the distribution only in enclosed portable containers or distribution to tenants or employees of the company operating such facilities for their own use and not for resale) of natural or manufactured gas for heat, light, or power.

(8) HOLDING COMPANY.—

(A) IN GENERAL.—The term "holding company" means—

(i) any company that directly or indirectly owns, controls, or holds, with power to vote, 10 percent or more of the outstanding voting securities of a public-utility company or of a holding company of any public-utility company; and

(ii) any person, determined by the Commission, after notice and opportunity for hearing, to exercise directly or indirectly (either alone or pursuant to an arrangement or understanding with one or more persons) such a controlling influence over the management or policies of any public-utility company or holding company as to make it necessary or appropriate for the rate protection of utility customers with respect to rates that such person be subject to the obligations,

duties, and liabilities imposed by this subtitle upon holding companies.

(B) EXCLUSIONS.—The term "holding company" shall not include—

(i) a bank, savings association, or trust company, or their operating subsidiaries that own, control, or hold, with the power to vote, public utility or public utility holding company securities so long as the securities are—

(I) held as collateral for a loan;

(II) held in the ordinary course of business as a fiduciary; or

(III) acquired solely for purposes of liquidation and in connection with a loan previously contracted for and owned beneficially for a period of not more than two years; or

(ii) a broker or dealer that owns, controls, or holds with the power to vote public utility or public utility holding company securities so long as the securities are—

(I) not beneficially owned by the broker or dealer and are subject to any voting instructions which may be given by customers or their assigns; or

(II) acquired within 12 months in the ordinary course of business as a broker, dealer, or underwriter with the bona fide intention of effecting distribution of the specific securities so acquired.

(9) HOLDING COMPANY SYSTEM.—The term "holding company system" means a holding company, together with its subsidiary companies.

(10) JURISDICTIONAL RATES.—The term "jurisdictional rates" means rates accepted or established by the Commission for the transmission of electric energy in interstate commerce, the sale of electric energy at wholesale in interstate commerce, the transportation of natural gas in interstate commerce, and the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use.

(11) NATURAL GAS COMPANY.—The term "natural gas company" means a person engaged in the transportation of natural gas in interstate commerce or the sale of such gas in interstate commerce for resale.

(12) PERSON.—The term "person" means an individual or company.

(13) PUBLIC UTILITY.—The term "public utility" means any person who owns or operates facilities used for transmission of electric energy in interstate commerce or sales of electric energy at wholesale in interstate commerce.

(14) PUBLIC-UTILITY COMPANY.—The term "public-utility company" means an electric utility company or a gas utility company.

(15) STATE COMMISSION.—The term "State commission" means any commission, board, agency, or officer, by whatever name designated, of a State, municipality, or other political subdivision of a State that, under the laws of such State, has jurisdiction to regulate public utility companies.

(16) SUBSIDIARY COMPANY.—The term "subsidiary company" of a holding company means—

(A) any company, 10 percent or more of the outstanding voting securities of which are directly or indirectly owned, controlled, or held with power to vote, by such holding company; and

(B) any person, the management or policies of which the Commission, after notice and opportunity for hearing, determines to be subject to a controlling influence, directly or indirectly, by such holding company (either alone or pursuant to an arrangement or understanding with one or more other persons) so as to make it necessary for the rate protection of utility customers with respect to rates that such person be subject to the obligations, duties, and liabilities imposed by this subtitle upon subsidiary companies of holding companies.

(17) VOTING SECURITY.—The term "voting security" means any security presently entitling the owner or holder thereof to vote in the direction or management of the affairs of a company.

SEC. 1263. REPEAL OF THE PUBLIC UTILITY HOLDING COMPANY ACT OF 1935.

The Public Utility Holding Company Act of 1935 (15 U.S.C. 79 et seq.) is repealed.

42 USC 16452.

SEC. 1264. FEDERAL ACCESS TO BOOKS AND RECORDS.

(a) IN GENERAL.—Each holding company and each associate company thereof shall maintain, and shall make available to the Commission, such books, accounts, memoranda, and other records as the Commission determines are relevant to costs incurred by a public utility or natural gas company that is an associate company of such holding company and necessary or appropriate for the protection of utility customers with respect to jurisdictional rates.

(b) AFFILIATE COMPANIES.—Each affiliate of a holding company or of any subsidiary company of a holding company shall maintain, and shall make available to the Commission, such books, accounts, memoranda, and other records with respect to any transaction with another affiliate, as the Commission determines are relevant to costs incurred by a public utility or natural gas company that is an associate company of such holding company and necessary or appropriate for the protection of utility customers with respect to jurisdictional rates.

(c) HOLDING COMPANY SYSTEMS.—The Commission may examine the books, accounts, memoranda, and other records of any company in a holding company system, or any affiliate thereof, as the Commission determines are relevant to costs incurred by a public utility or natural gas company within such holding company system and necessary or appropriate for the protection of utility customers with respect to jurisdictional rates.

(d) CONFIDENTIALITY.—No member, officer, or employee of the Commission shall divulge any fact or information that may come to his or her knowledge during the course of examination of books, accounts, memoranda, or other records as provided in this section, except as may be directed by the Commission or by a court of competent jurisdiction.

SEC. 1265. STATE ACCESS TO BOOKS AND RECORDS. 42 USC 16453.

(a) IN GENERAL.—Upon the written request of a State commission having jurisdiction to regulate a public-utility company in a holding company system, the holding company or any associate company or affiliate thereof, other than such public-utility company, wherever located, shall produce for inspection books, accounts, memoranda, and other records that—

(1) have been identified in reasonable detail in a proceeding before the State commission;

(2) the State commission determines are relevant to costs incurred by such public-utility company; and

(3) are necessary for the effective discharge of the responsibilities of the State commission with respect to such proceeding.

(b) LIMITATION.—Subsection (a) does not apply to any person that is a holding company solely by reason of ownership of one or more qualifying facilities under the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2601 et seq.).

(c) CONFIDENTIALITY OF INFORMATION.—The production of books, accounts, memoranda, and other records under subsection (a) shall be subject to such terms and conditions as may be necessary and appropriate to safeguard against unwarranted disclosure to the public of any trade secrets or sensitive commercial information.

(d) EFFECT ON STATE LAW.—Nothing in this section shall preempt applicable State law concerning the provision of books, accounts, memoranda, and other records, or in any way limit the rights of any State to obtain books, accounts, memoranda, and other records under any other Federal law, contract, or otherwise.

(e) COURT JURISDICTION.—Any United States district court located in the State in which the State commission referred to in subsection (a) is located shall have jurisdiction to enforce compliance with this section.

SEC. 1266. EXEMPTION AUTHORITY. 42 USC 16454.

(a) RULEMAKING.—Not later than 90 days after the effective date of this subtitle, the Commission shall issue a final rule to exempt from the requirements of section 1264 (relating to Federal access to books and records) any person that is a holding company, solely with respect to one or more— Deadline.

(1) qualifying facilities under the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2601 et seq.);

(2) exempt wholesale generators; or

(3) foreign utility companies.

(b) OTHER AUTHORITY.—The Commission shall exempt a person or transaction from the requirements of section 1264 (relating to Federal access to books and records) if, upon application or upon the motion of the Commission—

(1) the Commission finds that the books, accounts, memoranda, and other records of any person are not relevant to the jurisdictional rates of a public utility or natural gas company; or

(2) the Commission finds that any class of transactions is not relevant to the jurisdictional rates of a public utility or natural gas company.

42 USC 16455.

SEC. 1267. AFFILIATE TRANSACTIONS.

(a) COMMISSION AUTHORITY UNAFFECTED.—Nothing in this subtitle shall limit the authority of the Commission under the Federal Power Act (16 U.S.C. 791a et seq.) to require that jurisdictional rates are just and reasonable, including the ability to deny or approve the pass through of costs, the prevention of cross-subsidization, and the issuance of such rules and regulations as are necessary or appropriate for the protection of utility consumers.

(b) RECOVERY OF COSTS.—Nothing in this subtitle shall preclude the Commission or a State commission from exercising its jurisdiction under otherwise applicable law to determine whether a public-utility company, public utility, or natural gas company may recover in rates any costs of an activity performed by an associate company, or any costs of goods or services acquired by such public-utility company from an associate company.

42 USC 16456.

SEC. 1268. APPLICABILITY.

Except as otherwise specifically provided in this subtitle, no provision of this subtitle shall apply to, or be deemed to include—

(1) the United States;

(2) a State or any political subdivision of a State;

(3) any foreign governmental authority not operating in the United States;

(4) any agency, authority, or instrumentality of any entity referred to in paragraph (1), (2), or (3); or

(5) any officer, agent, or employee of any entity referred to in paragraph (1), (2), (3), or (4) acting as such in the course of his or her official duty.

42 USC 16457.

SEC. 1269. EFFECT ON OTHER REGULATIONS.

Nothing in this subtitle precludes the Commission or a State commission from exercising its jurisdiction under otherwise applicable law to protect utility customers.

42 USC 16458.

SEC. 1270. ENFORCEMENT.

The Commission shall have the same powers as set forth in sections 306 through 317 of the Federal Power Act (16 U.S.C. 825e–825p) to enforce the provisions of this subtitle.

42 USC 16459.

SEC. 1271. SAVINGS PROVISIONS.

(a) IN GENERAL.—Nothing in this subtitle, or otherwise in the Public Utility Holding Company Act of 1935, or rules, regulations, or orders thereunder, prohibits a person from engaging in or continuing to engage in activities or transactions in which it is legally engaged or authorized to engage on the date of enactment of this Act, if that person continues to comply with the terms (other than an expiration date or termination date) of any such authorization, whether by rule or by order.

(b) EFFECT ON OTHER COMMISSION AUTHORITY.—Nothing in this subtitle limits the authority of the Commission under the Federal Power Act (16 U.S.C. 791a et seq.) or the Natural Gas Act (15 U.S.C. 717 et seq.).

(c) TAX TREATMENT.—Tax treatment under section 1081 of the Internal Revenue Code of 1986 as a result of transactions ordered in compliance with the Public Utility Holding Company Act of 1935 (15 U.S.C. 79 et seq.) shall not be affected in any manner due to the repeal of that Act and the enactment of the Public Utility Holding Company Act of 2005.

SEC. 1272. IMPLEMENTATION.

Deadline.
42 USC 16460.

Not later than 4 months after the date of enactment of this subtitle, the Commission shall—

Regulations.

(1) issue such regulations as may be necessary or appropriate to implement this subtitle (other than section 1265, relating to State access to books and records); and

(2) submit to Congress detailed recommendations on technical and conforming amendments to Federal law necessary to carry out this subtitle and the amendments made by this subtitle.

SEC. 1273. TRANSFER OF RESOURCES.

Records.
42 USC 16461.

All books and records that relate primarily to the functions transferred to the Commission under this subtitle shall be transferred from the Securities and Exchange Commission to the Commission.

SEC. 1274. EFFECTIVE DATE.

42 USC 16451 note.

(a) IN GENERAL.—Except for section 1272 (relating to implementation), this subtitle shall take effect 6 months after the date of enactment of this subtitle.

(b) COMPLIANCE WITH CERTAIN RULES.—If the Commission approves and makes effective any final rulemaking modifying the standards of conduct governing entities that own, operate, or control facilities for transmission of electricity in interstate commerce or transportation of natural gas in interstate commerce prior to the effective date of this subtitle, any action taken by a public-utility company or utility holding company to comply with the requirements of such rulemaking shall not subject such public-utility company or utility holding company to any regulatory requirement applicable to a holding company under the Public Utility Holding Company Act of 1935 (15 U.S.C. 79 et seq.).

SEC. 1275. SERVICE ALLOCATION.

42 USC 16462.

(a) DEFINITION OF PUBLIC UTILITY.—In this section, the term "public utility" has the meaning given the term in section 201(e) of the Federal Power Act (16 U.S.C. 824(e)).

(b) FERC REVIEW.—In the case of non-power goods or administrative or management services provided by an associate company organized specifically for the purpose of providing such goods or services to any public utility in the same holding company system, at the election of the system or a State commission having jurisdiction over the public utility, the Commission, after the effective date of this subtitle, shall review and authorize the allocation of the costs for such goods or services to the extent relevant to that associate company.

(c) EFFECT ON FEDERAL AND STATE LAW.—Nothing in this section shall affect the authority of the Commission or a State commission under other applicable law.

Deadline.

(d) RULES.—Not later than 4 months after the date of enactment of this Act, the Commission shall issue rules (which rules shall be effective no earlier than the effective date of this subtitle) to exempt from the requirements of this section any company in a holding company system whose public utility operations are confined substantially to a single State and any other class of transactions that the Commission finds is not relevant to the jurisdictional rates of a public utility.

42 USC 16463.

SEC. 1276. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such funds as may be necessary to carry out this subtitle.

SEC. 1277. CONFORMING AMENDMENTS TO THE FEDERAL POWER ACT.

(a) CONFLICT OF JURISDICTION.—Section 318 of the Federal Power Act (16 U.S.C. 825q) is repealed.

(b) DEFINITIONS.—(1) Section 201(g)(5) of the Federal Power Act (16 U.S.C. 824(g)(5)) is amended by striking "1935" and inserting "2005".

(2) Section 214 of the Federal Power Act (16 U.S.C. 824m) is amended by striking "1935" and inserting "2005".

Subtitle G—Market Transparency, Enforcement, and Consumer Protection

SEC. 1281. ELECTRICITY MARKET TRANSPARENCY.

Part II of the Federal Power Act is amended by adding at the end the following:

16 USC 824t.

"SEC. 220. ELECTRICITY MARKET TRANSPARENCY RULES.

"(a)(1) The Commission is directed to facilitate price transparency in markets for the sale and transmission of electric energy in interstate commerce, having due regard for the public interest, the integrity of those markets, fair competition, and the protection of consumers.

"(2) The Commission may prescribe such rules as the Commission determines necessary and appropriate to carry out the purposes of this section. The rules shall provide for the dissemination, on a timely basis, of information about the availability and prices of wholesale electric energy and transmission service to the Commission, State commissions, buyers and sellers of wholesale electric energy, users of transmission services, and the public.

"(3) The Commission may—

"(A) obtain the information described in paragraph (2) from any market participant; and

"(B) rely on entities other than the Commission to receive and make public the information, subject to the disclosure rules in subsection (b).

"(4) In carrying out this section, the Commission shall consider the degree of price transparency provided by existing price publishers and providers of trade processing services, and shall rely on such publishers and services to the maximum extent possible. The Commission may establish an electronic information system if it determines that existing price publications are not adequately providing price discovery or market transparency. Nothing in this section, however, shall affect any electronic information filing requirements in effect under this Act as of the date of enactment of this section.

"(b)(1) Rules described in subsection (a)(2), if adopted, shall exempt from disclosure information the Commission determines would, if disclosed, be detrimental to the operation of an effective market or jeopardize system security.

"(2) In determining the information to be made available under this section and time to make the information available, the Commission shall seek to ensure that consumers and competitive

markets are protected from the adverse effects of potential collusion or other anticompetitive behaviors that can be facilitated by untimely public disclosure of transaction-specific information.

"(c)(1) Within 180 days of enactment of this section, the Commission shall conclude a memorandum of understanding with the Commodity Futures Trading Commission relating to information sharing, which shall include, among other things, provisions ensuring that information requests to markets within the respective jurisdiction of each agency are properly coordinated to minimize duplicative information requests, and provisions regarding the treatment of proprietary trading information. Deadline.

"(2) Nothing in this section may be construed to limit or affect the exclusive jurisdiction of the Commodity Futures Trading Commission under the Commodity Exchange Act (7 U.S.C. 1 et seq.).

"(d) The Commission shall not require entities who have a de minimis market presence to comply with the reporting requirements of this section.

"(e)(1) Except as provided in paragraph (2), no person shall be subject to any civil penalty under this section with respect to any violation occurring more than 3 years before the date on which the person is provided notice of the proposed penalty under section 316A.

"(2) Paragraph (1) shall not apply in any case in which the Commission finds that a seller that has entered into a contract for the sale of electric energy at wholesale or transmission service subject to the jurisdiction of the Commission has engaged in fraudulent market manipulation activities materially affecting the contract in violation of section 222.

"(f) This section shall not apply to a transaction for the purchase or sale of wholesale electric energy or transmission services within the area described in section 212(k)(2)(A).".

SEC. 1282. FALSE STATEMENTS.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

"SEC. 221. PROHIBITION ON FILING FALSE INFORMATION. 16 USC 824u.

"No entity (including an entity described in section 201(f)) shall willfully and knowingly report any information relating to the price of electricity sold at wholesale or the availability of transmission capacity, which information the person or any other entity knew to be false at the time of the reporting, to a Federal agency with intent to fraudulently affect the data being compiled by the Federal agency.".

SEC. 1283. MARKET MANIPULATION.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

"SEC. 222. PROHIBITION OF ENERGY MARKET MANIPULATION. 16 USC 824v.

"(a) IN GENERAL.—It shall be unlawful for any entity (including an entity described in section 201(f)), directly or indirectly, to use or employ, in connection with the purchase or sale of electric energy or the purchase or sale of transmission services subject to the jurisdiction of the Commission, any manipulative or deceptive device or contrivance (as those terms are used in section 10(b) of the Securities Exchange Act of 1934 (15 U.S.C. 78j(b))), in contravention

of such rules and regulations as the Commission may prescribe as necessary or appropriate in the public interest or for the protection of electric ratepayers.

"(b) NO PRIVATE RIGHT OF ACTION.—Nothing in this section shall be construed to create a private right of action.".

SEC. 1284. ENFORCEMENT.

(a) COMPLAINTS.—Section 306 of the Federal Power Act (16 U.S.C. 825e) is amended—

(1) by inserting "electric utility," after "Any person,"; and

(2) by inserting ", transmitting utility," after "licensee" each place it appears.

(b) INVESTIGATIONS.—Section 307(a) of the Federal Power Act (16 U.S.C. 825f(a)) is amended—

(1) by inserting ", electric utility, transmitting utility, or other entity" after "person" each place it appears; and

(2) in the first sentence, by inserting before the period at the end the following: ", or in obtaining information about the sale of electric energy at wholesale in interstate commerce and the transmission of electric energy in interstate commerce".

(c) REVIEW OF COMMISSION ORDERS.—Section 313(a) of the Federal Power Act (16 U.S.C. 825l) is amended by inserting "electric utility," after "person," in the first 2 places it appears and by striking "any person unless such person" and inserting "any entity unless such entity".

(d) CRIMINAL PENALTIES.—Section 316 of the Federal Power Act (16 U.S.C. 825o) is amended—

(1) in subsection (a)—

(A) by striking "$5,000" and inserting "$1,000,000"; and

(B) by striking "two years" and inserting "5 years";

(2) in subsection (b), by striking "$500" and inserting "$25,000"; and

(3) by striking subsection (c).

(e) CIVIL PENALTIES.—Section 316A of the Federal Power Act (16 U.S.C. 825o–1) is amended—

(1) by striking "section 211, 212, 213, or 214" each place it appears and inserting "part II"; and

(2) in subsection (b), by striking "$10,000" and inserting "$1,000,000".

SEC. 1285. REFUND EFFECTIVE DATE.

Section 206(b) of the Federal Power Act (16 U.S.C. 824e(b)) is amended as follows:

(1) By striking "the date 60 days after the filing of such complaint nor later than 5 months after the expiration of such 60-day period" in the second sentence and inserting "the date of the filing of such complaint nor later than 5 months after the filing of such complaint".

(2) By striking "60 days after" in the third sentence and inserting "of".

(3) By striking "expiration of such 60-day period" in the third sentence and inserting "publication date".

(4) By striking the fifth sentence and inserting the following: "If no final decision is rendered by the conclusion of the 180-day period commencing upon initiation of a proceeding pursuant to this section, the Commission shall state the reasons

why it has failed to do so and shall state its best estimate as to when it reasonably expects to make such decision.".

SEC. 1286. REFUND AUTHORITY.

Section 206 of the Federal Power Act (16 U.S.C. 824e) is amended by adding at the end the following:

"(e)(1) In this subsection:

"(A) The term 'short-term sale' means an agreement for the sale of electric energy at wholesale in interstate commerce that is for a period of 31 days or less (excluding monthly contracts subject to automatic renewal).

"(B) The term 'applicable Commission rule' means a Commission rule applicable to sales at wholesale by public utilities that the Commission determines after notice and comment should also be applicable to entities subject to this subsection.

"(2) If an entity described in section 201(f) voluntarily makes a short-term sale of electric energy through an organized market in which the rates for the sale are established by Commission-approved tariff (rather than by contract) and the sale violates the terms of the tariff or applicable Commission rules in effect at the time of the sale, the entity shall be subject to the refund authority of the Commission under this section with respect to the violation.

"(3) This section shall not apply to—

"(A) any entity that sells in total (including affiliates of the entity) less than 8,000,000 megawatt hours of electricity per year; or

"(B) an electric cooperative.

"(4)(A) The Commission shall have refund authority under paragraph (2) with respect to a voluntary short term sale of electric energy by the Bonneville Power Administration only if the sale is at an unjust and unreasonable rate.

"(B) The Commission may order a refund under subparagraph (A) only for short-term sales made by the Bonneville Power Administration at rates that are higher than the highest just and reasonable rate charged by any other entity for a short-term sale of electric energy in the same geographic market for the same, or most nearly comparable, period as the sale by the Bonneville Power Administration.

"(C) In the case of any Federal power marketing agency or the Tennessee Valley Authority, the Commission shall not assert or exercise any regulatory authority or power under paragraph (2) other than the ordering of refunds to achieve a just and reasonable rate.".

SEC. 1287. CONSUMER PRIVACY AND UNFAIR TRADE PRACTICES. 42 USC 16471.

(a) PRIVACY.—The Federal Trade Commission may issue rules protecting the privacy of electric consumers from the disclosure of consumer information obtained in connection with the sale or delivery of electric energy to electric consumers.

(b) SLAMMING.—The Federal Trade Commission may issue rules prohibiting the change of selection of an electric utility except with the informed consent of the electric consumer or if approved by the appropriate State regulatory authority.

(c) CRAMMING.—The Federal Trade Commission may issue rules prohibiting the sale of goods and services to an electric consumer unless expressly authorized by law or the electric consumer.

(d) RULEMAKING.—The Federal Trade Commission shall proceed in accordance with section 553 of title 5, United States Code, when prescribing a rule under this section.

(e) STATE AUTHORITY.—If the Federal Trade Commission determines that a State's regulations provide equivalent or greater protection than the provisions of this section, such State regulations shall apply in that State in lieu of the regulations issued by the Commission under this section.

(f) DEFINITIONS.—For purposes of this section:

(1) STATE REGULATORY AUTHORITY.—The term "State regulatory authority" has the meaning given that term in section 3(21) of the Federal Power Act (16 U.S.C. 796(21)).

(2) ELECTRIC CONSUMER AND ELECTRIC UTILITY.—The terms "electric consumer" and "electric utility" have the meanings given those terms in section 3 of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2602).

SEC. 1288. AUTHORITY OF COURT TO PROHIBIT INDIVIDUALS FROM SERVING AS OFFICERS, DIRECTORS, AND ENERGY TRADERS.

Section 314 of the Federal Power Act (16 U.S.C. 825m) is amended by adding at the end the following:

"(d) In any proceedings under subsection (a), the court may prohibit, conditionally or unconditionally, and permanently or for such period of time as the court determines, any individual who is engaged or has engaged in practices constituting a violation of section 221 (and related rules and regulations) from—

"(1) acting as an officer or director of an electric utility; or

"(2) engaging in the business of purchasing or selling—

"(A) electric energy; or

"(B) transmission services subject to the jurisdiction of the Commission.".

SEC. 1289. MERGER REVIEW REFORM.

(a) IN GENERAL.—Section 203(a) of the Federal Power Act (16 U.S.C. 824b(a)) is amended to read as follows:

"(a)(1) No public utility shall, without first having secured an order of the Commission authorizing it to do so—

"(A) sell, lease, or otherwise dispose of the whole of its facilities subject to the jurisdiction of the Commission, or any part thereof of a value in excess of $10,000,000;

"(B) merge or consolidate, directly or indirectly, such facilities or any part thereof with those of any other person, by any means whatsoever;

"(C) purchase, acquire, or take any security with a value in excess of $10,000,000 of any other public utility; or

"(D) purchase, lease, or otherwise acquire an existing generation facility—

"(i) that has a value in excess of $10,000,000; and

"(ii) that is used for interstate wholesale sales and over which the Commission has jurisdiction for ratemaking purposes.

"(2) No holding company in a holding company system that includes a transmitting utility or an electric utility shall purchase, acquire, or take any security with a value in excess

of $10,000,000 of, or, by any means whatsoever, directly or indirectly, merge or consolidate with, a transmitting utility, an electric utility company, or a holding company in a holding company system that includes a transmitting utility, or an electric utility company, with a value in excess of $10,000,000 without first having secured an order of the Commission authorizing it to do so.

"(3) Upon receipt of an application for such approval the Commission shall give reasonable notice in writing to the Governor and State commission of each of the States in which the physical property affected, or any part thereof, is situated, and to such other persons as it may deem advisable. Notice.

"(4) After notice and opportunity for hearing, the Commission shall approve the proposed disposition, consolidation, acquisition, or change in control, if it finds that the proposed transaction will be consistent with the public interest, and will not result in cross-subsidization of a non-utility associate company or the pledge or encumbrance of utility assets for the benefit of an associate company, unless the Commission determines that the cross-subsidization, pledge, or encumbrance will be consistent with the public interest.

"(5) The Commission shall, by rule, adopt procedures for the expeditious consideration of applications for the approval of dispositions, consolidations, or acquisitions, under this section. Such rules shall identify classes of transactions, or specify criteria for transactions, that normally meet the standards established in paragraph (4). The Commission shall provide expedited review for such transactions. The Commission shall grant or deny any other application for approval of a transaction not later than 180 days after the application is filed. If the Commission does not act within 180 days, such application shall be deemed granted unless the Commission finds, based on good cause, that further consideration is required to determine whether the proposed transaction meets the standards of paragraph (4) and issues an order tolling the time for acting on the application for not more than 180 days, at the end of which additional period the Commission shall grant or deny the application. Regulations. Procedures. Deadlines.

"(6) For purposes of this subsection, the terms 'associate company', 'holding company', and 'holding company system' have the meaning given those terms in the Public Utility Holding Company Act of 2005.".

(b) EFFECTIVE DATE.—The amendments made by this section shall take effect 6 months after the date of enactment of this Act. 16 USC 824b note.

(c) TRANSITION PROVISION.—The amendments made by subsection (a) shall not apply to any application under section 203 of the Federal Power Act (16 U.S.C. 824b) that was filed on or before the date of enactment of this Act.

SEC. 1290. RELIEF FOR EXTRAORDINARY VIOLATIONS.

(a) APPLICATION.—This section applies to any contract entered into the Western Interconnection prior to June 20, 2001, with a seller of wholesale electricity that the Commission has—

(1) found to have manipulated the electricity market resulting in unjust and unreasonable rates; and

(2) revoked the seller's authority to sell any electricity at market-based rates.

(b) RELIEF.—Notwithstanding section 222 of the Federal Power Act (as added by section 1262), any provision of title 11, United States Code, or any other provision of law, in the case of a contract described in subsection (a), the Commission shall have exclusive jurisdiction under the Federal Power Act (16 U.S.C. 791a et seq.) to determine whether a requirement to make termination payments for power not delivered by the seller, or any successor in interest of the seller, is not permitted under a rate schedule (or contract under such a schedule) or is otherwise unlawful on the grounds that the contract is unjust and unreasonable or contrary to the public interest.

(c) APPLICABILITY.—This section applies to any proceeding pending on the date of enactment of this section involving a seller described in subsection (a) in which there is not a final, nonappealable order by the Commission or any other jurisdiction determining the respective rights of the seller.

Subtitle H—Definitions

SEC. 1291. DEFINITIONS.

42 USC 16481.

(a) COMMISSION.—In this title, the term "Commission" means the Federal Energy Regulatory Commission.

(b) AMENDMENT.—Section 3 of the Federal Power Act (16 U.S.C. 796) is amended—

(1) by striking paragraphs (22) and (23) and inserting the following:

"(22) ELECTRIC UTILITY.—(A) The term 'electric utility' means a person or Federal or State agency (including an entity described in section 201(f)) that sells electric energy.

"(B) The term 'electric utility' includes the Tennessee Valley Authority and each Federal power marketing administration.

"(23) TRANSMITTING UTILITY.—The term 'transmitting utility' means an entity (including an entity described in section 201(f)) that owns, operates, or controls facilities used for the transmission of electric energy—

"(A) in interstate commerce;

"(B) for the sale of electric energy at wholesale."; and

(2) by adding at the end the following:

"(26) ELECTRIC COOPERATIVE.—The term 'electric cooperative' means a cooperatively owned electric utility.

"(27) RTO.—The term 'Regional Transmission Organization' or 'RTO' means an entity of sufficient regional scope approved by the Commission—

"(A) to exercise operational or functional control of facilities used for the transmission of electric energy in interstate commerce; and

"(B) to ensure nondiscriminatory access to the facilities.

"(28) ISO.—The term 'Independent System Operator' or 'ISO' means an entity approved by the Commission—

"(A) to exercise operational or functional control of facilities used for the transmission of electric energy in interstate commerce; and

"(B) to ensure nondiscriminatory access to the facilities.

"(29) TRANSMISSION ORGANIZATION.—The term 'Transmission Organization' means a Regional Transmission Organization, Independent System Operator, independent transmission provider, or other transmission organization finally approved by the Commission for the operation of transmission facilities.".

(c) APPLICABILITY.—Section 201(f) of the Federal Power Act (16 U.S.C. 824(f)) is amended by striking "political subdivision of a state," and inserting "political subdivision of a State, an electric cooperative that receives financing under the Rural Electrification Act of 1936 (7 U.S.C. 901 et seq.) or that sells less than 4,000,000 megawatt hours of electricity per year,".

Subtitle I—Technical and Conforming Amendments

SEC. 1295. CONFORMING AMENDMENTS.

(a) Section 201 of the Federal Power Act (16 U.S.C. 824) is amended—

(1) in subsection (b)(2)—

(A) in the first sentence—

(i) by striking "The" and inserting "Notwithstanding section 201(f), the"; and

(ii) by striking "210, 211, and 212" and inserting "203(a)(2), 206(e), 210, 211, 211A, 212, 215, 216, 217, 218, 219, 220, 221, and 222"; and

(B) in the second sentence—

(i) by inserting "or rule" after "any order"; and

(ii) by striking "210 or 211" and inserting "203(a)(2), 206(e), 210, 211, 211A, 212, 215, 216, 217, 218, 219, 220, 221, or 222"; and

(2) in subsection (e), by striking "210, 211, or 212" and inserting "206(e), 206(f), 210, 211, 211A, 212, 215, 216, 217, 218, 219, 220, 221, or 222".

(b) Section 206 of the Federal Power Act (16 U.S.C. 824e) is amended—

(1) in the first sentence of subsection (a), by striking "hearing had" and inserting "hearing held"; and

(2) in the seventh sentence of subsection (b), by striking "the public utility to make".

(c) Section 211 of the Federal Power Act (16 U.S.C. 824j) is amended—

(1) in subsection (c)—

(A) by striking "(2)";

(B) by striking "(A)" and inserting "(1)"

(C) by striking "(B)" and inserting "(2)"; and

(D) by striking "termination of modification" and inserting "termination or modification"; and

(2) in the second sentence of subsection (d)(1), by striking "electric utility" the second place it appears and inserting "transmitting utility".

(d) Section 315(c) of the Federal Power Act (16 U.S.C. 825n(c)) is amended by striking "subsection" and inserting "section".

Subtitle J—Economic Dispatch

SEC. 1298. ECONOMIC DISPATCH.

Part II of the Federal Power Act (16 U.S.C. 824 et seq.) is amended by adding at the end the following:

16 USC 824w.

"SEC. 223. JOINT BOARDS ON ECONOMIC DISPATCH.

Establishment.

"(a) IN GENERAL.—The Commission shall convene joint boards on a regional basis pursuant to section 209 of this Act to study the issue of security constrained economic dispatch for the various market regions. The Commission shall designate the appropriate regions to be covered by each such joint board for purposes of this section.

"(b) MEMBERSHIP.—The Commission shall request each State to nominate a representative for the appropriate regional joint board, and shall designate a member of the Commission to chair and participate as a member of each such board.

"(c) POWERS.—The sole authority of each joint board convened under this section shall be to consider issues relevant to what constitutes 'security constrained economic dispatch' and how such a mode of operating an electric energy system affects or enhances the reliability and affordability of service to customers in the region concerned and to make recommendations to the Commission regarding such issues.

"(d) REPORT TO THE CONGRESS.—Within 1 year after enactment of this section, the Commission shall issue a report and submit such report to the Congress regarding the recommendations of the joint boards under this section and the Commission may consolidate the recommendations of more than one such regional joint board, including any consensus recommendations for statutory or regulatory reform.".

Energy Tax Incentives Act of 2005.

TITLE XIII—ENERGY POLICY TAX INCENTIVES

SEC. 1300. SHORT TITLE; AMENDMENT OF 1986 CODE.

26 USC 1 note.

(a) SHORT TITLE.—This title may be cited as the "Energy Tax Incentives Act of 2005".

26 USC 1 *et seq.*

(b) AMENDMENT OF 1986 CODE.—Except as otherwise expressly provided, whenever in this title an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or other provision of the Internal Revenue Code of 1986.

Subtitle A—Electricity Infrastructure

SEC. 1301. EXTENSION AND MODIFICATION OF RENEWABLE ELECTRICITY PRODUCTION CREDIT.

26 USC 45.

(a) 2-YEAR EXTENSION FOR CERTAIN FACILITIES.—Section 45(d) (relating to qualified facilities) is amended—

(1) by striking "January 1, 2006" each place it appears in paragraphs (1), (2), (3), (5), (6), and (7) and inserting "January 1, 2008", and

(2) by striking "January 1, 2006" in paragraph (4) and inserting "January 1, 2008 (January 1, 2006, in the case of a facility using solar energy)".

(b) INCREASE IN CREDIT PERIOD.—Section 45(b)(4)(B) (relating to credit period) is amended— 26 USC 45.

(1) by inserting "or clause (iii)" after "clause (ii)" in clause (i), and

(2) by adding at the end the following:

"(iii) TERMINATION.—Clause (i) shall not apply to any facility placed in service after the date of the enactment of this clause.".

(c) EXPANSION OF QUALIFIED RESOURCES TO CERTAIN HYDROPOWER.—

(1) IN GENERAL.—Section 45(c)(1) (defining qualified energy resources) is amended by striking "and" at the end of subparagraph (F), by striking the period at the end of subparagraph (G) and inserting ", and", and by adding at the end the following new subparagraph:

"(H) qualified hydropower production.".

(2) CREDIT RATE.—Section 45(b)(4)(A) (relating to credit rate) is amended by striking "or (7)" and inserting "(7), or (9)".

(3) DEFINITION OF RESOURCES.—Section 45(c) (relating to qualified energy resources and refined coal) is amended by adding at the end the following new paragraph:

"(8) QUALIFIED HYDROPOWER PRODUCTION.—

"(A) IN GENERAL.—The term 'qualified hydropower production' means—

"(i) in the case of any hydroelectric dam which was placed in service on or before the date of the enactment of this paragraph, the incremental hydropower production for the taxable year, and

"(ii) in the case of any nonhydroelectric dam described in subparagraph (C), the hydropower production from the facility for the taxable year.

"(B) DETERMINATION OF INCREMENTAL HYDROPOWER PRODUCTION.—

"(i) IN GENERAL.—For purposes of subparagraph (A), incremental hydropower production for any taxable year shall be equal to the percentage of average annual hydropower production at the facility attributable to the efficiency improvements or additions of capacity placed in service after the date of the enactment of this paragraph, determined by using the same water flow information used to determine an historic average annual hydropower production baseline for such facility. Such percentage and baseline shall be certified by the Federal Energy Regulatory Commission.

"(ii) OPERATIONAL CHANGES DISREGARDED.—For purposes of clause (i), the determination of incremental hydropower production shall not be based on any operational changes at such facility not directly associated with the efficiency improvements or additions of capacity.

"(C) NONHYDROELECTRIC DAM.—For purposes of subparagraph (A), a facility is described in this subparagraph if—

"(i) the facility is licensed by the Federal Energy Regulatory Commission and meets all other applicable environmental, licensing, and regulatory requirements,

"(ii) the facility was placed in service before the date of the enactment of this paragraph and did not produce hydroelectric power on the date of the enactment of this paragraph, and

"(iii) turbines or other generating devices are to be added to the facility after such date to produce hydroelectric power, but only if there is not any enlargement of the diversion structure, or construction or enlargement of a bypass channel, or the impoundment or any withholding of any additional water from the natural stream channel.".

26 USC 45.

(4) FACILITIES.—Section 45(d) (relating to qualified facilities) is amended by adding at the end the following new paragraph:

"(9) QUALIFIED HYDROPOWER FACILITY.—In the case of a facility producing qualified hydroelectric production described in subsection (c)(8), the term 'qualified facility' means—

"(A) in the case of any facility producing incremental hydropower production, such facility but only to the extent of its incremental hydropower production attributable to efficiency improvements or additions to capacity described in subsection (c)(8)(B) placed in service after the date of the enactment of this paragraph and before January 1, 2008, and

"(B) any other facility placed in service after the date of the enactment of this paragraph and before January 1, 2008.

"(C) CREDIT PERIOD.—In the case of a qualified facility described in subparagraph (A), the 10-year period referred to in subsection (a) shall be treated as beginning on the date the efficiency improvements or additions to capacity are placed in service.".

(d) INDIAN COAL.—

(1) PRODUCTION FACILITIES.—Subsection (e) of section 45 (relating to definitions and special rules) is amended by adding at the end the following new paragraph:

"(10) INDIAN COAL PRODUCTION FACILITIES.—

"(A) DETERMINATION OF CREDIT AMOUNT.—In the case of a producer of Indian coal, the credit determined under this section (without regard to this paragraph) for any taxable year shall be increased by an amount equal to the applicable dollar amount per ton of Indian coal—

"(i) produced by the taxpayer at an Indian coal production facility during the 7-year period beginning on January 1, 2006, and

"(ii) sold by the taxpayer—

"(I) to an unrelated person, and

"(II) during such 7-year period and such taxable year.

"(B) APPLICABLE DOLLAR AMOUNT.—

"(i) IN GENERAL.—The term 'applicable dollar amount' for any taxable year beginning in a calendar year means—

"(I) $1.50 in the case of calendar years 2006 through 2009, and

"(II) $2.00 in the case of calendar years beginning after 2009.

"(ii) INFLATION ADJUSTMENT.—In the case of any calendar year after 2006, each of the dollar amounts under clause (i) shall be equal to the product of such dollar amount and the inflation adjustment factor determined under paragraph (2)(B) for the calendar year, except that such paragraph shall be applied by substituting '2005' for '1992'.

"(C) APPLICATION OF RULES.—Rules similar to the rules of the subsection (b)(3) and paragraphs (1), (3), (4), and (5) of this subsection shall apply for purposes of determining the amount of any increase under this paragraph.

"(D) TREATMENT AS SPECIFIED CREDIT.—The increase in the credit determined under subsection (a) by reason of this paragraph with respect to any facility shall be treated as a specified credit for purposes of section 38(c)(4)(A) during the 4-year period beginning on the later of January 1, 2006, or the date on which such facility is placed in service by the taxpayer.". Effective date.

(2) RESOURCE.—Subsection (c) of section 45 (relating to qualified energy resources and refined coal), as amended by this Act, is amended by adding at the end the following new paragraph: 26 USC 45.

"(9) INDIAN COAL.—

"(A) IN GENERAL.—The term 'Indian coal' means coal which is produced from coal reserves which, on June 14, 2005—

"(i) were owned by an Indian tribe, or

"(ii) were held in trust by the United States for the benefit of an Indian tribe or its members.

"(B) INDIAN TRIBE.—For purposes of this paragraph, the term 'Indian tribe' has the meaning given such term by section 7871(c)(3)(E)(ii).".

(3) INDIAN COAL PRODUCTION FACILITY.—Subsection (d) of section 45, as amended by this Act, is amended by adding at the end the following new paragraph:

"(10) INDIAN COAL PRODUCTION FACILITY.—The term 'Indian coal production facility' means a facility which is placed in service before January 1, 2009.".

(4) CONFORMING AMENDMENT.—The heading for section 45(c) is amended by striking "QUALIFIED ENERGY RESOURCES AND REFINED COAL" and inserting "RESOURCES".

(e) TECHNICAL AMENDMENT RELATED TO TRASH COMBUSTION FACILITIES.—Section 45(d)(7) (relating to trash combustion facilities) is amended by adding at the end the following: "Such term shall include a new unit placed in service in connection with a facility placed in service on or before the date of the enactment of this paragraph, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit.".

(f) ADDITIONAL TECHNICAL AMENDMENTS RELATED TO SECTION 710 OF THE AMERICAN JOBS CREATION ACT OF 2004.—

(1) Clause (ii) of section 45(b)(4)(B) is amended by striking "the date of the enactment of this Act" and inserting "January 1, 2005,".

26 USC 45.

(2) Clause (ii) of section 45(c)(3)(A) is amended by inserting "or any nonhazardous lignin waste material" after "cellulosic waste material".

(3) Subsection (e) of section 45 is amended by striking paragraph (6).

(4)(A) Paragraph (9) of section 45(e) is amended to read as follows:

"(9) COORDINATION WITH CREDIT FOR PRODUCING FUEL FROM A NONCONVENTIONAL SOURCE.—

"(A) IN GENERAL.—The term 'qualified facility' shall not include any facility which produces electricity from gas derived from the biodegradation of municipal solid waste if such biodegradation occurred in a facility (within the meaning of section 29) the production from which is allowed as a credit under section 29 for the taxable year or any prior taxable year.

"(B) REFINED COAL FACILITIES.—The term 'refined coal production facility' shall not include any facility the production from which is allowed as a credit under section 29 for the taxable year or any prior taxable year.".

(B) Subparagraph (C) of section 45(e)(8) is amended by striking "and (9)".

26 USC 168.

(5) Subclause (I) of section 168(e)(3)(B)(vi) is amended to read as follows:

"(I) is described in subparagraph (A) of section 48(a)(3) (or would be so described if 'solar and wind' were substituted for 'solar' in clause (i) thereof and the last sentence of such section did not apply to such subparagraph),".

26 USC 45 note.

(6) Paragraph (4) of section 710(g) of the American Jobs Creation Act of 2004 is amended by striking "January 1, 2004" and inserting "January 1, 2005".

26 USC 45 note.

(g) EFFECTIVE DATES.—

(1) IN GENERAL.—Except as provided in paragraph (2), the amendments made by this section shall take effect of the date of the enactment of this Act.

(2) TECHNICAL AMENDMENTS.—The amendments made by subsections (e) and (f) shall take effect as if included in the amendments made by section 710 of the American Jobs Creation Act of 2004.

SEC. 1302. APPLICATION OF SECTION 45 CREDIT TO AGRICULTURAL COOPERATIVES.

(a) IN GENERAL.—Section 45(e) (relating to definitions and special rules), as amended by this Act, is amended by adding at the end the following:

"(11) ALLOCATION OF CREDIT TO PATRONS OF AGRICULTURAL COOPERATIVE.—

"(A) ELECTION TO ALLOCATE.—

"(i) IN GENERAL.—In the case of an eligible cooperative organization, any portion of the credit determined under subsection (a) for the taxable year may, at the election of the organization, be apportioned among patrons of the organization on the basis of the amount of business done by the patrons during the taxable year.

"(ii) FORM AND EFFECT OF ELECTION.—An election under clause (i) for any taxable year shall be made on a timely filed return for such year. Such election, once made, shall be irrevocable for such taxable year. Such election shall not take effect unless the organization designates the apportionment as such in a written notice mailed to its patrons during the payment period described in section 1382(d).

"(B) TREATMENT OF ORGANIZATIONS AND PATRONS.—The amount of the credit apportioned to any patrons under subparagraph (A)—

"(i) shall not be included in the amount determined under subsection (a) with respect to the organization for the taxable year, and

"(ii) shall be included in the amount determined under subsection (a) for the first taxable year of each patron ending on or after the last day of the payment period (as defined in section 1382(d)) for the taxable year of the organization or, if earlier, for the taxable year of each patron ending on or after the date on which the patron receives notice from the cooperative of the apportionment.

"(C) SPECIAL RULES FOR DECREASE IN CREDITS FOR TAXABLE YEAR.—If the amount of the credit of a cooperative organization determined under subsection (a) for a taxable year is less than the amount of such credit shown on the return of the cooperative organization for such year, an amount equal to the excess of—

"(i) such reduction, over

"(ii) the amount not apportioned to such patrons under subparagraph (A) for the taxable year,

shall be treated as an increase in tax imposed by this chapter on the organization. Such increase shall not be treated as tax imposed by this chapter for purposes of determining the amount of any credit under this chapter.

"(D) ELIGIBLE COOPERATIVE DEFINED.—For purposes of this section the term 'eligible cooperative' means a cooperative organization described in section 1381(a) which is owned more than 50 percent by agricultural producers or by entities owned by agricultural producers. For this purpose an entity owned by an agricultural producer is one that is more than 50 percent owned by agricultural producers.".

(b) CONFORMING AMENDMENT.—The last sentence of section 55(c)(1) is amended by inserting "45(e)(11)(C)," after "section". 26 USC 55.

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to taxable years of cooperative organizations ending after the date of the enactment of this Act. 26 USC 45 note.

SEC. 1303. CLEAN RENEWABLE ENERGY BONDS.

(a) IN GENERAL.—Part IV of subchapter A of chapter 1 (relating to credits against tax) is amended by adding at the end the following new subpart:

"Subpart H—Nonrefundable Credit to Holders of Certain Bonds

"Sec. 54. Credit to holders of clean renewable energy bonds.

"SEC. 54. CREDIT TO HOLDERS OF CLEAN RENEWABLE ENERGY BONDS.

"(a) ALLOWANCE OF CREDIT.—If a taxpayer holds a clean renewable energy bond on one or more credit allowance dates of the bond occurring during any taxable year, there shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to the sum of the credits determined under subsection (b) with respect to such dates.

"(b) AMOUNT OF CREDIT.—

"(1) IN GENERAL.—The amount of the credit determined under this subsection with respect to any credit allowance date for a clean renewable energy bond is 25 percent of the annual credit determined with respect to such bond.

"(2) ANNUAL CREDIT.—The annual credit determined with respect to any clean renewable energy bond is the product of—

"(A) the credit rate determined by the Secretary under paragraph (3) for the day on which such bond was sold, multiplied by

"(B) the outstanding face amount of the bond.

"(3) DETERMINATION.—For purposes of paragraph (2), with respect to any clean renewable energy bond, the Secretary shall determine daily or cause to be determined daily a credit rate which shall apply to the first day on which there is a binding, written contract for the sale or exchange of the bond. The credit rate for any day is the credit rate which the Secretary or the Secretary's designee estimates will permit the issuance of clean renewable energy bonds with a specified maturity or redemption date without discount and without interest cost to the qualified issuer.

"(4) CREDIT ALLOWANCE DATE.—For purposes of this section, the term 'credit allowance date' means—

"(A) March 15,

"(B) June 15,

"(C) September 15, and

"(D) December 15.

Such term also includes the last day on which the bond is outstanding.

"(5) SPECIAL RULE FOR ISSUANCE AND REDEMPTION.—In the case of a bond which is issued during the 3-month period ending on a credit allowance date, the amount of the credit determined under this subsection with respect to such credit allowance date shall be a ratable portion of the credit otherwise determined based on the portion of the 3-month period during which the bond is outstanding. A similar rule shall apply when the bond is redeemed or matures.

"(c) LIMITATION BASED ON AMOUNT OF TAX.—The credit allowed under subsection (a) for any taxable year shall not exceed the excess of—

"(1) the sum of the regular tax liability (as defined in section 26(b)) plus the tax imposed by section 55, over

"(2) the sum of the credits allowable under this part (other than subpart C and this section).

"(d) CLEAN RENEWABLE ENERGY BOND.—For purposes of this section—

"(1) IN GENERAL.—The term 'clean renewable energy bond' means any bond issued as part of an issue if—

"(A) the bond is issued by a qualified issuer pursuant to an allocation by the Secretary to such issuer of a portion of the national clean renewable energy bond limitation under subsection (f)(2),

"(B) 95 percent or more of the proceeds of such issue are to be used for capital expenditures incurred by qualified borrowers for one or more qualified projects,

"(C) the qualified issuer designates such bond for purposes of this section and the bond is in registered form, and

"(D) the issue meets the requirements of subsection (h).

"(2) QUALIFIED PROJECT; SPECIAL USE RULES.—

"(A) IN GENERAL.—The term 'qualified project' means any qualified facility (as determined under section 45(d) without regard to paragraph (10) and to any placed in service date) owned by a qualified borrower.

"(B) REFINANCING RULES.—For purposes of paragraph (1)(B), a qualified project may be refinanced with proceeds of a clean renewable energy bond only if the indebtedness being refinanced (including any obligation directly or indirectly refinanced by such indebtedness) was originally incurred by a qualified borrower after the date of the enactment of this section.

"(C) REIMBURSEMENT.—For purposes of paragraph (1)(B), a clean renewable energy bond may be issued to reimburse a qualified borrower for amounts paid after the date of the enactment of this section with respect to a qualified project, but only if— Deadlines.

"(i) prior to the payment of the original expenditure, the qualified borrower declared its intent to reimburse such expenditure with the proceeds of a clean renewable energy bond,

"(ii) not later than 60 days after payment of the original expenditure, the qualified issuer adopts an official intent to reimburse the original expenditure with such proceeds, and

"(iii) the reimbursement is made not later than 18 months after the date the original expenditure is paid.

"(D) TREATMENT OF CHANGES IN USE.—For purposes of paragraph (1)(B), the proceeds of an issue shall not be treated as used for a qualified project to the extent that a qualified borrower or qualified issuer takes any action within its control which causes such proceeds not to be used for a qualified project. The Secretary shall prescribe regulations specifying remedial actions that may be taken (including conditions to taking such remedial actions) to prevent an action described in the preceding sentence from causing a bond to fail to be a clean renewable energy bond.

"(e) MATURITY LIMITATIONS.—

"(1) DURATION OF TERM.—A bond shall not be treated as a clean renewable energy bond if the maturity of such bond exceeds the maximum term determined by the Secretary under paragraph (2) with respect to such bond.

"(2) MAXIMUM TERM.—During each calendar month, the Secretary shall determine the maximum term permitted under this paragraph for bonds issued during the following calendar month. Such maximum term shall be the term which the Secretary estimates will result in the present value of the obligation to repay the principal on the bond being equal to 50 percent of the face amount of such bond. Such present value shall be determined without regard to the requirements of subsection (l)(6) and using as a discount rate the average annual interest rate of tax-exempt obligations having a term of 10 years or more which are issued during the month. If the term as so determined is not a multiple of a whole year, such term shall be rounded to the next highest whole year.

"(f) LIMITATION ON AMOUNT OF BONDS DESIGNATED.—

"(1) NATIONAL LIMITATION.—There is a national clean renewable energy bond limitation of $800,000,000.

"(2) ALLOCATION BY SECRETARY.—The Secretary shall allocate the amount described in paragraph (1) among qualified projects in such manner as the Secretary determines appropriate, except that the Secretary may not allocate more than $500,000,000 of the national clean renewable energy bond limitation to finance qualified projects of qualified borrowers which are governmental bodies.

"(g) CREDIT INCLUDED IN GROSS INCOME.—Gross income includes the amount of the credit allowed to the taxpayer under this section (determined without regard to subsection (c)) and the amount so included shall be treated as interest income.

"(h) SPECIAL RULES RELATING TO EXPENDITURES.—

"(1) IN GENERAL.—An issue shall be treated as meeting the requirements of this subsection if, as of the date of issuance, the qualified issuer reasonably expects—

"(A) at least 95 percent of the proceeds of such issue are to be spent for one or more qualified projects within the 5-year period beginning on the date of issuance of the clean energy bond,

"(B) a binding commitment with a third party to spend at least 10 percent of the proceeds of such issue will be incurred within the 6-month period beginning on the date of issuance of the clean energy bond or, in the case of a clean energy bond the proceeds of which are to be loaned to two or more qualified borrowers, such binding commitment will be incurred within the 6-month period beginning on the date of the loan of such proceeds to a qualified borrower, and

"(C) such projects will be completed with due diligence and the proceeds of such issue will be spent with due diligence.

"(2) EXTENSION OF PERIOD.—Upon submission of a request prior to the expiration of the period described in paragraph (1)(A), the Secretary may extend such period if the qualified

issuer establishes that the failure to satisfy the 5-year requirement is due to reasonable cause and the related projects will continue to proceed with due diligence.

"(3) FAILURE TO SPEND REQUIRED AMOUNT OF BOND PROCEEDS WITHIN 5 YEARS.—To the extent that less than 95 percent of the proceeds of such issue are expended by the close of the 5-year period beginning on the date of issuance (or if an extension has been obtained under paragraph (2), by the close of the extended period), the qualified issuer shall redeem all of the nonqualified bonds within 90 days after the end of such period. For purposes of this paragraph, the amount of the nonqualified bonds required to be redeemed shall be determined in the same manner as under section 142.

"(i) SPECIAL RULES RELATING TO ARBITRAGE.—A bond which is part of an issue shall not be treated as a clean renewable energy bond unless, with respect to the issue of which the bond is a part, the qualified issuer satisfies the arbitrage requirements of section 148 with respect to proceeds of the issue.

"(j) COOPERATIVE ELECTRIC COMPANY; QUALIFIED ENERGY TAX CREDIT BOND LENDER; GOVERNMENTAL BODY; QUALIFIED BORROWER.—For purposes of this section—

"(1) COOPERATIVE ELECTRIC COMPANY.—The term 'cooperative electric company' means a mutual or cooperative electric company described in section 501(c)(12) or section 1381(a)(2)(C), or a not-for-profit electric utility which has received a loan or loan guarantee under the Rural Electrification Act.

"(2) CLEAN RENEWABLE ENERGY BOND LENDER.—The term 'clean renewable energy bond lender' means a lender which is a cooperative which is owned by, or has outstanding loans to, 100 or more cooperative electric companies and is in existence on February 1, 2002, and shall include any affiliated entity which is controlled by such lender.

"(3) GOVERNMENTAL BODY.—The term 'governmental body' means any State, territory, possession of the United States, the District of Columbia, Indian tribal government, and any political subdivision thereof.

"(4) QUALIFIED ISSUER.—The term 'qualified issuer' means—

"(A) a clean renewable energy bond lender,

"(B) a cooperative electric company, or

"(C) a governmental body.

"(5) QUALIFIED BORROWER.—The term 'qualified borrower' means—

"(A) a mutual or cooperative electric company described in section 501(c)(12) or 1381(a)(2)(C), or

"(B) a governmental body.

"(k) SPECIAL RULES RELATING TO POOL BONDS.—No portion of a pooled financing bond may be allocable to any loan unless the borrower has entered into a written loan commitment for such portion prior to the issue date of such issue.

"(l) OTHER DEFINITIONS AND SPECIAL RULES.—For purposes of this section—

"(1) BOND.—The term 'bond' includes any obligation.

"(2) POOLED FINANCING BOND.—The term 'pooled financing bond' shall have the meaning given such term by section 149(f)(4)(A).

Applicability.

"(3) PARTNERSHIP; S CORPORATION; AND OTHER PASS-THRU ENTITIES.—

Regulations.

"(A) IN GENERAL.—Under regulations prescribed by the Secretary, in the case of a partnership, trust, S corporation, or other pass-thru entity, rules similar to the rules of section 41(g) shall apply with respect to the credit allowable under subsection (a).

"(B) NO BASIS ADJUSTMENT.—In the case of a bond held by a partnership or an S corporation, rules similar to the rules under section 1397E(i) shall apply.

Procedures.

"(4) BONDS HELD BY REGULATED INVESTMENT COMPANIES.—If any clean renewable energy bond is held by a regulated investment company, the credit determined under subsection (a) shall be allowed to shareholders of such company under procedures prescribed by the Secretary.

"(5) TREATMENT FOR ESTIMATED TAX PURPOSES.—Solely for purposes of sections 6654 and 6655, the credit allowed by this section (determined without regard to subsection (c)) to a taxpayer by reason of holding a clean renewable energy bond on a credit allowance date shall be treated as if it were a payment of estimated tax made by the taxpayer on such date.

"(6) RATABLE PRINCIPAL AMORTIZATION REQUIRED.—A bond shall not be treated as a clean renewable energy bond unless it is part of an issue which provides for an equal amount of principal to be paid by the qualified issuer during each calendar year that the issue is outstanding.

"(7) REPORTING.—Issuers of clean renewable energy bonds shall submit reports similar to the reports required under section 149(e).

"(m) TERMINATION.—This section shall not apply with respect to any bond issued after December 31, 2007.".

(b) REPORTING.—Subsection (d) of section 6049 (relating to returns regarding payments of interest) is amended by adding at the end the following new paragraph:

"(8) REPORTING OF CREDIT ON CLEAN RENEWABLE ENERGY BONDS.—

"(A) IN GENERAL.—For purposes of subsection (a), the term 'interest' includes amounts includible in gross income under section 54(g) and such amounts shall be treated as paid on the credit allowance date (as defined in section 54(b)(4)).

"(B) REPORTING TO CORPORATIONS, ETC.—Except as otherwise provided in regulations, in the case of any interest described in subparagraph (A), subsection (b)(4) shall be applied without regard to subparagraphs (A), (H), (I), (J), (K), and (L)(i) of such subsection.

"(C) REGULATORY AUTHORITY.—The Secretary may prescribe such regulations as are necessary or appropriate to carry out the purposes of this paragraph, including regulations which require more frequent or more detailed reporting.".

(c) CONFORMING AMENDMENTS.—

(1) The table of subparts for part IV of subchapter A of chapter 1 is amended by adding at the end the following new item:

"SUBPART H. NONREFUNDABLE CREDIT TO HOLDERS OF CERTAIN BONDS.".

(2) Section 1397E(c)(2) is amended by inserting ", and subpart H thereof" after "refundable credits".

(3) Subsection (h) of section 1397E is amended to read as follows:

"(h) CREDIT TREATED AS NONREFUNDABLE BONDHOLDER CREDIT.—For purposes of this title, the credit allowed by this section shall be treated as a credit allowable under subpart H of part IV of subchapter A of this chapter.".

(4) Section 6401(b)(1) is amended by striking "and G" and inserting "G, and H".

(d) ISSUANCE OF REGULATIONS.—The Secretary of the Treasury shall issue regulations required under section 54 of the Internal Revenue Code of 1986 (as added by this section) not later than 120 days after the date of the enactment of this Act. Deadline. 26 USC 54 note.

(e) EFFECTIVE DATE.—The amendments made by this section shall apply to bonds issued after December 31, 2005. 26 USC 54 note.

SEC. 1304. TREATMENT OF INCOME OF CERTAIN ELECTRIC COOPERATIVES.

(a) ELIMINATION OF SUNSET ON TREATMENT OF INCOME FROM OPEN ACCESS AND NUCLEAR DECOMMISSIONING TRANSACTIONS.—Section 501(c)(12)(C) is amended by striking the last sentence.

(b) ELIMINATION OF SUNSET ON TREATMENT OF INCOME FROM LOAD LOSS TRANSACTIONS.—Section 501(c)(12)(H) is amended by striking clause (x).

(c) EFFECTIVE DATE.—The amendments made by this section shall take effect on the date of the enactment of this Act. 26 USC 501 note.

SEC. 1305. DISPOSITIONS OF TRANSMISSION PROPERTY TO IMPLEMENT FERC RESTRUCTURING POLICY.

(a) IN GENERAL.—Section 451(i)(3) (defining qualifying electric transmission transaction) is amended by striking "2007" and inserting "2008".

(b) TECHNICAL AMENDMENT RELATED TO SECTION 909 OF THE AMERICAN JOBS CREATION ACT OF 2004.—Clause (ii) of section 451(i)(4)(B) is amended by striking "the close of the period applicable under subsection (a)(2)(B) as extended under paragraph (2)" and inserting "December 31, 2007".

(c) EFFECTIVE DATES.— 26 USC 451 note.

(1) IN GENERAL.—The amendment made by subsection (a) shall apply to transactions occurring after the date of the enactment of this Act.

(2) TECHNICAL AMENDMENT.—The amendment made by subsection (b) shall take effect as if included in the amendments made by section 909 of the American Jobs Creation Act of 2004.

SEC. 1306. CREDIT FOR PRODUCTION FROM ADVANCED NUCLEAR POWER FACILITIES.

(a) IN GENERAL.—Subpart D of part IV of subchapter A of chapter 1 (relating to business related credits) is amended by adding after section 45I the following new section:

"SEC. 45J. CREDIT FOR PRODUCTION FROM ADVANCED NUCLEAR POWER FACILITIES.

"(a) GENERAL RULE.—For purposes of section 38, the advanced nuclear power facility production credit of any taxpayer for any taxable year is equal to the product of—

"(1) 1.8 cents, multiplied by

"(2) the kilowatt hours of electricity—

"(A) produced by the taxpayer at an advanced nuclear power facility during the 8-year period beginning on the date the facility was originally placed in service, and

"(B) sold by the taxpayer to an unrelated person during the taxable year.

"(b) NATIONAL LIMITATION.—

"(1) IN GENERAL.—The amount of credit which would (but for this subsection and subsection (c)) be allowed with respect to any facility for any taxable year shall not exceed the amount which bears the same ratio to such amount of credit as—

"(A) the national megawatt capacity limitation allocated to the facility, bears to

"(B) the total megawatt nameplate capacity of such facility.

"(2) AMOUNT OF NATIONAL LIMITATION.—The national megawatt capacity limitation shall be 6,000 megawatts.

"(3) ALLOCATION OF LIMITATION.—The Secretary shall allocate the national megawatt capacity limitation in such manner as the Secretary may prescribe.

Deadline.

"(4) REGULATIONS.—Not later than 6 months after the date of the enactment of this section, the Secretary shall prescribe such regulations as may be necessary or appropriate to carry out the purposes of this subsection. Such regulations shall provide a certification process under which the Secretary, after consultation with the Secretary of Energy, shall approve and allocate the national megawatt capacity limitation.

"(c) OTHER LIMITATIONS.—

"(1) ANNUAL LIMITATION.—The amount of the credit allowable under subsection (a) (after the application of subsection (b)) for any taxable year with respect to any facility shall not exceed an amount which bears the same ratio to $125,000,000 as—

"(A) the national megawatt capacity limitation allocated under subsection (b) to the facility, bears to

"(B) 1,000.

"(2) OTHER LIMITATIONS.—Rules similar to the rules of section 45(b)(1) shall apply for purposes of this section.

"(d) ADVANCED NUCLEAR POWER FACILITY.—For purposes of this section—

"(1) IN GENERAL.—The term 'advanced nuclear power facility' means any advanced nuclear facility—

"(A) which is owned by the taxpayer and which uses nuclear energy to produce electricity, and

"(B) which is placed in service after the date of the enactment of this paragraph and before January 1, 2021.

"(2) ADVANCED NUCLEAR FACILITY.—For purposes of paragraph (1), the term 'advanced nuclear facility' means any nuclear facility the reactor design for which is approved after December 31, 1993, by the Nuclear Regulatory Commission

(and such design or a substantially similar design of comparable capacity was not approved on or before such date).

"(e) OTHER RULES TO APPLY.—Rules similar to the rules of paragraphs (1), (2), (3), (4), and (5) of section 45(e) shall apply for purposes of this section.".

(b) CREDIT TREATED AS BUSINESS CREDIT.—Section 38(b), as amended by the Transportation Equity Act: A Legacy for Users, is amended by striking "plus" at the end of paragraph (19), by striking the period at the end of paragraph (20) and inserting ", plus", and by adding at the end the following:

"(21) the advanced nuclear power facility production credit determined under section 45J(a).".

(c) CLERICAL AMENDMENT.—The table of sections for subpart D of part IV of subchapter A of chapter 1 is amended by adding at the end the following:

"Sec. 45J. Credit for production from advanced nuclear power facilities.".

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to production in taxable years beginning after the date of the enactment of this Act. 26 USC 38 note.

SEC. 1307. CREDIT FOR INVESTMENT IN CLEAN COAL FACILITIES.

(a) IN GENERAL.—Section 46 (relating to amount of credit) is amended by striking "and" at the end of paragraph (1), by striking the period at the end of paragraph (2), and by adding at the end the following new paragraphs:

"(3) the qualifying advanced coal project credit, and

"(4) the qualifying gasification project credit.".

(b) AMOUNT OF CREDITS.—Subpart E of part IV of subchapter A of chapter 1 (relating to rules for computing investment credit) is amended by inserting after section 48 the following new sections:

"SEC. 48A. QUALIFYING ADVANCED COAL PROJECT CREDIT.

"(a) IN GENERAL.—For purposes of section 46, the qualifying advanced coal project credit for any taxable year is an amount equal to—

"(1) 20 percent of the qualified investment for such taxable year in the case of projects described in subsection (d)(3)(B)(i), and

"(2) 15 percent of the qualified investment for such taxable year in the case of projects described in subsection (d)(3)(B)(ii).

"(b) QUALIFIED INVESTMENT.—

"(1) IN GENERAL.—For purposes of subsection (a), the qualified investment for any taxable year is the basis of eligible property placed in service by the taxpayer during such taxable year which is part of a qualifying advanced coal project—

"(A)(i) the construction, reconstruction, or erection of which is completed by the taxpayer, or

"(ii) which is acquired by the taxpayer if the original use of such property commences with the taxpayer, and

"(B) with respect to which depreciation (or amortization in lieu of depreciation) is allowable.

"(2) SPECIAL RULE FOR CERTAIN SUBSIDIZED PROPERTY.—Rules similar to section 48(a)(4) shall apply for purposes of this section.

"(3) CERTAIN QUALIFIED PROGRESS EXPENDITURES RULES MADE APPLICABLE.—Rules similar to the rules of subsections (c)(4) and (d) of section 46 (as in effect on the day before

the enactment of the Revenue Reconciliation Act of 1990) shall apply for purposes of this section.

"(c) DEFINITIONS.—For purposes of this section—

"(1) QUALIFYING ADVANCED COAL PROJECT.—The term 'qualifying advanced coal project' means a project which meets the requirements of subsection (e).

"(2) ADVANCED COAL-BASED GENERATION TECHNOLOGY.—The term 'advanced coal-based generation technology' means a technology which meets the requirements of subsection (f).

"(3) ELIGIBLE PROPERTY.—The term 'eligible property' means—

"(A) in the case of any qualifying advanced coal project using an integrated gasification combined cycle, any property which is a part of such project and is necessary for the gasification of coal, including any coal handling and gas separation equipment, and

"(B) in the case of any other qualifying advanced coal project, any property which is a part of such project.

"(4) COAL.—The term 'coal' means anthracite, bituminous coal, subbituminous coal, lignite, and peat.

"(5) GREENHOUSE GAS CAPTURE CAPABILITY.—The term 'greenhouse gas capture capability' means an integrated gasification combined cycle technology facility capable of adding components which can capture, separate on a long-term basis, isolate, remove, and sequester greenhouse gases which result from the generation of electricity.

"(6) ELECTRIC GENERATION UNIT.—The term 'electric generation unit' means any facility at least 50 percent of the total annual net output of which is electrical power, including an otherwise eligible facility which is used in an industrial application.

"(7) INTEGRATED GASIFICATION COMBINED CYCLE.—The term 'integrated gasification combined cycle' means an electric generation unit which produces electricity by converting coal to synthesis gas which is used to fuel a combined-cycle plant which produces electricity from both a combustion turbine (including a combustion turbine/fuel cell hybrid) and a steam turbine.

Deadlines.

"(d) QUALIFYING ADVANCED COAL PROJECT PROGRAM.—

"(1) ESTABLISHMENT.—Not later than 180 days after the date of enactment of this section, the Secretary, in consultation with the Secretary of Energy, shall establish a qualifying advanced coal project program for the deployment of advanced coal-based generation technologies.

"(2) CERTIFICATION.—

"(A) APPLICATION PERIOD.—Each applicant for certification under this paragraph shall submit an application meeting the requirements of subparagraph (B). An applicant may only submit an application during the 3-year period beginning on the date the Secretary establishes the program under paragraph (1).

"(B) REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATION.—An application under subparagraph (A) shall contain such information as the Secretary may require in order to make a determination to accept or reject an application for certification as meeting the requirements under subsection (e)(1). Any information contained in the

Trade secrets. Confidential information.

application shall be protected as provided in section 552(b)(4) of title 5, United States Code.

"(C) TIME TO ACT UPON APPLICATIONS FOR CERTIFICATION.—The Secretary shall issue a determination as to whether an applicant has met the requirements under subsection (e)(1) within 60 days following the date of submittal of the application for certification.

"(D) TIME TO MEET CRITERIA FOR CERTIFICATION.—Each applicant for certification shall have 2 years from the date of acceptance by the Secretary of the application during which to provide to the Secretary evidence that the criteria set forth in subsection (e)(2) have been met.

"(E) PERIOD OF ISSUANCE.—An applicant which receives a certification shall have 5 years from the date of issuance of the certification in order to place the project in service and if such project is not placed in service by that time period then the certification shall no longer be valid.

"(3) AGGREGATE CREDITS.—

"(A) IN GENERAL.—The aggregate credits allowed under subsection (a) for projects certified by the Secretary under paragraph (2) may not exceed $1,300,000,000.

"(B) PARTICULAR PROJECTS.—Of the dollar amount in subparagraph (A), the Secretary is authorized to certify—

"(i) $800,000,000 for integrated gasification combined cycle projects, and

"(ii) $500,000,000 for projects which use other advanced coal-based generation technologies.

"(4) REVIEW AND REDISTRIBUTION.—

"(A) REVIEW.—Not later than 6 years after the date of enactment of this section, the Secretary shall review the credits allocated under this section as of the date which is 6 years after the date of enactment of this section.

"(B) REDISTRIBUTION.—The Secretary may reallocate credits available under clauses (i) and (ii) of paragraph (3)(B) if the Secretary determines that—

"(i) there is an insufficient quantity of qualifying applications for certification pending at the time of the review, or

"(ii) any certification made pursuant to subsection paragraph (2) has been revoked pursuant to subsection paragraph (2)(D) because the project subject to the certification has been delayed as a result of third party opposition or litigation to the proposed project.

"(C) REALLOCATION.—If the Secretary determines that credits under clause (i) or (ii) of paragraph (3)(B) are available for reallocation pursuant to the requirements set forth in paragraph (2), the Secretary is authorized to conduct an additional program for applications for certification.

"(e) QUALIFYING ADVANCED COAL PROJECTS.—

"(1) REQUIREMENTS.—For purposes of subsection (c)(1), a project shall be considered a qualifying advanced coal project that the Secretary may certify under subsection (d)(2) if the Secretary determines that, at a minimum—

"(A) the project uses an advanced coal-based generation technology—

"(i) to power a new electric generation unit; or

"(ii) to retrofit or repower an existing electric generation unit (including an existing natural gas-fired combined cycle unit);

"(B) the fuel input for the project, when completed, is at least 75 percent coal;

"(C) the project, consisting of one or more electric generation units at one site, will have a total nameplate generating capacity of at least 400 megawatts;

"(D) the applicant provides evidence that a majority of the output of the project is reasonably expected to be acquired or utilized;

"(E) the applicant provides evidence of ownership or control of a site of sufficient size to allow the proposed project to be constructed and to operate on a long-term basis; and

"(F) the project will be located in the United States.

"(2) REQUIREMENTS FOR CERTIFICATION.—For the purpose of subsection (d)(2)(D), a project shall be eligible for certification only if the Secretary determines that—

"(A) the applicant for certification has received all Federal and State environmental authorizations or reviews necessary to commence construction of the project; and

"(B) the applicant for certification, except in the case of a retrofit or repower of an existing electric generation unit, has purchased or entered into a binding contract for the purchase of the main steam turbine or turbines for the project, except that such contract may be contingent upon receipt of a certification under subsection (d)(2).

"(3) PRIORITY FOR INTEGRATED GASIFICATION COMBINED CYCLE PROJECTS.—In determining which qualifying advanced coal projects to certify under subsection (d)(2), the Secretary shall—

"(A) certify capacity, in accordance with the procedures set forth in subsection (d), in relatively equal amounts to—

"(i) projects using bituminous coal as a primary feedstock,

"(ii) projects using subbituminous coal as a primary feedstock, and

"(iii) projects using lignite as a primary feedstock, and

"(B) give high priority to projects which include, as determined by the Secretary—

"(i) greenhouse gas capture capability,

"(ii) increased by-product utilization, and

"(iii) other benefits.

"(f) ADVANCED COAL-BASED GENERATION TECHNOLOGY.—

"(1) IN GENERAL.—For the purpose of this section, an electric generation unit uses advanced coal-based generation technology if—

"(A) the unit—

"(i) uses integrated gasification combined cycle technology, or

"(ii) except as provided in paragraph (3), has a design net heat rate of 8530 Btu/kWh (40 percent efficiency), and

"(B) the unit is designed to meet the performance requirements in the following table:

Performance characteristic:	Design level for project:
SO_2 (percent removal)	99 percent
NO_x (emissions)	0.07 lbs/MMBTU
PM* (emissions)	0.015 lbs/MMBTU
Hg (percent removal)	90 percent

"(2) DESIGN NET HEAT RATE.—For purposes of this subsection, design net heat rate with respect to an electric generation unit shall—

"(A) be measured in Btu per kilowatt hour (higher heating value),

"(B) be based on the design annual heat input to the unit and the rated net electrical power, fuels, and chemicals output of the unit (determined without regard to the cogeneration of steam by the unit),

"(C) be adjusted for the heat content of the design coal to be used by the unit—

"(i) if the heat content is less than 13,500 Btu per pound, but greater than 7,000 Btu per pound, according to the following formula: design net heat rate = unit net heat rate x [1–[((13,500-design coal heat content, Btu per pound)/1,000)* 0.013]], and

"(ii) if the heat content is less than or equal to 7,000 Btu per pound, according to the following formula: design net heat rate = unit net heat rate x [1–[((13,500-design coal heat content, Btu per pound)/1,000)* 0.018]], and

"(D) be corrected for the site reference conditions of—

"(i) elevation above sea level of 500 feet,

"(ii) air pressure of 14.4 pounds per square inch absolute,

"(iii) temperature, dry bulb of 63°F,

"(iv) temperature, wet bulb of 54°F, and

"(v) relative humidity of 55 percent.

"(3) EXISTING UNITS.—In the case of any electric generation unit in existence on the date of the enactment of this section, such unit uses advanced coal-based generation technology if, in lieu of the requirements under paragraph (1)(A)(ii), such unit achieves a minimum efficiency of 35 percent and an overall thermal design efficiency improvement, compared to the efficiency of the unit as operated, of not less than—

"(A) 7 percentage points for coal of more than 9,000 Btu,

"(B) 6 percentage points for coal of 7,000 to 9,000 Btu, or

"(C) 4 percentage points for coal of less than 7,000 Btu.

"(g) APPLICABILITY.—No use of technology (or level of emission reduction solely by reason of the use of the technology), and no achievement of any emission reduction by the demonstration of any technology or performance level, by or at one or more facilities with respect to which a credit is allowed under this section, shall

be considered to indicate that the technology or performance level is—

"(1) adequately demonstrated for purposes of section 111 of the Clean Air Act (42 U.S.C. 7411);

"(2) achievable for purposes of section 169 of that Act (42 U.S.C. 7479); or

"(3) achievable in practice for purposes of section 171 of such Act (42 U.S.C. 7501).

"SEC. 48B. QUALIFYING GASIFICATION PROJECT CREDIT.

"(a) IN GENERAL.—For purposes of section 46, the qualifying gasification project credit for any taxable year is an amount equal to 20 percent of the qualified investment for such taxable year.

"(b) QUALIFIED INVESTMENT.—

"(1) IN GENERAL.—For purposes of subsection (a), the qualified investment for any taxable year is the basis of eligible property placed in service by the taxpayer during such taxable year which is part of a qualifying gasification project—

"(A)(i) the construction, reconstruction, or erection of which is completed by the taxpayer, or

"(ii) which is acquired by the taxpayer if the original use of such property commences with the taxpayer, and

"(B) with respect to which depreciation (or amortization in lieu of depreciation) is allowable.

"(2) SPECIAL RULE FOR CERTAIN SUBSIDIZED PROPERTY.—Rules similar to section 48(a)(4) shall apply for purposes of this section.

"(3) CERTAIN QUALIFIED PROGRESS EXPENDITURES RULES MADE APPLICABLE.—Rules similar to the rules of subsections (c)(4) and (d) of section 46 (as in effect on the day before the enactment of the Revenue Reconciliation Act of 1990) shall apply for purposes of this section.

"(c) DEFINITIONS.—For purposes of this section—

"(1) QUALIFYING GASIFICATION PROJECT.—The term 'qualifying gasification project' means any project which—

"(A) employs gasification technology,

"(B) will be carried out by an eligible entity, and

"(C) any portion of the qualified investment of which is certified under the qualifying gasification program as eligible for credit under this section in an amount (not to exceed $650,000,000) determined by the Secretary.

"(2) GASIFICATION TECHNOLOGY.—The term 'gasification technology' means any process which converts a solid or liquid product from coal, petroleum residue, biomass, or other materials which are recovered for their energy or feedstock value into a synthesis gas composed primarily of carbon monoxide and hydrogen for direct use or subsequent chemical or physical conversion.

"(3) ELIGIBLE PROPERTY.—The term 'eligible property' means any property which is a part of a qualifying gasification project and is necessary for the gasification technology of such project.

"(4) BIOMASS.—

"(A) IN GENERAL.—The term 'biomass' means any—

"(i) agricultural or plant waste,

"(ii) byproduct of wood or paper mill operations, including lignin in spent pulping liquors, and

"(iii) other products of forestry maintenance.

"(B) EXCLUSION.—The term 'biomass' does not include paper which is commonly recycled.

"(5) CARBON CAPTURE CAPABILITY.—The term 'carbon capture capability' means a gasification plant design which is determined by the Secretary to reflect reasonable consideration for, and be capable of, accommodating the equipment likely to be necessary to capture carbon dioxide from the gaseous stream, for later use or sequestration, which would otherwise be emitted in the flue gas from a project which uses a nonrenewable fuel.

"(6) COAL.—The term 'coal' means anthracite, bituminous coal, subbituminous coal, lignite, and peat.

"(7) ELIGIBLE ENTITY.—The term 'eligible entity' means any person whose application for certification is principally intended for use in a domestic project which employs domestic gasification applications related to—

"(A) chemicals,

"(B) fertilizers,

"(C) glass,

"(D) steel,

"(E) petroleum residues,

"(F) forest products, and

"(G) agriculture, including feedlots and dairy operations.

"(8) PETROLEUM RESIDUE.—The term 'petroleum residue' means the carbonized product of high-boiling hydrocarbon fractions obtained in petroleum processing.

"(d) QUALIFYING GASIFICATION PROJECT PROGRAM.—

"(1) IN GENERAL.—Not later than 180 days after the date of the enactment of this section, the Secretary, in consultation with the Secretary of Energy, shall establish a qualifying gasification project program to consider and award certifications for qualified investment eligible for credits under this section to qualifying gasification project sponsors under this section. The total amounts of credit that may be allocated under the program shall not exceed $350,000,000 under rules similar to the rules of section 48A(d)(4). Deadline.

"(2) PERIOD OF ISSUANCE.—A certificate of eligibility under paragraph (1) may be issued only during the 10-fiscal year period beginning on October 1, 2005. Deadline.

"(3) SELECTION CRITERIA.—The Secretary shall not make a competitive certification award for qualified investment for credit eligibility under this section unless the recipient has documented to the satisfaction of the Secretary that—

"(A) the award recipient is financially viable without the receipt of additional Federal funding associated with the proposed project,

"(B) the recipient will provide sufficient information to the Secretary for the Secretary to ensure that the qualified investment is spent efficiently and effectively,

"(C) a market exists for the products of the proposed project as evidenced by contracts or written statements of intent from potential customers,

"(D) the fuels identified with respect to the gasification technology for such project will comprise at least 90 percent of the fuels required by the project for the production

of chemical feedstocks, liquid transportation fuels, or co-production of electricity,

"(E) the award recipient's project team is competent in the construction and operation of the gasification technology proposed, with preference given to those recipients with experience which demonstrates successful and reliable operations of the technology on domestic fuels so identified, and

"(F) the award recipient has met other criteria established and published by the Secretary.

"(e) DENIAL OF DOUBLE BENEFIT.—A credit shall not be allowed under this section for any qualified investment for which a credit is allowed under section 48A.".

(c) CONFORMING AMENDMENTS.—

(1) Section 49(a)(1)(C) is amended by striking "and" at the end of clause (ii), by striking clause (iii), and by adding after clause (ii) the following new clauses:

"(iii) the basis of any property which is part of a qualifying advanced coal project under section 48A, and

"(iv) the basis of any property which is part of a qualifying gasification project under section 48B.".

(2) The table of sections for subpart E of part IV of subchapter A of chapter 1 is amended by inserting after the item relating to section 48 the following new items:

"Sec. 48A. Qualifying advanced coal project credit.
"Sec. 48B. Qualifying gasification project credit.".

26 USC 46 note.

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to periods after the date of the enactment of this Act, under rules similar to the rules of section 48(m) of the Internal Revenue Code of 1986 (as in effect on the day before the date of the enactment of the Revenue Reconciliation Act of 1990).

SEC. 1308. ELECTRIC TRANSMISSION PROPERTY TREATED AS 15-YEAR PROPERTY.

(a) IN GENERAL.—Subparagraph (E) of section 168(e)(3) (relating to classification of certain property) is amended by striking "and" at the end of clause (v), by striking the period at the end of clause (vi) and inserting ", and", and by adding at the end the following new clause:

"(vii) any section 1245 property (as defined in section 1245(a)(3)) used in the transmission at 69 or more kilovolts of electricity for sale and the original use of which commences with the taxpayer after April 11, 2005.".

(b) ALTERNATIVE SYSTEM.—The table contained in section 168(g)(3)(B) (relating to special rule for certain property assigned to classes) is amended by inserting after the item relating to subparagraph (E)(vi) the following new item:

"(E)(vii) ..... 30".

26 USC 168 note.

(c) EFFECTIVE DATE.—

(1) IN GENERAL.—The amendments made by this section shall apply to property placed in service after April 11, 2005.

(2) EXCEPTION.—The amendments made by this section shall not apply to any property with respect to which the taxpayer or a related party has entered into a binding contract for the construction thereof on or before April 11, 2005, or, in the case of self-constructed property, has started construction on or before such date.

SEC. 1309. EXPANSION OF AMORTIZATION FOR CERTAIN ATMOSPHERIC POLLUTION CONTROL FACILITIES IN CONNECTION WITH PLANTS FIRST PLACED IN SERVICE AFTER 1975.

(a) ELIGIBILITY OF POST-1975 POLLUTION CONTROL FACILITIES.—Subsection (d) of section 169 (relating to definitions) is amended by adding at the end the following:

"(5) SPECIAL RULE RELATING TO CERTAIN ATMOSPHERIC POLLUTION CONTROL FACILITIES.—In the case of any atmospheric pollution control facility which is placed in service after April 11, 2005, and used in connection with an electric generation plant or other property which is primarily coal fired—

"(A) paragraph (1) shall be applied without regard to the phrase 'in operation before January 1, 1976', and

"(B) this section shall be applied by substituting '84' for '60' each place it appears in subsections (a) and (b).".

(b) TREATMENT AS NEW IDENTIFIABLE TREATMENT FACILITY.—Subparagraph (B) of section 169(d)(4) is amended to read as follows:

"(B) CERTAIN FACILITIES PLACED IN OPERATION AFTER APRIL 11, 2005.—In the case of any facility described in paragraph (1) solely by reason of paragraph (5), subparagraph (A) shall be applied by substituting 'April 11, 2005' for 'December 31, 1968' each place it appears therein.".

(c) CONFORMING AMENDMENT.—The heading for section 169(d) is amended by inserting "AND SPECIAL RULES" after "DEFINITIONS".

(d) TECHNICAL AMENDMENT.—Section 169(d)(3) is amended by striking "Health, Education, and Welfare" and inserting "Health and Human Services".

(e) EFFECTIVE DATE.—The amendments made by this section shall apply to facilities placed in service after April 11, 2005. 26 USC 169 note.

SEC. 1310. MODIFICATIONS TO SPECIAL RULES FOR NUCLEAR DECOMMISSIONING COSTS.

(a) REPEAL OF LIMITATION ON DEPOSITS INTO FUND BASED ON COST OF SERVICE; CONTRIBUTIONS AFTER FUNDING PERIOD.—Subsection (b) of section 468A (relating to special rules for nuclear decommissioning costs) is amended to read as follows:

"(b) LIMITATION ON AMOUNTS PAID INTO FUND.—The amount which a taxpayer may pay into the Fund for any taxable year shall not exceed the ruling amount applicable to such taxable year.".

(b) TREATMENT OF CERTAIN DECOMMISSIONING COSTS.—

(1) IN GENERAL.—Section 468A is amended by redesignating subsections (f) and (g) as subsections (g) and (h), respectively, and by inserting after subsection (e) the following new subsection:

"(f) TRANSFERS INTO QUALIFIED FUNDS.—

"(1) IN GENERAL.—Notwithstanding subsection (b), any taxpayer maintaining a Fund to which this section applies with respect to a nuclear power plant may transfer into such Fund not more than an amount equal to the present value of the

portion of the total nuclear decommissioning costs with respect to such nuclear power plant previously excluded for such nuclear power plant under subsection (d)(2)(A) as in effect immediately before the date of the enactment of this subsection.

"(2) DEDUCTION FOR AMOUNTS TRANSFERRED.—

"(A) IN GENERAL.—Except as provided in subparagraph (C), the deduction allowed by subsection (a) for any transfer permitted by this subsection shall be allowed ratably over the remaining estimated useful life (within the meaning of subsection (d)(2)(A)) of the nuclear power plant beginning with the taxable year during which the transfer is made.

"(B) DENIAL OF DEDUCTION FOR PREVIOUSLY DEDUCTED AMOUNTS.—No deduction shall be allowed for any transfer under this subsection of an amount for which a deduction was previously allowed to the taxpayer (or a predecessor) or a corresponding amount was not included in gross income of the taxpayer (or a predecessor). For purposes of the preceding sentence, a ratable portion of each transfer shall be treated as being from previously deducted or excluded amounts to the extent thereof.

"(C) TRANSFERS OF QUALIFIED FUNDS.—If—

"(i) any transfer permitted by this subsection is made to any Fund to which this section applies, and

"(ii) such Fund is transferred thereafter,

any deduction under this subsection for taxable years ending after the date that such Fund is transferred shall be allowed to the transferor for the taxable year which includes such date.

"(D) SPECIAL RULES.—

"(i) GAIN OR LOSS NOT RECOGNIZED ON TRANSFERS TO FUND.—No gain or loss shall be recognized on any transfer described in paragraph (1).

"(ii) TRANSFERS OF APPRECIATED PROPERTY TO FUND.—If appreciated property is transferred in a transfer described in paragraph (1), the amount of the deduction shall not exceed the adjusted basis of such property.

"(3) NEW RULING AMOUNT REQUIRED.—Paragraph (1) shall not apply to any transfer unless the taxpayer requests from the Secretary a new schedule of ruling amounts in connection with such transfer.

"(4) NO BASIS IN QUALIFIED FUNDS.—Notwithstanding any other provision of law, the taxpayer's basis in any Fund to which this section applies shall not be increased by reason of any transfer permitted by this subsection.".

(2) NEW RULING AMOUNT TO TAKE INTO ACCOUNT TOTAL COSTS.—Subparagraph (A) of section 468A(d)(2) (defining ruling amount) is amended to read as follows:

"(A) fund the total nuclear decommissioning costs with respect to such power plant over the estimated useful life of such power plant, and".

(c) NEW RULING AMOUNT REQUIRED UPON LICENSE RENEWAL.—Paragraph (1) of section 468A(d) (relating to request required) is amended by adding at the end the following new sentence: "For purposes of the preceding sentence, the taxpayer shall request a schedule of ruling amounts upon each renewal of the operating license of the nuclear powerplant.".

(d) CONFORMING AMENDMENT.—Section 468A(e)(3) (relating to review of amount) is amended by striking "The Fund" and inserting "Except as provided in subsection (f), the Fund".

(e) TECHNICAL AMENDMENTS.—Section 468A(e)(2) (relating to taxation of Fund) is amended—

(1) by striking "rate set forth in subparagraph (B)" in subparagraph (A) and inserting "rate of 20 percent",

(2) by striking subparagraph (B), and

(3) by redesignating subparagraphs (C) and (D) as subparagraphs (B) and (C), respectively.

(f) EFFECTIVE DATE.—The amendments made by this section shall apply to taxable years beginning after December 31, 2005. 26 USC 468A note.

SEC. 1311. FIVE-YEAR NET OPERATING LOSS CARRYOVER FOR CERTAIN LOSSES.

Paragraph (1) of section 172(b) (relating to net operating loss carrybacks and carryovers) is amended by adding at the end the following new subparagraph:

"(I) TRANSMISSION PROPERTY AND POLLUTION CONTROL INVESTMENT.—

"(i) IN GENERAL.—At the election of the taxpayer in any taxable year ending after December 31, 2005, and before January 1, 2009, in the case of a net operating loss in a taxable year ending after December 31, 2002, and before January 1, 2006, there shall be a net operating loss carryback to each of the 5 years preceding the taxable year of such loss to the extent that such loss does not exceed 20 percent of the sum of electric transmission property capital expenditures and pollution control facility capital expenditures of the taxpayer for the taxable year preceding the taxable year in which such election is made.

"(ii) LIMITATIONS.—For purposes of this subsection—

"(I) not more than one election may be made under clause (i) with respect to any net operating loss in a taxable year, and

"(II) an election may not be made under clause (i) for more than 1 taxable year beginning in any calendar year.

"(iii) COORDINATION WITH ORDERING RULE.—For purposes of applying subsection (b)(2), the portion of any loss which is carried back 5 years by reason of clause (i) shall be treated in a manner similar to the manner in which a specified liability loss is treated.

"(iv) APPLICATION FOR ADJUSTMENT.—In the case of any portion of a net operating loss to which an election under clause (i) applies, an application under section 6411(a) with respect to such loss shall not fail to be treated as timely filed if filed within 24 months after the due date specified under such section. Deadline.

"(v) SPECIAL RULES RELATING TO REFUND.—For purposes of a net operating loss to which an election under clause (i) applies, references in sections 6501(h), 6511(d)(2)(A), and 6611(f)(1) to the taxable year in which such net operating loss arises or result in a

net loss carryback shall be treated as references to the taxable year in which such election occurs.

"(vi) DEFINITIONS.—For purposes of this subparagraph—

"(I) ELECTRIC TRANSMISSION PROPERTY CAPITAL EXPENDITURES.—The term 'electric transmission property capital expenditures' means any expenditure, chargeable to capital account, made by the taxpayer which is attributable to electric transmission property used by the taxpayer in the transmission at 69 or more kilovolts of electricity for sale. Such term shall not include any expenditure which may be refunded or the purpose of which may be modified at the option of the taxpayer so as to cease to be treated as an expenditure within the meaning of such term.

"(II) POLLUTION CONTROL FACILITY CAPITAL EXPENDITURES.—The term 'pollution control facility capital expenditures' means any expenditure, chargeable to capital account, made by an electric utility company (as defined in section 2(3) of the Public Utility Holding Company Act (15 U.S.C. 79b(3)), as in effect on the day before the date of the enactment of the Energy Tax Incentives Act of 2005) which is attributable to a facility which will qualify as a certified pollution control facility as determined under section 169(d)(1) by striking 'before January 1, 1976,' and by substituting 'an identifiable' for 'a new identifiable'. Such term shall not include any expenditure which may be refunded or the purpose of which may be modified at the option of the taxpayer so as to cease to be treated as an expenditure within the meaning of such term.".

Subtitle B—Domestic Fossil Fuel Security

SEC. 1321. EXTENSION OF CREDIT FOR PRODUCING FUEL FROM A NONCONVENTIONAL SOURCE FOR FACILITIES PRODUCING COKE OR COKE GAS.

(a) IN GENERAL.—Section 29 (relating to credit for producing fuel from a nonconventional source) is amended by adding at the end the following new subsection:

"(h) EXTENSION FOR FACILITIES PRODUCING COKE OR COKE GAS.—Notwithstanding subsection (f)—

"(1) IN GENERAL.—In the case of a facility for producing coke or coke gas which was placed in service before January 1, 1993, or after June 30, 1998, and before January 1, 2010, this section shall apply with respect to coke and coke gas produced in such facility and sold during the period—

"(A) beginning on the later of January 1, 2006, or the date that such facility is placed in service, and

"(B) ending on the date which is 4 years after the date such period began.

"(2) SPECIAL RULES.—In determining the amount of credit allowable under this section solely by reason of this subsection—

"(A) DAILY LIMIT.—The amount of qualified fuels sold during any taxable year which may be taken into account by reason of this subsection with respect to any facility shall not exceed an average barrel-of-oil equivalent of 4,000 barrels per day. Days before the date the facility is placed in service shall not be taken into account in determining such average.

"(B) EXTENSION PERIOD TO COMMENCE WITH UNADJUSTED CREDIT AMOUNT.—For purposes of applying subsection (b)(2) to the $3 amount in subsection (a), in the case of fuels sold after 2005, subsection (d)(2)(B) shall be applied by substituting '2004' for '1979'.

"(C) DENIAL OF DOUBLE BENEFIT.—This subsection shall not apply to any facility producing qualified fuels for which a credit was allowed under this section for the taxable year or any preceding taxable year by reason of subsection (g).".

(b) EFFECTIVE DATE.—The amendment made by this section shall apply to fuel produced and sold after December 31, 2005, in taxable years ending after such date. 26 USC 29 note.

SEC. 1322. MODIFICATION OF CREDIT FOR PRODUCING FUEL FROM A NONCONVENTIONAL SOURCE.

(a) TREATMENT AS BUSINESS CREDIT.—

(1) CREDIT MOVED TO SUBPART RELATING TO BUSINESS RELATED CREDITS.—The Internal Revenue Code of 1986 is amended by redesignating section 29 as section 45K and by moving section 45K (as so redesignated) from subpart B of part IV of subchapter A of chapter 1 to the end of subpart D of part IV of subchapter A of chapter 1.

(2) CREDIT TREATED AS BUSINESS CREDIT.—Section 38(b), as amended by this Act, is amended by striking "plus" at the end of paragraph (20), by striking the period at the end of paragraph (21) and inserting ", plus", and by adding at the end the following:

"(22) the nonconventional source production credit determined under section 45K(a).".

(3) CONFORMING AMENDMENTS.—

(A) Section 30(b)(3)(A) is amended by striking "sections 27 and 29" and inserting "section 27".

(B) Sections 43(b)(2), 45I(b)(2)(C)(i), and 613A(c)(6)(C) are each amended by striking "section 29(d)(2)(C)" and inserting "section 45K(d)(2)(C)".

(C) Section 45(e)(9), as added by this Act, is amended—

(i) by striking "section 29" each place it appears and inserting "section 45K", and

(ii) by inserting "(or under section 29, as in effect on the day before the date of enactment of the Energy Tax Incentives Act of 2005, for any prior taxable year)" before the period at the end thereof.

(D) Section 45I is amended—

(i) in subsection (c)(2)(A) by striking "section 29(d)(5))" and inserting "section 45K(d)(5))", and

(ii) in subsection (d)(3) by striking "section 29" both places it appears and inserting "section 45K".

(E) Section 45K(a), as redesignated by paragraph (1), is amended by striking "There shall be allowed as a credit against the tax imposed by this chapter for the taxable year" and inserting "For purposes of section 38, if the taxpayer elects to have this section apply, the nonconventional source production credit determined under this section for the taxable year is".

(F) Section 45K(b), as so redesignated, is amended by striking paragraph (6).

(G) Section 53(d)(1)(B)(iii) is amended by striking "under section 29" and all that follows through "or not allowed".

(H) Section 55(c)(3) is amended by striking "29(b)(6),".

(I) Subsection (a) of section 772 is amended by inserting "and" at the end of paragraph (9), by striking paragraph (10), and by redesignating paragraph (11) as paragraph (10).

(J) Paragraph (5) of section 772(d) is amended by striking "the foreign tax credit, and the credit allowable under section 29" and inserting "and the foreign tax credit".

(K) The table of sections for subpart B of part IV of subchapter A of chapter 1 is amended by striking the item relating to section 29.

(L) The table of sections for subpart D of part IV of subchapter A of chapter 1 is amended by inserting after the item relating to section 45I the following new item:

"Sec. 45K. Credit for producing fuel from a nonconventional source.".

(b) AMENDMENTS CONFORMING TO THE REPEAL OF THE NATURAL GAS POLICY ACT OF 1978.—

(1) IN GENERAL.—Section 29(c)(2)(A) (before redesignation under subsection (a) and as amended by section 1321) is amended—

(A) by inserting "(as in effect before the repeal of such section)" after "1978", and

(B) by striking subsection (e) and redesignating subsections (f), (g), and (h) as subsections (e), (f), and (g), respectively.

(2) CONFORMING AMENDMENTS.—Section 29(g)(1) (before redesignation under subsection (a) and paragraph (1) of this subsection) is amended—

(A) in subparagraph (A) by striking "subsection (f)(1)(B)" and inserting "subsection (e)(1)(B)", and

(B) in subparagraph (B) by striking "subsection (f)" and inserting "subsection (e)".

26 USC 29 note.

(c) EFFECTIVE DATES.—

(1) IN GENERAL.—Except as provided in paragraph (2), the amendments made by this section shall apply to credits determined under the Internal Revenue Code of 1986 for taxable years ending after December 31, 2005.

(2) SUBSECTION (b).—The amendments made by subsection (b) shall take effect on the date of the enactment of this Act.

SEC. 1323. TEMPORARY EXPENSING FOR EQUIPMENT USED IN REFINING OF LIQUID FUELS.

(a) IN GENERAL.—Part VI of subchapter B of chapter 1 is amended by inserting after section 179B the following new section:

"SEC. 179C. ELECTION TO EXPENSE CERTAIN REFINERIES.

"(a) TREATMENT AS EXPENSES.—A taxpayer may elect to treat 50 percent of the cost of any qualified refinery property as an expense which is not chargeable to capital account. Any cost so treated shall be allowed as a deduction for the taxable year in which the qualified refinery property is placed in service.

"(b) ELECTION.—

"(1) IN GENERAL.—An election under this section for any taxable year shall be made on the taxpayer's return of the tax imposed by this chapter for the taxable year. Such election shall be made in such manner as the Secretary may by regulations prescribe.

"(2) ELECTION IRREVOCABLE.—Any election made under this section may not be revoked except with the consent of the Secretary.

"(c) QUALIFIED REFINERY PROPERTY.—

"(1) IN GENERAL.—The term 'qualified refinery property' means any portion of a qualified refinery—

"(A) the original use of which commences with the taxpayer,

"(B) which is placed in service by the taxpayer after the date of the enactment of this section and before January 1, 2012,

"(C) in the case any portion of a qualified refinery (other than a qualified refinery which is separate from any existing refinery), which meets the requirements of subsection (e),

"(D) which meets all applicable environmental laws in effect on the date such portion was placed in service,

"(E) no written binding contract for the construction of which was in effect on or before June 14, 2005, and

"(F)(i) the construction of which is subject to a written binding construction contract entered into before January 1, 2008,

"(ii) which is placed in service before January 1, 2008, or

"(iii) in the case of self-constructed property, the construction of which began after June 14, 2005, and before January 1, 2008.

"(2) SPECIAL RULE FOR SALE-LEASEBACKS.—For purposes of paragraph (1)(A), if property is—

"(A) originally placed in service after the date of the enactment of this section by a person, and

"(B) sold and leased back by such person within 3 months after the date such property was originally placed in service,

such property shall be treated as originally placed in service not earlier than the date on which such property is used under the leaseback referred to in subparagraph (B).

"(3) EFFECT OF WAIVER UNDER CLEAN AIR ACT.—A waiver under the Clean Air Act shall not be taken into account in

determining whether the requirements of paragraph (1)(D) are met.

"(d) QUALIFIED REFINERY.—For purposes of this section, the term 'qualified refinery' means any refinery located in the United States which is designed to serve the primary purpose of processing liquid fuel from crude oil or qualified fuels (as defined in section 45K(c)).

"(e) PRODUCTION CAPACITY.—The requirements of this subsection are met if the portion of the qualified refinery—

"(1) enables the existing qualified refinery to increase total volume output (determined without regard to asphalt or lube oil) by 5 percent or more on an average daily basis, or

"(2) enables the existing qualified refinery to process qualified fuels (as defined in section 45K(c)) at a rate which is equal to or greater than 25 percent of the total throughput of such qualified refinery on an average daily basis.

"(f) INELIGIBLE REFINERY PROPERTY.—No deduction shall be allowed under subsection (a) for any qualified refinery property—

"(1) the primary purpose of which is for use as a topping plant, asphalt plant, lube oil facility, crude or product terminal, or blending facility, or

"(2) which is built solely to comply with consent decrees or projects mandated by Federal, State, or local governments.

"(g) ELECTION TO ALLOCATE DEDUCTION TO COOPERATIVE OWNER.—

"(1) IN GENERAL.—If—

"(A) a taxpayer to which subsection (a) applies is an organization to which part I of subchapter T applies, and

"(B) one or more persons directly holding an ownership interest in the taxpayer are organizations to which part I of subchapter T apply,

the taxpayer may elect to allocate all or a portion of the deduction allowable under subsection (a) to such persons. Such allocation shall be equal to the person's ratable share of the total amount allocated, determined on the basis of the person's ownership interest in the taxpayer. The taxable income of the taxpayer shall not be reduced under section 1382 by reason of any amount to which the preceding sentence applies.

"(2) FORM AND EFFECT OF ELECTION.—An election under paragraph (1) for any taxable year shall be made on a timely filed return for such year. Such election, once made, shall be irrevocable for such taxable year.

"(3) WRITTEN NOTICE TO OWNERS.—If any portion of the deduction available under subsection (a) is allocated to owners under paragraph (1), the cooperative shall provide any owner receiving an allocation written notice of the amount of the allocation. Such notice shall be provided before the date on which the return described in paragraph (2) is due.

Deadline.

"(h) REPORTING.—No deduction shall be allowed under subsection (a) to any taxpayer for any taxable year unless such taxpayer files with the Secretary a report containing such information with respect to the operation of the refineries of the taxpayer as the Secretary shall require.".

(b) CONFORMING AMENDMENTS.—

(1) Section 1245(a) is amended by inserting "179C," after "179B," both places it appears in paragraphs (2)(C) and (3)(C).

(2) Section 263(a)(1) is amended by striking "or" at the end of subparagraph (H), by striking the period at the end of subparagraph (I) and inserting ", or", and by inserting after subparagraph (I) the following new subparagraph:

"(J) expenditures for which a deduction is allowed under section 179C.".

(3) Section 312(k)(3)(B) is amended by striking "179 179A, or 179B" each place it appears in the heading and text and inserting "179, 179A, 179B, or 179C".

(4) The table of sections for part VI of subchapter B of chapter 1 is amended by inserting after the item relating to section 179B the following new item:

"Sec. 179C. Election to expense certain refineries.".

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to properties placed in service after the date of the enactment of this Act. 26 USC 179C note.

SEC. 1324. PASS THROUGH TO OWNERS OF DEDUCTION FOR CAPITAL COSTS INCURRED BY SMALL REFINER COOPERATIVES IN COMPLYING WITH ENVIRONMENTAL PROTECTION AGENCY SULFUR REGULATIONS.

(a) IN GENERAL.—Section 179B (relating to deduction for capital costs incurred in complying with Environmental Protection Agency sulfur regulations) is amended by adding at the end the following new subsection:

"(e) ELECTION TO ALLOCATE DEDUCTION TO COOPERATIVE OWNER.—

"(1) IN GENERAL.—If—

"(A) a small business refiner to which subsection (a) applies is an organization to which part I of subchapter T applies, and

"(B) one or more persons directly holding an ownership interest in the refiner are organizations to which part I of subchapter T apply,

the refiner may elect to allocate all or a portion of the deduction allowable under subsection (a) to such persons. Such allocation shall be equal to the person's ratable share of the total amount allocated, determined on the basis of the person's ownership interest in the taxpayer. The taxable income of the refiner shall not be reduced under section 1382 by reason of any amount to which the preceding sentence applies.

"(2) FORM AND EFFECT OF ELECTION.—An election under paragraph (1) for any taxable year shall be made on a timely filed return for such year. Such election, once made, shall be irrevocable for such taxable year.

"(3) WRITTEN NOTICE TO OWNERS.—If any portion of the deduction available under subsection (a) is allocated to owners under paragraph (1), the cooperative shall provide any owner receiving an allocation written notice of the amount of the allocation. Such notice shall be provided before the date on which the return described in paragraph (2) is due.". Deadline.

(b) EFFECTIVE DATE.—The amendment made by this section shall take effect as if included in the amendment made by section 338(a) of the American Jobs Creation Act of 2004. 26 USC 179B note.

SEC. 1325. NATURAL GAS DISTRIBUTION LINES TREATED AS 15-YEAR PROPERTY.

(a) IN GENERAL.—Section 168(e)(3)(E) (defining 15-year property), as amended by this Act, is amended by striking "and" at the end of clause (vi), by striking the period at the end of clause (vii) and by inserting ", and", and by adding at the end the following new clause:

"(viii) any natural gas distribution line the original use of which commences with the taxpayer after April 11, 2005, and which is placed in service before January 1, 2011.".

(b) ALTERNATIVE SYSTEM.—The table contained in section 168(g)(3)(B) (relating to special rule for certain property assigned to classes), as amended by this Act, is amended by inserting after the item relating to subparagraph (E)(vii) the following new item:

"(E)(viii) ..... 35".

26 USC 168 note.

(c) EFFECTIVE DATE.—

(1) IN GENERAL.—The amendments made by this section shall apply to property placed in service after April 11, 2005.

(2) EXCEPTION.—The amendments made by this section shall not apply to any property with respect to which the taxpayer or a related party has entered into a binding contract for the construction thereof on or before April 11, 2005, or, in the case of self-constructed property, has started construction on or before such date.

SEC. 1326. NATURAL GAS GATHERING LINES TREATED AS 7-YEAR PROPERTY.

(a) IN GENERAL.—Subparagraph (C) of section 168(e)(3) (relating to classification of certain property) is amended by striking "and" at the end of clause (iii), by redesignating clause (iv) as clause (v), and by inserting after clause (iii) the following new clause:

"(iv) any natural gas gathering line the original use of which commences with the taxpayer after April 11, 2005, and".

(b) NATURAL GAS GATHERING LINE.—Subsection (i) of section 168 is amended by inserting after paragraph (16) the following new paragraph:

"(17) NATURAL GAS GATHERING LINE.—The term 'natural gas gathering line' means—

"(A) the pipe, equipment, and appurtenances determined to be a gathering line by the Federal Energy Regulatory Commission, and

"(B) the pipe, equipment, and appurtenances used to deliver natural gas from the wellhead or a commonpoint to the point at which such gas first reaches—

"(i) a gas processing plant,

"(ii) an interconnection with a transmission pipeline for which a certificate as an interstate transmission pipeline has been issued by the Federal Energy Regulatory Commission,

"(iii) an interconnection with an intrastate transmission pipeline, or

"(iv) a direct interconnection with a local distribution company, a gas storage facility, or an industrial consumer.".

(c) ALTERNATIVE SYSTEM.—The table contained in section 168(g)(3)(B) (relating to special rule for certain property assigned to classes), as amended by this Act, is amended by inserting after the item relating to subparagraph (C)(iii) the following new item:

"(C)(iv) ..... 14".

(d) ALTERNATIVE MINIMUM TAX EXCEPTION.—Subparagraph (B) of section 56(a)(1) is amended by inserting before the period the following: ", or in section 168(e)(3)(C)(iv)".

(e) EFFECTIVE DATE.— 26 USC 56 note.

(1) IN GENERAL.—The amendments made by this section shall apply to property placed in service after April 11, 2005.

(2) EXCEPTION.—The amendments made by this section shall not apply to any property with respect to which the taxpayer or a related party has entered into a binding contract for the construction thereof on or before April 11, 2005, or, in the case of self-constructed property, has started construction on or before such date.

SEC. 1327. ARBITRAGE RULES NOT TO APPLY TO PREPAYMENTS FOR NATURAL GAS.

(a) IN GENERAL.—Subsection (b) of section 148 (relating to higher yielding investments) is amended by adding at the end the following new paragraph:

"(4) SAFE HARBOR FOR PREPAID NATURAL GAS.—

"(A) IN GENERAL.—The term 'investment-type property' does not include a prepayment under a qualified natural gas supply contract.

"(B) QUALIFIED NATURAL GAS SUPPLY CONTRACT.—For purposes of this paragraph, the term 'qualified natural gas supply contract' means any contract to acquire natural gas for resale by a utility owned by a governmental unit if the amount of gas permitted to be acquired under the contract by the utility during any year does not exceed the sum of—

"(i) the annual average amount during the testing period of natural gas purchased (other than for resale) by customers of such utility who are located within the service area of such utility, and

"(ii) the amount of natural gas to be used to transport the prepaid natural gas to the utility during such year.

"(C) NATURAL GAS USED TO GENERATE ELECTRICITY.—Natural gas used to generate electricity shall be taken into account in determining the average under subparagraph (B)(i)—

"(i) only if the electricity is generated by a utility owned by a governmental unit, and

"(ii) only to the extent that the electricity is sold (other than for resale) to customers of such utility who are located within the service area of such utility.

Contracts.

"(D) ADJUSTMENTS FOR CHANGES IN CUSTOMER BASE.—

"(i) NEW BUSINESS CUSTOMERS.—If—

"(I) after the close of the testing period and before the date of issuance of the issue, the utility owned by a governmental unit enters into a contract to supply natural gas (other than for resale) for a business use at a property within the service area of such utility, and

"(II) the utility did not supply natural gas to such property during the testing period or the ratable amount of natural gas to be supplied under the contract is significantly greater than the ratable amount of gas supplied to such property during the testing period,

then a contract shall not fail to be treated as a qualified natural gas supply contract by reason of supplying the additional natural gas under the contract referred to in subclause (I).

"(ii) LOST CUSTOMERS.—The average under subparagraph (B)(i) shall not exceed the annual amount of natural gas reasonably expected to be purchased (other than for resale) by persons who are located within the service area of such utility and who, as of the date of issuance of the issue, are customers of such utility.

"(E) RULING REQUESTS.—The Secretary may increase the average under subparagraph (B)(i) for any period if the utility owned by the governmental unit establishes to the satisfaction of the Secretary that, based on objective evidence of growth in natural gas consumption or population, such average would otherwise be insufficient for such period.

"(F) ADJUSTMENT FOR NATURAL GAS OTHERWISE ON HAND.—

"(i) IN GENERAL.—The amount otherwise permitted to be acquired under the contract for any period shall be reduced by—

"(I) the applicable share of natural gas held by the utility on the date of issuance of the issue, and

"(II) the natural gas (not taken into account under subclause (I)) which the utility has a right to acquire during such period (determined as of the date of issuance of the issue).

"(ii) APPLICABLE SHARE.—For purposes of the clause (i), the term 'applicable share' means, with respect to any period, the natural gas allocable to such period if the gas were allocated ratably over the period to which the prepayment relates.

"(G) INTENTIONAL ACTS.—Subparagraph (A) shall cease to apply to any issue if the utility owned by the governmental unit engages in any intentional act to render the volume of natural gas acquired by such prepayment to be in excess of the sum of—

"(i) the amount of natural gas needed (other than for resale) by customers of such utility who are located within the service area of such utility, and

"(ii) the amount of natural gas used to transport such natural gas to the utility.

"(H) TESTING PERIOD.—For purposes of this paragraph, the term 'testing period' means, with respect to an issue, the most recent 5 calendar years ending before the date of issuance of the issue.

"(I) SERVICE AREA.—For purposes of this paragraph, the service area of a utility owned by a governmental unit shall be comprised of—

"(i) any area throughout which such utility provided at all times during the testing period—

"(I) in the case of a natural gas utility, natural gas transmission or distribution services, and

"(II) in the case of an electric utility, electricity distribution services,

"(ii) any area within a county contiguous to the area described in clause (i) in which retail customers of such utility are located if such area is not also served by another utility providing natural gas or electricity services, as the case may be, and

"(iii) any area recognized as the service area of such utility under State or Federal law.".

(b) PRIVATE LOAN FINANCING TEST NOT TO APPLY TO PREPAYMENTS FOR NATURAL GAS.—Paragraph (2) of section 141(c) (providing exceptions to the private loan financing test) is amended by striking "or" at the end of subparagraph (A), by striking the period at the end of subparagraph (B) and inserting ", or", and by adding at the end the following new subparagraph:

"(C) is a qualified natural gas supply contract (as defined in section 148(b)(4)).".

(c) EXCEPTION FOR QUALIFIED ELECTRIC AND NATURAL GAS SUPPLY CONTRACTS.—Section 141(d) is amended by adding at the end the following new paragraph:

"(7) EXCEPTION FOR QUALIFIED ELECTRIC AND NATURAL GAS SUPPLY CONTRACTS.—The term 'nongovernmental output property' shall not include any contract for the prepayment of electricity or natural gas which is not investment property under section 148(b)(2).".

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to obligations issued after the date of the enactment of this Act. 26 USC 141 note.

SEC. 1328. DETERMINATION OF SMALL REFINER EXCEPTION TO OIL DEPLETION DEDUCTION.

(a) IN GENERAL.—Paragraph (4) of section 613A(d) (relating to limitations on application of subsection (c)) is amended to read as follows:

"(4) CERTAIN REFINERS EXCLUDED.—If the taxpayer or one or more related persons engages in the refining of crude oil, subsection (c) shall not apply to the taxpayer for a taxable year if the average daily refinery runs of the taxpayer and such persons for the taxable year exceed 75,000 barrels. For purposes of this paragraph, the average daily refinery runs

for any taxable year shall be determined by dividing the aggregate refinery runs for the taxable year by the number of days in the taxable year.".

26 USC 613A note.

(b) EFFECTIVE DATE.—The amendment made by this section shall apply to taxable years ending after the date of the enactment of this Act.

SEC. 1329. AMORTIZATION OF GEOLOGICAL AND GEOPHYSICAL EXPENDITURES.

(a) IN GENERAL.—Section 167 (relating to depreciation) is amended by redesignating subsection (h) as subsection (i) and by inserting after subsection (g) the following new subsection:

"(h) AMORTIZATION OF GEOLOGICAL AND GEOPHYSICAL EXPENDITURES.—

"(1) IN GENERAL.—Any geological and geophysical expenses paid or incurred in connection with the exploration for, or development of, oil or gas within the United States (as defined in section 638) shall be allowed as a deduction ratably over the 24-month period beginning on the date that such expense was paid or incurred.

"(2) HALF-YEAR CONVENTION.—For purposes of paragraph (1), any payment paid or incurred during the taxable year shall be treated as paid or incurred on the mid-point of such taxable year.

"(3) EXCLUSIVE METHOD.—Except as provided in this subsection, no depreciation or amortization deduction shall be allowed with respect to such payments.

"(4) TREATMENT UPON ABANDONMENT.—If any property with respect to which geological and geophysical expenses are paid or incurred is retired or abandoned during the 24-month period described in paragraph (1), no deduction shall be allowed on account of such retirement or abandonment and the amortization deduction under this subsection shall continue with respect to such payment.".

(b) CONFORMING AMENDMENT.—Section 263A(c)(3) is amended by inserting "167(h)," after "under section".

26 USC 167 note.

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to amounts paid or incurred in taxable years beginning after the date of the enactment of this Act.

Subtitle C—Conservation and Energy Efficiency Provisions

SEC. 1331. ENERGY EFFICIENT COMMERCIAL BUILDINGS DEDUCTION.

(a) IN GENERAL.—Part VI of subchapter B of chapter 1 (relating to itemized deductions for individuals and corporations), as amended by this Act, is amended by inserting after section 179C the following new section:

"SEC. 179D. ENERGY EFFICIENT COMMERCIAL BUILDINGS DEDUCTION.

"(a) IN GENERAL.—There shall be allowed as a deduction an amount equal to the cost of energy efficient commercial building property placed in service during the taxable year.

"(b) MAXIMUM AMOUNT OF DEDUCTION.—The deduction under subsection (a) with respect to any building for any taxable year shall not exceed the excess (if any) of—

"(1) the product of—

"(A) $1.80, and

"(B) the square footage of the building, over

"(2) the aggregate amount of the deductions under subsection (a) with respect to the building for all prior taxable years.

"(c) DEFINITIONS.—For purposes of this section—

"(1) ENERGY EFFICIENT COMMERCIAL BUILDING PROPERTY.—The term 'energy efficient commercial building property' means property—

"(A) with respect to which depreciation (or amortization in lieu of depreciation) is allowable,

"(B) which is installed on or in any building which is—

"(i) located in the United States, and

"(ii) within the scope of Standard 90.1–2001,

"(C) which is installed as part of—

"(i) the interior lighting systems,

"(ii) the heating, cooling, ventilation, and hot water systems, or

"(iii) the building envelope, and

"(D) which is certified in accordance with subsection (d)(6) as being installed as part of a plan designed to reduce the total annual energy and power costs with respect to the interior lighting systems, heating, cooling, ventilation, and hot water systems of the building by 50 percent or more in comparison to a reference building which meets the minimum requirements of Standard 90.1–2001 using methods of calculation under subsection (d)(2).

"(2) STANDARD 90.1–2001.—The term 'Standard 90.1–2001' means Standard 90.1–2001 of the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America (as in effect on April 2, 2003).

"(d) SPECIAL RULES.—

"(1) PARTIAL ALLOWANCE.—

"(A) IN GENERAL.—Except as provided in subsection (f), if—

"(i) the requirement of subsection (c)(1)(D) is not met, but

"(ii) there is a certification in accordance with paragraph (6) that any system referred to in subsection (c)(1)(C) satisfies the energy-savings targets established by the Secretary under subparagraph (B) with respect to such system,

then the requirement of subsection (c)(1)(D) shall be treated as met with respect to such system, and the deduction under subsection (a) shall be allowed with respect to energy efficient commercial building property installed as part of such system and as part of a plan to meet such targets, except that subsection (b) shall be applied to such property by substituting '$.60' for '$1.80'.

"(B) REGULATIONS.—The Secretary, after consultation with the Secretary of Energy, shall establish a target for each system described in subsection (c)(1)(C) which, if such targets were met for all such systems, the building would meet the requirements of subsection (c)(1)(D).

Regulations.

"(2) METHODS OF CALCULATION.—The Secretary, after consultation with the Secretary of Energy, shall promulgate regulations which describe in detail methods for calculating and verifying energy and power consumption and cost, based on the provisions of the 2005 California Nonresidential Alternative Calculation Method Approval Manual.

"(3) COMPUTER SOFTWARE.—

"(A) IN GENERAL.—Any calculation under paragraph (2) shall be prepared by qualified computer software.

"(B) QUALIFIED COMPUTER SOFTWARE.—For purposes of this paragraph, the term 'qualified computer software' means software—

"(i) for which the software designer has certified that the software meets all procedures and detailed methods for calculating energy and power consumption and costs as required by the Secretary,

"(ii) which provides such forms as required to be filed by the Secretary in connection with energy efficiency of property and the deduction allowed under this section, and

"(iii) which provides a notice form which documents the energy efficiency features of the building and its projected annual energy costs.

"(4) ALLOCATION OF DEDUCTION FOR PUBLIC PROPERTY.—In the case of energy efficient commercial building property installed on or in property owned by a Federal, State, or local government or a political subdivision thereof, the Secretary shall promulgate a regulation to allow the allocation of the deduction to the person primarily responsible for designing the property in lieu of the owner of such property. Such person shall be treated as the taxpayer for purposes of this section.

"(5) NOTICE TO OWNER.—Each certification required under this section shall include an explanation to the building owner regarding the energy efficiency features of the building and its projected annual energy costs as provided in the notice under paragraph (3)(B)(iii).

"(6) CERTIFICATION.—

"(A) IN GENERAL.—The Secretary shall prescribe the manner and method for the making of certifications under this section.

"(B) PROCEDURES.—The Secretary shall include as part of the certification process procedures for inspection and testing by qualified individuals described in subparagraph (C) to ensure compliance of buildings with energy-savings plans and targets. Such procedures shall be comparable, given the difference between commercial and residential buildings, to the requirements in the Mortgage Industry National Accreditation Procedures for Home Energy Rating Systems.

"(C) QUALIFIED INDIVIDUALS.—Individuals qualified to determine compliance shall be only those individuals who are recognized by an organization certified by the Secretary for such purposes.

"(e) BASIS REDUCTION.—For purposes of this subtitle, if a deduction is allowed under this section with respect to any energy efficient commercial building property, the basis of such property shall be reduced by the amount of the deduction so allowed.

"(f) INTERIM RULES FOR LIGHTING SYSTEMS.—Until such time as the Secretary issues final regulations under subsection (d)(1)(B) with respect to property which is part of a lighting system—

"(1) IN GENERAL.—The lighting system target under subsection (d)(1)(A)(ii) shall be a reduction in lighting power density of 25 percent (50 percent in the case of a warehouse) of the minimum requirements in Table 9.3.1.1 or Table 9.3.1.2 (not including additional interior lighting power allowances) of Standard 90.1–2001.

"(2) REDUCTION IN DEDUCTION IF REDUCTION LESS THAN 40 PERCENT.—

"(A) IN GENERAL.—If, with respect to the lighting system of any building other than a warehouse, the reduction in lighting power density of the lighting system is not at least 40 percent, only the applicable percentage of the amount of deduction otherwise allowable under this section with respect to such property shall be allowed.

"(B) APPLICABLE PERCENTAGE.—For purposes of subparagraph (A), the applicable percentage is the number of percentage points (not greater than 100) equal to the sum of—

"(i) 50, and

"(ii) the amount which bears the same ratio to 50 as the excess of the reduction of lighting power density of the lighting system over 25 percentage points bears to 15.

"(C) EXCEPTIONS.—This subsection shall not apply to any system—

"(i) the controls and circuiting of which do not comply fully with the mandatory and prescriptive requirements of Standard 90.1–2001 and which do not include provision for bilevel switching in all occupancies except hotel and motel guest rooms, store rooms, restrooms, and public lobbies, or

"(ii) which does not meet the minimum requirements for calculated lighting levels as set forth in the Illuminating Engineering Society of North America Lighting Handbook, Performance and Application, Ninth Edition, 2000.

"(g) REGULATIONS.—The Secretary shall promulgate such regulations as necessary—

"(1) to take into account new technologies regarding energy efficiency and renewable energy for purposes of determining energy efficiency and savings under this section, and

"(2) to provide for a recapture of the deduction allowed under this section if the plan described in subsection (c)(1)(D) or (d)(1)(A) is not fully implemented.

"(h) TERMINATION.—This section shall not apply with respect to property placed in service after December 31, 2007.".

(b) CONFORMING AMENDMENTS.—

(1) Section 1016(a) is amended by striking "and" at the end of paragraph (30), by striking the period at the end of paragraph (31) and inserting ", and", and by adding at the end the following new paragraph:

"(32) to the extent provided in section 179D(e).".

(2) Section 1245(a), as amended by this Act, is amended by inserting "179D," after "179C," both places it appears in paragraphs (2)(C) and (3)(C).

(3) Section 1250(b)(3) is amended by inserting before the period at the end of the first sentence "or by section 179D".

(4) Section 263(a)(1), as amended by this Act, is amended by striking "or" at the end of subparagraph (I), by striking the period at the end of subparagraph (J) and inserting ", or", and by inserting after subparagraph (J) the following new subparagraph:

"(K) expenditures for which a deduction is allowed under section 179D.".

(5) Section 312(k)(3)(B), as amended by this Act, is amended by striking "179, 179A, 179B, or 179C" each place it appears in the heading and text and inserting "179, 179A, 179B, 179C, or 179D".

(c) CLERICAL AMENDMENT.—The table of sections for part VI of subchapter B of chapter 1, as amended by this Act, is amended by inserting after section 179C the following new item:

"Sec. 179D. Energy efficient commercial buildings deduction.".

26 USC 179D note.

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to property placed in service after December 31, 2005.

SEC. 1332. CREDIT FOR CONSTRUCTION OF NEW ENERGY EFFICIENT HOMES.

(a) IN GENERAL.—Subpart D of part IV of subchapter A of chapter 1 (relating to business related credits), as amended by this Act, is amended by adding at the end the following new section:

"SEC. 45L. NEW ENERGY EFFICIENT HOME CREDIT.

"(a) ALLOWANCE OF CREDIT.—

"(1) IN GENERAL.—For purposes of section 38, in the case of an eligible contractor, the new energy efficient home credit for the taxable year is the applicable amount for each qualified new energy efficient home which is—

"(A) constructed by the eligible contractor, and

"(B) acquired by a person from such eligible contractor for use as a residence during the taxable year.

"(2) APPLICABLE AMOUNT.—For purposes of paragraph (1), the applicable amount is an amount equal to—

"(A) in the case of a dwelling unit described in paragraph (1) or (2) of subsection (c), $2,000, and

"(B) in the case of a dwelling unit described in paragraph (3) of subsection (c), $1,000.

"(b) DEFINITIONS.—For purposes of this section—

"(1) ELIGIBLE CONTRACTOR.—The term 'eligible contractor' means—

"(A) the person who constructed the qualified new energy efficient home, or

"(B) in the case of a qualified new energy efficient home which is a manufactured home, the manufactured home producer of such home.

"(2) QUALIFIED NEW ENERGY EFFICIENT HOME.—The term 'qualified new energy efficient home' means a dwelling unit—

"(A) located in the United States,

"(B) the construction of which is substantially completed after the date of the enactment of this section, and

"(C) which meets the energy saving requirements of subsection (c).

"(3) CONSTRUCTION.—The term 'construction' includes substantial reconstruction and rehabilitation.

"(4) ACQUIRE.—The term 'acquire' includes purchase.

"(c) ENERGY SAVING REQUIREMENTS.—A dwelling unit meets the energy saving requirements of this subsection if such unit is—

"(1) certified—

"(A) to have a level of annual heating and cooling energy consumption which is at least 50 percent below the annual level of heating and cooling energy consumption of a comparable dwelling unit—

"(i) which is constructed in accordance with the standards of chapter 4 of the 2003 International Energy Conservation Code, as such Code (including supplements) is in effect on the date of the enactment of this section, and

"(ii) for which the heating and cooling equipment efficiencies correspond to the minimum allowed under the regulations established by the Department of Energy pursuant to the National Appliance Energy Conservation Act of 1987 and in effect at the time of completion of construction, and

"(B) to have building envelope component improvements account for at least ⅕ of such 50 percent,

"(2) a manufactured home which conforms to Federal Manufactured Home Construction and Safety Standards (section 3280 of title 24, Code of Federal Regulations) and which meets the requirements of paragraph (1), or

"(3) a manufactured home which conforms to Federal Manufactured Home Construction and Safety Standards (section 3280 of title 24, Code of Federal Regulations) and which—

"(A) meets the requirements of paragraph (1) applied by substituting '30 percent' for '50 percent' both places it appears therein and by substituting '⅓' for '⅕' in subparagraph (B) thereof, or

"(B) meets the requirements established by the Administrator of the Environmental Protection Agency under the Energy Star Labeled Homes program.

"(d) CERTIFICATION.—

"(1) METHOD OF CERTIFICATION.—A certification described in subsection (c) shall be made in accordance with guidance prescribed by the Secretary, after consultation with the Secretary of Energy. Such guidance shall specify procedures and methods for calculating energy and cost savings.

"(2) FORM.—Any certification described in subsection (c) shall be made in writing in a manner which specifies in readily verifiable fashion the energy efficient building envelope components and energy efficient heating or cooling equipment installed and their respective rated energy efficiency performance.

"(e) BASIS ADJUSTMENT.—For purposes of this subtitle, if a credit is allowed under this section in connection with any expenditure for any property, the increase in the basis of such property which would (but for this subsection) result from such expenditure shall be reduced by the amount of the credit so determined.

"(f) COORDINATION WITH INVESTMENT CREDIT.—For purposes of this section, expenditures taken into account under section 47 or 48(a) shall not be taken into account under this section.

"(g) TERMINATION.—This section shall not apply to any qualified new energy efficient home acquired after December 31, 2007.".

(b) CREDIT MADE PART OF GENERAL BUSINESS CREDIT.—Section 38(b) (relating to current year business credit), as amended by this Act, is amended by striking "plus" at the end of paragraph (21), by striking the period at the end of paragraph (22) and inserting ", plus", and by adding at the end the following new paragraph:

"(23) the new energy efficient home credit determined under section 45L(a).".

(c) BASIS ADJUSTMENT.—Subsection (a) of section 1016, as amended by this Act, is amended by striking "and" at the end of paragraph (31), by striking the period at the end of paragraph (32) and inserting ", and", and by adding at the end the following new paragraph:

"(33) to the extent provided in section 45L(e), in the case of amounts with respect to which a credit has been allowed under section 45L.".

(d) DEDUCTION FOR CERTAIN UNUSED BUSINESS CREDITS.—Section 196(c) (defining qualified business credits) is amended by striking "and" at the end of paragraph (11), by striking the period at the end of paragraph (12) and inserting ", and", and by adding after paragraph (12) the following new paragraph:

"(13) the new energy efficient home credit determined under section 45L(a).".

(e) CLERICAL AMENDMENT.—The table of sections for subpart D of part IV of subchapter A of chapter 1, as amended by this Act, is amended by adding at the end the following new item:

"Sec. 45L. New energy efficient home credit.".

26 USC 38 note.

(f) EFFECTIVE DATE.—The amendments made by this section shall apply to qualified new energy efficient homes acquired after December 31, 2005, in taxable years ending after such date.

SEC. 1333. CREDIT FOR CERTAIN NONBUSINESS ENERGY PROPERTY.

(a) IN GENERAL.—Subpart A of part IV of subchapter A of chapter 1 (relating to nonrefundable personal credits) is amended by inserting after section 25B the following new section:

"SEC. 25C. NONBUSINESS ENERGY PROPERTY.

"(a) ALLOWANCE OF CREDIT.—In the case of an individual, there shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to the sum of—

"(1) 10 percent of the amount paid or incurred by the taxpayer for qualified energy efficiency improvements installed during such taxable year, and

"(2) the amount of the residential energy property expenditures paid or incurred by the taxpayer during such taxable year.

"(b) LIMITATIONS.—

"(1) LIFETIME LIMITATION.—The credit allowed under this section with respect to any taxpayer for any taxable year shall not exceed the excess (if any) of $500 over the aggregate credits allowed under this section with respect to such taxpayer for all prior taxable years.

"(2) WINDOWS.—In the case of amounts paid or incurred for components described in subsection (c)(3)(B) by any taxpayer for any taxable year, the credit allowed under this section with respect to such amounts for such year shall not exceed the excess (if any) of $200 over the aggregate credits allowed under this section with respect to such amounts for all prior taxable years.

"(3) LIMITATION ON RESIDENTIAL ENERGY PROPERTY EXPENDITURES.—The amount of the credit allowed under this section by reason of subsection (a)(2) shall not exceed—

"(A) $50 for any advanced main air circulating fan,

"(B) $150 for any qualified natural gas, propane, or oil furnace or hot water boiler, and

"(C) $300 for any item of energy-efficient building property.

"(c) QUALIFIED ENERGY EFFICIENCY IMPROVEMENTS.—For purposes of this section—

"(1) IN GENERAL.—The term 'qualified energy efficiency improvements' means any energy efficient building envelope component which meets the prescriptive criteria for such component established by the 2000 International Energy Conservation Code, as such Code (including supplements) is in effect on the date of the enactment of this section (or, in the case of a metal roof with appropriate pigmented coatings which meet the Energy Star program requirements), if—

"(A) such component is installed in or on a dwelling unit located in the United States and owned and used by the taxpayer as the taxpayer's principal residence (within the meaning of section 121),

"(B) the original use of such component commences with the taxpayer, and

"(C) such component reasonably can be expected to remain in use for at least 5 years.

"(2) BUILDING ENVELOPE COMPONENT.—The term 'building envelope component' means—

"(A) any insulation material or system which is specifically and primarily designed to reduce the heat loss or gain of a dwelling unit when installed in or on such dwelling unit,

"(B) exterior windows (including skylights),

"(C) exterior doors, and

"(D) any metal roof installed on a dwelling unit, but only if such roof has appropriate pigmented coatings which are specifically and primarily designed to reduce the heat gain of such dwelling unit.

"(3) MANUFACTURED HOMES INCLUDED.—The term 'dwelling unit' includes a manufactured home which conforms to Federal Manufactured Home Construction and Safety Standards (section 3280 of title 24, Code of Federal Regulations).

"(d) RESIDENTIAL ENERGY PROPERTY EXPENDITURES.—For purposes of this section—

"(1) IN GENERAL.—The term 'residential energy property expenditures' means expenditures made by the taxpayer for qualified energy property which is—

"(A) installed on or in connection with a dwelling unit located in the United States and owned and used by the taxpayer as the taxpayer's principal residence (within the meaning of section 121), and

"(B) originally placed in service by the taxpayer.

Such term includes expenditures for labor costs properly allocable to the onsite preparation, assembly, or original installation of the property.

"(2) QUALIFIED ENERGY PROPERTY.—

"(A) IN GENERAL.—The term 'qualified energy property' means—

"(i) energy-efficient building property,

"(ii) a qualified natural gas, propane, or oil furnace or hot water boiler, or

"(iii) an advanced main air circulating fan.

"(B) PERFORMANCE AND QUALITY STANDARDS.—Property described under subparagraph (A) shall meet the performance and quality standards, and the certification requirements (if any), which—

"(i) have been prescribed by the Secretary by regulations (after consultation with the Secretary of Energy or the Administrator of the Environmental Protection Agency, as appropriate), and

"(ii) are in effect at the time of the acquisition of the property, or at the time of the completion of the construction, reconstruction, or erection of the property, as the case may be.

"(C) REQUIREMENTS FOR STANDARDS.—The standards and requirements prescribed by the Secretary under subparagraph (B)—

"(i) in the case of the energy efficiency ratio (EER) for central air conditioners and electric heat pumps—

"(I) shall require measurements to be based on published data which is tested by manufacturers at 95 degrees Fahrenheit, and

"(II) may be based on the certified data of the Air Conditioning and Refrigeration Institute that are prepared in partnership with the Consortium for Energy Efficiency, and

"(ii) in the case of geothermal heat pumps—

"(I) shall be based on testing under the conditions of ARI/ISO Standard 13256–1 for Water Source Heat Pumps or ARI 870 for Direct Expansion GeoExchange Heat Pumps (DX), as appropriate, and

"(II) shall include evidence that water heating services have been provided through a desuperheater or integrated water heating system connected to the storage water heater tank.

"(3) ENERGY-EFFICIENT BUILDING PROPERTY.—The term 'energy-efficient building property' means—

"(A) an electric heat pump water heater which yields an energy factor of at least 2.0 in the standard Department of Energy test procedure,

"(B) an electric heat pump which has a heating seasonal performance factor (HSPF) of at least 9, a seasonal energy efficiency ratio (SEER) of at least 15, and an energy efficiency ratio (EER) of at least 13,

"(C) a geothermal heat pump which—

"(i) in the case of a closed loop product, has an energy efficiency ratio (EER) of at least 14.1 and a heating coefficient of performance (COP) of at least 3.3,

"(ii) in the case of an open loop product, has an energy efficiency ratio (EER) of at least 16.2 and a heating coefficient of performance (COP) of at least 3.6, and

"(iii) in the case of a direct expansion (DX) product, has an energy efficiency ratio (EER) of at least 15 and a heating coefficient of performance (COP) of at least 3.5,

"(D) a central air conditioner which achieves the highest efficiency tier established by the Consortium for Energy Efficiency, as in effect on January 1, 2006, and

"(E) a natural gas, propane, or oil water heater which has an energy factor of at least 0.80.

"(4) QUALIFIED NATURAL GAS, PROPANE, OR OIL FURNACE OR HOT WATER BOILER.—The term 'qualified natural gas, propane, or oil furnace or hot water boiler' means a natural gas, propane, or oil furnace or hot water boiler which achieves an annual fuel utilization efficiency rate of not less than 95.

"(5) ADVANCED MAIN AIR CIRCULATING FAN.—The term 'advanced main air circulating fan' means a fan used in a natural gas, propane, or oil furnace and which has an annual electricity use of no more than 2 percent of the total annual energy use of the furnace (as determined in the standard Department of Energy test procedures).

"(e) SPECIAL RULES.—For purposes of this section—

"(1) APPLICATION OF RULES.—Rules similar to the rules under paragraphs (4), (5), (6), (7), (8), and (9) of section 25D(e) shall apply.

"(2) JOINT OWNERSHIP OF ENERGY ITEMS.—

"(A) IN GENERAL.—Any expenditure otherwise qualifying as an expenditure under this section shall not be treated as failing to so qualify merely because such expenditure was made with respect to two or more dwelling units.

"(B) LIMITS APPLIED SEPARATELY.—In the case of any expenditure described in subparagraph (A), the amount of the credit allowable under subsection (a) shall (subject to paragraph (1)) be computed separately with respect to the amount of the expenditure made for each dwelling unit.

"(f) BASIS ADJUSTMENTS.—For purposes of this subtitle, if a credit is allowed under this section for any expenditure with respect to any property, the increase in the basis of such property which would (but for this subsection) result from such expenditure shall be reduced by the amount of the credit so allowed.

"(g) TERMINATION.—This section shall not apply with respect to any property placed in service after December 31, 2007.".

(b) CONFORMING AMENDMENTS.—

(1) Subsection (a) of section 1016, as amended by this Act, is amended by striking "and" at the end of paragraph (32), by striking the period at the end of paragraph (33) and inserting ", and", and by adding at the end the following new paragraph:

"(34) to the extent provided in section 25C(e), in the case of amounts with respect to which a credit has been allowed under section 25C.".

(2) The table of sections for subpart A of part IV of subchapter A of chapter 1 is amended by inserting after the item relating to section 25B the following new item:

"Sec. 25C. Nonbusiness energy property.".

26 USC 25C note.

(c) EFFECTIVE DATES.—The amendments made by this section shall apply to property placed in service after December 31, 2005.

SEC. 1334. CREDIT FOR ENERGY EFFICIENT APPLIANCES.

(a) IN GENERAL.—Subpart D of part IV of subchapter A of chapter 1 (relating to business-related credits), as amended by this Act, is amended by adding at the end the following new section:

"SEC. 45M. ENERGY EFFICIENT APPLIANCE CREDIT.

"(a) GENERAL RULE.—

"(1) IN GENERAL.—For purposes of section 38, the energy efficient appliance credit determined under this section for any taxable year is an amount equal to the sum of the credit amounts determined under paragraph (2) for each type of qualified energy efficient appliance produced by the taxpayer during the calendar year ending with or within the taxable year.

"(2) CREDIT AMOUNTS.—The credit amount determined for any type of qualified energy efficient appliance is—

"(A) the applicable amount determined under subsection (b) with respect to such type, multiplied by

"(B) the eligible production for such type.

"(b) APPLICABLE AMOUNT.—

"(1) IN GENERAL.—For purposes of subsection (a)—

"(A) DISHWASHERS.—The applicable amount is the energy savings amount in the case of a dishwasher which—

"(i) is manufactured in calendar year 2006 or 2007, and

"(ii) meets the requirements of the Energy Star program which are in effect for dishwashers in 2007.

"(B) CLOTHES WASHERS.—The applicable amount is $100 in the case of a clothes washer which—

"(i) is manufactured in calendar year 2006 or 2007, and

"(ii) meets the requirements of the Energy Star program which are in effect for clothes washers in 2007.

"(C) REFRIGERATORS.—

"(i) 15 PERCENT SAVINGS.—The applicable amount is $75 in the case of a refrigerator which—

"(I) is manufactured in calendar year 2006, and

"(II) consumes at least 15 percent but not more than 20 percent less kilowatt hours per year than the 2001 energy conservation standards.

"(ii) 20 PERCENT SAVINGS.—The applicable amount is $125 in the case of a refrigerator which—

"(I) is manufactured in calendar year 2006 or 2007, and

"(II) consumes at least 20 percent but not more than 25 percent less kilowatt hours per year than the 2001 energy conservation standards.

"(iii) 25 PERCENT SAVINGS.—The applicable amount is $175 in the case of a refrigerator which—

"(I) is manufactured in calendar year 2006 or 2007, and

"(II) consumes at least 25 percent less kilowatt hours per year than the 2001 energy conservation standards.

"(2) ENERGY SAVINGS AMOUNT.—For purposes of paragraph (1)(A)—

"(A) IN GENERAL.—The energy savings amount is the lesser of—

"(i) the product of—

"(I) $3, and

"(II) 100 multiplied by the energy savings percentage, or

"(ii) $100.

"(B) ENERGY SAVINGS PERCENTAGE.—For purposes of subparagraph (A), the energy savings percentage is the ratio of—

"(i) the EF required by the Energy Star program for dishwashers in 2007 minus the EF required by the Energy Star program for dishwashers in 2005, to

"(ii) the EF required by the Energy Star program for dishwashers in 2007.

"(c) ELIGIBLE PRODUCTION.—

"(1) IN GENERAL.—Except as provided in paragraphs (2), the eligible production in a calendar year with respect to each type of energy efficient appliance is the excess of—

"(A) the number of appliances of such type which are produced by the taxpayer in the United States during such calendar year, over

"(B) the average number of appliances of such type which were produced by the taxpayer (or any predecessor) in the United States during the preceding 3-calendar year period.

"(2) SPECIAL RULE FOR REFRIGERATORS.—The eligible production in a calendar year with respect to each type of refrigerator described in subsection (b)(1)(C) is the excess of—

"(A) the number of appliances of such type which are produced by the taxpayer in the United States during such calendar year, over

"(B) 110 percent of the average number of appliances of such type which were produced by the taxpayer (or any predecessor) in the United States during the preceding 3-calendar year period.

"(d) TYPES OF ENERGY EFFICIENT APPLIANCE.—For purposes of this section, the types of energy efficient appliances are—

"(1) dishwashers described in subsection (b)(1)(A),

"(2) clothes washers described in subsection (b)(1)(B),

"(3) refrigerators described in subsection (b)(1)(C)(i),

"(4) refrigerators described in subsection (b)(1)(C)(ii), and

"(5) refrigerators described in subsection (b)(1)(C)(iii).

"(e) LIMITATIONS.—

"(1) AGGREGATE CREDIT AMOUNT ALLOWED.—The aggregate amount of credit allowed under subsection (a) with respect to a taxpayer for any taxable year shall not exceed $75,000,000 reduced by the amount of the credit allowed under subsection (a) to the taxpayer (or any predecessor) for all prior taxable years.

"(2) AMOUNT ALLOWED FOR 15 PERCENT SAVINGS REFRIGERATORS.—In the case of refrigerators described in subsection (b)(1)(C)(i), the aggregate amount of the credit allowed under subsection (a) with respect to a taxpayer for any taxable year shall not exceed $20,000,000.

"(3) LIMITATION BASED ON GROSS RECEIPTS.—The credit allowed under subsection (a) with respect to a taxpayer for the taxable year shall not exceed an amount equal to 2 percent of the average annual gross receipts of the taxpayer for the 3 taxable years preceding the taxable year in which the credit is determined.

Applicability.

"(4) GROSS RECEIPTS.—For purposes of this subsection, the rules of paragraphs (2) and (3) of section 448(c) shall apply.

"(f) DEFINITIONS.—For purposes of this section—

"(1) QUALIFIED ENERGY EFFICIENT APPLIANCE.—The term 'qualified energy efficient appliance' means—

"(A) any dishwasher described in subsection (b)(1)(A),

"(B) any clothes washer described in subsection (b)(1)(B), and

"(C) any refrigerator described in subsection (b)(1)(C).

"(2) DISHWASHER.—The term 'dishwasher' means a residential dishwasher subject to the energy conservation standards established by the Department of Energy.

"(3) CLOTHES WASHER.—The term 'clothes washer' means a residential model clothes washer, including a residential style coin operated washer.

"(4) REFRIGERATOR.—The term 'refrigerator' means a residential model automatic defrost refrigerator-freezer which has an internal volume of at least 16.5 cubic feet.

"(5) EF.—The term 'EF' means the energy factor established by the Department of Energy for compliance with the Federal energy conservation standards.

"(6) PRODUCED.—The term 'produced' includes manufactured.

"(7) 2001 ENERGY CONSERVATION STANDARD.—The term '2001 energy conservation standard' means the energy conservation standards promulgated by the Department of Energy and effective July 1, 2001.

"(g) SPECIAL RULES.—For purposes of this section—

Applicability.

"(1) IN GENERAL.—Rules similar to the rules of subsections (c), (d), and (e) of section 52 shall apply.

"(2) CONTROLLED GROUP.—

"(A) IN GENERAL.—All persons treated as a single employer under subsection (a) or (b) of section 52 or subsection (m) or (o) of section 414 shall be treated as a single producer.

"(B) INCLUSION OF FOREIGN CORPORATIONS.—For purposes of subparagraph (A), in applying subsections (a) and (b) of section 52 to this section, section 1563 shall be applied without regard to subsection (b)(2)(C) thereof. Applicability.

"(3) VERIFICATION.—No amount shall be allowed as a credit under subsection (a) with respect to which the taxpayer has not submitted such information or certification as the Secretary, in consultation with the Secretary of Energy, determines necessary.".

(b) CONFORMING AMENDMENT.—Section 38(b) (relating to general business credit), as amended by this Act, is amended by striking "plus" at the end of paragraph (22), by striking the period at the end of paragraph (23) and inserting ", plus", and by adding at the end the following new paragraph:

"(24) the energy efficient appliance credit determined under section 45M(a).".

(c) CLERICAL AMENDMENT.—The table of sections for subpart D of part IV of subchapter A of chapter 1, as amended by this Act, is amended by adding at the end the following new item:

"Sec. 45M. Energy efficient appliance credit.".

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to appliances produced after December 31, 2005. 26 USC 38 note.

SEC. 1335. CREDIT FOR RESIDENTIAL ENERGY EFFICIENT PROPERTY.

(a) IN GENERAL.—Subpart A of part IV of subchapter A of chapter 1 (relating to nonrefundable personal credits), as amended by this Act, is amended by inserting after section 25C the following new section:

"SEC. 25D. RESIDENTIAL ENERGY EFFICIENT PROPERTY.

"(a) ALLOWANCE OF CREDIT.—In the case of an individual, there shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to the sum of—

"(1) 30 percent of the qualified photovoltaic property expenditures made by the taxpayer during such year,

"(2) 30 percent of the qualified solar water heating property expenditures made by the taxpayer during such year, and

"(3) 30 percent of the qualified fuel cell property expenditures made by the taxpayer during such year.

"(b) LIMITATIONS.—

"(1) MAXIMUM CREDIT.—The credit allowed under subsection (a) for any taxable year shall not exceed—

"(A) $2,000 with respect to any qualified photovoltaic property expenditures,

"(B) $2,000 with respect to any qualified solar water heating property expenditures, and

"(C) $500 with respect to each half kilowatt of capacity of qualified fuel cell property (as defined in section 48(c)(1)) for which qualified fuel cell property expenditures are made.

"(2) CERTIFICATION OF SOLAR WATER HEATING PROPERTY.—No credit shall be allowed under this section for an item of property described in subsection (d)(1) unless such property is certified for performance by the non-profit Solar Rating Certification Corporation or a comparable entity endorsed by the government of the State in which such property is installed.

"(c) CARRYFORWARD OF UNUSED CREDIT.—If the credit allowable under subsection (a) exceeds the limitation imposed by section 26(a) for such taxable year reduced by the sum of the credits allowable under this subpart (other than this section), such excess shall be carried to the succeeding taxable year and added to the credit allowable under subsection (a) for such succeeding taxable year.

"(d) DEFINITIONS.—For purposes of this section—

"(1) QUALIFIED SOLAR WATER HEATING PROPERTY EXPENDITURE.—The term 'qualified solar water heating property expenditure' means an expenditure for property to heat water for use in a dwelling unit located in the United States and used as a residence by the taxpayer if at least half of the energy used by such property for such purpose is derived from the sun.

"(2) QUALIFIED PHOTOVOLTAIC PROPERTY EXPENDITURE.—The term 'qualified photovoltaic property expenditure' means an expenditure for property which uses solar energy to generate electricity for use in a dwelling unit located in the United States and used as a residence by the taxpayer.

"(3) QUALIFIED FUEL CELL PROPERTY EXPENDITURE.—The term 'qualified fuel cell property expenditure' means an expenditure for qualified fuel cell property (as defined in section 48(c)(1)) installed on or in connection with a dwelling unit located in the United States and used as a principal residence (within the meaning of section 121) by the taxpayer.

"(e) SPECIAL RULES.—For purposes of this section—

"(1) LABOR COSTS.—Expenditures for labor costs properly allocable to the onsite preparation, assembly, or original installation of the property described in subsection (d) and for piping or wiring to interconnect such property to the dwelling unit shall be taken into account for purposes of this section.

"(2) SOLAR PANELS.—No expenditure relating to a solar panel or other property installed as a roof (or portion thereof) shall fail to be treated as property described in paragraph (1) or (2) of subsection (d) solely because it constitutes a structural component of the structure on which it is installed.

"(3) SWIMMING POOLS, ETC., USED AS STORAGE MEDIUM.—Expenditures which are properly allocable to a swimming pool, hot tub, or any other energy storage medium which has a function other than the function of such storage shall not be taken into account for purposes of this section.

"(4) DOLLAR AMOUNTS IN CASE OF JOINT OCCUPANCY.—In the case of any dwelling unit which is jointly occupied and used during any calendar year as a residence by two or more individuals the following rules shall apply:

"(A) The amount of the credit allowable, under subsection (a) by reason of expenditures (as the case may be) made during such calendar year by any of such individuals with respect to such dwelling unit shall be determined by treating all of such individuals as 1 taxpayer whose taxable year is such calendar year.

"(B) There shall be allowable, with respect to such expenditures to each of such individuals, a credit under subsection (a) for the taxable year in which such calendar year ends in an amount which bears the same ratio to

the amount determined under subparagraph (A) as the amount of such expenditures made by such individual during such calendar year bears to the aggregate of such expenditures made by all of such individuals during such calendar year.

"(C) Subparagraphs (A) and (B) shall be applied separately with respect to expenditures described in paragraphs (1), (2), and (3) of subsection (d). Applicability.

"(5) TENANT-STOCKHOLDER IN COOPERATIVE HOUSING CORPORATION.—In the case of an individual who is a tenant-stockholder (as defined in section 216) in a cooperative housing corporation (as defined in such section), such individual shall be treated as having made his tenant-stockholder's proportionate share (as defined in section 216(b)(3)) of any expenditures of such corporation.

"(6) CONDOMINIUMS.—

"(A) IN GENERAL.—In the case of an individual who is a member of a condominium management association with respect to a condominium which the individual owns, such individual shall be treated as having made the individual's proportionate share of any expenditures of such association.

"(B) CONDOMINIUM MANAGEMENT ASSOCIATION.—For purposes of this paragraph, the term 'condominium management association' means an organization which meets the requirements of paragraph (1) of section 528(c) (other than subparagraph (E) thereof) with respect to a condominium project substantially all of the units of which are used as residences.

"(7) ALLOCATION IN CERTAIN CASES.—If less than 80 percent of the use of an item is for nonbusiness purposes, only that portion of the expenditures for such item which is properly allocable to use for nonbusiness purposes shall be taken into account.

"(8) WHEN EXPENDITURE MADE; AMOUNT OF EXPENDITURE.—

"(A) IN GENERAL.—Except as provided in subparagraph (B), an expenditure with respect to an item shall be treated as made when the original installation of the item is completed.

"(B) EXPENDITURES PART OF BUILDING CONSTRUCTION.—In the case of an expenditure in connection with the construction or reconstruction of a structure, such expenditure shall be treated as made when the original use of the constructed or reconstructed structure by the taxpayer begins.

"(9) PROPERTY FINANCED BY SUBSIDIZED ENERGY FINANCING.—For purposes of determining the amount of expenditures made by any individual with respect to any dwelling unit, there shall not be taken into account expenditures which are made from subsidized energy financing (as defined in section 48(a)(4)(C)).

"(f) BASIS ADJUSTMENTS.—For purposes of this subtitle, if a credit is allowed under this section for any expenditure with respect to any property, the increase in the basis of such property which would (but for this subsection) result from such expenditure shall be reduced by the amount of the credit so allowed.

"(g) TERMINATION.—The credit allowed under this section shall not apply to property placed in service after December 31, 2007.".

(b) CONFORMING AMENDMENTS.—

(1) Section 23(c) is amended by striking "this section and section 1400C" and inserting "this section, section 25D, and section 1400C".

(2) Section 25(e)(1)(C) is amended by striking "this section and sections 23 and 1400C" and inserting "other than this section, section 23, section 25D, and section 1400C".

(3) Section 1400C(d) is amended by striking "this section" and inserting "this section and section 25D".

(4) Section 1016(a), as amended by this Act, is amended by striking "and" at the end of paragraph (33), by striking the period at the end of paragraph (34) and inserting ", and", and by adding at the end the following new paragraph:

"(35) to the extent provided in section 25D(f), in the case of amounts with respect to which a credit has been allowed under section 25D.".

(5) The table of sections for subpart A of part IV of subchapter A of chapter 1, as amended by this Act, is amended by inserting after the item relating to section 25C the following new item:

"Sec. 25D. Residential energy efficient property.".

26 USC 23 note.

(c) EFFECTIVE DATES.—The amendments made by this section shall apply to property placed in service after December 31, 2005, in taxable years ending after such date.

SEC. 1336. CREDIT FOR BUSINESS INSTALLATION OF QUALIFIED FUEL CELLS AND STATIONARY MICROTURBINE POWER PLANTS.

(a) IN GENERAL.—Section 48(a)(3)(A) (defining energy property) is amended by striking "or" at the end of clause (i), by adding "or" at the end of clause (ii), and by inserting after clause (ii) the following new clause:

"(iii) qualified fuel cell property or qualified microturbine property,".

(b) QUALIFIED FUEL CELL PROPERTY; QUALIFIED MICROTURBINE PROPERTY.—Section 48 (relating to energy credit) is amended by adding at the end the following new subsection:

"(c) QUALIFIED FUEL CELL PROPERTY; QUALIFIED MICROTURBINE PROPERTY.—For purposes of this subsection—

"(1) QUALIFIED FUEL CELL PROPERTY.—

"(A) IN GENERAL.—The term 'qualified fuel cell property' means a fuel cell power plant which—

"(i) has a nameplate capacity of at least 0.5 kilowatt of electricity using an electrochemical process, and

"(ii) has an electricity-only generation efficiency greater than 30 percent.

"(B) LIMITATION.—In the case of qualified fuel cell property placed in service during the taxable year, the credit otherwise determined under paragraph (1) for such year with respect to such property shall not exceed an amount equal to $500 for each 0.5 kilowatt of capacity of such property.

"(C) FUEL CELL POWER PLANT.—The term 'fuel cell power plant' means an integrated system comprised of

a fuel cell stack assembly and associated balance of plant components which converts a fuel into electricity using electrochemical means.

"(D) SPECIAL RULE.—The first sentence of the matter in subsection (a)(3) which follows subparagraph (D) thereof shall not apply to qualified fuel cell property which is used predominantly in the trade or business of the furnishing or sale of telephone service, telegraph service by means of domestic telegraph operations, or other telegraph services (other than international telegraph services).

"(E) TERMINATION.—The term 'qualified fuel cell property' shall not include any property for any period after December 31, 2007.

"(2) QUALIFIED MICROTURBINE PROPERTY.—

"(A) IN GENERAL.—The term 'qualified microturbine property' means a stationary microturbine power plant which—

"(i) has a nameplate capacity of less than 2,000 kilowatts, and

"(ii) has an electricity-only generation efficiency of not less than 26 percent at International Standard Organization conditions.

"(B) LIMITATION.—In the case of qualified microturbine property placed in service during the taxable year, the credit otherwise determined under paragraph (1) for such year with respect to such property shall not exceed an amount equal $200 for each kilowatt of capacity of such property.

"(C) STATIONARY MICROTURBINE POWER PLANT.—The term 'stationary microturbine power plant' means an integrated system comprised of a gas turbine engine, a combustor, a recuperator or regenerator, a generator or alternator, and associated balance of plant components which converts a fuel into electricity and thermal energy. Such term also includes all secondary components located between the existing infrastructure for fuel delivery and the existing infrastructure for power distribution, including equipment and controls for meeting relevant power standards, such as voltage, frequency, and power factors.

"(D) SPECIAL RULE.—The first sentence of the matter in subsection (a)(3) which follows subparagraph (D) thereof shall not apply to qualified microturbine property which is used predominantly in the trade or business of the furnishing or sale of telephone service, telegraph service by means of domestic telegraph operations, or other telegraph services (other than international telegraph services).

"(E) TERMINATION.—The term 'qualified microturbine property' shall not include any property for any period after December 31, 2007.".

(c) ENERGY PERCENTAGE.—Section 48(a)(2)(A) (relating to energy percentage) is amended to read as follows:

"(A) IN GENERAL.—The energy percentage is—

"(i) in the case of qualified fuel cell property, 30 percent, and

"(ii) in the case of any other energy property, 10 percent.".

(d) CONFORMING AMENDMENT.—Section 48(a)(1) is amended by inserting "except as provided in paragraph (1)(B) or (2)(B) of subsection (d)," before "the energy".

26 USC 48 note.

(e) EFFECTIVE DATE.—The amendments made by this section shall apply to periods after December 31, 2005, in taxable years ending after such date, under rules similar to the rules of section 48(m) of the Internal Revenue Code of 1986 (as in effect on the day before the date of the enactment of the Revenue Reconciliation Act of 1990).

SEC. 1337. BUSINESS SOLAR INVESTMENT TAX CREDIT.

(a) INCREASE IN ENERGY PERCENTAGE.—Section 48(a)(2)(A) (relating to energy percentage), as amended by this Act, is amended to read as follows:

"(A) IN GENERAL.—The energy percentage is—

"(i) 30 percent in the case of—

"(I) qualified fuel cell property,

"(II) energy property described in paragraph (3)(A)(i) but only with respect to periods ending before January 1, 2008, and

"(III) energy property described in paragraph (3)(A)(ii), and

"(ii) in the case of any energy property to which clause (i) does not apply, 10 percent.".

(b) HYBRID SOLAR LIGHTING SYSTEMS.—Subparagraph (A) of section 48(a)(3) is amended by striking "or" at the end of clause (i), by redesignating clause (ii) as clause (iii), and by inserting after clause (i) the following new clause:

"(ii) equipment which uses solar energy to illuminate the inside of a structure using fiber-optic distributed sunlight but only with respect to periods ending before January 1, 2008, or".

(c) LIMITATION ON USE OF SOLAR ENERGY TO HEAT SWIMMING POOLS.—Clause (i) of section 48(a)(3)(A) is amended by inserting "excepting property used to generate energy for the purposes of heating a swimming pool," after "solar process heat,".

26 USC 48 note.

(d) EFFECTIVE DATE.—The amendments made by this section shall apply to periods after December 31, 2005, in taxable years ending after such date, under rules similar to the rules of section 48(m) of the Internal Revenue Code of 1986 (as in effect on the day before the date of the enactment of the Revenue Reconciliation Act of 1990).

Subtitle D—Alternative Motor Vehicles and Fuels Incentives

SEC. 1341. ALTERNATIVE MOTOR VEHICLE CREDIT.

(a) IN GENERAL.—Subpart B of part IV of subchapter A of chapter 1 (relating to foreign tax credit, etc.) is amended by adding at the end the following new section:

"SEC. 30B. ALTERNATIVE MOTOR VEHICLE CREDIT.

"(a) ALLOWANCE OF CREDIT.—There shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to the sum of—

"(1) the new qualified fuel cell motor vehicle credit determined under subsection (b),

"(2) the new advanced lean burn technology motor vehicle credit determined under subsection (c),

"(3) the new qualified hybrid motor vehicle credit determined under subsection (d), and

"(4) the new qualified alternative fuel motor vehicle credit determined under subsection (e).

"(b) NEW QUALIFIED FUEL CELL MOTOR VEHICLE CREDIT.—

"(1) IN GENERAL.—For purposes of subsection (a), the new qualified fuel cell motor vehicle credit determined under this subsection with respect to a new qualified fuel cell motor vehicle placed in service by the taxpayer during the taxable year is—

"(A) $8,000 ($4,000 in the case of a vehicle placed in service after December 31, 2009), if such vehicle has a gross vehicle weight rating of not more than 8,500 pounds,

"(B) $10,000, if such vehicle has a gross vehicle weight rating of more than 8,500 pounds but not more than 14,000 pounds,

"(C) $20,000, if such vehicle has a gross vehicle weight rating of more than 14,000 pounds but not more than 26,000 pounds, and

"(D) $40,000, if such vehicle has a gross vehicle weight rating of more than 26,000 pounds.

"(2) INCREASE FOR FUEL EFFICIENCY.—

"(A) IN GENERAL.—The amount determined under paragraph (1)(A) with respect to a new qualified fuel cell motor vehicle which is a passenger automobile or light truck shall be increased by—

"(i) $1,000, if such vehicle achieves at least 150 percent but less than 175 percent of the 2002 model year city fuel economy,

"(ii) $1,500, if such vehicle achieves at least 175 percent but less than 200 percent of the 2002 model year city fuel economy,

"(iii) $2,000, if such vehicle achieves at least 200 percent but less than 225 percent of the 2002 model year city fuel economy,

"(iv) $2,500, if such vehicle achieves at least 225 percent but less than 250 percent of the 2002 model year city fuel economy,

"(v) $3,000, if such vehicle achieves at least 250 percent but less than 275 percent of the 2002 model year city fuel economy,

"(vi) $3,500, if such vehicle achieves at least 275 percent but less than 300 percent of the 2002 model year city fuel economy, and

"(vii) $4,000, if such vehicle achieves at least 300 percent of the 2002 model year city fuel economy.

"(B) 2002 MODEL YEAR CITY FUEL ECONOMY.—For purposes of subparagraph (A), the 2002 model year city fuel economy with respect to a vehicle shall be determined in accordance with the following tables:

"(i) In the case of a passenger automobile:

"If vehicle inertia weight class is:	The 2002 model year city fuel economy is:
1,500 or 1,750 lbs	45.2 mpg
2,000 lbs	39.6 mpg
2,250 lbs	35.2 mpg
2,500 lbs	31.7 mpg
2,750 lbs	28.8 mpg
3,000 lbs	26.4 mpg
3,500 lbs	22.6 mpg
4,000 lbs	19.8 mpg
4,500 lbs	17.6 mpg
5,000 lbs	15.9 mpg
5,500 lbs	14.4 mpg
6,000 lbs	13.2 mpg
6,500 lbs	12.2 mpg
7,000 to 8,500 lbs	11.3 mpg.

"(ii) In the case of a light truck:

"If vehicle inertia weight class is:	The 2002 model year city fuel economy is:
1,500 or 1,750 lbs	39.4 mpg
2,000 lbs	35.2 mpg
2,250 lbs	31.8 mpg
2,500 lbs	29.0 mpg
2,750 lbs	26.8 mpg
3,000 lbs	24.9 mpg
3,500 lbs	21.8 mpg
4,000 lbs	19.4 mpg
4,500 lbs	17.6 mpg
5,000 lbs	16.1 mpg
5,500 lbs	14.8 mpg
6,000 lbs	13.7 mpg
6,500 lbs	12.8 mpg
7,000 to 8,500 lbs	12.1 mpg.

"(C) VEHICLE INERTIA WEIGHT CLASS.—For purposes of subparagraph (B), the term 'vehicle inertia weight class' has the same meaning as when defined in regulations prescribed by the Administrator of the Environmental Protection Agency for purposes of the administration of title II of the Clean Air Act (42 U.S.C. 7521 et seq.).

"(3) NEW QUALIFIED FUEL CELL MOTOR VEHICLE.—For purposes of this subsection, the term 'new qualified fuel cell motor vehicle' means a motor vehicle—

"(A) which is propelled by power derived from 1 or more cells which convert chemical energy directly into electricity by combining oxygen with hydrogen fuel which is stored on board the vehicle in any form and may or may not require reformation prior to use,

"(B) which, in the case of a passenger automobile or light truck, has received on or after the date of the enactment of this section a certificate that such vehicle meets or exceeds the Bin 5 Tier II emission level established in regulations prescribed by the Administrator of the Environmental Protection Agency under section 202(i) of the Clean Air Act for that make and model year vehicle,

"(C) the original use of which commences with the taxpayer,

"(D) which is acquired for use or lease by the taxpayer and not for resale, and

"(E) which is made by a manufacturer.

"(c) NEW ADVANCED LEAN BURN TECHNOLOGY MOTOR VEHICLE CREDIT.—

"(1) IN GENERAL.—For purposes of subsection (a), the new advanced lean burn technology motor vehicle credit determined under this subsection for the taxable year is the credit amount determined under paragraph (2) with respect to a new advanced lean burn technology motor vehicle placed in service by the taxpayer during the taxable year.

"(2) CREDIT AMOUNT.—

"(A) FUEL ECONOMY.—

"(i) IN GENERAL.—The credit amount determined under this paragraph shall be determined in accordance with the following table:

"In the case of a vehicle which achieves a fuel economy (expressed as a percentage of the 2002 model year city fuel economy) of—	The credit amount is—
At least 125 percent but less than 150 percent	$400
At least 150 percent but less than 175 percent	$800
At least 175 percent but less than 200 percent	$1,200
At least 200 percent but less than 225 percent	$1,600
At least 225 percent but less than 250 percent	$2,000
At least 250 percent	$2,400.

"(ii) 2002 MODEL YEAR CITY FUEL ECONOMY.—For purposes of clause (i), the 2002 model year city fuel economy with respect to a vehicle shall be determined on a gasoline gallon equivalent basis as determined by the Administrator of the Environmental Protection Agency using the tables provided in subsection (b)(2)(B) with respect to such vehicle.

"(B) CONSERVATION CREDIT.—The amount determined under subparagraph (A) with respect to a new advanced lean burn technology motor vehicle shall be increased by the conservation credit amount determined in accordance with the following table:

"In the case of a vehicle which achieves a lifetime fuel savings (expressed in gallons of gasoline) of—	The conservation credit amount is—
At least 1,200 but less than 1,800	$250
At least 1,800 but less than 2,400	$500
At least 2,400 but less than 3,000	$750
At least 3,000	$1,000.

"(3) NEW ADVANCED LEAN BURN TECHNOLOGY MOTOR VEHICLE.—For purposes of this subsection, the term 'new advanced lean burn technology motor vehicle' means a passenger automobile or a light truck—

"(A) with an internal combustion engine which—

"(i) is designed to operate primarily using more air than is necessary for complete combustion of the fuel,

"(ii) incorporates direct injection,

"(iii) achieves at least 125 percent of the 2002 model year city fuel economy,

"(iv) for 2004 and later model vehicles, has received a certificate that such vehicle meets or exceeds—

"(I) in the case of a vehicle having a gross vehicle weight rating of 6,000 pounds or less, the Bin 5 Tier II emission standard established in regulations prescribed by the Administrator of the Environmental Protection Agency under section 202(i) of the Clean Air Act for that make and model year vehicle, and

"(II) in the case of a vehicle having a gross vehicle weight rating of more than 6,000 pounds but not more than 8,500 pounds, the Bin 8 Tier II emission standard which is so established,

"(B) the original use of which commences with the taxpayer,

"(C) which is acquired for use or lease by the taxpayer and not for resale, and

"(D) which is made by a manufacturer.

"(4) LIFETIME FUEL SAVINGS.—For purposes of this subsection, the term 'lifetime fuel savings' means, in the case of any new advanced lean burn technology motor vehicle, an amount equal to the excess (if any) of—

"(A) 120,000 divided by the 2002 model year city fuel economy for the vehicle inertia weight class, over

"(B) 120,000 divided by the city fuel economy for such vehicle.

"(d) NEW QUALIFIED HYBRID MOTOR VEHICLE CREDIT.—

"(1) IN GENERAL.—For purposes of subsection (a), the new qualified hybrid motor vehicle credit determined under this subsection for the taxable year is the credit amount determined under paragraph (2) with respect to a new qualified hybrid motor vehicle placed in service by the taxpayer during the taxable year.

"(2) CREDIT AMOUNT.—

"(A) CREDIT AMOUNT FOR PASSENGER AUTOMOBILES AND LIGHT TRUCKS.—In the case of a new qualified hybrid motor vehicle which is a passenger automobile or light truck and which has a gross vehicle weight rating of not more than 8,500 pounds, the amount determined under this paragraph is the sum of the amounts determined under clauses (i) and (ii).

"(i) FUEL ECONOMY.—The amount determined under this clause is the amount which would be determined under subsection (c)(2)(A) if such vehicle were a vehicle referred to in such subsection.

"(ii) CONSERVATION CREDIT.—The amount determined under this clause is the amount which would be determined under subsection (c)(2)(B) if such vehicle were a vehicle referred to in such subsection.

"(B) CREDIT AMOUNT FOR OTHER MOTOR VEHICLES.—

"(i) IN GENERAL.—In the case of any new qualified hybrid motor vehicle to which subparagraph (A) does not apply, the amount determined under this paragraph is the amount equal to the applicable percentage of the qualified incremental hybrid cost of the vehicle as certified under clause (v).

"(ii) APPLICABLE PERCENTAGE.—For purposes of clause (i), the applicable percentage is—

"(I) 20 percent if the vehicle achieves an increase in city fuel economy relative to a comparable vehicle of at least 30 percent but less than 40 percent,

"(II) 30 percent if the vehicle achieves such an increase of at least 40 percent but less than 50 percent, and

"(III) 40 percent if the vehicle achieves such an increase of at least 50 percent.

"(iii) QUALIFIED INCREMENTAL HYBRID COST.—For purposes of this subparagraph, the qualified incremental hybrid cost of any vehicle is equal to the amount of the excess of the manufacturer's suggested retail price for such vehicle over such price for a comparable vehicle, to the extent such amount does not exceed—

"(I) $7,500, if such vehicle has a gross vehicle weight rating of not more than 14,000 pounds,

"(II) $15,000, if such vehicle has a gross vehicle weight rating of more than 14,000 pounds but not more than 26,000 pounds, and

"(III) $30,000, if such vehicle has a gross vehicle weight rating of more than 26,000 pounds.

"(iv) COMPARABLE VEHICLE.—For purposes of this subparagraph, the term 'comparable vehicle' means, with respect to any new qualified hybrid motor vehicle, any vehicle which is powered solely by a gasoline or diesel internal combustion engine and which is comparable in weight, size, and use to such vehicle.

"(v) CERTIFICATION.—A certification described in clause (i) shall be made by the manufacturer and shall be determined in accordance with guidance prescribed by the Secretary. Such guidance shall specify procedures and methods for calculating fuel economy savings and incremental hybrid costs.

"(3) NEW QUALIFIED HYBRID MOTOR VEHICLE.—For purposes of this subsection—

"(A) IN GENERAL.—The term 'new qualified hybrid motor vehicle' means a motor vehicle—

"(i) which draws propulsion energy from onboard sources of stored energy which are both—

"(I) an internal combustion or heat engine using consumable fuel, and

"(II) a rechargeable energy storage system,

"(ii) which, in the case of a vehicle to which paragraph (2)(A) applies, has received a certificate of conformity under the Clean Air Act and meets or exceeds the equivalent qualifying California low emission vehicle standard under section 243(e)(2) of the Clean Air Act for that make and model year, and

"(I) in the case of a vehicle having a gross vehicle weight rating of 6,000 pounds or less, the Bin 5 Tier II emission standard established in regulations prescribed by the Administrator of the Environmental Protection Agency under section

202(i) of the Clean Air Act for that make and model year vehicle, and

"(II) in the case of a vehicle having a gross vehicle weight rating of more than 6,000 pounds but not more than 8,500 pounds, the Bin 8 Tier II emission standard which is so established,

"(iii) which has a maximum available power of at least—

Applicability.

"(I) 4 percent in the case of a vehicle to which paragraph (2)(A) applies,

"(II) 10 percent in the case of a vehicle which has a gross vehicle weight rating of more than 8,500 pounds and not more than 14,000 pounds, and

"(III) 15 percent in the case of a vehicle in excess of 14,000 pounds,

Applicability.

"(iv) which, in the case of a vehicle to which paragraph (2)(B) applies, has an internal combustion or heat engine which has received a certificate of conformity under the Clean Air Act as meeting the emission standards set in the regulations prescribed by the Administrator of the Environmental Protection Agency for 2004 through 2007 model year diesel heavy duty engines or ottocycle heavy duty engines, as applicable,

"(v) the original use of which commences with the taxpayer,

"(vi) which is acquired for use or lease by the taxpayer and not for resale, and

"(vii) which is made by a manufacturer.

Such term shall not include any vehicle which is not a passenger automobile or light truck if such vehicle has a gross vehicle weight rating of less than 8,500 pounds.

"(B) CONSUMABLE FUEL.—For purposes of subparagraph (A)(i)(I), the term 'consumable fuel' means any solid, liquid, or gaseous matter which releases energy when consumed by an auxiliary power unit.

Applicability.

"(C) MAXIMUM AVAILABLE POWER.—

"(i) CERTAIN PASSENGER AUTOMOBILES AND LIGHT TRUCKS.—In the case of a vehicle to which paragraph (2)(A) applies, the term 'maximum available power' means the maximum power available from the rechargeable energy storage system, during a standard 10 second pulse power or equivalent test, divided by such maximum power and the SAE net power of the heat engine.

"(ii) OTHER MOTOR VEHICLES.—In the case of a vehicle to which paragraph (2)(B) applies, the term 'maximum available power' means the maximum power available from the rechargeable energy storage system, during a standard 10 second pulse power or equivalent test, divided by the vehicle's total traction power. For purposes of the preceding sentence, the term 'total traction power' means the sum of the peak power from the rechargeable energy storage system and the heat engine peak power of the vehicle, except that if such storage system is the sole means by which the vehicle

can be driven, the total traction power is the peak power of such storage system.

"(e) NEW QUALIFIED ALTERNATIVE FUEL MOTOR VEHICLE CREDIT.—

"(1) ALLOWANCE OF CREDIT.—Except as provided in paragraph (5), the new qualified alternative fuel motor vehicle credit determined under this subsection is an amount equal to the applicable percentage of the incremental cost of any new qualified alternative fuel motor vehicle placed in service by the taxpayer during the taxable year.

"(2) APPLICABLE PERCENTAGE.—For purposes of paragraph (1), the applicable percentage with respect to any new qualified alternative fuel motor vehicle is—

"(A) 50 percent, plus

"(B) 30 percent, if such vehicle—

"(i) has received a certificate of conformity under the Clean Air Act and meets or exceeds the most stringent standard available for certification under the Clean Air Act for that make and model year vehicle (other than a zero emission standard), or

"(ii) has received an order certifying the vehicle as meeting the same requirements as vehicles which may be sold or leased in California and meets or exceeds the most stringent standard available for certification under the State laws of California (enacted in accordance with a waiver granted under section 209(b) of the Clean Air Act) for that make and model year vehicle (other than a zero emission standard).

For purposes of the preceding sentence, in the case of any new qualified alternative fuel motor vehicle which weighs more than 14,000 pounds gross vehicle weight rating, the most stringent standard available shall be such standard available for certification on the date of the enactment of the Energy Tax Incentives Act of 2005.

"(3) INCREMENTAL COST.—For purposes of this subsection, the incremental cost of any new qualified alternative fuel motor vehicle is equal to the amount of the excess of the manufacturer's suggested retail price for such vehicle over such price for a gasoline or diesel fuel motor vehicle of the same model, to the extent such amount does not exceed—

"(A) $5,000, if such vehicle has a gross vehicle weight rating of not more than 8,500 pounds,

"(B) $10,000, if such vehicle has a gross vehicle weight rating of more than 8,500 pounds but not more than 14,000 pounds,

"(C) $25,000, if such vehicle has a gross vehicle weight rating of more than 14,000 pounds but not more than 26,000 pounds, and

"(D) $40,000, if such vehicle has a gross vehicle weight rating of more than 26,000 pounds.

"(4) NEW QUALIFIED ALTERNATIVE FUEL MOTOR VEHICLE.—For purposes of this subsection—

"(A) IN GENERAL.—The term 'new qualified alternative fuel motor vehicle' means any motor vehicle—

"(i) which is only capable of operating on an alternative fuel,

"(ii) the original use of which commences with the taxpayer,

"(iii) which is acquired by the taxpayer for use or lease, but not for resale, and

"(iv) which is made by a manufacturer.

"(B) ALTERNATIVE FUEL.—The term 'alternative fuel' means compressed natural gas, liquefied natural gas, liquefied petroleum gas, hydrogen, and any liquid at least 85 percent of the volume of which consists of methanol.

"(5) CREDIT FOR MIXED-FUEL VEHICLES.—

"(A) IN GENERAL.—In the case of a mixed-fuel vehicle placed in service by the taxpayer during the taxable year, the credit determined under this subsection is an amount equal to—

"(i) in the case of a 75/25 mixed-fuel vehicle, 70 percent of the credit which would have been allowed under this subsection if such vehicle was a qualified alternative fuel motor vehicle, and

"(ii) in the case of a 90/10 mixed-fuel vehicle, 90 percent of the credit which would have been allowed under this subsection if such vehicle was a qualified alternative fuel motor vehicle.

"(B) MIXED-FUEL VEHICLE.—For purposes of this subsection, the term 'mixed-fuel vehicle' means any motor vehicle described in subparagraph (C) or (D) of paragraph (3), which—

"(i) is certified by the manufacturer as being able to perform efficiently in normal operation on a combination of an alternative fuel and a petroleum-based fuel,

"(ii) either—

"(I) has received a certificate of conformity under the Clean Air Act, or

"(II) has received an order certifying the vehicle as meeting the same requirements as vehicles which may be sold or leased in California and meets or exceeds the low emission vehicle standard under section 88.105–94 of title 40, Code of Federal Regulations, for that make and model year vehicle,

"(iii) the original use of which commences with the taxpayer,

"(iv) which is acquired by the taxpayer for use or lease, but not for resale, and

"(v) which is made by a manufacturer.

"(C) 75/25 MIXED-FUEL VEHICLE.—For purposes of this subsection, the term '75/25 mixed-fuel vehicle' means a mixed-fuel vehicle which operates using at least 75 percent alternative fuel and not more than 25 percent petroleum-based fuel.

"(D) 90/10 MIXED-FUEL VEHICLE.—For purposes of this subsection, the term '90/10 mixed-fuel vehicle' means a mixed-fuel vehicle which operates using at least 90 percent alternative fuel and not more than 10 percent petroleum-based fuel.

"(f) LIMITATION ON NUMBER OF NEW QUALIFIED HYBRID AND ADVANCED LEAN-BURN TECHNOLOGY VEHICLES ELIGIBLE FOR CREDIT.—

"(1) IN GENERAL.—In the case of a qualified vehicle sold during the phaseout period, only the applicable percentage of the credit otherwise allowable under subsection (c) or (d) shall be allowed.

"(2) PHASEOUT PERIOD.—For purposes of this subsection, the phaseout period is the period beginning with the second calendar quarter following the calendar quarter which includes the first date on which the number of qualified vehicles manufactured by the manufacturer of the vehicle referred to in paragraph (1) sold for use in the United States after December 31, 2005, is at least 60,000.

"(3) APPLICABLE PERCENTAGE.—For purposes of paragraph (1), the applicable percentage is—

"(A) 50 percent for the first 2 calendar quarters of the phaseout period,

"(B) 25 percent for the 3d and 4th calendar quarters of the phaseout period, and

"(C) 0 percent for each calendar quarter thereafter.

"(4) CONTROLLED GROUPS.—

"(A) IN GENERAL.—For purposes of this subsection, all persons treated as a single employer under subsection (a) or (b) of section 52 or subsection (m) or (o) of section 414 shall be treated as a single manufacturer.

"(B) INCLUSION OF FOREIGN CORPORATIONS.—For purposes of subparagraph (A), in applying subsections (a) and (b) of section 52 to this section, section 1563 shall be applied without regard to subsection (b)(2)(C) thereof. Applicability.

"(5) QUALIFIED VEHICLE.—For purposes of this subsection, the term 'qualified vehicle' means any new qualified hybrid motor vehicle (described in subsection (d)(2)(A)) and any new advanced lean burn technology motor vehicle.

"(g) APPLICATION WITH OTHER CREDITS.—

"(1) BUSINESS CREDIT TREATED AS PART OF GENERAL BUSINESS CREDIT.—So much of the credit which would be allowed under subsection (a) for any taxable year (determined without regard to this subsection) that is attributable to property of a character subject to an allowance for depreciation shall be treated as a credit listed in section 38(b) for such taxable year (and not allowed under subsection (a)).

"(2) PERSONAL CREDIT.—The credit allowed under subsection (a) (after the application of paragraph (1)) for any taxable year shall not exceed the excess (if any) of—

"(A) the regular tax reduced by the sum of the credits allowable under subpart A and sections 27 and 30, over

"(B) the tentative minimum tax for the taxable year.

"(h) OTHER DEFINITIONS AND SPECIAL RULES.—For purposes of this section—

"(1) MOTOR VEHICLE.—The term 'motor vehicle' has the meaning given such term by section 30(c)(2).

"(2) CITY FUEL ECONOMY.—The city fuel economy with respect to any vehicle shall be measured in a manner which is substantially similar to the manner city fuel economy is measured in accordance with procedures under part 600 of

subchapter Q of chapter I of title 40, Code of Federal Regulations, as in effect on the date of the enactment of this section.

"(3) OTHER TERMS.—The terms 'automobile', 'passenger automobile', 'medium duty passenger vehicle', 'light truck', and 'manufacturer' have the meanings given such terms in regulations prescribed by the Administrator of the Environmental Protection Agency for purposes of the administration of title II of the Clean Air Act (42 U.S.C. 7521 et seq.).

"(4) REDUCTION IN BASIS.—For purposes of this subtitle, the basis of any property for which a credit is allowable under subsection (a) shall be reduced by the amount of such credit so allowed (determined without regard to subsection (g)).

"(5) NO DOUBLE BENEFIT.—The amount of any deduction or other credit allowable under this chapter—

"(A) for any incremental cost taken into account in computing the amount of the credit determined under subsection (e) shall be reduced by the amount of such credit attributable to such cost, and

"(B) with respect to a vehicle described under subsection (b) or (c), shall be reduced by the amount of credit allowed under subsection (a) for such vehicle for the taxable year.

"(6) PROPERTY USED BY TAX-EXEMPT ENTITY.—In the case of a vehicle whose use is described in paragraph (3) or (4) of section 50(b) and which is not subject to a lease, the person who sold such vehicle to the person or entity using such vehicle shall be treated as the taxpayer that placed such vehicle in service, but only if such person clearly discloses to such person or entity in a document the amount of any credit allowable under subsection (a) with respect to such vehicle (determined without regard to subsection (g)).

"(7) PROPERTY USED OUTSIDE UNITED STATES, ETC., NOT QUALIFIED.—No credit shall be allowable under subsection (a) with respect to any property referred to in section 50(b)(1) or with respect to the portion of the cost of any property taken into account under section 179.

Regulations.

"(8) RECAPTURE.—The Secretary shall, by regulations, provide for recapturing the benefit of any credit allowable under subsection (a) with respect to any property which ceases to be property eligible for such credit (including recapture in the case of a lease period of less than the economic life of a vehicle).

"(9) ELECTION TO NOT TAKE CREDIT.—No credit shall be allowed under subsection (a) for any vehicle if the taxpayer elects to not have this section apply to such vehicle.

"(10) INTERACTION WITH AIR QUALITY AND MOTOR VEHICLE SAFETY STANDARDS.—Unless otherwise provided in this section, a motor vehicle shall not be considered eligible for a credit under this section unless such vehicle is in compliance with—

"(A) the applicable provisions of the Clean Air Act for the applicable make and model year of the vehicle (or applicable air quality provisions of State law in the case of a State which has adopted such provision under a waiver under section 209(b) of the Clean Air Act), and

"(B) the motor vehicle safety provisions of sections 30101 through 30169 of title 49, United States Code.

"(i) REGULATIONS.—

"(1) IN GENERAL.—Except as provided in paragraph (2), the Secretary shall promulgate such regulations as necessary to carry out the provisions of this section.

"(2) COORDINATION IN PRESCRIPTION OF CERTAIN REGULATIONS.—The Secretary of the Treasury, in coordination with the Secretary of Transportation and the Administrator of the Environmental Protection Agency, shall prescribe such regulations as necessary to determine whether a motor vehicle meets the requirements to be eligible for a credit under this section.

"(j) TERMINATION.—This section shall not apply to any property purchased after—

"(1) in the case of a new qualified fuel cell motor vehicle (as described in subsection (b)), December 31, 2014,

"(2) in the case of a new advanced lean burn technology motor vehicle (as described in subsection (c)) or a new qualified hybrid motor vehicle (as described in subsection (d)(2)(A)), December 31, 2010,

"(3) in the case of a new qualified hybrid motor vehicle (as described in subsection (d)(2)(B)), December 31, 2009, and

"(4) in the case of a new qualified alternative fuel vehicle (as described in subsection (e)), December 31, 2010.".

(b) CONFORMING AMENDMENTS.—

(1) Section 38(b), as amended by this Act, is amended by striking "plus" at the end of paragraph (23), by striking the period at the end of paragraph (24) and inserting ", and", and by adding at the end the following new paragraph:

"(25) the portion of the alternative motor vehicle credit to which section 30B(g)(1) applies.".

(2) Section 1016(a), as amended by this Act, is amended by striking "and" at the end of paragraph (34), by striking the period at the end of paragraph (35) and inserting ", and", and by adding at the end the following new paragraph:

"(36) to the extent provided in section 30B(h)(4).".

(3) Section 55(c)(2), as amended by this Act, is amended by inserting "30B(g)(2)," after "30(b)(2),".

(4) Section 6501(m) is amended by inserting "30B(h)(9)," after "30(d)(4),".

(5) The table of sections for subpart B of part IV of subchapter A of chapter 1 is amended by inserting after the item relating to section 30A the following new item:

"Sec. 30B. Alternative motor vehicle credit.".

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to property placed in service after December 31, 2005, in taxable years ending after such date. 26 USC 30B note.

SEC. 1342. CREDIT FOR INSTALLATION OF ALTERNATIVE FUELING STATIONS.

(a) IN GENERAL.—Subpart B of part IV of subchapter A of chapter 1 (relating to other credits), as amended by this Act, is amended by adding at the end the following new section:

"SEC. 30C. ALTERNATIVE FUEL VEHICLE REFUELING PROPERTY CREDIT.

"(a) CREDIT ALLOWED.—There shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to 30 percent of the cost of any qualified alternative

fuel vehicle refueling property placed in service by the taxpayer during the taxable year.

"(b) LIMITATION.—The credit allowed under subsection (a) with respect to any alternative fuel vehicle refueling property shall not exceed—

"(1) $30,000 in the case of a property of a character subject to an allowance for depreciation, and

"(2) $1,000 in any other case.

"(c) QUALIFIED ALTERNATIVE FUEL VEHICLE REFUELING PROPERTY.—

"(1) IN GENERAL.—Except as provided in paragraph (2), the term 'qualified alternative fuel vehicle refueling property' has the meaning given to such term by section 179A(d), but only with respect to any fuel—

"(A) at least 85 percent of the volume of which consists of one or more of the following: ethanol, natural gas, compressed natural gas, liquefied natural gas, liquefied petroleum gas, or hydrogen, or

"(B) any mixture of biodiesel (as defined in section 40A(d)(1)) and diesel fuel (as defined in section 4083(a)(3)), determined without regard to any use of kerosene and containing at least 20 percent biodiesel.

"(2) RESIDENTIAL PROPERTY.—In the case of any property installed on property which is used as the principal residence (within the meaning of section 121) of the taxpayer, paragraph (1) of section 179A(d) shall not apply.

"(d) APPLICATION WITH OTHER CREDITS.—

"(1) BUSINESS CREDIT TREATED AS PART OF GENERAL BUSINESS CREDIT.—So much of the credit which would be allowed under subsection (a) for any taxable year (determined without regard to this subsection) that is attributable to property of a character subject to an allowance for depreciation shall be treated as a credit listed in section 38(b) for such taxable year (and not allowed under subsection (a)).

"(2) PERSONAL CREDIT.—The credit allowed under subsection (a) (after the application of paragraph (1)) for any taxable year shall not exceed the excess (if any) of—

"(A) the regular tax reduced by the sum of the credits allowable under subpart A and sections 27, 30, and 30B, over

"(B) the tentative minimum tax for the taxable year.

"(e) SPECIAL RULES.—For purposes of this section—

"(1) BASIS REDUCTION.—The basis of any property shall be reduced by the portion of the cost of such property taken into account under subsection (a).

"(2) PROPERTY USED BY TAX-EXEMPT ENTITY.—In the case of any qualified alternative fuel vehicle refueling property the use of which is described in paragraph (3) or (4) of section 50(b) and which is not subject to a lease, the person who sold such property to the person or entity using such property shall be treated as the taxpayer that placed such property in service, but only if such person clearly discloses to such person or entity in a document the amount of any credit allowable under subsection (a) with respect to such property (determined without regard to subsection (d)).

"(3) PROPERTY USED OUTSIDE UNITED STATES NOT QUALIFIED.—No credit shall be allowable under subsection (a) with

respect to any property referred to in section 50(b)(1) or with respect to the portion of the cost of any property taken into account under section 179.

"(4) ELECTION NOT TO TAKE CREDIT.—No credit shall be allowed under subsection (a) for any property if the taxpayer elects not to have this section apply to such property.

"(5) RECAPTURE RULES.—Rules similar to the rules of section 179A(e)(4) shall apply. Applicability.

"(f) REGULATIONS.—The Secretary shall prescribe such regulations as necessary to carry out the provisions of this section.

"(g) TERMINATION.—This section shall not apply to any property placed in service—

"(1) in the case of property relating to hydrogen, after December 31, 2014, and

"(2) in the case of any other property, after December 31, 2009.".

(b) CONFORMING AMENDMENTS.—

(1) Section 38(b), as amended by this Act, is amended by striking "plus" at the end of paragraph (24), by striking the period at the end of paragraph (25) and inserting ", and", and by adding at the end the following new paragraph:

"(26) the portion of the alternative fuel vehicle refueling property credit to which section 30C(d)(1) applies.".

(2) Section 1016(a), as amended by this Act, is amended by striking "and" at the end of paragraph (35), by striking the period at the end of paragraph (36) and inserting ", and", and by adding at the end the following new paragraph:

"(37) to the extent provided in section 30C(f).".

(3) Section 55(c)(2), as amended by this Act, is amended by inserting "30C(d)(2)," after "30B(g)(2),".

(4) Section 6501(m) is amended by inserting "30C(e)(5)," after "30B(h)(9),".

(5) The table of sections for subpart B of part IV of subchapter A of chapter 1, as amended by this Act, is amended by inserting after the item relating to section 30B the following new item:

"Sec. 30C. Clean-fuel vehicle refueling property credit.".

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to property placed in service after December 31, 2005, in taxable years ending after such date. 26 USC 30C note.

SEC. 1343. REDUCED MOTOR FUEL EXCISE TAX ON CERTAIN MIXTURES OF DIESEL FUEL.

(a) IN GENERAL.—Paragraph (2) of section 4081(a) is amended by adding at the end the following:

"(D) DIESEL-WATER FUEL EMULSION.—In the case of diesel-water fuel emulsion at least 14 percent of which is water and with respect to which the emulsion additive is registered by a United States manufacturer with the Environmental Protection Agency pursuant to section 211 of the Clean Air Act (as in effect on March 31, 2003), subparagraph (A)(iii) shall be applied by substituting '19.7 cents' for '24.3 cents'. The preceding sentence shall not apply to the removal, sale, or use of diesel-water fuel emulsion unless the person so removing, selling, or using such fuel is registered under section 4101.". Applicability.

(b) SPECIAL RULES FOR DIESEL-WATER FUEL EMULSIONS.—

26 USC 6427.

(1) REFUNDS FOR TAX-PAID PURCHASES.—Section 6427 is amended by redesignating subsections (m) through (p) as subsections (n) through (q), respectively, and by inserting after subsection (l) the following new subsection:

"(m) DIESEL FUEL USED TO PRODUCE EMULSION.—

"(1) IN GENERAL.—Except as provided in subsection (k), if any diesel fuel on which tax was imposed by section 4081 at the regular tax rate is used by any person in producing an emulsion described in section 4081(a)(2)(D) which is sold or used in such person's trade or business, the Secretary shall pay (without interest) to such person an amount equal to the excess of the regular tax rate over the incentive tax rate with respect to such fuel.

"(2) DEFINITIONS.—For purposes of paragraph (1)—

"(A) REGULAR TAX RATE.—The term 'regular tax rate' means the aggregate rate of tax imposed by section 4081 determined without regard to section 4081(a)(2)(D).

"(B) INCENTIVE TAX RATE.—The term 'incentive tax rate' means the aggregate rate of tax imposed by section 4081 determined with regard to section 4081(a)(2)(D).".

(2) LATER SEPARATION OF FUEL.—Section 4081 (relating to imposition of tax) is amended by inserting after subsection (b) the following new subsection:

"(c) LATER SEPARATION OF FUEL FROM DIESEL-WATER FUEL EMULSION.—If any person separates the taxable fuel from a diesel-water fuel emulsion on which tax was imposed under subsection (a) at a rate determined under subsection (a)(2)(D) (or with respect to which a credit or payment was allowed or made by reason of section 6427), such person shall be treated as the refiner of such taxable fuel. The amount of tax imposed on any removal of such fuel by such person shall be reduced by the amount of tax imposed (and not credited or refunded) on any prior removal or entry of such fuel.".

(3) CREDIT CLAIMS.—Paragraphs (1) and (2) of section 6427(i) are both amended by inserting "(m)," after "(l),".

26 USC 4081 note.

(c) EFFECTIVE DATE.—The amendments made by this section shall take effect on January 1, 2006.

SEC. 1344. EXTENSION OF EXCISE TAX PROVISIONS AND INCOME TAX CREDIT FOR BIODIESEL.

(a) IN GENERAL.—Sections 40A(e), 6426(c)(6), and 6427(e)(4)(B) are each amended by striking "2006" and inserting "2008".

26 USC 40A note.

(b) EFFECTIVE DATE.—The amendments made by this section shall take effect on the date of the enactment of this Act.

SEC. 1345. SMALL AGRI-BIODIESEL PRODUCER CREDIT.

(a) IN GENERAL.—Subsection (a) of section 40A (relating to biodiesel used as a fuel) is amended to read as follows:

"(a) GENERAL RULE.—For purposes of section 38, the biodiesel fuels credit determined under this section for the taxable year is an amount equal to the sum of—

"(1) the biodiesel mixture credit, plus

"(2) the biodiesel credit, plus

"(3) in the case of an eligible small agri-biodiesel producer, the small agri-biodiesel producer credit.".

(b) SMALL AGRI-BIODIESEL PRODUCER CREDIT DEFINED.—Section 40A(b) (relating to definition of biodiesel mixture credit and

biodiesel credit) is amended by adding at the end the following new paragraph:

"(5) SMALL AGRI-BIODIESEL PRODUCER CREDIT.—

"(A) IN GENERAL.—The small agri-biodiesel producer credit of any eligible small agri-biodiesel producer for any taxable year is 10 cents for each gallon of qualified agri-biodiesel production of such producer.

"(B) QUALIFIED AGRI-BIODIESEL PRODUCTION.—For purposes of this paragraph, the term 'qualified agri-biodiesel production' means any agri-biodiesel (determined without regard to the last sentence of subsection (d)(2)) which is produced by an eligible small agri-biodiesel producer, and which during the taxable year—

"(i) is sold by such producer to another person—

"(I) for use by such other person in the production of a qualified biodiesel mixture in such other person's trade or business (other than casual off-farm production),

"(II) for use by such other person as a fuel in a trade or business, or

"(III) who sells such agri-biodiesel at retail to another person and places such agri-biodiesel in the fuel tank of such other person, or

"(ii) is used or sold by such producer for any purpose described in clause (i).

"(C) LIMITATION.—The qualified agri-biodiesel production of any producer for any taxable year shall not exceed 15,000,000 gallons.".

(c) DEFINITIONS AND SPECIAL RULES.—Section 40A is amended by redesignating subsection (e) as subsection (f) and by inserting after subsection (d) the following new subsection:

"(e) DEFINITIONS AND SPECIAL RULES FOR SMALL AGRI-BIODIESEL PRODUCER CREDIT.—For purposes of this section—

"(1) ELIGIBLE SMALL AGRI-BIODIESEL PRODUCER.—The term 'eligible small agri-biodiesel producer' means a person who, at all times during the taxable year, has a productive capacity for agri-biodiesel not in excess of 60,000,000 gallons.

"(2) AGGREGATION RULE.—For purposes of the 15,000,000 gallon limitation under subsection (b)(5)(C) and the 60,000,000 gallon limitation under paragraph (1), all members of the same controlled group of corporations (within the meaning of section 267(f)) and all persons under common control (within the meaning of section 52(b) but determined by treating an interest of more than 50 percent as a controlling interest) shall be treated as 1 person.

Applicability.

"(3) PARTNERSHIP, S CORPORATION, AND OTHER PASS-THRU ENTITIES.—In the case of a partnership, trust, S corporation, or other pass-thru entity, the limitations contained in subsection (b)(5)(C) and paragraph (1) shall be applied at the entity level and at the partner or similar level.

"(4) ALLOCATION.—For purposes of this subsection, in the case of a facility in which more than 1 person has an interest, productive capacity shall be allocated among such persons in such manner as the Secretary may prescribe.

"(5) REGULATIONS.—The Secretary may prescribe such regulations as may be necessary—

"(A) to prevent the credit provided for in subsection (a)(3) from directly or indirectly benefiting any person with a direct or indirect productive capacity of more than 60,000,000 gallons of agri-biodiesel during the taxable year, or

"(B) to prevent any person from directly or indirectly benefiting with respect to more than 15,000,000 gallons during the taxable year.

"(6) ALLOCATION OF SMALL AGRI-BIODIESEL CREDIT TO PATRONS OF COOPERATIVE.—

"(A) ELECTION TO ALLOCATE.—

"(i) IN GENERAL.—In the case of a cooperative organization described in section 1381(a), any portion of the credit determined under subsection (a)(3) for the taxable year may, at the election of the organization, be apportioned pro rata among patrons of the organization on the basis of the quantity or value of business done with or for such patrons for the taxable year.

"(ii) FORM AND EFFECT OF ELECTION.—An election under clause (i) for any taxable year shall be made on a timely filed return for such year. Such election, once made, shall be irrevocable for such taxable year. Such election shall not take effect unless the organization designates the apportionment as such in a written notice mailed to its patrons during the payment period described in section 1382(d).

"(B) TREATMENT OF ORGANIZATIONS AND PATRONS.—

"(i) ORGANIZATIONS.—The amount of the credit not apportioned to patrons pursuant to subparagraph (A) shall be included in the amount determined under subsection (a)(3) for the taxable year of the organization.

"(ii) PATRONS.—The amount of the credit apportioned to patrons pursuant to subparagraph (A) shall be included in the amount determined under such subsection for the first taxable year of each patron ending on or after the last day of the payment period (as defined in section 1382(d)) for the taxable year of the organization or, if earlier, for the taxable year of each patron ending on or after the date on which the patron receives notice from the cooperative of the apportionment.

"(iii) SPECIAL RULES FOR DECREASE IN CREDITS FOR TAXABLE YEAR.—If the amount of the credit of the organization determined under such subsection for a taxable year is less than the amount of such credit shown on the return of the organization for such year, an amount equal to the excess of—

"(I) such reduction, over

"(II) the amount not apportioned to such patrons under subparagraph (A) for the taxable year, shall be treated as an increase in tax imposed by this chapter on the organization. Such increase shall not be treated as tax imposed by this chapter for purposes of determining the amount of any

credit under this chapter or for purposes of section 55.".

(d) CONFORMING AMENDMENTS.—

(1) Paragraph (4) of section 40A(b) is amended by striking "this section" and inserting "paragraph (1) or (2) of subsection (a)".

(2) The heading of subsection (b) of section 40A is amended by striking "and Biodiesel Credit" and inserting ", Biodiesel Credit, and Small Agri-biodiesel Producer Credit".

(3) Paragraph (3) of section 40A(d) is amended by redesignating subparagraph (C) as subparagraph (D) and by inserting after subparagraph (B) the following new subparagraph:

"(C) PRODUCER CREDIT.—If—

"(i) any credit was determined under subsection (a)(3), and

"(ii) any person does not use such fuel for a purpose described in subsection (b)(5)(B), then there is hereby imposed on such person a tax equal to 10 cents a gallon for each gallon of such agri-biodiesel.".

(e) EFFECTIVE DATE.—The amendments made by this section shall apply to taxable years ending after the date of the enactment of this Act. 26 USC 40A note.

SEC. 1346. RENEWABLE DIESEL.

(a) IN GENERAL.—Section 40A (relating to biodiesel used as fuel), as amended by this Act, is amended by redesignating subsection (f) as subsection (g) and by inserting after subsection (e) the following new subsection:

"(f) RENEWABLE DIESEL.—For purposes of this title—

"(1) TREATMENT IN THE SAME MANNER AS BIODIESEL.—Except as provided in paragraph (2), renewable diesel shall be treated in the same manner as biodiesel.

"(2) EXCEPTIONS.—

"(A) RATE OF CREDIT.—Subsections (b)(1)(A) and (b)(2)(A) shall be applied with respect to renewable diesel by substituting '$1.00' for '50 cents'. Applicability.

"(B) NONAPPLICATION OF CERTAIN CREDITS.—Subsections (b)(3) and (b)(5) shall not apply with respect to renewable diesel.

"(3) RENEWABLE DIESEL DEFINED.—The term 'renewable diesel' means diesel fuel derived from biomass (as defined in section 45K(c)(3)) using a thermal depolymerization process which meets—

"(A) the registration requirements for fuels and fuel additives established by the Environmental Protection Agency under section 211 of the Clean Air Act (42 U.S.C. 7545), and

"(B) the requirements of the American Society of Testing and Materials D975 or D396.".

(b) CLERICAL AMENDMENTS.—

(1) The heading for section 40A is amended by inserting "**AND RENEWABLE DIESEL**" after "**BIODIESEL**".

(2) The item in the table of contents for subpart D of part IV of subchapter A of chapter 1 relating to section 40A is amended to read as follows:

"Sec. 40A. Biodiesel and renewable diesel used as fuel.".

26 USC 40A note.

(c) EFFECTIVE DATE.—The amendment made by subsection (a) shall apply with respect to fuel sold or used after December 31, 2005.

SEC. 1347. MODIFICATION OF SMALL ETHANOL PRODUCER CREDIT.

(a) DEFINITION OF SMALL ETHANOL PRODUCER.—Section 40(g) (relating to definitions and special rules for eligible small ethanol producer credit) is amended by striking "30,000,000" each place it appears and inserting "60,000,000".

(b) WRITTEN NOTICE OF ELECTION TO ALLOCATE CREDIT TO PATRONS.—Section 40(g)(6)(A)(ii) (relating to form and effect of election) is amended by adding at the end the following new sentence: "Such election shall not take effect unless the organization designates the apportionment as such in a written notice mailed to its patrons during the payment period described in section 1382(d).".

26 USC 40 note.

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to taxable years ending after the date of the enactment of this Act.

SEC. 1348. SUNSET OF DEDUCTION FOR CLEAN-FUEL VEHICLES AND CERTAIN REFUELING PROPERTY.

Subsection (f) of section 179A (relating to termination) is amended by striking "December 31, 2006" and inserting "December 31, 2005".

Subtitle E—Additional Energy Tax Incentives

SEC. 1351. EXPANSION OF RESEARCH CREDIT.

(a) CREDIT FOR EXPENSES ATTRIBUTABLE TO CERTAIN COLLABORATIVE ENERGY RESEARCH CONSORTIA.—

(1) IN GENERAL.—Section 41(a) (relating to credit for increasing research activities) is amended by striking "and" at the end of paragraph (1), by striking the period at the end of paragraph (2) and inserting ", and", and by adding at the end the following new paragraph:

"(3) 20 percent of the amounts paid or incurred by the taxpayer in carrying on any trade or business of the taxpayer during the taxable year (including as contributions) to an energy research consortium.".

(2) ENERGY RESEARCH CONSORTIUM DEFINED.—Section 41(f) (relating to special rules) is amended by adding at the end the following new paragraph:

"(6) ENERGY RESEARCH CONSORTIUM.—

"(A) IN GENERAL.—The term 'energy research consortium' means any organization—

"(i) which is—

"(I) described in section 501(c)(3) and is exempt from tax under section 501(a) and is organized and operated primarily to conduct energy research, or

"(II) organized and operated primarily to conduct energy research in the public interest (within the meaning of section 501(c)(3)),

"(ii) which is not a private foundation,

"(iii) to which at least 5 unrelated persons paid or incurred during the calendar year in which the taxable year of the organization begins amounts (including as contributions) to such organization for energy research, and

"(iv) to which no single person paid or incurred (including as contributions) during such calendar year an amount equal to more than 50 percent of the total amounts received by such organization during such calendar year for energy research.

"(B) TREATMENT OF PERSONS.—All persons treated as a single employer under subsection (a) or (b) of section 52 shall be treated as related persons for purposes of subparagraph (A)(iii) and as a single person for purposes of subparagraph (A)(iv).".

(3) CONFORMING AMENDMENT.—Section 41(b)(3)(C) is amended by inserting "(other than an energy research consortium)" after "organization".

(b) REPEAL OF LIMITATION ON CONTRACT RESEARCH EXPENSES PAID TO SMALL BUSINESSES, UNIVERSITIES, AND FEDERAL LABORATORIES.—Section 41(b)(3) (relating to contract research expenses) is amended by adding at the end the following new subparagraph:

"(D) AMOUNTS PAID TO ELIGIBLE SMALL BUSINESSES, UNIVERSITIES, AND FEDERAL LABORATORIES.—

"(i) IN GENERAL.—In the case of amounts paid by the taxpayer to—

"(I) an eligible small business,

"(II) an institution of higher education (as defined in section 3304(f)), or

"(III) an organization which is a Federal laboratory,

Applicability.

for qualified research which is energy research, subparagraph (A) shall be applied by substituting '100 percent' for '65 percent'.

"(ii) ELIGIBLE SMALL BUSINESS.—For purposes of this subparagraph, the term 'eligible small business' means a small business with respect to which the taxpayer does not own (within the meaning of section 318) 50 percent or more of—

"(I) in the case of a corporation, the outstanding stock of the corporation (either by vote or value), and

"(II) in the case of a small business which is not a corporation, the capital and profits interests of the small business.

"(iii) SMALL BUSINESS.—For purposes of this subparagraph—

"(I) IN GENERAL.—The term 'small business' means, with respect to any calendar year, any person if the annual average number of employees employed by such person during either of the 2 preceding calendar years was 500 or fewer. For purposes of the preceding sentence, a preceding calendar year may be taken into account only if the person was in existence throughout the year.

"(II) STARTUPS, CONTROLLED GROUPS, AND PREDECESSORS.—Rules similar to the rules of subparagraphs (B) and (D) of section 220(c)(4) shall apply for purposes of this clause.

"(iv) FEDERAL LABORATORY.—For purposes of this subparagraph, the term 'Federal laboratory' has the meaning given such term by section 4(6) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703(6)), as in effect on the date of the enactment of the Energy Tax Incentives Act of 2005.".

(c) EFFECTIVE DATE.—The amendments made by this section shall apply to amounts paid or incurred after the date of the enactment of this Act, in taxable years ending after such date.

26 USC 41 note.

SEC. 1352. NATIONAL ACADEMY OF SCIENCES STUDY AND REPORT.

Contracts.

(a) STUDY.—Not later than 60 days after the date of the enactment of this Act, the Secretary of the Treasury shall enter into an agreement with the National Academy of Sciences under which the National Academy of Sciences shall conduct a study to define and evaluate the health, environmental, security, and infrastructure external costs and benefits associated with the production and consumption of energy that are not or may not be fully incorporated into the market price of such energy, or into the Federal tax or fee or other applicable revenue measure related to such production or consumption.

(b) REPORT.—Not later than 2 years after the date on which the agreement under subsection (a) is entered into, the National Academy of Sciences shall submit to Congress a report on the study conducted under subsection (a).

SEC. 1353. RECYCLING STUDY.

(a) STUDY.—The Secretary of the Treasury, in consultation with the Secretary of Energy, shall conduct a study—

(1) to determine and quantify the energy savings achieved through the recycling of glass, paper, plastic, steel, aluminum, and electronic devices, and

(2) to identify tax incentives which would encourage recycling of such material.

(b) REPORT.—Not later than 1 year after the date of the enactment of this Act, the Secretary of the Treasury shall submit to Congress a report on the study conducted under subsection (a).

Subtitle F—Revenue Raising Provisions

SEC. 1361. OIL SPILL LIABILITY TRUST FUND FINANCING RATE.

Section 4611(f) (relating to application of oil spill liability trust fund financing rate) is amended to read as follows:

"(f) APPLICATION OF OIL SPILL LIABILITY TRUST FUND FINANCING RATE.—

Effective date.

"(1) IN GENERAL.—Except as provided in paragraphs (2) and (3), the Oil Spill Liability Trust Fund financing rate under subsection (c) shall apply on and after April 1, 2006, or if later, the date which is 30 days after the last day of any calendar quarter for which the Secretary estimates that, as of the close of that quarter, the unobligated balance in the Oil Spill Liability Trust Fund is less than $2,000,000,000.

"(2) FUND BALANCE.—The Oil Spill Liability Trust Fund financing rate shall not apply during a calendar quarter if the Secretary estimates that, as of the close of the preceding calendar quarter, the unobligated balance in the Oil Spill Liability Trust Fund exceeds $2,700,000,000.

"(3) TERMINATION.—The Oil Spill Liability Trust Fund financing rate shall not apply after December 31, 2014.".

SEC. 1362. EXTENSION OF LEAKING UNDERGROUND STORAGE TANK TRUST FUND FINANCING RATE.

(a) IN GENERAL.—Paragraph (3) of section 4081(d) (relating to Leaking Underground Storage Tank Trust Fund financing rate) is amended by striking "2005" and inserting "2011".

(b) NO EXEMPTIONS FROM TAX EXCEPT FOR EXPORTS.—

(1) IN GENERAL.—Section 4082(a) (relating to exemptions for diesel fuel and kerosene) is amended by inserting "(other than such tax at the Leaking Underground Storage Tank Trust Fund financing rate imposed in all cases other than for export)" after "section 4081".

(2) AMENDMENTS RELATING TO SECTION 4041.—

(A) Subsections (a)(1)(B), (a)(2)(A), and (c)(2) of section 4041 are each amended by inserting "(other than such tax at the Leaking Underground Storage Tank Trust Fund financing rate)" after "section 4081".

(B) Section 4041(b)(1)(A) is amended by striking "or (d)(1))".

(C) Section 4041(d) is amended by adding at the end the following new paragraph:

"(5) NONAPPLICATION OF EXEMPTIONS OTHER THAN FOR EXPORTS.—For purposes of this section, the tax imposed under this subsection shall be determined without regard to subsections (f), (g) (other than with respect to any sale for export under paragraph (3) thereof), (h), and (l).".

(3) NO REFUND.—

(A) IN GENERAL.—Subchapter B of chapter 65 is amended by adding at the end the following new section:

"SEC. 6430. TREATMENT OF TAX IMPOSED AT LEAKING UNDERGROUND STORAGE TANK TRUST FUND FINANCING RATE.

"No refunds, credits, or payments shall be made under this subchapter for any tax imposed at the Leaking Underground Storage Tank Trust Fund financing rate, except in the case of fuels destined for export.".

(B) CLERICAL AMENDMENT.—The table of sections for subchapter B of chapter 65 is amended by adding at the end the following new item:

"Sec. 6430. Treatment of tax imposed at Leaking Underground Storage Tank Trust Fund financing rate.".

(c) CERTAIN REFUNDS AND CREDITS NOT CHARGED TO LUST TRUST FUND.—Subsection (c) of section 9508 (relating to Leaking Underground Storage Tank Trust Fund) is amended to read as follows:

"(c) EXPENDITURES.—Amounts in the Leaking Underground Storage Tank Trust Fund shall be available, as provided in appropriation Acts, only for purposes of making expenditures to carry out section 9003(h) of the Solid Waste Disposal Act as in effect

on the date of the enactment of the Superfund Amendments and Reauthorization Act of 1986.".

26 USC 4041 note.

(d) EFFECTIVE DATES.—

(1) IN GENERAL.—Except as provided in paragraph (2), the amendments made by this section shall take effect on October 1, 2005.

(2) NO EXEMPTION.—The amendments made by subsection (b) shall apply to fuel entered, removed, or sold after September 30, 2005.

SEC. 1363. MODIFICATION OF RECAPTURE RULES FOR AMORTIZABLE SECTION 197 INTANGIBLES.

(a) IN GENERAL.—Subsection (b) of section 1245 (relating to gain from dispositions of certain depreciable property) is amended by adding at the end the following new paragraph:

"(9) DISPOSITION OF AMORTIZABLE SECTION 197 INTANGIBLES.—

"(A) IN GENERAL.—If a taxpayer disposes of more than 1 amortizable section 197 intangible (as defined in section 197(c)) in a transaction or a series of related transactions, all such amortizable 197 intangibles shall be treated as 1 section 1245 property for purposes of this section.

"(B) EXCEPTION.—Subparagraph (A) shall not apply to any amortizable section 197 intangible (as so defined) with respect to which the adjusted basis exceeds the fair market value.".

26 USC 1245 note.

(b) EFFECTIVE DATE.—The amendment made by this section shall apply to dispositions of property after the date of the enactment of this Act.

SEC. 1364. CLARIFICATION OF TIRE EXCISE TAX.

(a) IN GENERAL.—Section 4072(e) (defining super single tire) is amended by adding at the end the following: "Such term shall not include any tire designed for steering."

26 USC 4072 note.

(b) EFFECTIVE DATE.—The amendment made by this section shall take effect as if included in section 869 of the American Jobs Creation Act of 2004.

(c) STUDY.—

Effective date.

(1) IN GENERAL.—With respect to the 1-year period beginning on January 1, 2006, the Secretary of the Treasury shall conduct a study to determine—

(A) the amount of tax collected during such period under section 4071 of the Internal Revenue Code of 1986 with respect to each class of tire, and

(B) the number of tires in each such class on which tax is imposed under such section during such period.

(2) REPORT.—Not later than July 1, 2007, the Secretary of the Treasury shall submit to Congress a report on the study conducted under paragraph (1).

TITLE XIV—MISCELLANEOUS

Subtitle A—In General

SEC. 1401. SENSE OF CONGRESS ON RISK ASSESSMENTS.

Subtitle B of title XXX of the Energy Policy Act of 1992 is amended by adding at the end the following new section:

"SEC. 3022. SENSE OF CONGRESS ON RISK ASSESSMENTS. 42 USC 13557.

"It is the sense of Congress that Federal agencies conducting assessments of risks to human health and the environment from energy technology, production, transport, transmission, distribution, storage, use, or conservation activities shall use sound and objective scientific practices in assessing such risks, shall consider the best available science (including peer reviewed studies), and shall include a description of the weight of the scientific evidence concerning such risks.".

SEC. 1402. ENERGY PRODUCTION INCENTIVES. 42 USC 16491.

(a) IN GENERAL.—A State may provide to any entity—

(1) a credit against any tax or fee owed to the State under a State law, or

(2) any other tax incentive,

determined by the State to be appropriate, in the amount calculated under and in accordance with a formula determined by the State, for production described in subsection (b) in the State by the entity that receives such credit or such incentive.

(b) ELIGIBLE ENTITIES.—Subsection (a) shall apply with respect to the production in the State of electricity from coal mined in the State and used in a facility, if such production meets all applicable Federal and State laws and if such facility uses scrubbers or other forms of clean coal technology. Applicability.

(c) EFFECT ON INTERSTATE COMMERCE.—Any action taken by a State in accordance with this section with respect to a tax or fee payable, or incentive applicable, for any period beginning after the date of the enactment of this Act shall—

(1) be considered to be a reasonable regulation of commerce; and

(2) not be considered to impose an undue burden on interstate commerce or to otherwise impair, restrain, or discriminate, against interstate commerce.

SEC. 1403. REGULATION OF CERTAIN OIL USED IN TRANSFORMERS. 42 USC 16492.

Notwithstanding any other provision of law, or rule promulgated by the Environmental Protection Agency, vegetable oil made from soybeans and used in electric transformers as thermal insulation shall not be regulated as an oil identified under section 2(a)(1)(B) of the Edible Oil Regulatory Reform Act (33 U.S.C. 2720(a)(1)(B)).

SEC. 1404. PETROCHEMICAL AND OIL REFINERY FACILITY HEALTH ASSESSMENT.

(a) ESTABLISHMENT.—The Secretary shall conduct a study of direct and significant health impacts to persons resulting from living in proximity to petrochemical and oil refinery facilities. The Secretary shall consult with the Director of the National Cancer Institute and other Federal Government bodies with expertise in

the field it deems appropriate in the design of such study. The study shall be conducted according to sound and objective scientific practices and present the weight of the scientific evidence. The Secretary shall obtain scientific peer review of the draft study.

(b) REPORT TO CONGRESS.—The Secretary shall transmit the results of the study to Congress within 6 months of the enactment of this section.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for activities under this section such sums as are necessary for the completion of the study.

42 USC 16493.

SEC. 1405. NATIONAL PRIORITY PROJECT DESIGNATION.

(a) DESIGNATION OF NATIONAL PRIORITY PROJECTS.—

(1) IN GENERAL.—There is established the National Priority Project Designation (referred to in this section as the "Designation"), which shall be evidenced by a medal bearing the inscription "National Priority Project".

(2) DESIGN AND MATERIALS.—The medal shall be of such design and materials and bear such additional inscriptions as the President may prescribe.

President.

(b) MAKING AND PRESENTATION OF DESIGNATION.—

(1) IN GENERAL.—The President, on the basis of recommendations made by the Secretary, shall annually designate organizations that have—

(A) advanced the field of renewable energy technology and contributed to North American energy independence; and

Certification.

(B) been certified by the Secretary under subsection (e).

(2) PRESENTATION.—The President shall designate projects with such ceremonies as the President may prescribe.

(3) USE OF DESIGNATION.—An organization that receives a Designation under this section may publicize the Designation of the organization as a National Priority Project in advertising.

(4) CATEGORIES IN WHICH THE DESIGNATION MAY BE GIVEN.—Separate Designations shall be made to qualifying projects in each of the following categories:

(A) Wind and biomass energy generation projects.

(B) Photovoltaic and fuel cell energy generation projects.

(C) Energy efficient building and renewable energy projects.

(D) First-in-Class projects.

(c) SELECTION CRITERIA.—

(1) IN GENERAL.—Certification and selection of the projects to receive the Designation shall be based on criteria established under this subsection.

(2) WIND, BIOMASS, AND BUILDING PROJECTS.—In the case of a wind, biomass, or building project, the project shall demonstrate that the project will install not less than 30 megawatts of renewable energy generation capacity.

(3) SOLAR PHOTOVOLTAIC AND FUEL CELL PROJECTS.—In the case of a solar photovoltaic or fuel cell project, the project shall demonstrate that the project will install not less than 3 megawatts of renewable energy generation capacity.

(4) ENERGY EFFICIENT BUILDING AND RENEWABLE ENERGY PROJECTS.—In the case of an energy efficient building or renewable energy project, in addition to meeting the criteria established under paragraph (2), each building project shall demonstrate that the project will—

(A) comply with third-party certification standards for high-performance, sustainable buildings;

(B) use whole-building integration of energy efficiency and environmental performance design and technology, including advanced building controls;

(C) use renewable energy for at least 50 percent of the energy consumption of the project;

(D) comply with applicable Energy Star standards; and

(E) include at least 5,000,000 square feet of enclosed space.

(5) FIRST-IN-CLASS USE.—Notwithstanding paragraphs (2) through (4), a new building project may qualify under this section if the Secretary determines that the project—

(A) represents a First-In-Class use of renewable energy; or

(B) otherwise establishes a new paradigm of building integrated renewable energy use or energy efficiency.

(d) APPLICATION.—

(1) INITIAL APPLICATIONS.—No later than 120 days after the date of enactment of this Act, and annually thereafter, the Secretary shall publish in the Federal Register an invitation and guidelines for submitting applications, consistent with this section.

Deadline.
Federal Register, publication.
Guidelines.

(2) CONTENTS.—The application shall describe the project, or planned project, and the plans to meet the criteria established under subsection (c).

(e) CERTIFICATION.—

(1) IN GENERAL.—Not later than 60 days after the application period described in subsection (d), and annually thereafter, the Secretary shall certify projects that are reasonably expected to meet the criteria established under subsection (c).

Deadline.

(2) CERTIFIED PROJECTS.—The Secretary shall designate personnel of the Department to work with persons carrying out each certified project and ensure that the personnel—

(A) provide each certified project with guidance in meeting the criteria established under subsection (c);

(B) identify programs of the Department, including National Laboratories and Technology Centers, that will assist each project in meeting the criteria established under subsection (c); and

(C) ensure that knowledge and transfer of the most current technology between the applicable resources of the Federal Government (including the National Laboratories and Technology Centers, the Department, and the Environmental Protection Agency) and the certified projects is being facilitated to accelerate commercialization of work developed through those resources.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section for each of fiscal years 2006 through 2010.

SEC. 1406. COLD CRACKING.

(a) STUDY.—The Secretary shall conduct a study of the application of radiation to petroleum at standard temperature and pressure to refine petroleum products, whose objective shall be to increase the economic yield from each barrel of oil.

(b) GOALS.—The goals of the study shall include—

(1) increasing the value of our current oil supply;

(2) reducing the capital investment cost for cracking oil;

(3) reducing the operating energy cost for cracking oil; and

(4) reducing sulfur content using an environmentally responsible method.

(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $250,000 for fiscal year 2006.

42 USC 16494.

SEC. 1407. OXYGEN-FUEL.

(a) PROGRAM.—The Secretary shall establish a program on oxygen-fuel systems. If feasible, the program shall include renovation of at least one existing large unit and one existing small unit, and construction of one new large unit and one new small unit.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this section—

(1) $100,000,000 for fiscal year 2006;

(2) $100,000,000 for fiscal year 2007; and

(3) $100,000,000 for fiscal year 2008.

(c) DEFINITIONS.—For purposes of this section—

(1) the term "large unit" means a unit with a generating capacity of 100 megawatts or more;

(2) the term "oxygen-fuel systems" means systems that utilize fuel efficiency benefits of oil, gas, coal, and biomass combustion using substantially pure oxygen, with high flame temperatures and the exclusion of air from the boiler, in industrial or electric utility steam generating units; and

(3) the term "small unit" means a unit with a generating capacity in the 10–50 megawatt range.

Set America Free Act of 2005.
Canada.
Mexico.

Subtitle B—Set America Free

SEC. 1421. SHORT TITLE.

This subtitle may be cited as the "Set America Free Act of 2005" or the "SAFE Act".

SEC. 1422. PURPOSE.

The purpose of this subtitle is to establish a United States commission to make recommendations for a coordinated and comprehensive North American energy policy that will achieve energy self-sufficiency by 2025 within the three contiguous North American nation area of Canada, Mexico, and the United States.

SEC. 1423. UNITED STATES COMMISSION ON NORTH AMERICAN ENERGY FREEDOM.

(a) ESTABLISHMENT.—There is hereby established the United States Commission on North American Energy Freedom (in this subtitle referred to as the "Commission"). The Federal Advisory

Committee Act (5 U.S.C. App.), except sections 3, 7, and 12, does not apply to the Commission.

(b) MEMBERSHIP.— President.

(1) APPOINTMENT.—The Commission shall be composed of 16 members appointed by the President from among individuals described in paragraph (2) who are knowledgeable on energy issues, including oil and gas exploration and production, crude oil refining, oil and gas pipelines, electricity production and transmission, coal, unconventional hydrocarbon resources, fuel cells, motor vehicle power systems, nuclear energy, renewable energy, biofuels, energy efficiency, and energy conservation. The membership of the Commission shall be balanced by area of expertise to the extent consistent with maintaining the highest level of expertise on the Commission. Members of the Commission may be citizens of Canada, Mexico, or the United States, and the President shall ensure that citizens of all three nations are appointed to the Commission.

(2) NOMINATIONS.—The President shall appoint the members of the Commission within 60 days after the effective date of this Act, including individuals nominated as follows: Deadline.

(A) Four members shall be appointed from amongst individuals independently determined by the President to be qualified for appointment.

(B) Four members shall be appointed from a list of eight individuals who shall be nominated by the majority leader of the Senate in consultation with the chairman of the Committee on Energy and Natural Resources of the Senate.

(C) Four members shall be appointed from a list of eight individuals who shall be nominated by the Speaker of the House of Representatives in consultation with the chairmen of the Committees on Energy and Commerce and Resources of the House of Representatives.

(D) Two members shall be appointed from a list of four individuals who shall be nominated by the minority leader of the Senate in consultation with the ranking Member of the Committee on Energy and Natural Resources of the Senate.

(E) Two members shall be appointed from a list of four individuals who shall be nominated by the minority leader of the House in consultation with the ranking Members of the Committees on Energy and Commerce and Resources of the House of Representatives.

(3) CHAIRMAN.—The chairman of the Commission shall be selected by the President. The chairman of the Commission shall be responsible for—

(A) the assignment of duties and responsibilities among staff personnel and their continuing supervision; and

(B) the use and expenditure of funds available to the Commission.

(4) VACANCIES.—Any vacancy on the Commission shall be filled in the same manner as the original incumbent was appointed.

(c) RESOURCES.—In carrying out its functions under this section, the Commission—

(1) is authorized to secure directly from any Federal agency or department any information it deems necessary to carry

out its functions under this Act, and each such agency or department is authorized to cooperate with the Commission and, to the extent permitted by law, to furnish such information (other than information described in section 552(b)(1)(A) of title 5, United States Code) to the Commission, upon the request of the Commission;

(2) may enter into contracts, subject to the availability of appropriations for contracting, and employ such staff experts and consultants as may be necessary to carry out the duties of the Commission, as provided by section 3109 of title 5, United States Code; and

Establishment.

(3) shall establish a multidisciplinary science and technical advisory panel of experts in the field of energy to assist the Commission in preparing its report, including ensuring that the scientific and technical information considered by the Commission is based on the best scientific and technical information available.

(d) STAFFING.—The chairman of the Commission may, without regard to the civil service laws and regulations, appoint and terminate an executive director and such other additional personnel as may be necessary for the Commission to perform its duties. The executive director shall be compensated at a rate not to exceed the rate payable for Level IV of the Executive Schedule under chapter 5136 of title 5, United States Code. The chairman shall select staff from among qualified citizens of Canada, Mexico, and the United States of America.

(e) MEETINGS.—

(1) ADMINISTRATION.—All meetings of the Commission shall be open to the public, except that a meeting or any portion of it may be closed to the public if it concerns matters or information described in section 552b(c) of title 5, United States Code. Interested persons shall be permitted to appear at open meetings and present oral or written statements on the subject matter of the meeting. The Commission may administer oaths or affirmations to any person appearing before it.

(2) NOTICE; MINUTES; PUBLIC AVAILABILITY OF DOCUMENTS.—

(A) NOTICE.—All open meetings of the Commission shall be preceded by timely public notice in the Federal Register of the time, place, and subject of the meeting.

(B) MINUTES.—Minutes of each meeting shall be kept and shall contain a record of the people present, a description of the discussion that occurred, and copies of all statements filed. Subject to section 552 of title 5, United States Code, the minutes and records of all meetings and other documents that were made available to or prepared for the Commission shall be available for public inspection and copying at a single location in the offices of the Commission.

Deadline.

(3) INITIAL MEETING.—The Commission shall hold its first meeting within 30 days after all 16 members have been appointed.

(f) REPORT.—Within 12 months after the effective date of this Act, the Commission shall submit to Congress and the President a final report of its findings and recommendations regarding North American energy freedom.

(g) ADMINISTRATIVE PROCEDURE FOR REPORT AND REVIEW.—Chapter 5 and chapter 7 of title 5, United States Code, do not apply to the preparation, review, or submission of the report required by subsection (f).

(h) TERMINATION.—The Commission shall cease to exist 90 days after the date on which it submits its final report.

(i) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this chapter a total of $10,000,000 for the 2 fiscal-year period beginning with fiscal year 2005, such sums to remain available until expended.

SEC. 1424. NORTH AMERICAN ENERGY FREEDOM POLICY.

Deadline. President.

Within 90 days after receiving and considering the report and recommendations of the Commission under section 1423, the President shall submit to Congress a statement of proposals to implement or respond to the Commission's recommendations for a coordinated, comprehensive, and long-range national policy to achieve North American energy freedom by 2025.

TITLE XV—ETHANOL AND MOTOR FUELS

Subtitle A—General Provisions

SEC. 1501. RENEWABLE CONTENT OF GASOLINE.

(a) IN GENERAL.—Section 211 of the Clean Air Act (42 U.S.C. 7545) is amended—

(1) by redesignating subsection (o) as subsection (r); and

(2) by inserting after subsection (n) the following:

"(o) RENEWABLE FUEL PROGRAM.—

"(1) DEFINITIONS.—In this section:

"(A) CELLULOSIC BIOMASS ETHANOL.—The term 'cellulosic biomass ethanol' means ethanol derived from any lignocellulosic or hemicellulosic matter that is available on a renewable or recurring basis, including—

"(i) dedicated energy crops and trees;

"(ii) wood and wood residues;

"(iii) plants;

"(iv) grasses;

"(v) agricultural residues;

"(vi) fibers;

"(vii) animal wastes and other waste materials; and

"(viii) municipal solid waste.

The term also includes any ethanol produced in facilities where animal wastes or other waste materials are digested or otherwise used to displace 90 percent or more of the fossil fuel normally used in the production of ethanol.

"(B) WASTE DERIVED ETHANOL.—The term 'waste derived ethanol' means ethanol derived from—

"(i) animal wastes, including poultry fats and poultry wastes, and other waste materials; or

"(ii) municipal solid waste.

"(C) RENEWABLE FUEL.—

"(i) IN GENERAL.—The term 'renewable fuel' means motor vehicle fuel that—

"(I)(aa) is produced from grain, starch, oilseeds, vegetable, animal, or fish materials including fats, greases, and oils, sugarcane, sugar beets, sugar components, tobacco, potatoes, or other biomass; or

"(bb) is natural gas produced from a biogas source, including a landfill, sewage waste treatment plant, feedlot, or other place where decaying organic material is found; and

"(II) is used to replace or reduce the quantity of fossil fuel present in a fuel mixture used to operate a motor vehicle.

"(ii) INCLUSION.—The term 'renewable fuel' includes—

"(I) cellulosic biomass ethanol and 'waste derived ethanol'; and

"(II) biodiesel (as defined in section 312(f) of the Energy Policy Act of 1992 (42 U.S.C. 13220(f))) and any blending components derived from renewable fuel (provided that only the renewable fuel portion of any such blending component shall be considered part of the applicable volume under the renewable fuel program established by this subsection).

"(D) SMALL REFINERY.—The term 'small refinery' means a refinery for which the average aggregate daily crude oil throughput for a calendar year (as determined by dividing the aggregate throughput for the calendar year by the number of days in the calendar year) does not exceed 75,000 barrels.

"(2) RENEWABLE FUEL PROGRAM.—

"(A) REGULATIONS.—

Deadline.

"(i) IN GENERAL.—Not later than 1 year after the date of enactment of this paragraph, the Administrator shall promulgate regulations to ensure that gasoline sold or introduced into commerce in the United States (except in noncontiguous States or territories), on an annual average basis, contains the applicable volume of renewable fuel determined in accordance with subparagraph (B).

"(ii) NONCONTIGUOUS STATE OPT-IN.—

"(I) IN GENERAL.—On the petition of a noncontiguous State or territory, the Administrator may allow the renewable fuel program established under this subsection to apply in the noncontiguous State or territory at the same time or any time after the Administrator promulgates regulations under this subparagraph.

"(II) OTHER ACTIONS.—In carrying out this clause, the Administrator may—

"(aa) issue or revise regulations under this paragraph;

"(bb) establish applicable percentages under paragraph (3);

"(cc) provide for the generation of credits under paragraph (5); and

"(dd) take such other actions as are necessary to allow for the application of the renewable fuels program in a noncontiguous State or territory.

"(iii) PROVISIONS OF REGULATIONS.—Regardless of the date of promulgation, the regulations promulgated under clause (i)—

"(I) shall contain compliance provisions applicable to refineries, blenders, distributors, and importers, as appropriate, to ensure that the requirements of this paragraph are met; but

"(II) shall not—

"(aa) restrict geographic areas in which renewable fuel may be used; or

"(bb) impose any per-gallon obligation for the use of renewable fuel.

"(iv) REQUIREMENT IN CASE OF FAILURE TO PROMULGATE REGULATIONS.—If the Administrator does not promulgate regulations under clause (i), the percentage of renewable fuel in gasoline sold or dispensed to consumers in the United States, on a volume basis, shall be 2.78 percent for calendar year 2006.

"(B) APPLICABLE VOLUME.—

"(i) CALENDAR YEARS 2006 THROUGH 2012.—For the purpose of subparagraph (A), the applicable volume for any of calendar years 2006 through 2012 shall be determined in accordance with the following table:

"Calendar year:	**Applicable volume of renewable fuel (in billions of gallons):**
2006	4.0
2007	4.7
2008	5.4
2009	6.1
2010	6.8
2011	7.4
2012	7.5.

"(ii) CALENDAR YEAR 2013 AND THEREAFTER.—Subject to clauses (iii) and (iv), for the purposes of subparagraph (A), the applicable volume for calendar year 2013 and each calendar year thereafter shall be determined by the Administrator, in coordination with the Secretary of Agriculture and the Secretary of Energy, based on a review of the implementation of the program during calendar years 2006 through 2012, including a review of—

"(I) the impact of the use of renewable fuels on the environment, air quality, energy security, job creation, and rural economic development; and

"(II) the expected annual rate of future production of renewable fuels, including cellulosic ethanol.

"(iii) MINIMUM QUANTITY DERIVED FROM CELLULOSIC BIOMASS.—For calendar year 2013 and each calendar year thereafter—

"(I) the applicable volume referred to in clause (ii) shall contain a minimum of 250,000,000 gallons that are derived from cellulosic biomass; and

"(II) the 2.5-to-1 ratio referred to in paragraph (4) shall not apply.

"(iv) MINIMUM APPLICABLE VOLUME.—For the purpose of subparagraph (A), the applicable volume for calendar year 2013 and each calendar year thereafter shall be equal to the product obtained by multiplying—

"(I) the number of gallons of gasoline that the Administrator estimates will be sold or introduced into commerce in the calendar year; and

"(II) the ratio that—

"(aa) 7,500,000,000 gallons of renewable fuel; bears to

"(bb) the number of gallons of gasoline sold or introduced into commerce in calendar year 2012.

Deadlines.

"(3) APPLICABLE PERCENTAGES.—

"(A) PROVISION OF ESTIMATE OF VOLUMES OF GASOLINE SALES.—Not later than October 31 of each of calendar years 2005 through 2011, the Administrator of the Energy Information Administration shall provide to the Administrator of the Environmental Protection Agency an estimate, with respect to the following calendar year, of the volumes of gasoline projected to be sold or introduced into commerce in the United States.

"(B) DETERMINATION OF APPLICABLE PERCENTAGES.—

"(i) IN GENERAL.—Not later than November 30 of each of calendar years 2005 through 2012, based on the estimate provided under subparagraph (A), the Administrator of the Environmental Protection Agency shall determine and publish in the Federal Register, with respect to the following calendar year, the renewable fuel obligation that ensures that the requirements of paragraph (2) are met.

"(ii) REQUIRED ELEMENTS.—The renewable fuel obligation determined for a calendar year under clause (i) shall—

"(I) be applicable to refineries, blenders, and importers, as appropriate;

"(II) be expressed in terms of a volume percentage of gasoline sold or introduced into commerce in the United States; and

"(III) subject to subparagraph (C)(i), consist of a single applicable percentage that applies to all categories of persons specified in subclause (I).

"(C) ADJUSTMENTS.—In determining the applicable percentage for a calendar year, the Administrator shall make adjustments—

"(i) to prevent the imposition of redundant obligations on any person specified in subparagraph (B)(ii)(I); and

"(ii) to account for the use of renewable fuel during the previous calendar year by small refineries that are exempt under paragraph (9).

"(4) CELLULOSIC BIOMASS ETHANOL OR WASTE DERIVED ETHANOL.—For the purpose of paragraph (2), 1 gallon of cellulosic biomass ethanol or waste derived ethanol shall be considered to be the equivalent of 2.5 gallons of renewable fuel.

"(5) CREDIT PROGRAM.—

"(A) IN GENERAL.—The regulations promulgated under paragraph (2)(A) shall provide—

"(i) for the generation of an appropriate amount of credits by any person that refines, blends, or imports gasoline that contains a quantity of renewable fuel that is greater than the quantity required under paragraph (2);

"(ii) for the generation of an appropriate amount of credits for biodiesel; and

"(iii) for the generation of credits by small refineries in accordance with paragraph (9)(C).

"(B) USE OF CREDITS.—A person that generates credits under subparagraph (A) may use the credits, or transfer all or a portion of the credits to another person, for the purpose of complying with paragraph (2).

"(C) DURATION OF CREDITS.—A credit generated under this paragraph shall be valid to show compliance for the 12 months as of the date of generation.

"(D) INABILITY TO GENERATE OR PURCHASE SUFFICIENT CREDITS.—The regulations promulgated under paragraph (2)(A) shall include provisions allowing any person that is unable to generate or purchase sufficient credits to meet the requirements of paragraph (2) to carry forward a renewable fuel deficit on condition that the person, in the calendar year following the year in which the renewable fuel deficit is created—

"(i) achieves compliance with the renewable fuel requirement under paragraph (2); and

"(ii) generates or purchases additional renewable fuel credits to offset the renewable fuel deficit of the previous year.

"(6) SEASONAL VARIATIONS IN RENEWABLE FUEL USE.—

"(A) STUDY.—For each of calendar years 2006 through 2012, the Administrator of the Energy Information Administration shall conduct a study of renewable fuel blending to determine whether there are excessive seasonal variations in the use of renewable fuel.

"(B) REGULATION OF EXCESSIVE SEASONAL VARIATIONS.—If, for any calendar year, the Administrator of the Energy Information Administration, based on the study under subparagraph (A), makes the determinations specified in subparagraph (C), the Administrator of the Environmental Protection Agency shall promulgate regulations to ensure that 25 percent or more of the quantity of renewable fuel necessary to meet the requirements of paragraph (2) is used during each of the 2 periods specified in subparagraph (D) of each subsequent calendar year.

"(C) DETERMINATIONS.—The determinations referred to in subparagraph (B) are that—

"(i) less than 25 percent of the quantity of renewable fuel necessary to meet the requirements of paragraph (2) has been used during 1 of the 2 periods specified in subparagraph (D) of the calendar year;

"(ii) a pattern of excessive seasonal variation described in clause (i) will continue in subsequent calendar years; and

"(iii) promulgating regulations or other requirements to impose a 25 percent or more seasonal use of renewable fuels will not prevent or interfere with the attainment of national ambient air quality standards or significantly increase the price of motor fuels to the consumer.

"(D) PERIODS.—The 2 periods referred to in this paragraph are—

"(i) April through September; and

"(ii) January through March and October through December.

"(E) EXCLUSION.—Renewable fuel blended or consumed in calendar year 2006 in a State that has received a waiver under section 209(b) shall not be included in the study under subparagraph (A).

"(F) STATE EXEMPTION FROM SEASONALITY REQUIREMENTS.—Notwithstanding any other provision of law, the seasonality requirement relating to renewable fuel use established by this paragraph shall not apply to any State that has received a waiver under section 209(b) or any State dependent on refineries in such State for gasoline supplies.

"(7) WAIVERS.—

"(A) IN GENERAL.—The Administrator, in consultation with the Secretary of Agriculture and the Secretary of Energy, may waive the requirements of paragraph (2) in whole or in part on petition by one or more States by reducing the national quantity of renewable fuel required under paragraph (2)—

"(i) based on a determination by the Administrator, after public notice and opportunity for comment, that implementation of the requirement would severely harm the economy or environment of a State, a region, or the United States; or

"(ii) based on a determination by the Administrator, after public notice and opportunity for comment, that there is an inadequate domestic supply.

Deadline.

"(B) PETITIONS FOR WAIVERS.—The Administrator, in consultation with the Secretary of Agriculture and the Secretary of Energy, shall approve or disapprove a State petition for a waiver of the requirements of paragraph (2) within 90 days after the date on which the petition is received by the Administrator.

"(C) TERMINATION OF WAIVERS.—A waiver granted under subparagraph (A) shall terminate after 1 year, but may be renewed by the Administrator after consultation with the Secretary of Agriculture and the Secretary of Energy.

"(8) STUDY AND WAIVER FOR INITIAL YEAR OF PROGRAM.—

"(A) IN GENERAL.—Not later than 180 days after the date of enactment of this paragraph, the Secretary of Energy shall conduct for the Administrator a study assessing whether the renewable fuel requirement under paragraph (2) will likely result in significant adverse impacts on consumers in 2006, on a national, regional, or State basis. Deadline.

"(B) REQUIRED EVALUATIONS.—The study shall evaluate renewable fuel—

"(i) supplies and prices;

"(ii) blendstock supplies; and

"(iii) supply and distribution system capabilities.

"(C) RECOMMENDATIONS BY THE SECRETARY.—Based on the results of the study, the Secretary of Energy shall make specific recommendations to the Administrator concerning waiver of the requirements of paragraph (2), in whole or in part, to prevent any adverse impacts described in subparagraph (A).

"(D) WAIVER.—

"(i) IN GENERAL.—Not later than 270 days after the date of enactment of this paragraph, the Administrator shall, if and to the extent recommended by the Secretary of Energy under subparagraph (C), waive, in whole or in part, the renewable fuel requirement under paragraph (2) by reducing the national quantity of renewable fuel required under paragraph (2) in calendar year 2006. Deadline.

"(ii) NO EFFECT ON WAIVER AUTHORITY.—Clause (i) does not limit the authority of the Administrator to waive the requirements of paragraph (2) in whole, or in part, under paragraph (7).

"(9) SMALL REFINERIES.—

"(A) TEMPORARY EXEMPTION.—

"(i) IN GENERAL.—The requirements of paragraph (2) shall not apply to small refineries until calendar year 2011.

"(ii) EXTENSION OF EXEMPTION.—

"(I) STUDY BY SECRETARY OF ENERGY.—Not later than December 31, 2008, the Secretary of Energy shall conduct for the Administrator a study to determine whether compliance with the requirements of paragraph (2) would impose a disproportionate economic hardship on small refineries. Deadline.

"(II) EXTENSION OF EXEMPTION.—In the case of a small refinery that the Secretary of Energy determines under subclause (I) would be subject to a disproportionate economic hardship if required to comply with paragraph (2), the Administrator shall extend the exemption under clause (i) for the small refinery for a period of not less than 2 additional years.

"(B) PETITIONS BASED ON DISPROPORTIONATE ECONOMIC HARDSHIP.—

"(i) EXTENSION OF EXEMPTION.—A small refinery may at any time petition the Administrator for an extension of the exemption under subparagraph (A) for the reason of disproportionate economic hardship.

"(ii) EVALUATION OF PETITIONS.—In evaluating a petition under clause (i), the Administrator, in consultation with the Secretary of Energy, shall consider the findings of the study under subparagraph (A)(ii) and other economic factors.

"(iii) DEADLINE FOR ACTION ON PETITIONS.—The Administrator shall act on any petition submitted by a small refinery for a hardship exemption not later than 90 days after the date of receipt of the petition.

"(C) CREDIT PROGRAM.—If a small refinery notifies the Administrator that the small refinery waives the exemption under subparagraph (A), the regulations promulgated under paragraph (2)(A) shall provide for the generation of credits by the small refinery under paragraph (5) beginning in the calendar year following the date of notification.

"(D) OPT-IN FOR SMALL REFINERIES.—A small refinery shall be subject to the requirements of paragraph (2) if the small refinery notifies the Administrator that the small refinery waives the exemption under subparagraph (A).

"(10) ETHANOL MARKET CONCENTRATION ANALYSIS.—

"(A) ANALYSIS.—

Deadline.

"(i) IN GENERAL.—Not later than 180 days after the date of enactment of this paragraph, and annually thereafter, the Federal Trade Commission shall perform a market concentration analysis of the ethanol production industry using the Herfindahl-Hirschman Index to determine whether there is sufficient competition among industry participants to avoid price-setting and other anticompetitive behavior.

"(ii) SCORING.—For the purpose of scoring under clause (i) using the Herfindahl-Hirschman Index, all marketing arrangements among industry participants shall be considered.

"(B) REPORT.—Not later than December 1, 2005, and annually thereafter, the Federal Trade Commission shall submit to Congress and the Administrator a report on the results of the market concentration analysis performed under subparagraph (A)(i).".

(b) PENALTIES AND ENFORCEMENT.—Section 211(d) of the Clean Air Act (42 U.S.C. 7545(d)) is amended—

(1) in paragraph (1)—

(A) in the first sentence, by striking "or (n)" each place it appears and inserting "(n), or (o)"; and

(B) in the second sentence, by striking "or (m)" and inserting "(m), or (o)"; and

(2) in the first sentence of paragraph (2), by striking "and (n)" each place it appears and inserting "(n), and (o)".

(c) EXCLUSION FROM ETHANOL WAIVER.—Section 211(h) of the Clean Air Act (42 U.S.C. 7545(h)) is amended—

(1) by redesignating paragraph (5) as paragraph (6); and

(2) by inserting after paragraph (4) the following:

"(5) EXCLUSION FROM ETHANOL WAIVER.—

Notification.

"(A) PROMULGATION OF REGULATIONS.—Upon notification, accompanied by supporting documentation, from the Governor of a State that the Reid vapor pressure limitation established by paragraph (4) will increase emissions that contribute to air pollution in any area in the State, the

Administrator shall, by regulation, apply, in lieu of the Reid vapor pressure limitation established by paragraph (4), the Reid vapor pressure limitation established by paragraph (1) to all fuel blends containing gasoline and 10 percent denatured anhydrous ethanol that are sold, offered for sale, dispensed, supplied, offered for supply, transported, or introduced into commerce in the area during the high ozone season.

"(B) DEADLINE FOR PROMULGATION.—The Administrator shall promulgate regulations under subparagraph (A) not later than 90 days after the date of receipt of a notification from a Governor under that subparagraph.

"(C) EFFECTIVE DATE.—

"(i) IN GENERAL.—With respect to an area in a State for which the Governor submits a notification under subparagraph (A), the regulations under that subparagraph shall take effect on the later of—

"(I) the first day of the first high ozone season for the area that begins after the date of receipt of the notification; or

"(II) 1 year after the date of receipt of the notification.

"(ii) EXTENSION OF EFFECTIVE DATE BASED ON DETERMINATION OF INSUFFICIENT SUPPLY.—

"(I) IN GENERAL.—If, after receipt of a notification with respect to an area from a Governor of a State under subparagraph (A), the Administrator determines, on the Administrator's own motion or on petition of any person and after consultation with the Secretary of Energy, that the promulgation of regulations described in subparagraph (A) would result in an insufficient supply of gasoline in the State, the Administrator, by regulation— Regulations.

"(aa) shall extend the effective date of the regulations under clause (i) with respect to the area for not more than 1 year; and

"(bb) may renew the extension under item (aa) for two additional periods, each of which shall not exceed 1 year.

"(II) DEADLINE FOR ACTION ON PETITIONS.—The Administrator shall act on any petition submitted under subclause (I) not later than 180 days after the date of receipt of the petition.".

(d) SURVEY OF RENEWABLE FUEL MARKET.— 47 USC 7545 note.

(1) SURVEY AND REPORT.—Not later than December 1, 2006, and annually thereafter, the Administrator of the Environmental Protection Agency (in consultation with the Secretary acting through the Administrator of the Energy Information Administration) shall—

(A) conduct, with respect to each conventional gasoline use area and each reformulated gasoline use area in each State, a survey to determine the market shares of—

(i) conventional gasoline containing ethanol;

(ii) reformulated gasoline containing ethanol;

(iii) conventional gasoline containing renewable fuel; and

(iv) reformulated gasoline containing renewable fuel; and

(B) submit to Congress, and make publicly available, a report on the results of the survey under subparagraph (A).

(2) RECORDKEEPING AND REPORTING REQUIREMENTS.—The Administrator of the Environmental Protection Agency (hereinafter in this subsection referred to as the "Administrator") may require any refiner, blender, or importer to keep such records and make such reports as are necessary to ensure that the survey conducted under paragraph (1) is accurate. The Administrator, to avoid duplicative requirements, shall rely, to the extent practicable, on existing reporting and recordkeeping requirements and other information available to the Administrator including gasoline distribution patterns that include multistate use areas.

(3) APPLICABLE LAW.—Activities carried out under this subsection shall be conducted in a manner designed to protect confidentiality of individual responses.

42 USC 7545 note.

SEC. 1502. FINDINGS.

Congress finds that—

(1) since 1979, methyl tertiary butyl ether (hereinafter in this section referred to as "MTBE") has been used nationwide at low levels in gasoline to replace lead as an octane booster or anti-knocking agent;

(2) Public Law 101–549 (commonly known as the "Clean Air Act Amendments of 1990") (42 U.S.C. 7401 et seq.) established a fuel oxygenate standard under which reformulated gasoline must contain at least 2 percent oxygen by weight; and

(3) the fuel industry responded to the fuel oxygenate standard established by Public Law 101–549 by making substantial investments in—

(A) MTBE production capacity; and

(B) systems to deliver MTBE-containing gasoline to the marketplace.

42 USC 7545 note.

SEC. 1503. CLAIMS FILED AFTER ENACTMENT.

Claims and legal actions filed after the date of enactment of this Act related to allegations involving actual or threatened contamination of methyl tertiary butyl ether (MTBE) may be removed to the appropriate United States district court.

SEC. 1504. ELIMINATION OF OXYGEN CONTENT REQUIREMENT FOR REFORMULATED GASOLINE.

(a) ELIMINATION.—

(1) IN GENERAL.—Section 211(k) of the Clean Air Act (42 U.S.C. 7545(k)) is amended—

(A) in paragraph (2)—

(i) in the second sentence of subparagraph (A), by striking "(including the oxygen content requirement contained in subparagraph (B))";

(ii) by striking subparagraph (B); and

(iii) by redesignating subparagraphs (C) and (D) as subparagraphs (B) and (C), respectively;

(B) in paragraph (3)(A), by striking clause (v); and

(C) in paragraph (7)—

(i) in subparagraph (A)—

(I) by striking clause (i); and

(II) by redesignating clauses (ii) and (iii) as clauses (i) and (ii), respectively; and

(ii) in subparagraph (C)—

(I) by striking clause (ii); and

(II) by redesignating clause (iii) as clause (ii).

(2) APPLICABILITY.—The amendments made by paragraph (1) apply—

Effective dates. 42 USC 7545 note.

(A) in the case of a State that has received a waiver under section 209(b) of the Clean Air Act (42 U.S.C. 7543(b)), beginning on the date of enactment of this Act; and

(B) in the case of any other State, beginning 270 days after the date of enactment of this Act.

(b) MAINTENANCE OF TOXIC AIR POLLUTANT EMISSION REDUCTIONS.—Section 211(k)(1) of the Clean Air Act (42 U.S.C. 7545(k)(1)) is amended—

(1) by striking "Within 1 year after the enactment of the Clean Air Act Amendments of 1990," and inserting the following:

"(A) IN GENERAL.—Not later than November 15, 1991,"; and

Deadline.

(2) by adding at the end the following:

"(B) MAINTENANCE OF TOXIC AIR POLLUTANT EMISSIONS REDUCTIONS FROM REFORMULATED GASOLINE.—

"(i) DEFINITION OF PADD.—In this subparagraph the term 'PADD' means a Petroleum Administration for Defense District.

"(ii) REGULATIONS CONCERNING EMISSIONS OF TOXIC AIR POLLUTANTS.—Not later than 270 days after the date of enactment of this subparagraph, the Administrator shall establish by regulation, for each refinery or importer (other than a refiner or importer in a State that has received a waiver under section 209(b) with respect to gasoline produced for use in that State), standards for toxic air pollutants from use of the reformulated gasoline produced or distributed by the refiner or importer that maintain the reduction of the average annual aggregate emissions of toxic air pollutants for reformulated gasoline produced or distributed by the refiner or importer during calendar years 2001 and 2002 (as determined on the basis of data collected by the Administrator with respect to the refiner or importer).

Deadline.

"(iii) STANDARDS APPLICABLE TO SPECIFIC REFINERIES OR IMPORTERS.—

"(I) APPLICABILITY OF STANDARDS.—For any calendar year, the standards applicable to a refiner or importer under clause (ii) shall apply to the quantity of gasoline produced or distributed by the refiner or importer in the calendar year only to the extent that the quantity is less than or equal to the average annual quantity of reformulated gasoline produced or distributed by the refiner or importer during calendar years 2001 and 2002.

"(II) APPLICABILITY OF OTHER STANDARDS.—For any calendar year, the quantity of gasoline produced or distributed by a refiner or importer that is in excess of the quantity subject to subclause (I) shall be subject to standards for emissions of toxic air pollutants promulgated under subparagraph (A) and paragraph (3)(B).

"(iv) CREDIT PROGRAM.—The Administrator shall provide for the granting and use of credits for emissions of toxic air pollutants in the same manner as provided in paragraph (7).

"(v) REGIONAL PROTECTION OF TOXICS REDUCTION BASELINES.—

Deadlines.
Federal Register, publication.
Reports.

"(I) IN GENERAL.—Not later than 60 days after the date of enactment of this subparagraph, and not later than April 1 of each calendar year that begins after that date of enactment, the Administrator shall publish in the Federal Register a report that specifies, with respect to the previous calendar year—

"(aa) the quantity of reformulated gasoline produced that is in excess of the average annual quantity of reformulated gasoline produced in 2001 and 2002; and

"(bb) the reduction of the average annual aggregate emissions of toxic air pollutants in each PADD, based on retail survey data or data from other appropriate sources.

"(II) EFFECT OF FAILURE TO MAINTAIN AGGREGATE TOXICS REDUCTIONS.—If, in any calendar year, the reduction of the average annual aggregate emissions of toxic air pollutants in a PADD fails to meet or exceed the reduction of the average annual aggregate emissions of toxic air pollutants in the PADD in calendar years 2001 and 2002, the Administrator, not later than 90 days after the date of publication of the report for the calendar year under subclause (I), shall—

"(aa) identify, to the maximum extent practicable, the reasons for the failure, including the sources, volumes, and characteristics of reformulated gasoline that contributed to the failure; and

Effective dates.
Regulations.

"(bb) promulgate revisions to the regulations promulgated under clause (ii), to take effect not earlier than 180 days but not later than 270 days after the date of promulgation, to provide that, notwithstanding clause (iii)(II), all reformulated gasoline produced or distributed at each refiner or importer shall meet the standards applicable under clause (iii)(I) beginning not later than April 1 of the calendar year following publication of the report under subclause (I) and in each calendar year thereafter.

Deadline.
Regulations.

"(vi) Not later than July 1, 2007, the Administrator shall promulgate final regulations to control hazardous

air pollutants from motor vehicles and motor vehicle fuels, as provided for in section 80.1045 of title 40, Code of Federal Regulations (as in effect on the date of enactment of this subparagraph), and as authorized under section 202(1) of the Clean Air Act. If the Administrator promulgates by such date, final regulations to control hazardous air pollutants from motor vehicles and motor vehicle fuels that achieve and maintain greater overall reductions in emissions of air toxics from reformulated gasoline than the reductions that would be achieved under section 211(k)(1)(B) of the Clean Air Act as amended by this clause, then sections 211(k)(1)(B)(i) through 211(k)(1)(B)(v) shall be null and void and regulations promulgated thereunder shall be rescinded and have no further effect.".

(c) CONSOLIDATION IN REFORMULATED GASOLINE REGULATIONS.—Not later than 180 days after the date of enactment of this Act, the Administrator of the Environmental Protection Agency shall revise the reformulated gasoline regulations under subpart D of part 80 of title 40, Code of Federal Regulations, to consolidate the regulations applicable to VOC-Control Regions 1 and 2 under section 80.41 of that title by eliminating the less stringent requirements applicable to gasoline designated for VOC-Control Region 2 and instead applying the more stringent requirements applicable to gasoline designated for VOC-Control Region 1. Deadline.

(d) SAVINGS CLAUSE.— 42 USC 7545 note.

(1) IN GENERAL.—Nothing in this section or any amendment made by this section affects or prejudices any legal claim or action with respect to regulations promulgated by the Administrator before the date of enactment of this Act regarding—

(A) emissions of toxic air pollutants from motor vehicles; or

(B) the adjustment of standards applicable to a specific refinery or importer made under those regulations.

(2) ADJUSTMENT OF STANDARDS.—

(A) APPLICABILITY.—The Administrator may apply any adjustments to the standards applicable to a refinery or importer under subparagraph (B)(iii)(I) of section 211(k)(1) of the Clean Air Act (as added by subsection (b)(2)), except that—

(i) the Administrator shall revise the adjustments to be based only on calendar years 1999 and 2000;

(ii) any such adjustment shall not be made at a level below the average percentage of reductions of emissions of toxic air pollutants for reformulated gasoline supplied to PADD I during calendar years 1999 and 2000; and

(iii) in the case of an adjustment based on toxic air pollutant emissions from reformulated gasoline significantly below the national annual average emissions of toxic air pollutants from all reformulated gasoline—

(I) the Administrator may revise the adjustment to take account of the scope of the prohibition on methyl tertiary butyl ether imposed by a State; and

(II) any such adjustment shall require the refiner or importer, to the maximum extent practicable, to maintain the reduction achieved during calendar years 1999 and 2000 in the average annual aggregate emissions of toxic air pollutants from reformulated gasoline produced or distributed by the refiner or importer.

SEC. 1505. PUBLIC HEALTH AND ENVIRONMENTAL IMPACTS OF FUELS AND FUEL ADDITIVES.

Section 211(b) of the Clean Air Act (42 U.S.C. 7545(b)) is amended—

(1) in paragraph (2)—

(A) by striking "may also" and inserting "shall, on a regular basis,"; and

(B) by striking subparagraph (A) and inserting the following:

"(A) to conduct tests to determine potential public health and environmental effects of the fuel or additive (including carcinogenic, teratogenic, or mutagenic effects); and"; and

(2) by adding at the end the following:

"(4) STUDY ON CERTAIN FUEL ADDITIVES AND BLENDSTOCKS.—

Deadline.

"(A) IN GENERAL.—Not later than 2 years after the date of enactment of this paragraph, the Administrator shall—

"(i) conduct a study on the effects on public health (including the effects on children, pregnant women, minority or low-income communities, and other sensitive populations), air quality, and water resources of increased use of, and the feasibility of using as substitutes for methyl tertiary butyl ether in gasoline—

"(I) ethyl tertiary butyl ether;

"(II) tertiary amyl methyl ether;

"(III) di-isopropyl ether;

"(IV) tertiary butyl alcohol;

"(V) other ethers and heavy alcohols, as determined by then Administrator;

"(VI) ethanol;

"(VII) iso-octane; and

"(VIII) alkylates; and

"(ii) conduct a study on the effects on public health (including the effects on children, pregnant women, minority or low-income communities, and other sensitive populations), air quality, and water resources of the adjustment for ethanol-blended reformulated gasoline to the volatile organic compounds performance requirements that are applicable under paragraphs (1) and (3) of section 211(k); and

Reports.

"(iii) submit to the Committee on Environment and Public Works of the Senate and the Committee on Energy and Commerce of the House of Representatives a report describing the results of the studies under clauses (i) and (ii).

"(B) CONTRACTS FOR STUDY.—In carrying out this paragraph, the Administrator may enter into one or more contracts with nongovernmental entities such as—

"(i) the national energy laboratories; and

"(ii) institutions of higher education (as defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)).".

SEC. 1506. ANALYSES OF MOTOR VEHICLE FUEL CHANGES.

Deadlines.

Section 211 of the Clean Air Act (42 U.S.C. 7545) is amended by inserting after subsection (p) the following:

"(q) ANALYSES OF MOTOR VEHICLE FUEL CHANGES AND EMISSIONS MODEL.—

Publication.

"(1) ANTI-BACKSLIDING ANALYSIS.—

"(A) DRAFT ANALYSIS.—Not later than 4 years after the date of enactment of this paragraph, the Administrator shall publish for public comment a draft analysis of the changes in emissions of air pollutants and air quality due to the use of motor vehicle fuel and fuel additives resulting from implementation of the amendments made by the Energy Policy Act of 2005.

Public information.

"(B) FINAL ANALYSIS.—After providing a reasonable opportunity for comment but not later than 5 years after the date of enactment of this paragraph, the Administrator shall publish the analysis in final form.

"(2) EMISSIONS MODEL.—For the purposes of this section, not later than 4 years after the date of enactment of this paragraph, the Administrator shall develop and finalize an emissions model that reflects, to the maximum extent practicable, the effects of gasoline characteristics or components on emissions from vehicles in the motor vehicle fleet during calendar year 2007.

"(3) PERMEATION EFFECTS STUDY.—

"(A) IN GENERAL.—Not later than 1 year after the date of enactment of this paragraph, the Administrator shall conduct a study, and report to Congress the results of the study, on the effects of ethanol content in gasoline on permeation, the process by which fuel molecules migrate through the elastomeric materials (rubber and plastic parts) that make up the fuel and fuel vapor systems of a motor vehicle.

"(B) EVAPORATIVE EMISSIONS.—The study shall include estimates of the increase in total evaporative emissions likely to result from the use of gasoline with ethanol content in a motor vehicle, and the fleet of motor vehicles, due to permeation.".

SEC. 1507. ADDITIONAL OPT-IN AREAS UNDER REFORMULATED GASOLINE PROGRAM.

Section 211(k)(6) of the Clean Air Act (42 U.S.C. 7545(k)(6)) is amended—

(1) by striking "(6) OPT-IN AREAS.—(A) Upon" and inserting the following:

"(6) OPT-IN AREAS.—

"(A) CLASSIFIED AREAS.—

"(i) IN GENERAL.—Upon";

(2) in subparagraph (B), by striking "(B) If" and inserting the following:

"(ii) EFFECT OF INSUFFICIENT DOMESTIC CAPACITY TO PRODUCE REFORMULATED GASOLINE.—If";

(3) in subparagraph (A)(ii) (as redesignated by paragraph (2))—

(A) in the first sentence, by striking "subparagraph (A)" and inserting "clause (i)"; and

(B) in the second sentence, by striking "this paragraph" and inserting "this subparagraph"; and

(4) by adding at the end the following:

Deadlines.

"(B) OZONE TRANSPORT REGION.—

"(i) APPLICATION OF PROHIBITION.—

"(I) IN GENERAL.—On application of the Governor of a State in the ozone transport region established by section 184(a), the Administrator, not later than 180 days after the date of receipt of the application, shall apply the prohibition specified in paragraph (5) to any area in the State (other than an area classified as a marginal, moderate, serious, or severe ozone nonattainment area under subpart 2 of part D of title I) unless the Administrator determines under clause (iii) that there is insufficient capacity to supply reformulated gasoline.

Federal Register, publication.

"(II) PUBLICATION OF APPLICATION.—As soon as practicable after the date of receipt of an application under subclause (I), the Administrator shall publish the application in the Federal Register.

"(ii) PERIOD OF APPLICABILITY.—Under clause (i), the prohibition specified in paragraph (5) shall apply in a State—

"(I) commencing as soon as practicable but not later than 2 years after the date of approval by the Administrator of the application of the Governor of the State; and

"(II) ending not earlier than 4 years after the commencement date determined under subclause (I).

"(iii) EXTENSION OF COMMENCEMENT DATE BASED ON INSUFFICIENT CAPACITY.—

"(I) IN GENERAL.—If, after receipt of an application from a Governor of a State under clause (i), the Administrator determines, on the Administrator's own motion or on petition of any person, after consultation with the Secretary of Energy, that there is insufficient capacity to supply reformulated gasoline, the Administrator, by regulation—

"(aa) shall extend the commencement date with respect to the State under clause (ii)(I) for not more than 1 year; and

"(bb) may renew the extension under item (aa) for 2 additional periods, each of which shall not exceed 1 year.

"(II) DEADLINE FOR ACTION ON PETITIONS.—The Administrator shall act on any petition submitted under subclause (I) not later than 180 days after the date of receipt of the petition.".

SEC. 1508. DATA COLLECTION.

Section 205 of the Department of Energy Organization Act (42 U.S.C. 7135) is amended by adding at the end the following:

"(m) RENEWABLE FUELS SURVEY.—(1) In order to improve the ability to evaluate the effectiveness of the Nation's renewable fuels mandate, the Administrator shall conduct and publish the results of a survey of renewable fuels demand in the motor vehicle fuels market in the United States monthly, and in a manner designed to protect the confidentiality of individual responses. In conducting the survey, the Administrator shall collect information both on a national and regional basis, including each of the following: Publication.

"(A) The quantity of renewable fuels produced.

"(B) The quantity of renewable fuels blended.

"(C) The quantity of renewable fuels imported.

"(D) The quantity of renewable fuels demanded.

"(E) Market price data.

"(F) Such other analyses or evaluations as the Administrator finds are necessary to achieve the purposes of this section.

"(2) The Administrator shall also collect or estimate information both on a national and regional basis, pursuant to subparagraphs (A) through (F) of paragraph (1), for the 5 years prior to implementation of this subsection.

"(3) This subsection does not affect the authority of the Administrator to collect data under section 52 of the Federal Energy Administration Act of 1974 (15 U.S.C. 790a).".

SEC. 1509. FUEL SYSTEM REQUIREMENTS HARMONIZATION STUDY.

(a) STUDY.—

(1) IN GENERAL.—The Administrator of the Environmental Protection Agency and the Secretary shall jointly conduct a study of Federal, State, and local requirements concerning motor vehicle fuels, including—

(A) requirements relating to reformulated gasoline, volatility (measured in Reid vapor pressure), oxygenated fuel, and diesel fuel; and

(B) other requirements that vary from State to State, region to region, or locality to locality.

(2) REQUIRED ELEMENTS.—The study shall assess—

(A) the effect of the variety of requirements described in paragraph (1) on the supply, quality, and price of motor vehicle fuels available to the consumer;

(B) the effect of the requirements described in paragraph (1) on achievement of—

(i) national, regional, and local air quality standards and goals; and

(ii) related environmental and public health protection standards and goals (including the protection of children, pregnant women, minority or low-income communities, and other sensitive populations);

(C) the effect of Federal, State, and local motor vehicle fuel regulations, including multiple motor vehicle fuel requirements, on—

(i) domestic refiners;

(ii) the fuel distribution system; and

(iii) industry investment in new capacity;

(D) the effect of the requirements described in paragraph (1) on emissions from vehicles, refiners, and fuel handling facilities;

(E) the feasibility of developing national or regional motor vehicle fuel slates for the 48 contiguous States that, while protecting and improving air quality at the national, regional, and local levels, could—

(i) enhance flexibility in the fuel distribution infrastructure and improve fuel fungibility;

(ii) reduce price volatility and costs to consumers and producers;

(iii) provide increased liquidity to the gasoline market; and

(iv) enhance fuel quality, consistency, and supply;

(F) the feasibility of providing incentives, and the need for the development of national standards necessary, to promote cleaner burning motor vehicle fuel; and

(G) the extent to which improvements in air quality and any increases or decreases in the price of motor fuel can be projected to result from the Environmental Protection Agency's Tier II requirements for conventional gasoline and vehicle emission systems, on-road and off-road diesel rules, the reformulated gasoline program, the renewable content requirements established by this subtitle, State programs regarding gasoline volatility, and any other requirements imposed by the Federal Government, States or localities affecting the composition of motor fuel.

(b) REPORT.—

(1) IN GENERAL.—Not later than June 1, 2008, the Administrator of the Environmental Protection Agency and the Secretary shall submit to Congress a report on the results of the study conducted under subsection (a).

(2) RECOMMENDATIONS.—

(A) IN GENERAL.—The report shall contain recommendations for legislative and administrative actions that may be taken—

(i) to improve air quality;

(ii) to reduce costs to consumers and producers; and

(iii) to increase supply liquidity.

(B) REQUIRED CONSIDERATIONS.—The recommendations under subparagraph (A) shall take into account the need to provide advance notice of required modifications to refinery and fuel distribution systems in order to ensure an adequate supply of motor vehicle fuel in all States.

(3) CONSULTATION.—In developing the report, the Administrator of the Environmental Protection Agency and the Secretary shall consult with—

(A) the Governors of the States;

(B) automobile manufacturers;

(C) State and local air pollution control regulators;

(D) public health experts;

(E) motor vehicle fuel producers and distributors; and

(F) the public.

SEC. 1510. COMMERCIAL BYPRODUCTS FROM MUNICIPAL SOLID WASTE AND CELLULOSIC BIOMASS LOAN GUARANTEE PROGRAM. 42 USC 16501.

(a) DEFINITION OF MUNICIPAL SOLID WASTE.—In this section, the term "municipal solid waste" has the meaning given the term "solid waste" in section 1004 of the Solid Waste Disposal Act (42 U.S.C. 6903).

(b) ESTABLISHMENT OF PROGRAM.—The Secretary shall establish a program to provide guarantees of loans by private institutions for the construction of facilities for the processing and conversion of municipal solid waste and cellulosic biomass into fuel ethanol and other commercial byproducts.

(c) REQUIREMENTS.—The Secretary may provide a loan guarantee under subsection (b) to an applicant if—

(1) without a loan guarantee, credit is not available to the applicant under reasonable terms or conditions sufficient to finance the construction of a facility described in subsection (b);

(2) the prospective earning power of the applicant and the character and value of the security pledged provide a reasonable assurance of repayment of the loan to be guaranteed in accordance with the terms of the loan; and

(3) the loan bears interest at a rate determined by the Secretary to be reasonable, taking into account the current average yield on outstanding obligations of the United States with remaining periods of maturity comparable to the maturity of the loan.

(d) CRITERIA.—In selecting recipients of loan guarantees from among applicants, the Secretary shall give preference to proposals that—

(1) meet all applicable Federal and State permitting requirements;

(2) are most likely to be successful; and

(3) are located in local markets that have the greatest need for the facility because of—

(A) the limited availability of land for waste disposal;

(B) the availability of sufficient quantities of cellulosic biomass; or

(C) a high level of demand for fuel ethanol or other commercial byproducts of the facility.

(e) MATURITY.—A loan guaranteed under subsection (b) shall have a maturity of not more than 20 years.

(f) TERMS AND CONDITIONS.—The loan agreement for a loan guaranteed under subsection (b) shall provide that no provision of the loan agreement may be amended or waived without the consent of the Secretary.

(g) ASSURANCE OF REPAYMENT.—The Secretary shall require that an applicant for a loan guarantee under subsection (b) provide an assurance of repayment in the form of a performance bond, insurance, collateral, or other means acceptable to the Secretary in an amount equal to not less than 20 percent of the amount of the loan.

(h) GUARANTEE FEE.—The recipient of a loan guarantee under subsection (b) shall pay the Secretary an amount determined by the Secretary to be sufficient to cover the administrative costs of the Secretary relating to the loan guarantee.

(i) FULL FAITH AND CREDIT.—The full faith and credit of the United States is pledged to the payment of all guarantees made under this section. Any such guarantee made by the Secretary shall be conclusive evidence of the eligibility of the loan for the guarantee with respect to principal and interest. The validity of the guarantee shall be incontestable in the hands of a holder of the guaranteed loan.

(j) REPORTS.—Until each guaranteed loan under this section has been repaid in full, the Secretary shall annually submit to Congress a report on the activities of the Secretary under this section.

(k) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

(l) TERMINATION OF AUTHORITY.—The authority of the Secretary to issue a loan guarantee under subsection (b) terminates on the date that is 10 years after the date of enactment of this Act.

SEC. 1511. RENEWABLE FUEL.

The Clean Air Act is amended by inserting after section 211 (42 U.S.C. 7411) the following:

42 USC 7546.

"SEC. 212. RENEWABLE FUEL.

"(a) DEFINITIONS.—In this section:

"(1) MUNICIPAL SOLID WASTE.—The term 'municipal solid waste' has the meaning given the term 'solid waste' in section 1004 of the Solid Waste Disposal Act (42 U.S.C. 6903).

"(2) RFG STATE.—The term 'RFG State' means a State in which is located one or more covered areas (as defined in section 211(k)(10)(D)).

"(3) SECRETARY.—The term 'Secretary' means the Secretary of Energy.

"(b) CELLULOSIC BIOMASS ETHANOL AND MUNICIPAL SOLID WASTE LOAN GUARANTEE PROGRAM.—

"(1) IN GENERAL.—Funds may be provided for the cost (as defined in the Federal Credit Reform Act of 1990 (2 U.S.C. 661 et seq.)) of loan guarantees issued under title XIV of the Energy Policy Act to carry out commercial demonstration projects for celluosic biomass and sucrose-derived ethanol.

"(2) DEMONSTRATION PROJECTS.—

"(A) IN GENERAL.—The Secretary shall issue loan guarantees under this section to carry out not more than 4 projects to commercially demonstrate the feasibility and viability of producing cellulosic biomass ethanol or sucrose-derived ethanol, including at least 1 project that uses cereal straw as a feedstock and 1 project that uses municipal solid waste as a feedstock.

"(B) DESIGN CAPACITY.—Each project shall have a design capacity to produce at least 30,000,000 gallons of cellulosic biomass ethanol each year.

"(3) APPLICANT ASSURANCES.—An applicant for a loan guarantee under this section shall provide assurances, satisfactory to the Secretary, that—

"(A) the project design has been validated through the operation of a continuous process facility with a cumulative output of at least 50,000 gallons of ethanol;

"(B) the project has been subject to a full technical review;

"(C) the project is covered by adequate project performance guarantees;

"(D) the project, with the loan guarantee, is economically viable; and

"(E) there is a reasonable assurance of repayment of the guaranteed loan.

"(4) LIMITATIONS.—

"(A) MAXIMUM GUARANTEE.—Except as provided in subparagraph (B), a loan guarantee under this section may be issued for up to 80 percent of the estimated cost of a project, but may not exceed $250,000,000 for a project.

"(B) ADDITIONAL GUARANTEES.—

"(i) IN GENERAL.—The Secretary may issue additional loan guarantees for a project to cover up to 80 percent of the excess of actual project cost over estimated project cost but not to exceed 15 percent of the amount of the original guarantee.

"(ii) PRINCIPAL AND INTEREST.—Subject to subparagraph (A), the Secretary shall guarantee 100 percent of the principal and interest of a loan made under subparagraph (A).

"(5) EQUITY CONTRIBUTIONS.—To be eligible for a loan guarantee under this section, an applicant for the loan guarantee shall have binding commitments from equity investors to provide an initial equity contribution of at least 20 percent of the total project cost.

"(6) INSUFFICIENT AMOUNTS.—If the amount made available to carry out this section is insufficient to allow the Secretary to make loan guarantees for 3 projects described in subsection (b), the Secretary shall issue loan guarantees for one or more qualifying projects under this section in the order in which the applications for the projects are received by the Secretary.

"(7) APPROVAL.—An application for a loan guarantee under this section shall be approved or disapproved by the Secretary not later than 90 days after the application is received by the Secretary. Deadline.

"(c) AUTHORIZATION OF APPROPRIATIONS FOR RESOURCE CENTER.—There is authorized to be appropriated, for a resource center to further develop bioconversion technology using low-cost biomass for the production of ethanol at the Center for Biomass-Based Energy at the Mississippi State University and the Oklahoma State University, $4,000,000 for each of fiscal years 2005 through 2007. Mississippi. Oklahoma.

"(d) RENEWABLE FUEL PRODUCTION RESEARCH AND DEVELOPMENT GRANTS.—

"(1) IN GENERAL.—The Administrator shall provide grants for the research into, and development and implementation of, renewable fuel production technologies in RFG States with low rates of ethanol production, including low rates of production of cellulosic biomass ethanol.

"(2) ELIGIBILITY.—

"(A) IN GENERAL.—The entities eligible to receive a grant under this subsection are academic institutions in RFG States, and consortia made up of combinations of academic institutions, industry, State government agencies, or local government agencies in RFG States, that have

proven experience and capabilities with relevant technologies.

"(B) APPLICATION.—To be eligible to receive a grant under this subsection, an eligible entity shall submit to the Administrator an application in such manner and form, and accompanied by such information, as the Administrator may specify.

"(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this subsection $25,000,000 for each of fiscal years 2006 through 2010.

"(e) CELLULOSIC BIOMASS ETHANOL CONVERSION ASSISTANCE.—

"(1) IN GENERAL.—The Secretary may provide grants to merchant producers of cellulosic biomass ethanol in the United States to assist the producers in building eligible production facilities described in paragraph (2) for the production of cellulosic biomass ethanol.

"(2) ELIGIBLE PRODUCTION FACILITIES.—A production facility shall be eligible to receive a grant under this subsection if the production facility—

"(A) is located in the United States; and

"(B) uses cellulosic biomass feedstocks derived from agricultural residues or municipal solid waste.

"(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this subsection—

"(A) $250,000,000 for fiscal year 2006; and

"(B) $400,000,000 for fiscal year 2007.".

SEC. 1512. CONVERSION ASSISTANCE FOR CELLULOSIC BIOMASS, WASTE-DERIVED ETHANOL, APPROVED RENEWABLE FUELS.

Section 211 of the Clean Air Act (42 U.S.C. 7545) is amended by adding at the end the following:

"(r) CONVERSION ASSISTANCE FOR CELLULOSIC BIOMASS, WASTE-DERIVED ETHANOL, APPROVED RENEWABLE FUELS.—

"(1) IN GENERAL.—The Secretary of Energy may provide grants to merchant producers of cellulosic biomass ethanol, waste-derived ethanol, and approved renewable fuels in the United States to assist the producers in building eligible production facilities described in paragraph (2) for the production of ethanol or approved renewable fuels.

"(2) ELIGIBLE PRODUCTION FACILITIES.—A production facility shall be eligible to receive a grant under this subsection if the production facility—

"(A) is located in the United States; and

"(B) uses cellulosic or renewable biomass or waste-derived feedstocks derived from agricultural residues, wood residues, municipal solid waste, or agricultural byproducts.

"(3) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated the following amounts to carry out this subsection:

"(A) $100,000,000 for fiscal year 2006.

"(B) $250,000,000 for fiscal year 2007.

"(C) $400,000,000 for fiscal year 2008.

"(4) DEFINITIONS.—For the purposes of this subsection:

"(A) The term 'approved renewable fuels' are fuels and components of fuels that have been approved by the Department of Energy, as defined in section 301 of the Energy

Policy Act of 1992 (42 U.S.C. 13211), which have been made from renewable biomass.

"(B) The term 'renewable biomass' is, as defined in Presidential Executive Order 13134, published in the Federal Register on August 16, 1999, any organic matter that is available on a renewable or recurring basis (excluding old-growth timber), including dedicated energy crops and trees, agricultural food and feed crop residues, aquatic plants, animal wastes, wood and wood residues, paper and paper residues, and other vegetative waste materials. Old-growth timber means timber of a forest from the late successional stage of forest development.".

SEC. 1513. BLENDING OF COMPLIANT REFORMULATED GASOLINES.

Section 211 of the Clean Air Act (42 U.S.C. 7545) is amended by adding at the end the following:

"(s) BLENDING OF COMPLIANT REFORMULATED GASOLINES.—

"(1) IN GENERAL.—Notwithstanding subsections (h) and (k) and subject to the limitations in paragraph (2) of this subsection, it shall not be a violation of this subtitle for a gasoline retailer, during any month of the year, to blend at a retail location batches of ethanol-blended and non-ethanol-blended reformulated gasoline, provided that—

"(A) each batch of gasoline to be blended has been individually certified as in compliance with subsections (h) and (k) prior to being blended;

"(B) the retailer notifies the Administrator prior to such blending, and identifies the exact location of the retail station and the specific tank in which such blending will take place;

"(C) the retailer retains and, as requested by the Administrator or the Administrator's designee, makes available for inspection such certifications accounting for all gasoline at the retail outlet; and

"(D) the retailer does not, between June 1 and September 15 of each year, blend a batch of VOC-controlled, or 'summer', gasoline with a batch of non-VOC-controlled, or 'winter', gasoline (as these terms are defined under subsections (h) and (k)).

"(2) LIMITATIONS.—

"(A) FREQUENCY LIMITATION.—A retailer shall only be permitted to blend batches of compliant reformulated gasoline under this subsection a maximum of two blending periods between May 1 and September 15 of each calendar year.

"(B) DURATION OF BLENDING PERIOD.—Each blending period authorized under subparagraph (A) shall extend for a period of no more than 10 consecutive calendar days.

"(3) SURVEYS.—A sample of gasoline taken from a retail location that has blended gasoline within the past 30 days and is in compliance with subparagraphs (A), (B), (C), and (D) of paragraph (1) shall not be used in a VOC survey mandated by 40 CFR Part 80.

"(4) STATE IMPLEMENTATION PLANS.—A State shall be held harmless and shall not be required to revise its State implementation plan under section 110 to account for the emissions from blended gasoline authorized under paragraph (1).

"(5) PRESERVATION OF STATE LAW.—Nothing in this subsection shall—

"(A) preempt existing State laws or regulations regulating the blending of compliant gasolines; or

"(B) prohibit a State from adopting such restrictions in the future.

Notice.
Deadline.

"(6) REGULATIONS.—The Administrator shall promulgate, after notice and comment, regulations implementing this subsection within 1 year after the date of enactment of this subsection.

"(7) EFFECTIVE DATE.—This subsection shall become effective 15 months after the date of its enactment and shall apply to blended batches of reformulated gasoline on or after that date, regardless of whether the implementing regulations required by paragraph (6) have been promulgated by the Administrator by that date.

"(8) LIABILITY.—No person other than the person responsible for blending under this subsection shall be subject to an enforcement action or penalties under subsection (d) solely arising from the blending of compliant reformulated gasolines by the retailers.

"(9) FORMULATION OF GASOLINE.—This subsection does not grant authority to the Administrator or any State (or any subdivision thereof) to require reformulation of gasoline at the refinery to adjust for potential or actual emissions increases due to the blending authorized by this subsection.".

42 USC 16502.

SEC. 1514. ADVANCED BIOFUEL TECHNOLOGIES PROGRAM.

(a) IN GENERAL.—Subject to the availability of appropriations under subsection (d), the Administrator of the Environmental Protection Agency shall, in consultation with the Secretary of Agriculture and the Biomass Research and Development Technical Advisory Committee established under section 306 of the Biomass Research and Development Act of 2000 (Public Law 106–224; 7 U.S.C. 8101 note), establish a program, to be known as the "Advanced Biofuel Technologies Program", to demonstrate advanced technologies for the production of alternative transportation fuels.

(b) PRIORITY.—In carrying out the program under subsection (a), the Administrator shall give priority to projects that enhance the geographical diversity of alternative fuels production and utilize feedstocks that represent 10 percent or less of ethanol or biodiesel fuel production in the United States during the previous fiscal year.

(c) DEMONSTRATION PROJECTS.—

(1) IN GENERAL.—As part of the program under subsection (a), the Administrator shall fund demonstration projects—

(A) to develop not less than 4 different conversion technologies for producing cellulosic biomass ethanol; and

(B) to develop not less than 5 technologies for coproducing value-added bioproducts (such as fertilizers, herbicides, and pesticides) resulting from the production of biodiesel fuel.

(2) ADMINISTRATION.—Demonstration projects under this subsection shall be—

(A) conducted based on a merit-reviewed, competitive process; and

(B) subject to the cost-sharing requirements of section 988.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $110,000,000 for each of fiscal years 2005 through 2009.

SEC. 1515. WASTE-DERIVED ETHANOL AND BIODIESEL.

Section 312(f)(1) of the Energy Policy Act of 1992 (42 U.S.C. 13220(f)(1)) is amended—

(1) by striking "'biodiesel' means" and inserting the following: "'biodiesel'—

"(A) means"; and

(2) in subparagraph (A) (as designated by paragraph (1)) by striking "and" at the end and inserting the following:

"(B) includes biodiesel derived from—

"(i) animal wastes, including poultry fats and poultry wastes, and other waste materials; or

"(ii) municipal solid waste and sludges and oils derived from wastewater and the treatment of wastewater; and".

SEC. 1516. SUGAR ETHANOL LOAN GUARANTEE PROGRAM. 42 USC 16503.

(a) IN GENERAL.—Funds may be provided for the cost (as defined in section 502 of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a)) of loan guarantees issued under title XIV to carry out commercial demonstration projects for ethanol derived from sugarcane, bagasse, and other sugarcane byproducts.

(b) DEMONSTRATION PROJECTS.—The Secretary may issue loan guarantees under this section to projects to demonstrate commercially the feasibility and viability of producing ethanol using sugarcane, sugarcane bagasse, and other sugarcane byproducts as a feedstock.

(c) REQUIREMENTS.—An applicant for a loan guarantee under this section may provide assurances, satisfactory to the Secretary, that—

(1) the project design has been validated through the operation of a continuous process facility;

(2) the project has been subject to a full technical review;

(3) the project, with the loan guarantee, is economically viable; and

(4) there is a reasonable assurance of repayment of the guaranteed loan.

(d) LIMITATIONS.—

(1) MAXIMUM GUARANTEE.—Except as provided in paragraph (2), a loan guarantee under this section—

(A) may be issued for up to 80 percent of the estimated cost of a project; but

(B) shall not exceed $50,000,000 for any 1 project.

(2) ADDITIONAL GUARANTEES.—

(A) IN GENERAL.—The Secretary may issue additional loan guarantees for a project to cover—

(i) up to 80 percent of the excess of actual project costs; but

(ii) not to exceed 15 percent of the amount of the original loan guarantee.

(B) PRINCIPAL AND INTEREST.—Subject to subparagraph (A), the Secretary shall guarantee 100 percent of the principal and interest of a loan guarantee made under subparagraph (A).

Underground Storage Tank Compliance Act.

Subtitle B—Underground Storage Tank Compliance

42 USC 6901 note.

SEC. 1521. SHORT TITLE.

This subtitle may be cited as the "Underground Storage Tank Compliance Act".

SEC. 1522. LEAKING UNDERGROUND STORAGE TANKS.

(a) IN GENERAL.—Section 9004 of the Solid Waste Disposal Act (42 U.S.C. 6991c) is amended by adding at the end the following:

"(f) TRUST FUND DISTRIBUTION.—

"(1) IN GENERAL.—

"(A) AMOUNT AND PERMITTED USES OF DISTRIBUTION.—The Administrator shall distribute to States not less than 80 percent of the funds from the Trust Fund that are made available to the Administrator under section 9014(2)(A) for each fiscal year for use in paying the reasonable costs, incurred under a cooperative agreement with any State for—

"(i) corrective actions taken by the State under section 9003(h)(7)(A);

"(ii) necessary administrative expenses, as determined by the Administrator, that are directly related to State fund or State assurance programs under subsection (c)(1); or

"(iii) enforcement, by a State or a local government, of State or local regulations pertaining to underground storage tanks regulated under this subtitle.

"(B) USE OF FUNDS FOR ENFORCEMENT.—In addition to the uses of funds authorized under subparagraph (A), the Administrator may use funds from the Trust Fund that are not distributed to States under subparagraph (A) for enforcement of any regulation promulgated by the Administrator under this subtitle.

"(C) PROHIBITED USES.—Funds provided to a State by the Administrator under subparagraph (A) shall not be used by the State to provide financial assistance to an owner or operator to meet any requirement relating to underground storage tanks under subparts B, C, D, H, and G of part 280 of title 40, Code of Federal Regulations (as in effect on the date of enactment of this subsection).

"(2) ALLOCATION.—

"(A) PROCESS.—Subject to subparagraphs (B) and (C), in the case of a State with which the Administrator has entered into a cooperative agreement under section 9003(h)(7)(A), the Administrator shall distribute funds from the Trust Fund to the State using an allocation process developed by the Administrator.

"(B) DIVERSION OF STATE FUNDS.—The Administrator shall not distribute funds under subparagraph (A)(iii) of subsection (f)(1) to any State that has diverted funds from

a State fund or State assurance program for purposes other than those related to the regulation of underground storage tanks covered by this subtitle, with the exception of those transfers that had been completed earlier than the date of enactment of this subsection.

"(C) REVISIONS TO PROCESS.—The Administrator may revise the allocation process referred to in subparagraph (A) after—

"(i) consulting with State agencies responsible for overseeing corrective action for releases from underground storage tanks; and

"(ii) taking into consideration, at a minimum, each of the following:

"(I) The number of confirmed releases from federally regulated leaking underground storage tanks in the States.

"(II) The number of federally regulated underground storage tanks in the States.

"(III) The performance of the States in implementing and enforcing the program.

"(IV) The financial needs of the States.

"(V) The ability of the States to use the funds referred to in subparagraph (A) in any year.

"(3) DISTRIBUTIONS TO STATE AGENCIES.—Distributions from the Trust Fund under this subsection shall be made directly to a State agency that—

"(A) enters into a cooperative agreement referred to in paragraph (2)(A); or

"(B) is enforcing a State program approved under this section.".

(b) WITHDRAWAL OF APPROVAL OF STATE FUNDS.—Section 9004(c) of the Solid Waste Disposal Act (42 U.S.C. 6991c(c)) is amended by inserting the following new paragraph at the end thereof:

"(6) WITHDRAWAL OF APPROVAL.—After an opportunity for good faith, collaborative efforts to correct financial deficiencies with a State fund, the Administrator may withdraw approval of any State fund or State assurance program to be used as a financial responsibility mechanism without withdrawing approval of a State underground storage tank program under section 9004(a).".

(c) ABILITY TO PAY.—Section 9003(h)(6) of the Solid Waste Disposal Act (42 U.S.C. 6591a(h)(6)) is amended by adding the following new subparagraph at the end thereof: 42 USC 6991b.

"(E) INABILITY OR LIMITED ABILITY TO PAY.—

"(i) IN GENERAL.—In determining the level of recovery effort, or amount that should be recovered, the Administrator (or the State pursuant to paragraph (7)) shall consider the owner or operator's ability to pay. An inability or limited ability to pay corrective action costs must be demonstrated to the Administrator (or the State pursuant to paragraph (7)) by the owner or operator.

"(ii) CONSIDERATIONS.—In determining whether or not a demonstration is made under clause (i), the Administrator (or the State pursuant to paragraph (7)) shall take into consideration the ability of the

owner or operator to pay corrective action costs and still maintain its basic business operations, including consideration of the overall financial condition of the owner or operator and demonstrable constraints on the ability of the owner or operator to raise revenues.

"(iii) INFORMATION.—An owner or operator requesting consideration under this subparagraph shall promptly provide the Administrator (or the State pursuant to paragraph (7)) with all relevant information needed to determine the ability of the owner or operator to pay corrective action costs.

"(iv) ALTERNATIVE PAYMENT METHODS.—The Administrator (or the State pursuant to paragraph (7)) shall consider alternative payment methods as may be necessary or appropriate if the Administrator (or the State pursuant to paragraph (7)) determines that an owner or operator cannot pay all or a portion of the costs in a lump sum payment.

"(v) MISREPRESENTATION.—If an owner or operator provides false information or otherwise misrepresents their financial situation under clause (ii), the Administrator (or the State pursuant to paragraph (7)) shall seek full recovery of the costs of all such actions pursuant to the provisions of subparagraph (A) without consideration of the factors in subparagraph (B).".

SEC. 1523. INSPECTION OF UNDERGROUND STORAGE TANKS.

(a) INSPECTION REQUIREMENTS.—Section 9005 of the Solid Waste Disposal Act (42 U.S.C. 6991d) is amended by inserting the following new subsection at the end thereof:

"(c) INSPECTION REQUIREMENTS.—

Deadline.

"(1) UNINSPECTED TANKS.—In the case of underground storage tanks regulated under this subtitle that have not undergone an inspection since December 22, 1998, not later than 2 years after the date of enactment of this subsection, the Administrator or a State that receives funding under this subtitle, as appropriate, shall conduct on-site inspections of all such tanks to determine compliance with this subtitle and the regulations under this subtitle (40 CFR 280) or a requirement or standard of a State program developed under section 9004.

"(2) PERIODIC INSPECTIONS.—After completion of all inspections required under paragraph (1), the Administrator or a State that receives funding under this subtitle, as appropriate, shall conduct on-site inspections of each underground storage tank regulated under this subtitle at least once every 3 years to determine compliance with this subtitle and the regulations under this subtitle (40 CFR 280) or a requirement or standard of a State program developed under section 9004. The Administrator may extend for up to one additional year the first 3-year inspection interval under this paragraph if the State demonstrates that it has insufficient resources to complete all such inspections within the first 3-year period.

"(3) INSPECTION AUTHORITY.—Nothing in this section shall be construed to diminish the Administrator's or a State's authorities under section 9005(a).".

(b) STUDY OF ALTERNATIVE INSPECTION PROGRAMS.—The Administrator of the Environmental Protection Agency, in coordination with a State, shall gather information on compliance assurance programs that could serve as an alternative to the inspection programs under section 9005(c) of the Solid Waste Disposal Act (42 U.S.C. 6991d(c)) and shall, within 4 years after the date of enactment of this Act, submit a report to the Congress containing the results of such study.

Reports. Deadline.

SEC. 1524. OPERATOR TRAINING.

(a) IN GENERAL.—Section 9010 of the Solid Waste Disposal Act (42 U.S.C. 6991i) is amended to read as follows:

"SEC. 9010. OPERATOR TRAINING.

"(a) GUIDELINES.—

"(1) IN GENERAL.—Not later than 2 years after the date of enactment of the Underground Storage Tank Compliance Act, in consultation and cooperation with States and after public notice and opportunity for comment, the Administrator shall publish guidelines that specify training requirements for—

Deadline. Notification. Public information. Publication.

"(A) persons having primary responsibility for on-site operation and maintenance of underground storage tank systems;

"(B) persons having daily on-site responsibility for the operation and maintenance of underground storage tanks systems; and

"(C) daily, on-site employees having primary responsibility for addressing emergencies presented by a spill or release from an underground storage tank system.

"(2) CONSIDERATIONS.—The guidelines described in paragraph (1) shall take into account—

"(A) State training programs in existence as of the date of publication of the guidelines;

"(B) training programs that are being employed by tank owners and tank operators as of the date of enactment of the Underground Storage Tank Compliance Act;

"(C) the high turnover rate of tank operators and other personnel;

"(D) the frequency of improvement in underground storage tank equipment technology;

"(E) the nature of the businesses in which the tank operators are engaged;

"(F) the substantial differences in the scope and length of training needed for the different classes of persons described in subparagraphs (A), (B), and (C) of paragraph (1); and

"(G) such other factors as the Administrator determines to be necessary to carry out this section.

"(b) STATE PROGRAMS.—

Deadline.

"(1) IN GENERAL.—Not later than 2 years after the date on which the Administrator publishes the guidelines under subsection (a)(1), each State that receives funding under this subtitle shall develop State-specific training requirements that are consistent with the guidelines developed under subsection (a)(1).

"(2) REQUIREMENTS.—State requirements described in paragraph (1) shall—

"(A) be consistent with subsection (a);

"(B) be developed in cooperation with tank owners and tank operators;

"(C) take into consideration training programs implemented by tank owners and tank operators as of the date of enactment of this section; and

"(D) be appropriately communicated to tank owners and operators.

"(3) FINANCIAL INCENTIVE.—The Administrator may award to a State that develops and implements requirements described in paragraph (1), in addition to any funds that the State is entitled to receive under this subtitle, not more than $200,000, to be used to carry out the requirements.

"(c) TRAINING.—All persons that are subject to the operator training requirements of subsection (a) shall—

"(1) meet the training requirements developed under subsection (b); and

"(2) repeat the applicable requirements developed under subsection (b), if the tank for which they have primary daily on-site management responsibilities is determined to be out of compliance with—

"(A) a requirement or standard promulgated by the Administrator under section 9003; or

"(B) a requirement or standard of a State program approved under section 9004.".

(b) STATE PROGRAM REQUIREMENT.—Section 9004(a) of the Solid Waste Disposal Act (42 U.S.C. 6991c(a)) is amended by striking "and" at the end of paragraph (7), by striking the period at the end of paragraph (8) and inserting "; and", and by adding the following new paragraph at the end thereof:

"(9) State-specific training requirements as required by section 9010.".

(c) ENFORCEMENT.—Section 9006(d)(2) of such Act (42 U.S.C. 6991e) is amended as follows:

(1) By striking "or" at the end of subparagraph (B).

(2) By adding the following new subparagraph after subparagraph (C):

"(D) the training requirements established by States pursuant to section 9010 (relating to operator training); or".

(d) TABLE OF CONTENTS.—The item relating to section 9010 in the table of contents for the Solid Waste Disposal Act is amended to read as follows:

"Sec. 9010. Operator training.".

SEC. 1525. REMEDIATION FROM OXYGENATED FUEL ADDITIVES.

Section 9003(h) of the Solid Waste Disposal Act (42 U.S.C. 6991b(h)) is amended as follows:

(1) In paragraph (7)(A)—

(A) by striking "paragraphs (1) and (2) of this subsection" and inserting "paragraphs (1), (2), and (12)"; and

(B) by striking "and including the authorities of paragraphs (4), (6), and (8) of this subsection" and inserting "and the authority under sections 9011 and 9012 and paragraphs (4), (6), and (8),".

(2) By adding at the end the following:

"(12) REMEDIATION OF OXYGENATED FUEL CONTAMINATION.—

"(A) IN GENERAL.—The Administrator and the States may use funds made available under section 9014(2)(B) to carry out corrective actions with respect to a release of a fuel containing an oxygenated fuel additive that presents a threat to human health or welfare or the environment.

"(B) APPLICABLE AUTHORITY.—The Administrator or a State shall carry out subparagraph (A) in accordance with paragraph (2), and in the case of a State, in accordance with a cooperative agreement entered into by the Administrator and the State under paragraph (7).". Contracts.

SEC. 1526. RELEASE PREVENTION, COMPLIANCE, AND ENFORCEMENT.

(a) RELEASE PREVENTION AND COMPLIANCE.—Subtitle I of the Solid Waste Disposal Act (42 U.S.C. 6991 et seq.) is amended by adding at the end the following:

"SEC. 9011. USE OF FUNDS FOR RELEASE PREVENTION AND COMPLIANCE. 42 USC 6991j.

"Funds made available under section 9014(2)(D) from the Trust Fund may be used to conduct inspections, issue orders, or bring actions under this subtitle—

"(1) by a State, in accordance with a grant or cooperative agreement with the Administrator, of State regulations pertaining to underground storage tanks regulated under this subtitle; and

"(2) by the Administrator, for tanks regulated under this subtitle (including under a State program approved under section 9004).".

(b) GOVERNMENT-OWNED TANKS.—Section 9003 of the Solid Waste Disposal Act (42 U.S.C. 6991b) is amended by adding at the end the following:

"(i) GOVERNMENT-OWNED TANKS.—

"(1) STATE COMPLIANCE REPORT.—(A) Not later than 2 years after the date of enactment of this subsection, each State that receives funding under this subtitle shall submit to the Administrator a State compliance report that— Deadline.

"(i) lists the location and owner of each underground storage tank described in subparagraph (B) in the State that, as of the date of submission of the report, is not in compliance with section 9003; and

"(ii) specifies the date of the last inspection and describes the actions that have been and will be taken to ensure compliance of the underground storage tank listed under clause (i) with this subtitle.

"(B) An underground storage tank described in this subparagraph is an underground storage tank that is—

"(i) regulated under this subtitle; and

"(ii) owned or operated by the Federal, State, or local government.

"(C) The Administrator shall make each report, received under subparagraph (A), available to the public through an appropriate media.

"(2) FINANCIAL INCENTIVE.—The Administrator may award to a State that develops a report described in paragraph (1), in addition to any other funds that the State is entitled to receive under this subtitle, not more than $50,000, to be used to carry out the report.

"(3) NOT A SAFE HARBOR.—This subsection does not relieve any person from any obligation or requirement under this subtitle.".

(c) PUBLIC RECORD.—Section 9002 of the Solid Waste Disposal Act (42 U.S.C. 6991a) is amended by adding at the end the following:

"(d) PUBLIC RECORD.—

"(1) IN GENERAL.—The Administrator shall require each State that receives Federal funds to carry out this subtitle to maintain, update at least annually, and make available to the public, in such manner and form as the Administrator shall prescribe (after consultation with States), a record of underground storage tanks regulated under this subtitle.

"(2) CONSIDERATIONS.—To the maximum extent practicable, the public record of a State, respectively, shall include, for each year—

"(A) the number, sources, and causes of underground storage tank releases in the State;

"(B) the record of compliance by underground storage tanks in the State with—

"(i) this subtitle; or

"(ii) an applicable State program approved under section 9004; and

"(C) data on the number of underground storage tank equipment failures in the State.".

(d) INCENTIVE FOR PERFORMANCE.—Section 9006 of the Solid Waste Disposal Act (42 U.S.C. 6991e) is amended by adding at the end the following:

"(e) INCENTIVE FOR PERFORMANCE.—Both of the following may be taken into account in determining the terms of a civil penalty under subsection (d):

"(1) The compliance history of an owner or operator in accordance with this subtitle or a program approved under section 9004.

"(2) Any other factor the Administrator considers appropriate.".

(e) TABLE OF CONTENTS.—The table of contents for such subtitle I is amended by adding the following new item at the end thereof:

"Sec. 9011. Use of funds for release prevention and compliance.".

SEC. 1527. DELIVERY PROHIBITION.

(a) IN GENERAL.—Subtitle I of the Solid Waste Disposal Act (42 U.S.C. 6991 et seq.) is amended by adding at the end the following:

42 USC 6991k.

"SEC. 9012. DELIVERY PROHIBITION.

"(a) REQUIREMENTS.—

Effective date.

"(1) PROHIBITION OF DELIVERY OR DEPOSIT.—Beginning 2 years after the date of enactment of this section, it shall be unlawful to deliver to, deposit into, or accept a regulated substance into an underground storage tank at a facility which has been identified by the Administrator or a State implementing agency to be ineligible for such delivery, deposit, or acceptance.

Deadline.

"(2) GUIDANCE.—Within 1 year after the date of enactment of this section, the Administrator shall, in consultation with the States, underground storage tank owners, and product delivery industries, publish guidelines detailing the specific

processes and procedures they will use to implement the provisions of this section. The processes and procedures include, at a minimum—

"(A) the criteria for determining which underground storage tank facilities are ineligible for delivery, deposit, or acceptance of a regulated substance;

"(B) the mechanisms for identifying which facilities are ineligible for delivery, deposit, or acceptance of a regulated substance to the underground storage tank owning and fuel delivery industries;

"(C) the process for reclassifying ineligible facilities as eligible for delivery, deposit, or acceptance of a regulated substance;

"(D) one or more processes for providing adequate notice to underground storage tank owners and operators and supplier industries that an underground storage tank has been determined to be ineligible for delivery, deposit, or acceptance or a regulated substance; and

"(E) a delineation of, or a process for determining, the specified geographic areas subject to paragraph (4).

"(3) COMPLIANCE.—States that receive funding under this subtitle shall, at a minimum, comply with the processes and procedures published under paragraph (2).

"(4) CONSIDERATION.—

"(A) RURAL AND REMOTE AREAS.—Subject to subparagraph (B), the Administrator or a State may consider not treating an underground storage tank as ineligible for delivery, deposit, or acceptance of a regulated substance if such treatment would jeopardize the availability of, or access to, fuel in any rural and remote areas unless an urgent threat to public health, as determined by the Administrator, exists.

"(B) APPLICABILITY.—Subparagraph (A) shall apply only during the 180-day period following the date of a determination by the Administrator or the appropriate State under subparagraph (A).

"(b) EFFECT ON STATE AUTHORITY.—Nothing in this section shall affect or preempt the authority of a State to prohibit the delivery, deposit, or acceptance of a regulated substance to an underground storage tank.

"(c) DEFENSE TO VIOLATION.—A person shall not be in violation of subsection (a)(1) if the person has not been provided with notice pursuant to subsection (a)(2)(D) of the ineligibility of a facility for delivery, deposit, or acceptance of a regulated substance as determined by the Administrator or a State, as appropriate, under this section.".

(b) ENFORCEMENT.—Section 9006(d)(2) of such Act (42 U.S.C. 6991e(d)(2)) is amended as follows:

(1) By adding the following new subparagraph after subparagraph (D):

"(E) the delivery prohibition requirement established by section 9012,".

(2) By adding the following new sentence at the end thereof: "Any person making or accepting a delivery or deposit of a regulated substance to an underground storage tank at an ineligible facility in violation of section 9012 shall also be subject to the same civil penalty for each day of such violation.".

(c) TABLE OF CONTENTS.—The table of contents for such subtitle I is amended by adding the following new item at the end thereof:

"Sec. 9012. Delivery prohibition.".

SEC. 1528. FEDERAL FACILITIES.

Section 9007 of the Solid Waste Disposal Act (42 U.S.C. 6991f) is amended to read as follows:

Penalties. Exemptions.

"SEC. 9007. FEDERAL FACILITIES.

"(a) IN GENERAL.—Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any underground storage tank or underground storage tank system, or (2) engaged in any activity resulting, or which may result, in the installation, operation, management, or closure of any underground storage tank, release response activities related thereto, or in the delivery, acceptance, or deposit of any regulated substance to an underground storage tank or underground storage tank system shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural (including any requirement for permits or reporting or any provisions for injunctive relief and such sanctions as may be imposed by a court to enforce such relief), respecting underground storage tanks in the same manner, and to the same extent, as any person is subject to such requirements, including the payment of reasonable service charges. The Federal, State, interstate, and local substantive and procedural requirements referred to in this subsection include, but are not limited to, all administrative orders and all civil and administrative penalties and fines, regardless of whether such penalties or fines are punitive or coercive in nature or are imposed for isolated, intermittent, or continuing violations. The United States hereby expressly waives any immunity otherwise applicable to the United States with respect to any such substantive or procedural requirement (including, but not limited to, any injunctive relief, administrative order or civil or administrative penalty or fine referred to in the preceding sentence, or reasonable service charge). The reasonable service charges referred to in this subsection include, but are not limited to, fees or charges assessed in connection with the processing and issuance of permits, renewal of permits, amendments to permits, review of plans, studies, and other documents, and inspection and monitoring of facilities, as well as any other nondiscriminatory charges that are assessed in connection with a Federal, State, interstate, or local underground storage tank regulatory program. Neither the United States, nor any agent, employee, or officer thereof, shall be immune or exempt from any process or sanction of any State or Federal Court with respect to the enforcement of any such injunctive relief. No agent, employee, or officer of the United States shall be personally liable for any civil penalty under any Federal, State, interstate, or local law concerning underground storage tanks with respect to any act or omission within the scope of the official duties of the agent, employee, or officer. An agent, employee, or officer of the United States shall be subject to any criminal sanction (including, but not limited to, any fine or imprisonment) under any Federal or State law concerning underground storage tanks, but no department, agency, or instrumentality of the executive, legislative, or judicial branch of the Federal Government shall be subject to any

such sanction. The President may exempt any underground storage tank of any department, agency, or instrumentality in the executive branch from compliance with such a requirement if he determines it to be in the paramount interest of the United States to do so. No such exemption shall be granted due to lack of appropriation unless the President shall have specifically requested such appropriation as a part of the budgetary process and the Congress shall have failed to make available such requested appropriation. Any exemption shall be for a period not in excess of 1 year, but additional exemptions may be granted for periods not to exceed 1 year upon the President's making a new determination. The President shall report each January to the Congress all exemptions from the requirements of this section granted during the preceding calendar year, together with his reason for granting each such exemption.

President. Reports.

"(b) REVIEW OF AND REPORT ON FEDERAL UNDERGROUND STORAGE TANKS.—

"(1) REVIEW.—Not later than 12 months after the date of enactment of the Underground Storage Tank Compliance Act, each Federal agency that owns or operates one or more underground storage tanks, or that manages land on which one or more underground storage tanks are located, shall submit to the Administrator, the Committee on Energy and Commerce of the United States House of Representatives, and the Committee on the Environment and Public Works of the Senate a compliance strategy report that—

Deadline.

"(A) lists the location and owner of each underground storage tank described in this paragraph;

"(B) lists all tanks that are not in compliance with this subtitle that are owned or operated by the Federal agency;

"(C) specifies the date of the last inspection by a State or Federal inspector of each underground storage tank owned or operated by the agency;

"(D) lists each violation of this subtitle respecting any underground storage tank owned or operated by the agency;

"(E) describes the operator training that has been provided to the operator and other persons having primary daily on-site management responsibility for the operation and maintenance of underground storage tanks owned or operated by the agency; and

"(F) describes the actions that have been and will be taken to ensure compliance for each underground storage tank identified under subparagraph (B).

"(2) NOT A SAFE HARBOR.—This subsection does not relieve any person from any obligation or requirement under this subtitle.".

SEC. 1529. TANKS ON TRIBAL LANDS.

(a) IN GENERAL.—Subtitle I of the Solid Waste Disposal Act (42 U.S.C. 6991 et seq.) is amended by adding the following at the end thereof:

"SEC. 9013. TANKS ON TRIBAL LANDS.

42 USC 6991*l*.

"(a) STRATEGY.—The Administrator, in coordination with Indian tribes, shall, not later than 1 year after the date of enactment of this section, develop and implement a strategy—

Deadline.

"(1) giving priority to releases that present the greatest threat to human health or the environment, to take necessary

corrective action in response to releases from leaking underground storage tanks located wholly within the boundaries of—

"(A) an Indian reservation; or

"(B) any other area under the jurisdiction of an Indian tribe; and

"(2) to implement and enforce requirements concerning underground storage tanks located wholly within the boundaries of—

"(A) an Indian reservation; or

"(B) any other area under the jurisdiction of an Indian tribe.

"(b) REPORT.—Not later than 2 years after the date of enactment of this section, the Administrator shall submit to Congress a report that summarizes the status of implementation and enforcement of this subtitle in areas located wholly within—

"(1) the boundaries of Indian reservations; and

"(2) any other areas under the jurisdiction of an Indian tribe.

Public information.

The Administrator shall make the report under this subsection available to the public.

"(c) NOT A SAFE HARBOR.—This section does not relieve any person from any obligation or requirement under this subtitle.

"(d) STATE AUTHORITY.—Nothing in this section applies to any underground storage tank that is located in an area under the jurisdiction of a State, or that is subject to regulation by a State, as of the date of enactment of this section.".

(b) TABLE OF CONTENTS.—The table of contents for such subtitle I is amended by adding the following new item at the end thereof:

"Sec. 9013. Tanks on Tribal lands.".

SEC. 1530. ADDITIONAL MEASURES TO PROTECT GROUNDWATER.

(a) IN GENERAL.—Section 9003 of the Solid Waste Disposal Act (42 U.S.C. 6991b) is amended by adding the following new subsection at the end:

"(i) ADDITIONAL MEASURES TO PROTECT GROUNDWATER FROM CONTAMINATION.—The Administrator shall require each State that receives funding under this subtitle to require one of the following:

"(1) TANK AND PIPING SECONDARY CONTAINMENT.—(A) Each new underground storage tank, or piping connected to any such new tank, installed after the effective date of this subsection, or any existing underground storage tank, or existing piping connected to such existing tank, that is replaced after the effective date of this subsection, shall be secondarily contained and monitored for leaks if the new or replaced underground storage tank or piping is within 1,000 feet of any existing community water system or any existing potable drinking water well.

"(B) In the case of a new underground storage tank system consisting of one or more underground storage tanks and connected by piping, subparagraph (A) shall apply to all underground storage tanks and connected pipes comprising such system.

"(C) In the case of a replacement of an existing underground storage tank or existing piping connected to the underground storage tank, subparagraph (A) shall apply only to the specific underground storage tank or piping being replaced,

not to other underground storage tanks and connected pipes comprising such system.

"(D) Each installation of a new motor fuel dispenser system, after the effective date of this subsection, shall include under-dispenser spill containment if the new dispenser is within 1,000 feet of any existing community water system or any existing potable drinking water well.

"(E) This paragraph shall not apply to repairs to an underground storage tank, piping, or dispenser that are meant to restore a tank, pipe, or dispenser to operating condition.

"(F) As used in this subsection:

"(i) The term 'secondarily contained' means a release detection and prevention system that meets the requirements of 40 CFR 280.43(g), but shall not include under-dispenser spill containment or control systems.

"(ii) The term 'underground storage tank' has the meaning given to it in section 9001, except that such term does not include tank combinations or more than a single underground pipe connected to a tank.

"(iii) The term 'installation of a new motor fuel dispenser system' means the installation of a new motor fuel dispenser and the equipment necessary to connect the dispenser to the underground storage tank system, but does not mean the installation of a motor fuel dispenser installed separately from the equipment need to connect the dispenser to the underground storage tank system.

"(2) EVIDENCE OF FINANCIAL RESPONSIBILITY AND CERTIFICATION.—

"(A) MANUFACTURER AND INSTALLER FINANCIAL RESPONSIBILITY.—A person that manufactures an underground storage tank or piping for an underground storage tank system or that installs an underground storage tank system is required to maintain evidence of financial responsibility under section 9003(d) in order to provide for the costs of corrective actions directly related to releases caused by improper manufacture or installation unless the person can demonstrate themselves to be already covered as an owner or operator of an underground storage tank under section 9003.

"(B) INSTALLER CERTIFICATION.—The Administrator and each State that receives funding under this subtitle, as appropriate, shall require that a person that installs an underground storage tank system is—

"(i) certified or licensed by the tank and piping manufacturer;

"(ii) certified or licensed by the Administrator or a State, as appropriate;

"(iii) has their underground storage tank system installation certified by a registered professional engineer with education and experience in underground storage tank system installation;

"(iv) has had their installation of the underground storage tank inspected and approved by the Administrator or the State, as appropriate;

"(v) compliant with a code of practice developed by a nationally recognized association or independent

testing laboratory and in accordance with the manufacturer's instructions; or

"(vi) compliant with another method that is determined by the Administrator or a State, as appropriate, to be no less protective of human health and the environment.

"(C) SAVINGS CLAUSE.—Nothing in subparagraph (A) alters or affects the liability of any owner or operator of an underground storage tank.".

42 USC 6991b note.

(b) EFFECTIVE DATE.—This subsection shall take effect 18 months after the date of enactment of this subsection.

42 USC 6991b note.

(c) PROMULGATION OF REGULATIONS OR GUIDELINES.—The Administrator shall issue regulations or guidelines implementing the requirements of this subsection, including guidance to differentiate between the terms "repair" and "replace" for the purposes of section 9003(i)(1) of the Solid Waste Disposal Act.

(d) PENALTIES.—Section 9006(d)(2) of such Act (42 U.S.C. 6991e(d)(2)) is amended as follows:

(1) By striking "or" at the end of subparagraph (B).

(2) By inserting "; or" at the end of subparagraph (C).

(3) By adding the following new subparagraph after subparagraph (C):

"(D) the requirements established in section 9003(i),".

SEC. 1531. AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—Subtitle I of the Solid Waste Disposal Act (42 U.S.C. 6991 et seq.) is amended by adding at the end the following:

42 USC 6991m.

"SEC. 9014. AUTHORIZATION OF APPROPRIATIONS.

"There are authorized to be appropriated to the Administrator the following amounts:

"(1) To carry out subtitle I (except sections 9003(h), 9005(c), 9011, and 9012) $50,000,000 for each of fiscal years 2005 through 2009.

"(2) From the Trust Fund, notwithstanding section 9508(c)(1) of the Internal Revenue Code of 1986—

"(A) to carry out section 9003(h) (except section 9003(h)(12)) $200,000,000 for each of fiscal years 2005 through 2009;

"(B) to carry out section 9003(h)(12), $200,000,000 for each of fiscal years 2005 through 2009;

"(C) to carry out sections 9003(i), 9004(f), and 9005(c) $100,000,000 for each of fiscal years 2005 through 2009; and

"(D) to carry out sections 9010, 9011, 9012, and 9013 $55,000,000 for each of fiscal years 2005 through 2009.".

(b) TABLE OF CONTENTS.—The table of contents for such subtitle I is amended by adding the following new item at the end thereof:

"Sec. 9014. Authorization of appropriations.".

SEC. 1532. CONFORMING AMENDMENTS.

(a) IN GENERAL.—Section 9001 of the Solid Waste Disposal Act (42 U.S.C. 6991) is amended as follows:

(1) By striking "For the purposes of this subtitle—" and inserting "In this subtitle:".

(2) By redesignating paragraphs (1), (2), (3), (4), (5), (6), (7), and (8) as paragraphs (10), (7), (4), (3), (8), (5), (2), and (6), respectively.

(3) By inserting before paragraph (2) (as redesignated by paragraph (2) of this subsection) the following:

"(1) INDIAN TRIBE.—

"(A) IN GENERAL.—The term 'Indian tribe' means any Indian tribe, band, nation, or other organized group or community that is recognized as being eligible for special programs and services provided by the United States to Indians because of their status as Indians.

"(B) INCLUSIONS.—The term 'Indian tribe' includes an Alaska Native village, as defined in or established under the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.); and".

(4) By inserting after paragraph (8) (as redesignated by paragraph (2) of this subsection) the following:

"(9) TRUST FUND.—The term 'Trust Fund' means the Leaking Underground Storage Tank Trust Fund established by section 9508 of the Internal Revenue Code of 1986.".

(b) CONFORMING AMENDMENTS.—The Solid Waste Disposal Act (42 U.S.C. 6901 and following) is amended as follows:

(1) Section 9003(f) (42 U.S.C. 6991b(f)) is amended—

(A) in paragraph (1), by striking "9001(2)(B)" and inserting "9001(7)(B)"; and

(B) in paragraphs (2) and (3), by striking "9001(2)(A)" each place it appears and inserting "9001(7)(A)".

(2) Section 9003(h) (42 U.S.C. 6991b(h)) is amended in paragraphs (1), (2)(C), (7)(A), and (11) by striking "Leaking Underground Storage Tank Trust Fund" each place it appears and inserting "Trust Fund".

(3) Section 9009 (42 U.S.C. 6991h) is amended—

(A) in subsection (a), by striking "9001(2)(B)" and inserting "9001(7)(B)"; and

(B) in subsection (d), by striking "section 9001(1) (A) and (B)" and inserting "subparagraphs (A) and (B) of section 9001(10)".

SEC. 1533. TECHNICAL AMENDMENTS.

The Solid Waste Disposal Act is amended as follows:

(1) Section 9001(4)(A) (42 U.S.C. 6991(4)(A)) is amended by striking "sustances" and inserting "substances".

(2) Section 9003(f)(1) (42 U.S.C. 6991b(f)(1)) is amended by striking "subsection (c) and (d) of this section" and inserting "subsections (c) and (d)".

(3) Section 9004(a) (42 U.S.C. 6991c(a)) is amended by striking "in 9001(2) (A) or (B) or both" and inserting "in subparagraph (A) or (B) of section 9001(7)".

(4) Section 9005 (42 U.S.C. 6991d) is amended—

(A) in subsection (a), by striking "study taking" and inserting "study, taking";

(B) in subsection (b)(1), by striking "relevent" and inserting "relevant"; and

(C) in subsection (b)(4), by striking "Evironmental" and inserting "Environmental".

Subtitle C—Boutique Fuels

SEC. 1541. REDUCING THE PROLIFERATION OF BOUTIQUE FUELS.

(a) TEMPORARY WAIVERS DURING SUPPLY EMERGENCIES.—Section 211(c)(4)(C) of the Clean Air Act (42 U.S.C. 7545(c)(4)(C)) is amended by inserting "(i)" after "(C)" and by adding the following new clauses at the end thereof:

"(ii) The Administrator may temporarily waive a control or prohibition respecting the use of a fuel or fuel additive required or regulated by the Administrator pursuant to subsection (c), (h), (i), (k), or (m) of this section or prescribed in an applicable implementation plan under section 110 approved by the Administrator under clause (i) of this subparagraph if, after consultation with, and concurrence by, the Secretary of Energy, the Administrator determines that—

"(I) extreme and unusual fuel or fuel additive supply circumstances exist in a State or region of the Nation which prevent the distribution of an adequate supply of the fuel or fuel additive to consumers;

"(II) such extreme and unusual fuel and fuel additive supply circumstances are the result of a natural disaster, an Act of God, a pipeline or refinery equipment failure, or another event that could not reasonably have been foreseen or prevented and not the lack of prudent planning on the part of the suppliers of the fuel or fuel additive to such State or region; and

"(III) it is in the public interest to grant the waiver (for example, when a waiver is necessary to meet projected temporary shortfalls in the supply of the fuel or fuel additive in a State or region of the Nation which cannot otherwise be compensated for).

"(iii) If the Administrator makes the determinations required under clause (ii), such a temporary extreme and unusual fuel and fuel additive supply circumstances waiver shall be permitted only if—

"(I) the waiver applies to the smallest geographic area necessary to address the extreme and unusual fuel and fuel additive supply circumstances;

"(II) the waiver is effective for a period of 20 calendar days or, if the Administrator determines that a shorter waiver period is adequate, for the shortest practicable time period necessary to permit the correction of the extreme and unusual fuel and fuel additive supply circumstances and to mitigate impact on air quality;

"(III) the waiver permits a transitional period, the exact duration of which shall be determined by the Administrator (but which shall be for the shortest practicable period), after the termination of the temporary waiver to permit wholesalers and retailers to blend down their wholesale and retail inventory;

"(IV) the waiver applies to all persons in the motor fuel distribution system; and

"(V) the Administrator has given public notice to all parties in the motor fuel distribution system, and local and State regulators, in the State or region to be covered by the waiver.

The term 'motor fuel distribution system' as used in this clause shall be defined by the Administrator through rulemaking.

"(iv) Within 180 days of the date of enactment of this clause, the Administrator shall promulgate regulations to implement clauses (ii) and (iii).

Regulations. Deadline.

"(v) Nothing in this subparagraph shall—

"(I) limit or otherwise affect the application of any other waiver authority of the Administrator pursuant to this section or pursuant to a regulation promulgated pursuant to this section; and

"(II) subject any State or person to an enforcement action, penalties, or liability solely arising from actions taken pursuant to the issuance of a waiver under this subparagraph.".

(b) LIMIT ON NUMBER OF BOUTIQUE FUELS.—Section 211(c)(4)(C) of the Clean Air Act (42 U.S.C. 7545(c)(4)(C)), as amended by subsection (a), is further amended by adding at the end the following:

"(v)(I) The Administrator shall have no authority, when considering a State implementation plan or a State implementation plan revision, to approve under this paragraph any fuel included in such plan or revision if the effect of such approval increases the total number of fuels approved under this paragraph as of September 1, 2004, in all State implementation plans.

"(II) The Administrator, in consultation with the Secretary of Energy, shall determine the total number of fuels approved under this paragraph as of September 1, 2004, in all State implementation plans and shall publish a list of such fuels, including the States and Petroleum Administration for Defense District in which they are used, in the Federal Register for public review and comment no later than 90 days after enactment.

Deadline. Federal Register, publication. Public information.

"(III) The Administrator shall remove a fuel from the list published under subclause (II) if a fuel ceases to be included in a State implementation plan or if a fuel in a State implementation plan is identical to a Federal fuel formulation implemented by the Administrator, but the Administrator shall not reduce the total number of fuels authorized under the list published under subclause (II).

"(IV) Subclause (I) shall not limit the Administrator's authority to approve a control or prohibition respecting any new fuel under this paragraph in a State implementation plan or revision to a State implementation plan if such new fuel—

"(aa) completely replaces a fuel on the list published under subclause (II); or

"(bb) does not increase the total number of fuels on the list published under subclause (II) as of September 1, 2004.

In the event that the total number of fuels on the list published under subclause (II) at the time of the Administrator's consideration of a control or prohibition respecting a new fuel is lower than the total number of fuels on such list as of September 1, 2004, the Administrator may approve a control or prohibition respecting a new fuel under this subclause if the Administrator, after consultation with the Secretary of Energy, publishes in the Federal Register after notice and comment a finding that, in the Administrator's judgment, such control or prohibition respecting a new fuel will not cause fuel supply or distribution interruptions or have a significant adverse impact on fuel producibility in the affected area or contiguous areas.

Supply. Federal Register, publication.

"(V) The Administrator shall have no authority under this paragraph, when considering any particular State's implementation

plan or a revision to that State's implementation plan, to approve any fuel unless that fuel was, as of the date of such consideration, approved in at least one State implementation plan in the applicable Petroleum Administration for Defense District. However, the Administrator may approve as part of a State implementation plan or State implementation plan revision a fuel with a summertime Reid Vapor Pressure of 7.0 psi. In no event shall such approval by the Administrator cause an increase in the total number of fuels on the list published under subclause (II).

"(VI) Nothing in this clause shall be construed to have any effect regarding any available authority of States to require the use of any fuel additive registered in accordance with subsection (b), including any fuel additive registered in accordance with subsection (b) after the enactment of this subclause.".

(c) STUDY AND REPORT TO CONGRESS ON BOUTIQUE FUELS.—

(1) JOINT STUDY.—The Administrator of the Environmental Protection Agency and the Secretary shall undertake a study of the effects on air quality, on the number of fuel blends, on fuel availability, on fuel fungibility, and on fuel costs of the State plan provisions adopted pursuant to section 211(c)(4)(C) of the Clean Air Act (42 U.S.C. 7545(c)(4)(C)).

(2) FOCUS OF STUDY.—The primary focus of the study required under paragraph (1) shall be to determine how to develop a Federal fuels system that maximizes motor fuel fungibility and supply, addresses air quality requirements, and reduces motor fuel price volatility including that which has resulted from the proliferation of boutique fuels, and to recommend to Congress such legislative changes as are necessary to implement such a system. The study should include the impacts on overall energy supply, distribution, and use as a result of the legislative changes recommended.

Science and technology.

(3) CONDUCT OF STUDY.—In carrying out their joint duties under this section, the Administrator and the Secretary shall use sound science and objective science practices, shall consider the best available science, shall use data collected by accepted means and shall consider and include a description of the weight of the scientific evidence. The Administrator and the Secretary shall coordinate the study required by this section with other studies required by the Act.

(4) RESPONSIBILITY OF ADMINISTRATOR.—In carrying out the study required by this section, the Administrator shall coordinate obtaining comments from affected parties interested in the air quality impact assessment portion of the study.

(5) RESPONSIBILITY OF SECRETARY.—In carrying out the study required by this section, the Secretary shall coordinate obtaining comments from affected parties interested in the fuel availability, number of fuel blends, fuel fungibility, and fuel costs portion of the study.

Deadline.

(6) REPORT TO CONGRESS.—The Administrator and the Secretary jointly shall submit the results of the study required by this section in a report to the Congress not later than 12 months after the date of the enactment of this Act, together with any recommended regulatory and legislative changes. Such report shall be submitted to the Committee on Energy and Commerce of the United States House of Representatives and the Committees on Energy and Natural Resources and on Environment and Public Works of the Senate.

(7) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated jointly to the Administrator and the Secretary $500,000 for the completion of the study required under this subsection.

(d) DEFINITIONS.—In this section:

(1) The term "Administrator" means the Administrator of the Environmental Protection Agency.

(2) The term "fuel" means gasoline, diesel fuel, and any other liquid petroleum product commercially known as gasoline and diesel fuel for use in highway and nonroad motor vehicles.

(3) The term "a control or prohibition respecting a new fuel" means a control or prohibition on the formulation, composition, or emissions characteristics of a fuel that would require the increase or decrease of a constituent in gasoline or diesel fuel.

TITLE XVI—CLIMATE CHANGE

Subtitle A—National Climate Change Technology Deployment

SEC. 1601. GREENHOUSE GAS INTENSITY REDUCING TECHNOLOGY STRATEGIES.

Title XVI of the Energy Policy Act of 1992 (42 U.S.C. 13381 et seq.) is amended by adding at the end the following:

"SEC. 1610. GREENHOUSE GAS INTENSITY REDUCING STRATEGIES. 42 USC 13389.

"(a) DEFINITIONS.—In this section:

"(1) ADVISORY COMMITTEE.—The term 'Advisory Committee' means the Climate Change Technology Advisory Committee established under subsection (f)(1).

"(2) CARBON SEQUESTRATION.—The term 'carbon sequestration' means the capture of carbon dioxide through terrestrial, geological, biological, or other means, which prevents the release of carbon dioxide into the atmosphere.

"(3) COMMITTEE.—The term 'Committee' means the Committee on Climate Change Technology established under subsection (b)(1).

"(4) DEVELOPING COUNTRY.—The term 'developing country' has the meaning given the term in section 1608(m).

"(5) GREENHOUSE GAS.—The term 'greenhouse gas' means—

"(A) carbon dioxide;

"(B) methane;

"(C) nitrous oxide;

"(D) hydrofluorocarbons;

"(E) perfluorocarbons; and

"(F) sulfur hexafluoride.

"(6) GREENHOUSE GAS INTENSITY.—The term 'greenhouse gas intensity' means the ratio of greenhouse gas emissions to economic output.

"(7) NATIONAL LABORATORY.—The term 'National Laboratory' has the meaning given the term in section 3(3) of the Energy Policy Act of 2005.

"(b) COMMITTEE ON CLIMATE CHANGE TECHNOLOGY.— Establishment. Deadline.

"(1) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the President shall establish a Committee on Climate Change Technology to—

"(A) integrate current Federal climate reports; and

"(B) coordinate Federal climate change technology activities and programs carried out in furtherance of the strategy developed under subsection (c)(1).

"(2) MEMBERSHIP.—The Committee shall be composed of at least 7 members, including—

"(A) the Secretary, who shall chair the Committee;

"(B) the Secretary of Commerce;

"(C) the Chairman of the Council on Environmental Quality;

"(D) the Secretary of Agriculture;

"(E) the Administrator of the Environmental Protection Agency;

"(F) the Secretary of Transportation;

"(G) the Director of the Office of Science and Technology Policy; and

"(H) other representatives as may be determined by the President.

"(3) STAFF.—The members of the Committee shall provide such personnel as are necessary to enable the Committee to perform its duties.

Research and development. Deadline.

"(c) NATIONAL CLIMATE CHANGE TECHNOLOGY POLICY.—

"(1) IN GENERAL.—Not later than 18 months after the date of enactment of this section, the Committee shall, based on applicable Federal climate reports, submit to the Secretary and the President a national strategy to promote the deployment and commercialization of greenhouse gas intensity reducing technologies and practices developed through research and development programs conducted by the National Laboratories, other Federal research facilities, institutions of higher education, and the private sector.

Public information.

"(2) UPDATES.—The Committee shall—

"(A) at the time of submission of the strategy to the President under paragraph (1), also make the strategy available to the public; and

"(B) update the strategy every 5 years, or more frequently as the Committee determines to be necessary.

Establishment. Deadline.

"(d) CLIMATE CHANGE TECHNOLOGY PROGRAM.—Not later than 180 days after the date on which the Committee is established under subsection (b)(1), the Secretary, in consultation with the Committee, shall establish within the Department of Energy the Climate Change Technology Program to—

"(1) assist the Committee in the interagency coordination of climate change technology research, development, demonstration, and deployment to reduce greenhouse gas intensity; and

"(2) carry out the programs authorized under this section.

Public information.

"(e) TECHNOLOGY INVENTORY.—

"(1) IN GENERAL.—The Secretary shall conduct and make public an inventory and evaluation of greenhouse gas intensity reducing technologies that have been developed, or are under development, by the National Laboratories, other Federal research facilities, institutions of higher education, and the private sector to determine which technologies are suitable for commercialization and deployment.

"(2) REPORT.—Not later than 180 days after the completion of the inventory under paragraph (1), the Secretary shall submit to Congress a report that includes the results of the completed inventory and any recommendations of the Secretary.

"(3) USE.—The Secretary shall use the results of the inventory as guidance in the commercialization and deployment of greenhouse gas intensity reducing technologies.

"(4) UPDATED INVENTORY.—The Secretary shall—

"(A) periodically update the inventory under paragraph (1), including when determined necessary by the Committee; and

"(B) make the updated inventory available to the public.

"(f) CLIMATE CHANGE TECHNOLOGY ADVISORY COMMITTEE.—

"(1) IN GENERAL.—The Secretary, in consultation with the Committee, may establish under section 624 of the Department of Energy Organization Act (42 U.S.C. 7234) a Climate Change Technology Advisory Committee to identify statutory, regulatory, economic, and other barriers to the commercialization and deployment of greenhouse gas intensity reducing technologies and practices in the United States.

"(2) COMPOSITION.—The Advisory Committee shall be composed of the following members, to be appointed by the Secretary, in consultation with the Committee:

"(A) 1 representative shall be appointed from each National Laboratory.

"(B) 3 members shall be representatives of energy-producing trade organizations.

"(C) 3 members shall represent energy-intensive trade organizations.

"(D) 3 members shall represent groups that represent end-use energy and other consumers.

"(E) 3 members shall be employees of the Federal Government who are experts in energy technology, intellectual property, and tax.

"(F) 3 members shall be representatives of institutions of higher education with expertise in energy technology development that are recommended by the National Academy of Engineering.

"(3) REPORT.—Not later than 1 year after the date of enactment of this section and annually thereafter, the Advisory Committee shall submit to the Committee a report that describes—

"(A) the findings of the Advisory Committee; and

"(B) any recommendations of the Advisory Committee for the removal or reduction of barriers to commercialization, deployment, and increasing the use of greenhouse gas intensity reducing technologies and practices.

"(g) GREENHOUSE GAS INTENSITY REDUCING TECHNOLOGY DEPLOYMENT.—

"(1) IN GENERAL.—Based on the strategy developed under subsection (c)(1), the technology inventory conducted under subsection (e)(1), the greenhouse gas intensity reducing technology study report submitted under subsection (e)(2), and reports under subsection (f)(3), if any, the Committee shall develop recommendations that would provide for the removal of

domestic barriers to the commercialization and deployment of greenhouse gas intensity reducing technologies and practices.

"(2) REQUIREMENTS.—In developing the recommendations under paragraph (1), the Committee shall consider in the aggregate—

"(A) the cost-effectiveness of the technology;

"(B) fiscal and regulatory barriers;

"(C) statutory and other barriers; and

"(D) intellectual property issues.

"(3) DEMONSTRATION PROJECTS.—In developing recommendations under paragraph (1), the Committee may identify the need for climate change technology demonstration projects.

"(4) REPORT.—Not later than 18 months after the date of enactment of this section, the Committee shall submit to the President and Congress a report that—

"(A) identifies, based on the report submitted under subsection (f)(3), any barriers to, and commercial risks associated with, the deployment of greenhouse gas intensity reducing technologies; and

"(B) includes a plan for carrying out demonstration projects.

"(5) UPDATES.—The Committee shall—

Public information.

"(A) at the time of submission of the report to Congress under paragraph (4), also make the report available to the public; and

"(B) update the report every 5 years, or more frequently as the Committee determines to be necessary.

Notification. Public information.

"(h) PROCEDURES FOR CALCULATING, MONITORING, AND ANALYZING GREENHOUSE GAS INTENSITY.—The Secretary, in collaboration with the Committee and the National Institute of Standards and Technology, and after public notice and opportunity for comment, shall develop standards and best practices for calculating, monitoring, and analyzing greenhouse gas intensity.

"(i) DEMONSTRATION PROJECTS.—

"(1) IN GENERAL.—The Secretary shall, subject to the availability of appropriations, support demonstration projects that—

"(A) increase the reduction of the greenhouse gas intensity to levels below that which would be achieved by technologies being used in the United States as of the date of enactment of this section;

"(B) maximize the potential return on Federal investment;

"(C) demonstrate distinct roles in public-private partnerships;

"(D) produce a large-scale reduction of greenhouse gas intensity if commercialization occurred; and

"(E) support a diversified portfolio to mitigate the uncertainty associated with a single technology.

"(2) COST SHARING.—In supporting a demonstration project under this subsection, the Secretary shall require cost-sharing in accordance with section 988 of the Energy Policy Act of 2005.

"(3) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this subsection.

"(j) COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.—In carrying out greenhouse gas intensity reduction research and technology deployment activities under this subtitle, the Secretary may enter into cooperative research and development agreements under section 12 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a).".

Subtitle B—Climate Change Technology Deployment in Developing Countries

SEC. 1611. CLIMATE CHANGE TECHNOLOGY DEPLOYMENT IN DEVELOPING COUNTRIES.

The Global Environmental Protection Assistance Act of 1989 (Public Law 101–240; 103 Stat. 2521) is amending by adding at the end the following:

"PART C—TECHNOLOGY DEPLOYMENT IN DEVELOPING COUNTRIES

"SEC. 731. DEFINITIONS. 22 USC 7901.

"In this part:

"(1) CARBON SEQUESTRATION.—The term 'carbon sequestration' means the capture of carbon dioxide through terrestrial, geological, biological, or other means, which prevents the release of carbon dioxide into the atmosphere.

"(2) GREENHOUSE GAS.—The term 'greenhouse gas' means carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

"(3) GREENHOUSE GAS INTENSITY.—The term 'greenhouse gas intensity' means the ratio of greenhouse gas emissions to economic output.

"SEC. 732. REDUCTION OF GREENHOUSE GAS INTENSITY. 22 USC 7902.

"(a) LEAD AGENCY.—

"(1) IN GENERAL.—The Department of State shall act as the lead agency for integrating into United States foreign policy the goal of reducing greenhouse gas intensity in developing countries.

"(2) REPORTS.—

"(A) INITIAL REPORT.—Not later than 180 days after the date of enactment of this part, the Secretary of State shall submit to the appropriate authorizing and appropriating committees of Congress an initial report, based on the most recent information available to the Secretary from reliable public sources, that identifies the 25 developing countries that are the largest greenhouse gas emitters, including for each country—

"(i) an estimate of the quantity and types of energy used;

"(ii) an estimate of the greenhouse gas intensity of the energy, manufacturing, agricultural, and transportation sectors;

"(iii) a description the progress of any significant projects undertaken to reduce greenhouse gas intensity;

"(iv) a description of the potential for undertaking projects to reduce greenhouse gas intensity;

"(v) a description of any obstacles to the reduction of greenhouse gas intensity; and

"(vi) a description of the best practices learned by the Agency for International Development from conducting previous pilot and demonstration projects to reduce greenhouse gas intensity.

"(B) UPDATE.—Not later than 18 months after the date on which the initial report is submitted under subparagraph (A), the Secretary shall submit to the appropriate authorizing and appropriating committees of Congress, based on the best information available to the Secretary, an update of the information provided in the initial report.

"(C) USE.—

"(i) INITIAL REPORT.—The Secretary of State shall use the initial report submitted under subparagraph (A) to establish baselines for the developing countries identified in the report with respect to the information provided under clauses (i) and (ii) of that subparagraph.

"(ii) ANNUAL REPORTS.—The Secretary of State shall use the annual reports prepared under subparagraph (B) and any other information available to the Secretary to track the progress of the developing countries with respect to reducing greenhouse gas intensity.

"(b) PROJECTS.—The Secretary of State, in coordination with Administrator of the United States Agency for International Development, shall (directly or through agreements with the World Bank, the International Monetary Fund, the Overseas Private Investment Corporation, and other development institutions) provide assistance to developing countries specifically for projects to reduce greenhouse gas intensity, including projects to—

"(1) leverage, through bilateral agreements, funds for reduction of greenhouse gas intensity;

"(2) increase private investment in projects and activities to reduce greenhouse gas intensity; and

"(3) expedite the deployment of technology to reduce greenhouse gas intensity.

"(c) FOCUS.—In providing assistance under subsection (b), the Secretary of State shall focus on—

"(1) promoting the rule of law, property rights, contract protection, and economic freedom; and

"(2) increasing capacity, infrastructure, and training.

"(d) PRIORITY.—In providing assistance under subsection (b), the Secretary of State shall give priority to projects in the 25 developing countries identified in the report submitted under subsection (a)(2)(A).

22 USC 7903.

"SEC. 733. TECHNOLOGY INVENTORY FOR DEVELOPING COUNTRIES.

"(a) IN GENERAL.—The Secretary of Energy, in coordination with the Secretary of State and the Secretary of Commerce, shall conduct an inventory of greenhouse gas intensity reducing technologies that are developed, or under development in the United States, to identify technologies that are suitable for transfer to, deployment in, and commercialization in the developing countries identified in the report submitted under section 732(a)(2)(A).

"(b) REPORT.—Not later than 180 days after the completion of the inventory under subsection (a), the Secretary of State and the Secretary of Energy shall jointly submit to Congress a report that—

"(1) includes the results of the completed inventory;

"(2) identifies obstacles to the transfer, deployment, and commercialization of the inventoried technologies;

"(3) includes results from previous Federal reports related to the inventoried technologies; and

"(4) includes an analysis of market forces related to the inventoried technologies.

"SEC. 734. TRADE-RELATED BARRIERS TO EXPORT OF GREENHOUSE GAS INTENSITY REDUCING TECHNOLOGIES. 22 USC 7904.

"(a) IN GENERAL.—Not later than 1 year after the date of enactment of this part, the United States Trade Representative shall (as appropriate and consistent with applicable bilateral, regional, and mutual trade agreements)— Deadline.

"(1) identify trade-relations barriers maintained by foreign countries to the export of greenhouse gas intensity reducing technologies and practices from the United States to the developing countries identified in the report submitted under section 732(a)(2)(A); and

"(2) negotiate with foreign countries for the removal of those barriers.

"(b) ANNUAL REPORT.—Not later than 1 year after the date on which a report is submitted under subsection (a)(1) and annually thereafter, the United States Trade Representative shall submit to Congress a report that describes any progress made with respect to removing the barriers identified by the United States Trade Representative under subsection (a)(1).

"SEC. 735. GREENHOUSE GAS INTENSITY REDUCING TECHNOLOGY EXPORT INITIATIVE. 22 USC 7905.

"(a) IN GENERAL.—There is established an interagency working group to carry out a Greenhouse Gas Intensity Reducing Technology Export Initiative to— Establishment.

"(1) promote the export of greenhouse gas intensity reducing technologies and practices from the United States;

"(2) identify developing countries that should be designated as priority countries for the purpose of exporting greenhouse gas intensity reducing technologies and practices, based on the report submitted under section 732(a)(2)(A);

"(3) identify potential barriers to adoption of exported greenhouse gas intensity reducing technologies and practices based on the reports submitted under section 734; and

"(4) identify previous efforts to export energy technologies to learn best practices.

"(b) COMPOSITION.—The working group shall be composed of—

"(1) the Secretary of State, who shall act as the head of the working group;

"(2) the Administrator of the United States Agency for International Development;

"(3) the United States Trade Representative;

"(4) a designee of the Secretary of Energy;

"(5) a designee of the Secretary of Commerce; and

"(6) a designee of the Administrator of the Environmental Protection Agency.

"(c) PERFORMANCE REVIEWS AND REPORTS.—Not later than 180 days after the date of enactment of this part and each year thereafter, the interagency working group shall—

"(1) conduct a performance review of actions taken and results achieved by the Federal Government (including each of the agencies represented on the interagency working group) to promote the export of greenhouse gas intensity reducing technologies and practices from the United States; and

"(2) submit to the appropriate authorizing and appropriating committees of Congress a report that describes the results of the performance reviews and evaluates progress in promoting the export of greenhouse gas intensity reducing technologies and practices from the United States, including any recommendations for increasing the export of the technologies and practices.

22 USC 7906.

"SEC. 736. TECHNOLOGY DEMONSTRATION PROJECTS.

"(a) IN GENERAL.—The Secretary of State, in coordination with the Secretary of Energy and the Administrator of the United States Agency for International Development, shall promote the adoption of technologies and practices that reduce greenhouse gas intensity in developing countries in accordance with this section.

"(b) DEMONSTRATION PROJECTS.—

"(1) IN GENERAL.—The Secretaries and the Administrator shall plan, coordinate, and carry out, or provide assistance for the planning, coordination, or carrying out of, demonstration projects under this section in at least 10 eligible countries, as determined by the Secretaries and the Administrator.

"(2) ELIGIBILITY.—A country shall be eligible for assistance under this subsection if the Secretaries and the Administrator determine that the country has demonstrated a commitment to—

"(A) just governance, including—

"(i) promoting the rule of law;

"(ii) respecting human and civil rights;

"(iii) protecting private property rights; and

"(iv) combating corruption; and

"(B) economic freedom, including economic policies that—

"(i) encourage citizens and firms to participate in global trade and international capital markets;

"(ii) promote private sector growth and the sustainable management of natural resources; and

"(iii) strengthen market forces in the economy.

"(3) SELECTION.—In determining which eligible countries to provide assistance to under paragraph (1), the Secretaries and the Administrator shall consider—

"(A) the opportunity to reduce greenhouse gas intensity in the eligible country; and

"(B) the opportunity to generate economic growth in the eligible country.

"(4) TYPES OF PROJECTS.—Demonstration projects under this section may include—

"(A) coal gasification, coal liquefaction, and clean coal projects;

"(B) carbon sequestration projects;

"(C) cogeneration technology initiatives;

"(D) renewable projects; and

"(E) lower emission transportation.

"SEC. 737. FELLOWSHIP AND EXCHANGE PROGRAMS. 22 USC 7907.

"The Secretary of State, in coordination with the Secretary of Energy, the Secretary of Commerce, and the Administrator of the Environmental Protection Agency, shall carry out fellowship and exchange programs under which officials from developing countries visit the United States to acquire expertise and knowledge of best practices to reduce greenhouse gas intensity in their countries.

"SEC. 738. AUTHORIZATION OF APPROPRIATIONS. 22 USC 7908.

"There are authorized to be appropriated such sums as are necessary to carry out this part.

"SEC. 739. EFFECTIVE DATE. 22 USC 7901 note.

"Except as otherwise provided in this part, this part takes effect on October 1, 2005.".

TITLE XVII—INCENTIVES FOR INNOVATIVE TECHNOLOGIES

SEC. 1701. DEFINITIONS. 22 USC 16511.

In this title:

(1) COMMERCIAL TECHNOLOGY.—

(A) IN GENERAL.—The term "commercial technology" means a technology in general use in the commercial marketplace.

(B) INCLUSIONS.—The term "commercial technology" does not include a technology solely by use of the technology in a demonstration project funded by the Department.

(2) COST.—The term "cost" has the meaning given the term "cost of a loan guarantee" within the meaning of section 502(5)(C) of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a(5)(C)).

(3) ELIGIBLE PROJECT.—The term "eligible project" means a project described in section 1703.

(4) GUARANTEE.—

(A) IN GENERAL.—The term "guarantee" has the meaning given the term "loan guarantee" in section 502 of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a).

(B) INCLUSION.—The term "guarantee" includes a loan guarantee commitment (as defined in section 502 of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a)).

(5) OBLIGATION.—The term "obligation" means the loan or other debt obligation that is guaranteed under this section.

SEC. 1702. TERMS AND CONDITIONS. 22 USC 16512.

(a) IN GENERAL.—Except for division C of Public Law 108–324, the Secretary shall make guarantees under this or any other Act for projects on such terms and conditions as the Secretary determines, after consultation with the Secretary of the Treasury, only in accordance with this section.

(b) SPECIFIC APPROPRIATION OR CONTRIBUTION.—No guarantee shall be made unless—

(1) an appropriation for the cost has been made; or

(2) the Secretary has received from the borrower a payment in full for the cost of the obligation and deposited the payment into the Treasury.

(c) AMOUNT.—Unless otherwise provided by law, a guarantee by the Secretary shall not exceed an amount equal to 80 percent of the project cost of the facility that is the subject of the guarantee, as estimated at the time at which the guarantee is issued.

(d) REPAYMENT.—

(1) IN GENERAL.—No guarantee shall be made unless the Secretary determines that there is reasonable prospect of repayment of the principal and interest on the obligation by the borrower.

(2) AMOUNT.—No guarantee shall be made unless the Secretary determines that the amount of the obligation (when combined with amounts available to the borrower from other sources) will be sufficient to carry out the project.

(3) SUBORDINATION.—The obligation shall be subject to the condition that the obligation is not subordinate to other financing.

(e) INTEREST RATE.—An obligation shall bear interest at a rate that does not exceed a level that the Secretary determines appropriate, taking into account the prevailing rate of interest in the private sector for similar loans and risks.

(f) TERM.—The term of an obligation shall require full repayment over a period not to exceed the lesser of—

(1) 30 years; or

(2) 90 percent of the projected useful life of the physical asset to be financed by the obligation (as determined by the Secretary).

(g) DEFAULTS.—

(1) PAYMENT BY SECRETARY.—

(A) IN GENERAL.—If a borrower defaults on the obligation (as defined in regulations promulgated by the Secretary and specified in the guarantee contract), the holder of the guarantee shall have the right to demand payment of the unpaid amount from the Secretary.

(B) PAYMENT REQUIRED.—Within such period as may be specified in the guarantee or related agreements, the Secretary shall pay to the holder of the guarantee the unpaid interest on, and unpaid principal of the obligation as to which the borrower has defaulted, unless the Secretary finds that there was no default by the borrower in the payment of interest or principal or that the default has been remedied.

(C) FORBEARANCE.—Nothing in this subsection precludes any forbearance by the holder of the obligation for the benefit of the borrower which may be agreed upon by the parties to the obligation and approved by the Secretary.

(2) SUBROGATION.—

(A) IN GENERAL.—If the Secretary makes a payment under paragraph (1), the Secretary shall be subrogated to the rights of the recipient of the payment as specified in the guarantee or related agreements including, where appropriate, the authority (notwithstanding any other provision of law) to—

(i) complete, maintain, operate, lease, or otherwise dispose of any property acquired pursuant to such guarantee or related agreements; or

(ii) permit the borrower, pursuant to an agreement with the Secretary, to continue to pursue the purposes of the project if the Secretary determines this to be in the public interest.

(B) SUPERIORITY OF RIGHTS.—The rights of the Secretary, with respect to any property acquired pursuant to a guarantee or related agreements, shall be superior to the rights of any other person with respect to the property.

(C) TERMS AND CONDITIONS.—A guarantee agreement shall include such detailed terms and conditions as the Secretary determines appropriate to—

(i) protect the interests of the United States in the case of default; and

(ii) have available all the patents and technology necessary for any person selected, including the Secretary, to complete and operate the project.

(3) PAYMENT OF PRINCIPAL AND INTEREST BY SECRETARY.—With respect to any obligation guaranteed under this section, the Secretary may enter into a contract to pay, and pay, holders of the obligation, for and on behalf of the borrower, from funds appropriated for that purpose, the principal and interest payments which become due and payable on the unpaid balance of the obligation if the Secretary finds that—

(A)(i) the borrower is unable to meet the payments and is not in default;

(ii) it is in the public interest to permit the borrower to continue to pursue the purposes of the project; and

(iii) the probable net benefit to the Federal Government in paying the principal and interest will be greater than that which would result in the event of a default;

(B) the amount of the payment that the Secretary is authorized to pay shall be no greater than the amount of principal and interest that the borrower is obligated to pay under the agreement being guaranteed; and

(C) the borrower agrees to reimburse the Secretary for the payment (including interest) on terms and conditions that are satisfactory to the Secretary.

(4) ACTION BY ATTORNEY GENERAL.—

(A) NOTIFICATION.—If the borrower defaults on an obligation, the Secretary shall notify the Attorney General of the default.

(B) RECOVERY.—On notification, the Attorney General shall take such action as is appropriate to recover the unpaid principal and interest due from—

(i) such assets of the defaulting borrower as are associated with the obligation; or

(ii) any other security pledged to secure the obligation.

(h) FEES.—

(1) IN GENERAL.—The Secretary shall charge and collect fees for guarantees in amounts the Secretary determines are sufficient to cover applicable administrative expenses.

(2) AVAILABILITY.—Fees collected under this subsection shall—

(A) be deposited by the Secretary into the Treasury; and

(B) remain available until expended, subject to such other conditions as are contained in annual appropriations Acts.

(i) RECORDS; AUDITS.—

(1) IN GENERAL.—A recipient of a guarantee shall keep such records and other pertinent documents as the Secretary shall prescribe by regulation, including such records as the Secretary may require to facilitate an effective audit.

(2) ACCESS.—The Secretary and the Comptroller General of the United States, or their duly authorized representatives, shall have access, for the purpose of audit, to the records and other pertinent documents.

(j) FULL FAITH AND CREDIT.—The full faith and credit of the United States is pledged to the payment of all guarantees issued under this section with respect to principal and interest.

42 USC 16513.

SEC. 1703. ELIGIBLE PROJECTS.

(a) IN GENERAL.—The Secretary may make guarantees under this section only for projects that—

(1) avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and

(2) employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.

(b) CATEGORIES.—Projects from the following categories shall be eligible for a guarantee under this section:

(1) Renewable energy systems.

(2) Advanced fossil energy technology (including coal gasification meeting the criteria in subsection (d)).

(3) Hydrogen fuel cell technology for residential, industrial, or transportation applications.

(4) Advanced nuclear energy facilities.

(5) Carbon capture and sequestration practices and technologies, including agricultural and forestry practices that store and sequester carbon.

(6) Efficient electrical generation, transmission, and distribution technologies.

(7) Efficient end-use energy technologies.

(8) Production facilities for fuel efficient vehicles, including hybrid and advanced diesel vehicles.

(9) Pollution control equipment.

(10) Refineries, meaning facilities at which crude oil is refined into gasoline.

(c) GASIFICATION PROJECTS.—The Secretary may make guarantees for the following gasification projects:

(1) INTEGRATED GASIFICATION COMBINED CYCLE PROJECTS.—Integrated gasification combined cycle plants meeting the emission levels under subsection (d), including—

(A) projects for the generation of electricity—

(i) for which, during the term of the guarantee—

(I) coal, biomass, petroleum coke, or a combination of coal, biomass, and petroleum coke will

account for at least 65 percent of annual heat input; and

(II) electricity will account for at least 65 percent of net useful annual energy output;

(ii) that have a design that is determined by the Secretary to be capable of accommodating the equipment likely to be necessary to capture the carbon dioxide that would otherwise be emitted in flue gas from the plant;

(iii) that have an assured revenue stream that covers project capital and operating costs (including servicing all debt obligations covered by the guarantee) that is approved by the Secretary and the relevant State public utility commission; and

(iv) on which construction commences not later than the date that is 3 years after the date of the issuance of the guarantee;

(B) a project to produce energy from coal (of not more than 13,000 Btu/lb and mined in the western United States) using appropriate advanced integrated gasification combined cycle technology that minimizes and offers the potential to sequester carbon dioxide emissions and that—

(i) may include repowering of existing facilities;

(ii) may be built in stages;

(iii) shall have a combined output of at least 100 megawatts;

(iv) shall be located in a western State at an altitude greater than 4,000 feet; and

(v) shall demonstrate the ability to use coal with an energy content of not more than 9,000 Btu/lb;

(C) a project located in a taconite-producing region of the United States that is entitled under the law of the State in which the plant is located to enter into a long-term contract approved by a State public utility commission to sell at least 450 megawatts of output to a utility;

(D) facilities that—

(i) generate one or more hydrogen-rich and carbon monoxide-rich product streams from the gasification of coal or coal waste; and

(ii) use those streams to facilitate the production of ultra clean premium fuels through the Fischer-Tropsch process; and

(E) a project to produce energy and clean fuels, using appropriate coal liquefaction technology, from Western bituminous or subbituminous coal, that—

(i) is owned by a State government; and

(ii) may include tribal and private coal resources.

(2) INDUSTRIAL GASIFICATION PROJECTS.—Facilities that gasify coal, biomass, or petroleum coke in any combination to produce synthesis gas for use as a fuel or feedstock and for which electricity accounts for less than 65 percent of the useful energy output of the facility.

Loans.

(3) PETROLEUM COKE GASIFICATION PROJECTS.—The Secretary is encouraged to make loan guarantees under this title available for petroleum coke gasification projects.

(4) LIQUEFACTION PROJECT.—Notwithstanding any other provision of law, funds awarded under the clean coal power initiative under subtitle A of title IV for coal-to-oil liquefaction projects may be used to finance the cost of loan guarantees for projects awarded such funds.

(d) EMISSION LEVELS.—In addition to any other applicable Federal or State emission limitation requirements, a project shall attain at least—

(1) total sulfur dioxide emissions in flue gas from the project that do not exceed 0.05 lb/MMBtu;

(2) a 90-percent removal rate (including any fuel pretreatment) of mercury from the coal-derived gas, and any other fuel, combusted by the project;

(3) total nitrogen oxide emissions in the flue gas from the project that do not exceed 0.08 lb/MMBtu; and

(4) total particulate emissions in the flue gas from the project that do not exceed 0.01 lb/MMBtu.

(e) QUALIFICATION OF FACILITIES RECEIVING TAX CREDITS.—A project that receives tax credits for clean coal technology shall not be disqualified from receiving a guarantee under this title.

42 USC 16514.

SEC. 1704. AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—There are authorized to be appropriated such sums as are necessary to provide the cost of guarantees under this title.

(b) USE OF OTHER APPROPRIATED FUNDS.—The Department may use amounts awarded under the clean coal power initiative under subtitle A of title IV to carry out the project described in section 1703(c)(1)(C), on the request of the recipient of such award, for a loan guarantee, to the extent that the amounts have not yet been disbursed to, or have been repaid by, the recipient.

TITLE XVIII—STUDIES

SEC. 1801. STUDY ON INVENTORY OF PETROLEUM AND NATURAL GAS STORAGE.

(a) DEFINITION.—For purposes of this section "petroleum" means crude oil, motor gasoline, jet fuel, distillates, and propane.

(b) STUDY.—The Secretary shall conduct a study on petroleum and natural gas storage capacity and operational inventory levels, nationwide and by major geographical regions.

(c) CONTENTS.—The study shall address—

(1) historical normal ranges for petroleum and natural gas inventory levels;

(2) historical and projected storage capacity trends;

(3) estimated operation inventory levels below which outages, delivery slowdown, rationing, interruptions in service, or other indicators of shortage begin to appear;

(4) explanations for inventory levels dropping below normal ranges; and

(5) the ability of industry to meet United States demand for petroleum and natural gas without shortages or price spikes, when inventory levels are below normal ranges.

(d) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit a report

to Congress on the results of the study, including findings and any recommendations for preventing future supply shortages.

SEC. 1802. STUDY OF ENERGY EFFICIENCY STANDARDS.

Deadline.

The Secretary shall contract with the National Academy of Sciences for a study, to be completed within 1 year after the date of enactment of this Act, to examine whether the goals of energy efficiency standards are best served by measurement of energy consumed, and efficiency improvements, at the actual site of energy consumption, or through the full fuel cycle, beginning at the source of energy production. The Secretary shall submit the report to Congress.

Reports.

SEC. 1803. TELECOMMUTING STUDY.

(a) STUDY REQUIRED.—The Secretary, in consultation with the Commission, the Director of the Office of Personnel Management, the Administrator of General Services, and the Administrator of NTIA, shall conduct a study of the energy conservation implications of the widespread adoption of telecommuting by Federal employees in the United States.

(b) REQUIRED SUBJECTS OF STUDY.—The study required by subsection (a) shall analyze the following subjects in relation to the energy saving potential of telecommuting by Federal employees:

(1) Reductions of energy use and energy costs in commuting and regular office heating, cooling, and other operations.

(2) Other energy reductions accomplished by telecommuting.

(3) Existing regulatory barriers that hamper telecommuting, including barriers to broadband telecommunications services deployment.

(4) Collateral benefits to the environment, family life, and other values.

(c) REPORT REQUIRED.—The Secretary shall submit to the President and Congress a report on the study required by this section not later than 6 months after the date of enactment of this Act. Such report shall include a description of the results of the analysis of each of the subjects described in subsection (b).

(d) DEFINITIONS.—As used in this section:

(1) COMMISSION.—The term "Commission" means the Federal Communications Commission.

(2) NTIA.—The term "NTIA" means the National Telecommunications and Information Administration of the Department of Commerce.

(3) TELECOMMUTING.—The term "telecommuting" means the performance of work functions using communications technologies, thereby eliminating or substantially reducing the need to commute to and from traditional worksites.

(4) FEDERAL EMPLOYEE.—The term "Federal employee" has the meaning provided the term "employee" by section 2105 of title 5, United States Code.

SEC. 1804. LIHEAP REPORT.

Not later than 1 year after the date of enactment of this Act, the Secretary of Health and Human Services shall transmit to Congress a report on how the Low-Income Home Energy Assistance Program could be used more effectively to prevent loss of

life from extreme temperatures. In preparing such report, the Secretary shall consult with appropriate officials in all 50 States and the District of Columbia.

SEC. 1805. OIL BYPASS FILTRATION TECHNOLOGY.

The Secretary and the Administrator of the Environmental Protection Agency shall—

(1) conduct a joint study of the benefits of oil bypass filtration technology in reducing demand for oil and protecting the environment;

(2) examine the feasibility of using oil bypass filtration technology in Federal motor vehicle fleets; and

(3) include in such study, prior to any determination of the feasibility of using oil bypass filtration technology, the evaluation of products and various manufacturers.

SEC. 1806. TOTAL INTEGRATED THERMAL SYSTEMS.

The Secretary shall—

(1) conduct a study of the benefits of total integrated thermal systems in reducing demand for oil and protecting the environment; and

(2) examine the feasibility of using total integrated thermal systems in Department of Defense and other Federal motor vehicle fleets.

42 USC 16521.

SEC. 1807. REPORT ON ENERGY INTEGRATION WITH LATIN AMERICA.

The Secretary shall submit an annual report to the Committee on Energy and Commerce of the United States House of Representatives and to the Committee on Energy and Natural Resources of the Senate concerning the status of energy export development in Latin America and efforts by the Secretary and other departments and agencies of the United States to promote energy integration with Latin America. The report shall contain a detailed analysis of the status of energy export development in Mexico and a description of all significant efforts by the Secretary and other departments and agencies to promote a constructive relationship with Mexico regarding the development of that nation's energy capacity. In particular this report shall outline efforts the Secretary and other departments and agencies have made to ensure that regulatory approval and oversight of United States/Mexico border projects that result in the expansion of Mexican energy capacity are effectively coordinated across departments and with the Mexican government.

Mexico.

42 USC 16522.

SEC. 1808. LOW-VOLUME GAS RESERVOIR STUDY.

Grants.

(a) STUDY.—The Secretary shall make a grant to an organization of oil and gas producing States, specifically those containing significant numbers of marginal oil and natural gas wells, for conducting an annual study of low-volume natural gas reservoirs. Such organization shall work with the State geologist of each State being studied.

(b) CONTENTS.—The studies under this section shall—

(1) determine the status and location of marginal wells and gas reservoirs;

(2) gather the production information of these marginal wells and reservoirs;

(3) estimate the remaining producible reserves based on variable pipeline pressures;

(4) locate low-pressure gathering facilities and pipelines;

(5) recommend incentives which will enable the continued production of these resources;

(6) produce maps and literature to disseminate to States to promote conservation of natural gas reserves; and

(7) evaluate the amount of natural gas that is being wasted through the practice of venting or flaring of natural gas produced in association with crude oil well production.

(c) DATA ANALYSIS.—Data development and analysis under this section shall be performed by an institution of higher education with GIS capabilities. If the organization receiving the grant under subsection (a) does not have GIS capabilities, such organization shall contract with one or more entities with—

(1) technological capabilities and resources to perform advanced image processing, GIS programming, and data analysis; and

(2) the ability to—

(A) process remotely sensed imagery with high spatial resolution;

(B) deploy global positioning systems;

(C) process and synthesize existing, variable-format gas well, pipeline, gathering facility, and reservoir data;

(D) create and query GIS databases with infrastructure location and attribute information;

(E) write computer programs to customize relevant GIS software;

(F) generate maps, charts, and graphs which summarize findings from data research for presentation to different audiences; and

(G) deliver data in a variety of formats, including Internet Map Server for query and display, desktop computer display, and access through handheld personal digital assistants.

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this section—

(1) $1,500,000 for fiscal year 2006; and

(2) $450,000 for each of the fiscal years 2007 through 2010.

(e) DEFINITIONS.—For purposes of this section, the term "GIS" means geographic information systems technology that facilitates the organization and management of data with a geographic component.

SEC. 1809. INVESTIGATION OF GASOLINE PRICES.

(a) INVESTIGATION.—Not later than 90 days after the date of enactment of this Act, the Federal Trade Commission shall conduct an investigation to determine if the price of gasoline is being artificially manipulated by reducing refinery capacity or by any other form of market manipulation or price gouging practices. Deadline.

(b) EVALUATION AND ANALYSIS.—The Secretary shall direct the National Petroleum Council to conduct an evaluation and analysis to determine whether, and to what extent, environmental and other regulations affect new domestic refinery construction and significant expansion of existing refinery capacity.

(c) REPORTS TO CONGRESS.—

(1) INVESTIGATION.—On completion of the investigation under subsection (a), the Federal Trade Commission shall submit to Congress a report that describes—

(A) the results of the investigation; and

(B) any recommendations of the Federal Trade Commission.

(2) EVALUATION AND ANALYSIS.—On completion of the evaluation and analysis under subsection (b), the Secretary shall submit to Congress a report that describes—

(A) the results of the evaluation and analysis; and

(B) any recommendations of the National Petroleum Council.

Reports. Deadlines. 42 USC 16523.

SEC. 1810. ALASKA NATURAL GAS PIPELINE.

Not later than 180 days after the date of enactment of this Act, and every 180 days thereafter until the Alaska natural gas pipeline commences operation, the Federal Energy Regulatory Commission shall submit to Congress a report describing—

(1) the progress made in licensing and constructing the pipeline; and

(2) any issue impeding that progress.

State listing.

SEC. 1811. COAL BED METHANE STUDY.

(a) STUDY.—

Contracts.

(1) IN GENERAL.—The Secretary of the Interior, in consultation with the Administrator of the Environmental Protection Agency, shall enter into an arrangement under which the National Academy of Sciences shall conduct a study on the effect of coal bed natural gas production on surface and ground water resources, including ground water aquifiers, in the States of Montana, Wyoming, Colorado, New Mexico, North Dakota, and Utah.

(2) MATTERS TO BE ADDRESSED.—The study shall address the effectiveness of—

(A) the management of coal bed methane produced water;

(B) the use of best management practices; and

(C) various production techniques for coal bed methane natural gas in minimizing impacts on water resources.

(b) DATA ANALYSIS.—The study shall analyze available hydrologic, geologic and water quality data, along with—

(1) production techniques, produced water management techniques, best management practices, and other factors that can mitigate effects of coal bed methane development;

(2) the costs associated with mitigation techniques;

(3) effects on surface or ground water resources, including drinking water, associated with surface or subsurface disposal of waters produced during extraction of coal bed methane; and

(4) any other significant effects on surface or ground water resources associated with production of coal bed methane.

(c) RECOMMENDATIONS.—The study shall analyze the effectiveness of current mitigation practices of coal bed methane produced water handling in relation to existing Federal and State laws and regulations, and make recommendations as to changes, if any, to Federal law necessary to address adverse impacts to surface or ground water resources associated with coal bed methane development.

Public information.

(d) COMPLETION OF STUDY.—The National Academy of Sciences shall submit the findings and recommendations of the study to the Secretary of the Interior and the Administrator of the Environmental Protection Agency within 12 months after the date of enactment of this Act, and shall upon completion make the results of the study available to the public.

(e) REPORT TO CONGRESS.—The Secretary of the Interior and the Administrator of the Environmental Protection Agency, after consulting with States, shall report to the Congress within 6 months after receiving the results of the study on—

(1) the findings and recommendations of the study;

(2) the agreement or disagreement of the Secretary of the Interior and the Administrator of the Environmental Protection Agency with each of its findings and recommendations; and

(3) any recommended changes in funding to address the effects of coal bed methane production on surface and ground water resources.

SEC. 1812. BACKUP FUEL CAPABILITY STUDY.

(a) STUDY.—

(1) IN GENERAL.—The Secretary shall conduct a study of the effect of obtaining and maintaining liquid and other fuel backup capability at—

(A) gas-fired power generation facilities; and

(B) other gas-fired industrial facilities.

(2) CONTENTS.—The study under paragraph (1) shall address—

(A) the costs and benefits of adding a different fuel capability to a power gas-fired power generating or industrial facility, taking into consideration regional differences;

(B) methods of the Federal Government and State governments to encourage gas-fired power generators and industries to develop the capability to power the facilities using a backup fuel;

(C) the effect on the supply and cost of natural gas of—

(i) a balanced portfolio of fuel choices in power generation and industrial applications; and

(ii) State regulations that permit agencies in the State to carry out policies that encourage the use of other backup fuels in gas-fired power generation; and

(D) changes required in the Clean Air Act (42 U.S.C. 7401 et seq.) to allow natural gas generators to add clean backup fuel capabilities.

(b) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report on the results of the study under subsection (a), including recommendations regarding future activity of the Federal Government relating to backup fuel capability.

SEC. 1813. INDIAN LAND RIGHTS-OF-WAY.

(a) STUDY.—

(1) IN GENERAL.—The Secretary and the Secretary of the Interior (referred to in this section as the "Secretaries") shall jointly conduct a study of issues regarding energy rights-of-way on tribal land (as defined in section 2601 of the Energy Policy Act of 1992 (as amended by section 503)) (referred to in this section as "tribal land").

(2) CONSULTATION.—In conducting the study under paragraph (1), the Secretaries shall consult with Indian tribes, the energy industry, appropriate governmental entities, and affected businesses and consumers.

(b) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretaries shall submit to Congress a report on the findings of the study, including—

(1) an analysis of historic rates of compensation paid for energy rights-of-way on tribal land;

(2) recommendations for appropriate standards and procedures for determining fair and appropriate compensation to Indian tribes for grants, expansions, and renewals of energy rights-of-way on tribal land;

(3) an assessment of the tribal self-determination and sovereignty interests implicated by applications for the grant, expansion, or renewal of energy rights-of-way on tribal land; and

(4) an analysis of relevant national energy transportation policies relating to grants, expansions, and renewals of energy rights-of-way on tribal land.

Reports. Deadline.

SEC. 1814. MOBILITY OF SCIENTIFIC AND TECHNICAL PERSONNEL.

Not later than 2 years after the date of enactment of this section, the Secretary shall transmit to Congress a report that—

(1) identifies any policies or procedures of a contractor operating a National Laboratory or single-purpose research facility that create disincentives to the temporary or permanent transfer of scientific and technical personnel among the contractor-operated National Laboratories or contractor-operated single-purpose research facilities; and

(2) provides recommendations for improving interlaboratory exchange of scientific and technical personnel.

SEC. 1815. INTERAGENCY REVIEW OF COMPETITION IN THE WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY.

Establishment.

(a) TASK FORCE.—There is established an inter-agency task force, to be known as the "Electric Energy Market Competition Task Force" (referred to in this section as the "task force"), consisting of five members—

(1) one of whom shall be an employee of the Department of Justice, to be appointed by the Attorney General of the United States;

(2) one of whom shall be an employee of the Federal Energy Regulatory Commission, to be appointed by the Chairperson of that Commission;

(3) one of whom shall be an employee of the Federal Trade Commission, to be appointed by the Chairperson of that Commission;

(4) one of whom shall be an employee of the Department, to be appointed by the Secretary; and

(5) one of whom shall be an employee of the Rural Utilities Service, to be appointed by the Secretary of Agriculture.

(b) STUDY AND REPORT.—

(1) STUDY.—The task force shall conduct a study and analysis of competition within the wholesale and retail market for electric energy in the United States.

(2) REPORT.—

(A) FINAL REPORT.—Not later than 1 year after the date of enactment of this Act, the task force shall submit to Congress a final report on the findings of the task force under paragraph (1).

(B) PUBLIC COMMENT.—Not later than the date that is 60 days before a final report is submitted to Congress under subparagraph (A), the task force shall—

(i) publish in the Federal Register a draft of the report; and

Federal Register, publication.

(ii) provide an opportunity for public comment on the report.

(c) CONSULTATION.—In conducting the study under subsection (b), the task force shall consult with and solicit comments from any advisory entity of the task force, the States, representatives of the electric power industry, and the public.

SEC. 1816. STUDY OF RAPID ELECTRICAL GRID RESTORATION.

(a) STUDY.—

(1) IN GENERAL.—The Secretary shall conduct a study of the benefits of using mobile transformers and mobile substations to rapidly restore electrical service to areas subjected to blackouts as a result of—

(A) equipment failure;

(B) natural disasters;

(C) acts of terrorism; or

(D) war.

(2) CONTENTS.—The study under paragraph (1) shall contain an analysis of—

(A) the feasibility of using mobile transformers and mobile substations to reduce dependence on foreign entities for key elements of the electrical grid system of the United States;

(B) the feasibility of using mobile transformers and mobile substations to rapidly restore electrical power to—

(i) military bases;

(ii) the Federal Government;

(iii) communications industries;

(iv) first responders; and

(v) other critical infrastructures, as determined by the Secretary;

(C) the quantity of mobile transformers and mobile substations necessary—

(i) to eliminate dependence on foreign sources for key electrical grid components in the United States;

(ii) to rapidly deploy technology to fully restore full electrical service to prioritized Governmental functions; and

(iii) to identify manufacturing sources in existence on the date of enactment of this Act that have previously manufactured specialized mobile transformer or mobile substation products for Federal agencies.

(b) REPORT.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to the President and Congress a report on the study under subsection (a).

(2) INCLUSION.—The report shall include a description of the results of the analysis under subsection (a)(2).

SEC. 1817. STUDY OF DISTRIBUTED GENERATION.

(a) STUDY.—

(1) IN GENERAL.—

(A) POTENTIAL BENEFITS.—The Secretary, in consultation with the Federal Energy Regulatory Commission, shall conduct a study of the potential benefits of cogeneration and small power production.

(B) RECIPIENTS.—The benefits described in subparagraph (A) include benefits that are received directly or indirectly by—

(i) an electricity distribution or transmission service provider;

(ii) other customers served by an electricity distribution or transmission service provider; and

(iii) the general public in the area served by the public utility in which the cogenerator or small power producer is located.

(2) INCLUSIONS.—The study shall include an analysis of—

(A) the potential benefits of—

(i) increased system reliability;

(ii) improved power quality;

(iii) the provision of ancillary services;

(iv) reduction of peak power requirements through onsite generation;

(v) the provision of reactive power or volt-ampere reactives;

(vi) an emergency supply of power;

(vii) offsets to investments in generation, transmission, or distribution facilities that would otherwise be recovered through rates;

(viii) diminished land use effects and right-of-way acquisition costs; and

(ix) reducing the vulnerability of a system to terrorism; and

(B) any rate-related issue that may impede or otherwise discourage the expansion of cogeneration and small power production facilities, including a review of whether rates, rules, or other requirements imposed on the facilities are comparable to rates imposed on customers of the same class that do not have cogeneration or small power production.

(3) VALUATION OF BENEFITS.—In carrying out the study, the Secretary shall determine an appropriate method of valuing potential benefits under varying circumstances for individual cogeneration or small power production units.

(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary shall—

(1) complete the study;

Public information.

(2) provide an opportunity for public comment on the results of the study; and

(3) submit to the President and Congress a report describing—

(A) the results of the study; and

(B) information relating to the public comments received under paragraph (2).

(c) PUBLICATION.—After submission of the report under subsection (b) to the President and Congress, the Secretary shall publish the report.

SEC. 1818. NATURAL GAS SUPPLY SHORTAGE REPORT.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to Congress a report on natural gas supplies and demand.

(b) PURPOSE.—The purpose of the report under subsection (a) is to develop recommendations for achieving a balance between natural gas supply and demand in order to—

(1) provide residential consumers with natural gas at reasonable and stable prices;

(2) accommodate long-term maintenance and growth of domestic natural gas-dependent industrial, manufacturing, and commercial enterprises;

(3) facilitate the attainment of national ambient air quality standards under the Clean Air Act (43 U.S.C. 7401 et seq.);

(4) achieve continued progress in reducing the emissions associated with electric power generation; and

(5) support the development of the preliminary phases of hydrogen-based energy technologies.

(c) COMPREHENSIVE ANALYSIS.—The report shall include a comprehensive analysis of, for the period beginning on January 1, 2004, and ending on December 31, 2015, natural gas supply and demand in the United States, including—

(1) estimates of annual domestic demand for natural gas, taking into consideration the effect of Federal policies and actions that are likely to increase or decrease the demand for natural gas;

(2) projections of annual natural gas supplies, from domestic and foreign sources, under Federal policies in existence on the date of enactment of this Act;

(3) an identification of estimated natural gas supplies that are not available under those Federal policies;

(4) scenarios for decreasing natural gas demand and increasing natural gas supplies that compare the relative economic and environmental impacts of Federal policies that—

(A) encourage or require the use of natural gas to meet air quality, carbon dioxide emission reduction, or energy security goals;

(B) encourage or require the use of energy sources other than natural gas, including coal, nuclear, and renewable sources;

(C) support technologies to develop alternative sources of natural gas and synthetic gas, including coal gasification technologies;

(D) encourage or require the use of energy conservation and demand side management practices; and

(E) affect access to domestic natural gas supplies; and

(5) recommendations for Federal actions to achieve the purposes described in subsection (b), including recommendations that—

(A) encourage or require the use of energy sources other than natural gas, including coal, nuclear, and renewable sources;

(B) encourage or require the use of energy conservation or demand side management practices;

(C) support technologies for the development of alternative sources of natural gas and synthetic gas, including coal gasification technologies; and

(D) would improve access to domestic natural gas supplies.

(d) CONSULTATION.—In preparing the report under subsection (a), the Secretary shall consult with—

(1) experts in natural gas supply and demand; and

(2) representatives of—

(A) State and local governments;

(B) tribal organizations; and

(C) consumer and other organizations.

(e) HEARINGS.—In preparing the report under subsection (a), the Secretary may hold public hearings and provide other opportunities for public comment, as the Secretary considers appropriate.

Reports. Deadline.

SEC. 1819. HYDROGEN PARTICIPATION STUDY.

Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report evaluating methodologies to ensure the widest participation practicable in setting goals and milestones under the hydrogen program of the Department, including international participants.

SEC. 1820. OVERALL EMPLOYMENT IN A HYDROGEN ECONOMY.

(a) STUDY.—

(1) IN GENERAL.—The Secretary shall carry out a study of the likely effects of a transition to a hydrogen economy on overall employment in the United States.

(2) CONTENTS.—In completing the study, the Secretary shall take into consideration—

(A) the replacement effects of new goods and services;

(B) international competition;

(C) workforce training requirements;

(D) multiple possible fuel cycles, including usage of raw materials;

(E) rates of market penetration of technologies; and

(F) regional variations based on geography.

(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary shall submit to Congress a report describing the findings, conclusions, and recommendations of the study under subsection (a).

SEC. 1821. STUDY OF BEST MANAGEMENT PRACTICES FOR ENERGY RESEARCH AND DEVELOPMENT PROGRAMS.

(a) IN GENERAL.—The Secretary shall enter into an arrangement with the National Academy of Public Administration under which the Academy shall conduct a study to assess management practices for research, development, and demonstration programs at the Department.

(b) SCOPE OF THE STUDY.—The study shall consider—

(1) management practices that act as barriers between the Office of Science and offices conducting mission-oriented research;

(2) recommendations for management practices that would improve coordination and bridge the innovation gap between the Office of Science and offices conducting mission-oriented research;

(3) the applicability of the management practices used by the Department of Defense Advanced Research Projects Agency to research programs at the Department;

(4) the advisability of creating an agency within the Department modeled after the Department of Defense Advanced Research Projects Agency;

(5) recommendations for management practices that could best encourage innovative research and efficiency at the Department; and

(6) any other relevant considerations.

(c) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary shall submit to Congress a report on the study conducted under this section.

SEC. 1822. EFFECT OF ELECTRICAL CONTAMINANTS ON RELIABILITY OF ENERGY PRODUCTION SYSTEMS.

Contracts. Deadline.

Not later than 180 days after the date of enactment of this Act, the Secretary shall enter into a contract with the National Academy of Sciences under which the National Academy of Sciences shall determine the effect that electrical contaminants (such as tin whiskers) may have on the reliability of energy production systems, including nuclear energy.

SEC. 1823. ALTERNATIVE FUELS REPORTS.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress reports on the potential for each of biodiesel and hythane to become major, sustainable, alternative fuels.

(b) BIODIESEL REPORT.—The report relating to biodiesel submitted under subsection (a) shall—

(1) provide a detailed assessment of—

(A) potential biodiesel markets and manufacturing capacity; and

(B) environmental and energy security benefits with respect to the use of biodiesel;

(2) identify any impediments, especially in infrastructure needed for production, distribution, and storage, to biodiesel becoming a substantial source of fuel for conventional diesel and heating oil applications;

(3) identify strategies to enhance the commercial deployment of biodiesel; and

(4) include an examination and recommendations, as appropriate, of the ways in which biodiesel may be modified to be a cleaner-burning fuel.

(c) HYTHANE REPORT.—The report relating to hythane submitted under subsection (a) shall—

(1) provide a detailed assessment of potential hythane markets and the research and development activities that are necessary to facilitate the commercialization of hythane as a competitive, environmentally friendly transportation fuel;

(2) address—

(A) the infrastructure necessary to produce, blend, distribute, and store hythane for widespread commercial purposes; and

(B) other potential market barriers to the commercialization of hythane;

(3) examine the viability of producing hydrogen using energy-efficient, environmentally friendly methods so that the hydrogen can be blended with natural gas to produce hythane; and

(4) include an assessment of the modifications that would be required to convert compressed natural gas vehicle engines to engines that use hythane as fuel.

(d) GRANTS FOR REPORT COMPLETION.—The Secretary may use such sums as are available to the Secretary to provide, to one or more colleges or universities selected by the Secretary, grants for use in carrying out research to assist the Secretary in preparing the reports required to be submitted under subsection (a).

SEC. 1824. FINAL ACTION ON REFUNDS FOR EXCESSIVE CHARGES.

The Federal Energy Regulatory Commission (FERC) shall—

(1) seek to conclude its investigation into the unjust or unreasonable charges incurred by California during the 2000–2001 electricity crisis as soon as possible;

California.

(2) seek to ensure that refunds the Commission determines are owed to the State of California are paid to the State of California; and

Reports.
Deadline.

(3) submit to Congress a report by December 31, 2005, describing the actions taken by the Commission to date under this section and timetables for further actions.

SEC. 1825. FUEL CELL AND HYDROGEN TECHNOLOGY STUDY.

Contracts.

(a) IN GENERAL.—As soon as practicable after the date of enactment of this Act, the Secretary shall enter into a contract with the National Academy of Sciences and the National Research Council to carry out a study of fuel cell technologies that provides a budget roadmap for the development of fuel cell technologies and the transition from petroleum to hydrogen in a significant percentage of the vehicles sold by 2020.

(b) REQUIREMENTS.—In carrying out the study, the National Academy of Sciences and the National Research Council shall—

(1) establish as a goal the maximum percentage practicable of vehicles that the National Academy of Sciences and the National Research Council determines can be fueled by hydrogen by 2020;

(2) determine the amount of Federal and private funding required to meet the goal established under paragraph (1);

(3) determine what actions are required to meet the goal established under paragraph (1);

(4) examine the need for expanded and enhanced Federal research and development programs, changes in regulations, grant programs, partnerships between the Federal Government and industry, private sector investments, infrastructure investments by the Federal Government and industry, educational and public information initiatives, and Federal and State tax incentives to meet the goal established under paragraph (1);

(5) consider whether other technologies would be less expensive or could be more quickly implemented than fuel cell technologies to achieve significant reductions in carbon dioxide emissions;

(6) take into account any reports relating to fuel cell technologies and hydrogen-fueled vehicles, including—

(A) the report prepared by the National Academy of Engineering and the National Research Council in 2004 entitled "Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs"; and

(B) the report prepared by the U.S. Fuel Cell Council in 2003 entitled "Fuel Cells and Hydrogen: The Path Forward";

(7) consider the challenges, difficulties, and potential barriers to meeting the goal established under paragraph (1); and

(8) with respect to the budget roadmap—

(A) specify the amount of funding required on an annual basis from the Federal Government and industry to carry out the budget roadmap; and

(B) specify the advantages and disadvantages to moving toward the transition to hydrogen in vehicles in accordance with the timeline established by the budget roadmap.

SEC. 1826. PASSIVE SOLAR TECHNOLOGIES.

(a) DEFINITION OF PASSIVE SOLAR TECHNOLOGY.—In this section, the term "passive solar technology" means a passive solar technology, including daylighting, that—

(1) is used exclusively to avoid electricity use; and

(2) can be metered to determine energy savings.

(b) STUDY.—The Secretary shall conduct a study to determine—

(1) the range of levelized costs of avoided electricity for passive solar technologies;

(2) the quantity of electricity displaced using passive solar technologies in the United States as of the date of enactment of this Act; and

(3) the projected energy savings from passive solar technologies in 5, 10, 15, 20, and 25 years after the date of enactment of this Act if—

(A) incentives comparable to the incentives provided for electricity generation technologies were provided for passive solar technologies; and

(B) no new incentives for passive solar technologies were provided.

(c) REPORT.—Not later than 120 days after the date of enactment of this Act, the Secretary shall submit to Congress a report that describes the results of the study under subsection (b).

SEC. 1827. STUDY OF LINK BETWEEN ENERGY SECURITY AND INCREASES IN VEHICLE MILES TRAVELED.

(a) IN GENERAL.—The Secretary shall enter into an arrangement with the National Academy of Sciences under which the Academy shall conduct a study to assess the implications on energy use and efficiency of land development patterns in the United States.

(b) SCOPE.—The study shall consider—

(1) the correlation, if any, between land development patterns and increases in vehicle miles traveled;

(2) whether petroleum use in the transportation sector can be reduced through changes in the design of development patterns;

(3) the potential benefits of—

(A) information and education programs for State and local officials (including planning officials) on the potential for energy savings through planning, design, development, and infrastructure decisions;

(B) incorporation of location efficiency models in transportation infrastructure planning and investments; and

(C) transportation policies and strategies to help transportation planners manage the demand for the number and length of vehicle trips, including trips that increase the viability of other means of travel; and

(4) such other considerations relating to the study topic as the National Academy of Sciences finds appropriate.

(c) REPORT.—Not later than 2 years after the date of enactment of this Act, the National Academy of Sciences shall submit to the Secretary and Congress a report on the study conducted under this section.

SEC. 1828. SCIENCE STUDY ON CUMULATIVE IMPACTS OF MULTIPLE OFFSHORE LIQUEFIED NATURAL GAS FACILITIES.

(a) IN GENERAL.—The Secretary (in consultation with the National Oceanic Atmospheric Administration, the Commandant of the Coast Guard, affected recreational and commercial fishing industries, and affected energy and transportation stakeholders) shall carry out a study and compile existing science (including studies and data) to determine the risks or benefits presented by cumulative impacts of multiple offshore liquefied natural gas facilities reasonably assumed to be constructed in an area of the Gulf of Mexico using the open-rack vaporization system.

(b) ACCURACY.—In carrying out subsection (a), the Secretary shall verify the accuracy of available science and develop a science-based evaluation of significant short-term and long-term cumulative impacts, both adverse and beneficial, of multiple offshore liquefied natural gas facilities reasonably assumed to be constructed in an area of the Gulf of Mexico using or proposing the open-rack vaporization system on the fisheries and marine populations in the vicinity of the facility.

SEC. 1829. ENERGY AND WATER SAVING MEASURES IN CONGRESSIONAL BUILDINGS.

(a) IN GENERAL.—The Architect of the Capitol, as part of the process of updating the Master Plan Study for the Capitol complex, shall—

(1) carry out a study to evaluate the energy infrastructure of the Capitol complex to determine how to augment the infrastructure to become more energy efficient—

(A) by using unconventional and renewable energy resources;

(B) by—

(i) incorporating new technologies to implement effective green building solutions;

(ii) adopting computer-based building management systems; and

(iii) recommending strategies based on end-user behavioral changes to implement low-cost environmental gains; and

(C) in a manner that would enable the Capitol complex to have reliable utility service in the event of power fluctuations, shortages, or outages;

(2) carry out a study to explore the feasibility of installing energy and water conservation measures on the rooftop of the Dirksen Senate Office Building, including the area directly above the food service facilities in the center of the building, including the installation of—

(A) a vegetative covering area, using native species to the maximum extent practicable, to—

(i) insulate and increase the energy efficiency of the building;

(ii) reduce precipitation runoff and conserve water for landscaping or other uses;

(iii) increase, and provide more efficient use of, available outdoor space through management of the rooftop of the center of the building as a park or garden area for occupants of the building; and

(iv) improve the aesthetics of the building; and

(B) onsite renewable energy and other state-of-the-art technologies to—

(i) improve the energy efficiency and energy security of the building or the Capitol complex by providing additional or backup sources of power in the event of a power shortage or other emergency;

(ii) reduce the use of resources by the building; or

(iii) enhance worker productivity; and

(C) not later than 180 days after the date of enactment of this Act, submit to Congress a report describing the findings and recommendations of the study under subparagraph (B). Reports. Deadline.

(b) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Architect of the Capitol to carry out this section $2,000,000 for each of fiscal years 2006 through 2010.

SEC. 1830. STUDY OF AVAILABILITY OF SKILLED WORKERS.

(a) IN GENERAL.—The Secretary shall enter into an arrangement with the National Academy of Sciences under which the National Academy of Sciences shall conduct a study of the short-term and long-term availability of skilled workers to meet the energy and mineral security requirements of the United States.

(b) INCLUSIONS.—The study shall include an analysis of—

(1) the need for and availability of workers for the oil, gas, and mineral industries;

(2) the availability of skilled labor at both entry level and more senior levels; and

(3) recommendations for future actions needed to meet future labor requirements.

(c) REPORT.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress a report that describes the results of the study.

SEC. 1831. REVIEW OF ENERGY POLICY ACT OF 1992 PROGRAMS.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary shall complete a study to determine the effect that titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.) have had on— Deadline.

(1) the development of alternative fueled vehicle technology;

(2) the availability of that technology in the market; and

(3) the cost of alternative fueled vehicles.

(b) TOPICS.—As part of the study under subsection (a), the Secretary shall specifically identify—

(1) the number of alternative fueled vehicles acquired by fleets or covered persons required to acquire alternative fueled vehicles;

(2) the quantity, by type, of alternative fuel actually used in alternative fueled vehicles acquired by fleets or covered persons;

(3) the quantity of petroleum displaced by the use of alternative fuels in alternative fueled vehicles acquired by fleets or covered persons;

(4) the direct and indirect costs of compliance with requirements under titles III, IV, and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.), including—

(A) vehicle acquisition requirements imposed on fleets or covered persons;

(B) administrative and recordkeeping expenses;

(C) fuel and fuel infrastructure costs;

(D) associated training and employee expenses; and

(E) any other factors or expenses the Secretary determines to be necessary to compile reliable estimates of the overall costs and benefits of complying with programs under those titles for fleets, covered persons, and the national economy;

(5) the existence of obstacles preventing compliance with vehicle acquisition requirements and increased use of alternative fuel in alternative fueled vehicles acquired by fleets or covered persons; and

(6) the projected impact of amendments to the Energy Policy Act of 1992 made by this title.

(c) REPORT.—Upon completion of the study under this section, the Secretary shall submit to Congress a report that describes the results of the study and includes any recommendations of the Secretary for legislative or administrative changes concerning the alternative fueled vehicle requirements under titles III, IV and V of the Energy Policy Act of 1992 (42 U.S.C. 13211 et seq.).

42 USC 16524.

SEC. 1832. STUDY ON THE BENEFITS OF ECONOMIC DISPATCH.

(a) STUDY.—The Secretary, in coordination and consultation with the States, shall conduct a study on—

(1) the procedures currently used by electric utilities to perform economic dispatch;

(2) identifying possible revisions to those procedures to improve the ability of nonutility generation resources to offer their output for sale for the purpose of inclusion in economic dispatch; and

(3) the potential benefits to residential, commercial, and industrial electricity consumers nationally and in each state if economic dispatch procedures were revised to improve the ability of nonutility generation resources to offer their output for inclusion in economic dispatch.

(b) DEFINITION.—The term "economic dispatch" when used in this section means the operation of generation facilities to produce

energy at the lowest cost to reliably serve consumers, recognizing any operational limits of generation and transmission facilities.

(c) REPORT TO CONGRESS AND THE STATES.—Not later than 90 days after the date of enactment of this Act, and on a yearly basis following, the Secretary shall submit a report to Congress and the States on the results of the study conducted under subsection (a), including recommendations to Congress and the States for any suggested legislative or regulatory changes.

SEC. 1833. RENEWABLE ENERGY ON FEDERAL LAND.

Contracts. Deadline.

(a) NATIONAL ACADEMY OF SCIENCES STUDY.—Not later than 90 days after the date of enactment of this Act, the Secretary of the Interior shall enter into a contract with the National Academy of Sciences under which the National Academy of Sciences shall—

(1) study the potential of developing wind, solar, and ocean energy resources (including tidal, wave, and thermal energy) on Federal land available for those uses under current law and the outer Continental Shelf;

(2) assess any Federal law (including regulations) relating to the development of those resources that is in existence on the date of enactment of this Act; and

(3) recommend statutory and regulatory mechanisms for developing those resources.

(b) SUBMISSION TO CONGRESS.—Not later than 2 years after the date of enactment of this Act, the Secretary of the Interior shall submit to Congress the results of the study under subsection (a).

SEC. 1834. INCREASED HYDROELECTRIC GENERATION AT EXISTING FEDERAL FACILITIES.

(a) IN GENERAL.—The Secretary of the Interior, the Secretary, and the Secretary of the Army shall jointly conduct a study of the potential for increasing electric power production capability at federally owned or operated water regulation, storage, and conveyance facilities.

(b) CONTENT.—The study under this section shall include identification and description in detail of each facility that is capable, with or without modification, of producing additional hydroelectric power, including estimation of the existing potential for the facility to generate hydroelectric power.

(c) REPORT.—The Secretaries shall submit to the Committees on Energy and Commerce, Resources, and Transportation and Infrastructure of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the findings, conclusions, and recommendations of the study under this section by not later than 18 months after the date of the enactment of this Act. The report shall include each of the following:

(1) The identifications, descriptions, and estimations referred to in subsection (b).

(2) A description of activities currently conducted or considered, or that could be considered, to produce additional hydroelectric power from each identified facility.

(3) A summary of prior actions taken by the Secretaries to produce additional hydroelectric power from each identified facility.

(4) The costs to install, upgrade, or modify equipment or take other actions to produce additional hydroelectric power

from each identified facility and the level of Federal power customer involvement in the determination of such costs.

(5) The benefits that would be achieved by such installation, upgrade, modification, or other action, including quantified estimates of any additional energy or capacity from each facility identified under subsection (b).

(6) A description of actions that are planned, underway, or might reasonably be considered to increase hydroelectric power production by replacing turbine runners, by performing generator upgrades or rewinds, or construction of pumped storage facilities.

(7) The impact of increased hydroelectric power production on irrigation, water supply, fish, wildlife, Indian tribes, river health, water quality, navigation, recreation, fishing, and flood control.

(8) Any additional recommendations to increase hydroelectric power production from, and reduce costs and improve efficiency at, federally owned or operated water regulation, storage, and conveyance facilities.

SEC. 1835. SPLIT-ESTATE FEDERAL OIL AND GAS LEASING AND DEVELOPMENT PRACTICES.

(a) REVIEW.—In consultation with affected private surface owners, oil and gas industry, and other interested parties, the Secretary of the Interior shall undertake a review of the current policies and practices with respect to management of Federal subsurface oil and gas development activities and their effects on the privately owned surface. This review shall include—

(1) a comparison of the rights and responsibilities under existing mineral and land law for the owner of a Federal mineral lease, the private surface owners and the Department;

(2) a comparison of the surface owner consent provisions in section 714 of the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1304) concerning surface mining of Federal coal deposits and the surface owner consent provisions for oil and gas development, including coalbed methane production; and

(3) recommendations for administrative or legislative action necessary to facilitate reasonable access for Federal oil and gas activities while addressing surface owner concerns and minimizing impacts to private surface.

(b) REPORT.—The Secretary of the Interior shall report the results of such review to Congress not later than 180 days after the date of enactment of this Act.

SEC. 1836. RESOLUTION OF FEDERAL RESOURCE DEVELOPMENT CONFLICTS IN THE POWDER RIVER BASIN.

Wyoming.
Montana.

(a) REVIEW.—The Secretary of the Interior shall review Federal and State laws in existence on the date of enactment of this Act in order to resolve any conflict relating to the Powder River Basin in Wyoming and Montana between—

(1) the development of Federal coal; and

(2) the development of Federal and non-Federal coalbed methane.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Secretary of the Interior shall submit to Congress a report that—

(1) describes methods of resolving a conflict described in subsection (a); and

(2) identifies a method preferred by the Secretary of the Interior, including proposed legislative language, if any, required to implement the method.

SEC. 1837. NATIONAL SECURITY REVIEW OF INTERNATIONAL ENERGY REQUIREMENTS. China.

(a) STUDY.—The Secretary, in consultation with the Secretary of Defense and Secretary of Homeland Security, shall conduct a study of the growing energy requirements of the People's Republic of China and the implications of such growth on the political, strategic, economic, or national security interests of the United States, including—

(1) an assessment of the type, nationality, and location of energy assets that have been sought for investment by entities located in the People's Republic of China;

(2) an assessment of the extent to which investment in energy assets by entities located in the People's Republic of China has been on market-based terms and free from subsidies from the People's Republic of China;

(3) an assessment of the effect of investment in energy assets by entities located in the People's Republic of China on the control by the United States of dual-use and export-controlled technologies, including the effect on current and future access to foreign and domestic sources of rare earth elements used to produce such technologies;

(4) an assessment of the relationship between the Government of the People's Republic of China and energy-related businesses located in the People's Republic of China;

(5) an assessment of the impact on the world energy market of the common practice of entities located in the People's Republic of China of removing the energy assets owned or controlled by such entities from the competitive market, with emphasis on the effect if such practice expands along with the growth in energy consumption of the People's Republic of China;

(6) an examination of the United States energy policy and foreign policy as it relates to ensuring a competitive global energy market;

(7) an examination of the relationship between the United States and the People's Republic of China as it relates to pursuing energy interests in a manner that avoids conflicts; and

(8) a comparison of the appropriate laws and regulations of other nations to determine whether a United States company would be permitted to purchase, acquire, merge, or otherwise establish a joint relationship with an entity whose primary place of business is in that other nation, including the laws and regulations of the People's Republic of China.

(b) REPORT AND RECOMMENDATIONS.—Not later than 120 days after the date of the enactment of this Act, the Secretary, in consultation with the Secretary of Defense, shall report to the President and the Congress on the findings of the study described in subsection (a) and any recommendations the Secretaries consider appropriate.

President.
Effective date.

(c) REGULATORY EFFECT.—Notwithstanding any other provision of law, any instrumentality of the United States vested with authority to review a transaction that includes an investment in a United States domestic corporation may not conclude a national security review related to an investment in the energy assets of a United States domestic corporation by an entity owned or controlled by the government of the People's Republic of China for 21 days after the report to the President and the Congress, and until the President certifies that he has received the report described in subsection (b).

SEC. 1838. USED OIL RE-REFINING STUDY.

The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall undertake a study of the energy and environmental benefits of the re-refining of used lubricating oil and report to Congress within 90 days after enactment of this Act including recommendations of specific steps that can be taken to improve collections of used lubricating oil and increase re-refining and other beneficial re-use of such oil.

Deadline.
Reports.

SEC. 1839. TRANSMISSION SYSTEM MONITORING.

Within 6 months after the date of enactment of this Act, the Secretary and the Federal Energy Regulatory Commission shall study and report to Congress on the steps which must be taken to establish a system to make available to all transmission system owners and Regional Transmission Organizations (as defined in the Federal Power Act) within the Eastern and Western Interconnections real-time information on the functional status of all transmission lines within such Interconnections. In such study, the Commission shall assess technical means for implementing such transmission information system and identify the steps the Commission or Congress must take to require the implementation of such system.

SEC. 1840. REPORT IDENTIFYING AND DESCRIBING THE STATUS OF POTENTIAL HYDROPOWER FACILITIES.

(a) REPORT REQUIREMENT.—Not later than 90 days after the date of enactment of this Act, the Secretary of the Interior, acting through the Bureau of Reclamation, shall submit to the Committee on Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report identifying and describing the status of potential hydropower facilities included in water surface storage studies undertaken by the Secretary for projects that have not been completed or authorized for construction.

(b) REPORT CONTENTS.—The report shall include the following:

(1) Identification of all surface storage studies authorized by Congress since the enactment of the Reclamation Project Act of 1939 (43 U.S.C. 485 et seq.).

(2) The purposes of each project included within each study identified under paragraph (1).

(3) The status of each study identified under paragraph (1), including for each study—

(A) whether the study is completed or, if not completed, still authorized;

(B) the level of analyses conducted at the feasibility and reconnaissance levels of review;

(C) identifiable environmental impacts of each project included in the study, including to fish and wildlife, water quality, and recreation;

(D) projected water yield from each such project;

(E) beneficiaries of each such project;

(F) the amount authorized and expended;

(G) projected funding needs and timelines for completing the study (if applicable);

(H) anticipated costs of each such project; and

(I) other factors that might interfere with construction of any such project.

(4) An identification of potential hydroelectric facilities that might be developed pursuant to each study identified under paragraph (1).

(5) Applicable costs and benefits associated with potential hydroelectric production pursuant to each study.

Approved August 8, 2005.

LEGISLATIVE HISTORY—H.R. 6:

HOUSE REPORTS: No. 109–190 (Comm. of Conference).
CONGRESSIONAL RECORD, Vol. 151 (2005):
Apr. 20, 21, considered and passed House.
June 14–16, 20–23, 28, considered and passed Senate, amended.
July 28, House agreed to conference report.
July 29, Senate agreed to conference report.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 41 (2005):
Aug. 8, Presidential remarks and statement.

○

INTERIM APPROACH TO ADDRESSING CLIMATE CHANGE IN CEQA DOCUMENTS

July 22, 2009

Absent clear direction from the State of California, but recognizing the need to address the global climate change issue in CEQA documents, the following is an outline of an interim approach to addressing climate change for privately initiated discretionary projects. This approach will be modified as needed based on more specific guidance from the State and will be further refined when the County's General Plan Update is completed. In the interim, the following approach is being taken by DPLU in evaluating the need for Climate Change Analysis and in evaluating the adequacy of Climate Change Reports.

Determination of Need for Climate Change Analysis in CEQA documents

Various screening thresholds have been published by the California Air Resources Board (CARB) and the California Air Pollution Control Officers Association (CAPCOA). Screening thresholds for determining when a Climate Change analysis is needed to date have been presented as "suggestions" or "options" for lead agencies to consider in setting screening criteria for requiring a Climate Change Analysis.

The 900 metric ton screening criteria (CO2 generated annually) referenced in the CAPCOA white paper (http://www.capcoa.org/) is being used as a conservative criteria for determining which projects require further analysis and mitigation with regard to Climate Change. The follow table describes the general sizes of projects that would generally require this analysis, however the determination of need for a climate change analysis must consider project specific details that could contribute to a climate change impact.

Project Sizes that Would Typically Require a Climate Change Analysis *

Project Type	Project Size
Single Family Residential	50 units
Apartments / Condominiums	70 units
General Commercial Office Space	35,000 square feet
Retail Space	11,000 square feet
Supermarket / Grocery Space	6,300 square feet

*A determination on the need for a climate change analysis for project types not included in the table will be made on a case-by-case basis considering the 900 metric ton criteria.

Minimum Requirements for Climate Change Reports

The following are the minimum recommended components of a Climate Change Analysis:

1. Background: This section should briefly discuss the issue of climate change and greenhouse gases (GHGs), along with a brief history of recent California regulations that have required Climate Change to be considered as a part of the California Environmental Quality Act (CEQA). Explain that Climate Change is not generally considered a direct impact but would be analyzed as a potential cumulative impact under CEQA.

2. Project Description and Location: Include the location of the project and a detailed project description. Include any project design features that will used to demonstrate emissions reductions.

3. Greenhouse Gas Inventory: This section should provide a detailed accounting of the project's construction and operational greenhouse gas emissions. Construction GHG Emissions should account for emissions associated with the use of heavy construction equipment, construction worker Vehicle Miles Traveled (VMTs), and construction water usage for the duration of construction activities. Operational GHG emissions should include energy use (including electricity, natural gas and water), transportation VMTs, and solid waste. Certain pending fuel efficiency standards (e.g. Pavley Bill, CAFÉ standards, etc.) may be assumed to reduce a portion of the projects vehicle emissions. The greenhouse gas inventory must include justification and references to the extent practical to document the assumptions that are made about the emissions calculations.

4. Guideline for Determining Significance: The report must include a clearly stated significance guideline to determine the significance of impacts. DPLU recommends the following guideline: "The project would conflict with the implementation of AB 32". To demonstrate that the project would not conflict with the implementation of AB 32, the project should demonstrate how it would reduce overall carbon emissions to 25% below Business As Usual (BAU)". The 25% reduction can be an overall reduction considering both construction and operational emissions combined. BAU means emissions that would be generated prior to the implementation of 2006 emissions restrictions and updated standards (e.g. 2005 Title 24 standards). Discuss the reason for choosing this significance guideline, referencing AB 32 legislation and implementing strategies that have been developed to reduce carbon emissions to meet statewide reduction targets.

5. Project Design Features and Mitigation Measures: The analysis must include specific, enforceable measures to reduce project emissions. To the extent feasible, each measure should include references or a logical, fact based explanation as to why a specific measure will achieve the stated reductions. While it will generally be possible to quantify reductions associated with energy and water related measures, other measures may require qualitative discussion of reductions achieved. Numerically identify GHG Emissions and association emissions under a BAU scenario and identify corresponding mitigation measures that would reduce BAU emissions.

   This section must clearly differentiate between Design Features and Mitigation Measures. Design Features should also typically be referenced in the project description. Measures that are not specific or enforceable will not be accepted as mitigation. Use of an independent third party certification using an available green building standard and rating system is one method to implement design and mitigation measures. Examples of certification systems that may be used include LEED or Leadership in Energy and Environmental Design Green Building Rating System, the GPR or Green Point Rated system administered by Build It Green, and the CGB or California Green Builder rating system for residential construction. Regardless of the rating system used, specific enforceable measures would need to be identified the report would need to provide some assumptions about the carbon emission reductions that would be achieved from each measure.

6. Conclusion: Make a clear conclusion whether the project exceeds the Guideline for Determining Significance, specifically stating the guideline used. Make a clear conclusion as to whether the impact is considered fully mitigated.

March 3, 2011

Iain Fisher
CEQA Project Manager
Energy Division
California Public Utilities Commission
c/o Dudek
605 Third Street
Encinitas, California 92024

Greg Thomsen
Project Lead
United States Bureau of Land Management
c/o Dudek
605 Third Street
Encinitas, California 92024

Re: Calculating the Tule Wind Project's Capacity to Offset Greenhouse Gas and Criteria Air Pollutant Emissions in California

Dear Messrs. Fisher and Thomsen:

Iberdrola Renewables, Inc. (IRI), proponent of the Tule Wind Project, submits the following analysis to illustrate the benefits of the Tule Wind Project, as modified, and the drawbacks to Tule Wind Alternative 5, which would eliminate at least one half of the Project's electric power production and corresponding environmental benefits provided through the displacement of fossil fuel fired power production.

I. Description of the Proposed Tule Wind Project and the Modified Project Layout

As studied in the Draft Environmental Impact Report / Draft Environmental Impact Statement (DEIR/DEIS), the Tule Wind Project will consist of up to 134 wind turbines, from 1.5 to 3.0 megawatts (MW), and would have a generating capacity of 201 MW. DEIR/DEIS, Section B, page B-2, Table B-1.

IBERDROLA RENEWABLES, Inc.
1125 NW Couch St., Suite 700
Portland, OR 97209
Telephone (503) 796–7000
www.iberdrolarenewables.us

Through its comments on the DEIR/DEIS, Tule Wind, LLC has submitted a Modified Project Layout, which makes minor adjustments to the Tule Wind Project studied in the DEIR/DEIS to avoid resources and reduce total project impacts. If accepted as proposed, the Modified Project Layout would slightly reduce the maximum number of wind turbines to be constructed in the Tule Wind Project from 134 to 128 turbines, while continuing to have a generating capacity of 201 MW.

A. Tule Wind Alternative 5

One of the alternatives to the proposed Tule Wind Project studied at depth in the DEIR/DEIS is Tule Wind Alternative 5 (Alternative 5), which proposes the elimination of the portions of the project with the strongest winds, including the ridge, and which would result in the loss of 62 of the 134 turbines in the Tule Wind Project. As described in the DEIR/DEIS:

> Under this alternative, the proposed Tule Wind Project would be the same as that described in Section B of this EIR/EIS with the exception that this alternative would remove 62 turbines including J1 through J15; K1 through K12; L1 through L11; M1 and M2; N1 through N8; P1 through P5; Q1 and Q2; R1 through R10, and R13. Note that there are no turbines labeled J7, J12, K6, or K10.

DEIR/DEIS, Section C, page C-40. The 62 wind turbines that would be removed from the Tule Wind Project by Alternative 5 are graphically represented in Figure 1, "Original EIR Layout – Alternative 5."

If the Tule Wind Project is modified as described above in the Modified Project Layout, however, the number of wind turbines that would be affected by Alternative 5 would increase slightly, from 62 to 65 turbines. *See* Figure 2, "Current Modified Layout – Alternative 5."

Accordingly, if the Modified Project Layout is accepted, the maximum build-out of the Tule Wind Project would be 128 wind turbines. If both the Modified Project Layout and Alternative 5 are selected, however, the maximum build-out of the Tule Wind Project would be 63 wind turbines (128 wind turbines less 65 wind turbines removed by Alternative 5).

IBERDROLA RENEWABLES

B. Alternative 5 Would Significantly Reduce the Tule Wind Project's Capture of Potential Wind Energy

The Tule Wind Project is comprised of turbine sites that can topographically be described as either "ridge" turbines (turbines located on wind-swept ridges that are elevated from surrounding geographic features) or "valley" turbines (turbines located in areas that are lower than the surrounding geographic features). The average observed wind speed at the "ridge" turbine locations in the Tule Wind Project is higher than that for the "valley" turbine locations.

Based on six years of meteorological data, the wind speed at the "ridge" turbine locations (identified in Figure 1 as the J, K, L, M, N, P, and Q string turbines, and in Figure 2 as the H, I, J, K, L, M, N, P, and Q string turbines) is 8.0 meters per second. In contrast, the average wind speed at the "valley" turbine locations (identified in Figure 1 as the A, B, C, D, E, F, G, and R string turbines, and in Figure 2 as the A, B, C, D, E, F, G, R, S, and T string turbines) is 7.3 meters per second.

The power available in the wind is proportional to the cube of the wind speed. *See* Gasch, R., Twelve, J., Wind Power Plants: Fundamentals, Design, Construction, and Operation at p. 181 (Solarpraxis Publishing 2004). Accordingly, the Tule Wind Project's "ridge" turbines will generate substantially more energy than the "valley" turbines, simply by virtue of the fact that average wind speed at those locations is higher.

Furthermore, because Alternative 5 would eliminate all of the "ridge" turbines within the Tule Wind Project (see DEIR/DEIS, Section C, page C-40 [Alternative 5 eliminates J1 through J15; K1 through K12; L1 through L11; M1 and M2; N1 through N8; P1 through P5; Q1 and Q2; R1 through R10, and R13]), it would disproportionately affect the Tule Wind Project's ability to capture potential wind energy within the project area by removing all of the higher energy "ridge" turbines.

As illustrated in Table 1, below, even though there are less "ridge" turbines than "valley" turbines in the original 134 turbine layout and 128 turbine Modified Project Layout, under both scenarios the "ridge" turbines will produce a greater proportion of the project's energy. Under the 134 turbine layout, although "ridge" turbines only comprise 38% of the total turbines, they would generate over 43% of the project's energy. For the Modified Project Layout, although "ridge" turbines only comprise 44% of the total turbines, they would generate 50% of the project's energy.

Table 1. Ridge and Valley Turbine Breakdown, and the Effect of Alternative 5 on Potential Wind Energy Generation

	134 Turbine Layout	Alternative 5 (72 turbines)	128 Turbine Layout	Alternative 5 (63 turbines)
Ridge Turbines	51	0	57	0
Valley Turbines	83	72	71	63
% Ridge Turbines	38.1%	0%	44.5%	0%
Wind Speed Ridge, m/s	8.0	n/a	8.0	n/a
Wind Speed Valley, m/s	7.3	7.3	7.3	7.3
Wind Energy per Ridge Turbine[1]	512	n/a	512	n/a
Wind Energy per Valley Turbine	389	389	389	389
Total Energy, Ridge Turbines[2]	26,112	n/a	29,184	n/a
Total Energy, Valley Turbines	32,288	28,009	27,620	24,508
Total Energy	58,400	28,009	56,804	24,508
% Total Energy, Ridge Turbines	44.7%	n/a	51.4%	n/a
% Energy Reduction, Alternative 5	**n/a**	**(52.0%)**	**n/a**	**(56.9%)**

Table 1 Notes.
1. Wind energy is proportional to wind speed ^ 3.

2. Total wind energy = # of turbines * wind energy per turbine.

Furthermore, as illustrated in Table 1, if Alternative 5 is applied to the 134 turbine project layout, it will reduce the Tule Wind Project's ability to capture wind energy by 52%. If Alternative 5 is applied to the Modified Project Layout, it will reduce the Tule Wind Project's ability to capture wind energy by 56.9%.

Not only will this loss in ability to capture potential wind energy affect the Tule Wind Project's renewable energy generation, but it will also diminish the project's ability to accomplish other important public benefits, including offsetting existing greenhouse gas emissions, criteria air pollutant emissions, and water use from fossil-fuel fired electricity generation. The following section provides a comparison of the Tule Wind Project's potential to offset greenhouse gas emissions, criteria air pollutant emissions, and water use, and describes the reduction in that potential if Alternative 5 were to be selected.

II. Analysis of the Tule Wind Project's Potential to Offset Greenhouse Gas Emissions, Criteria Air Pollutant Emissions, and Water Use From Fossil-Fuel Fired Electrical Generation

A. Tule Wind Project Will Most Likely Displace Older Natural Gas-Fired Generation

Due to their low variable operating cost and contract type (as compared to natural gas-fired power plants) hydroelectric, nuclear, and coal-fired power plants are typically operated continuously at full load. In contrast, it is California's natural gas-fired projects that are ramped up and down to meet the incremental changes in demand that occur during the day. Therefore, the generation type mostly likely to be offset by the renewable electricity generated by the Tule Wind Project will be natural gas-fired units.

Natural gas-fired power plants built in recent years are increasingly energy efficient, and more are employing air cooling systems, which significantly reduces water use. These state of the art projects have low heat rates (high efficiency). Accordingly, it is likely that the Tule Wind Project's electricity will displace electricity that otherwise would have been generated by the older, less efficient natural gas-fired plants that employ water cooling systems because of their higher variable cost as compared to the newer more efficient plants. Therefore, in the California Independent System Operator (CalISO) system where plants with the higher variable operating costs are dispatched down first, the wind energy from the Tule Wind Project would likely displace generation from the older combined-cycle, water-cooled gas-fired power plants.

The Tule Wind Project's net capacity factor is approximately 0.31 (based on six years of meteorological data measured at the site), and includes estimated losses in collecting and transforming the wind power to 138 kV for delivery to the San Diego Gas & Electric (SDG&E) transmission system. Using this net capacity factor, it is

possible to estimate the amount of greenhouse gas (GHG) emissions that the Tule Wind Project will offset from California-based natural gas-fired generation by relying on CO_2 emission estimates prepared for the California Public Utilities Commission (CPUC).[1] *See* E3, "New Combined Cycle Gas Turbine (CCGT) Generation Resource, Cost, and Performance Assumptions" (November 2007), *available at* http://www.ethree.com/GHG/21%20Gas%20CCGT%20Assumptions%20v4.doc.

It is also possible to conservatively estimate the amount of criteria air pollutant emissions and water use that will be offset by the Tule Wind Project. This analysis conservatively assumes that the Tule Wind Project will displace generation from SDG&E's Palomar Power Project (or a plant of similar generating capacity). The Palomar Power Plant is located in San Diego County, in the City of Escondido, and is a modern, efficient, natural gas generating station that began commercial operations in 2006. *See* http://www.energy.ca.gov/sitingcases/palomar/index.html. Accordingly, if the Tule Wind Project displaces generation from older and less efficient power plants than Palomar, the amount of criteria air pollutant emissions and water use offset will be higher than calculated below.

B. Calculating the Tule Wind Project's Ability to Offset Greenhouse Gas Emissions, Criteria Air Pollutant Emissions, and Water Use

1. Tule Wind Project's Ability to Offset Greenhouse Gas Emissions

Using CPUC estimates of carbon dioxide (CO_2) emissions rates for natural gas-fired generation, the Tule Wind Project will offset approximately 231,744 metric tons of CO_2 per year, generating a net reduction in CO_2 emissions of 231,407 metric tons per year.[2] *See* Table 2, Tule Wind Project Greenhouse Gas Offset Calculation. If the GHG emissions offset from the embodied energy in water saved from the Tule Wind Project is added (803 metric tons of CO_2 emissions per year), the Tule Wind Project would offset 232,210 metric tons of CO_2 emissions per year. *See id.*

---

[1] The net capacity factor of a wind project is the ratio of the actual output of the project over a period of time and its output if it had operated at full nameplate capacity the entire time. A wind project's net capacity factor is less than 1.0 because the wind does not blow constantly.

[2] This calculation accounts for the Tule Wind Project's 337 metric tons of CO_2 emissions per year, including yearly operational emissions (73 metric tons of CO_2 emissions per year) and amortized annual construction emissions (264 tons of CO_2 emissions per year).

Table 2. Tule Wind Project Greenhouse Gas Offset Calculation

Natural Gas-Fired Electricity Generation Tule Wind Would Offset	
Tule Net Capacity Factor (%)[1]	0.31
Tule's Annual generation per MW of wind turbine capacity (MWh)[2]	2,716
Tule Annual Generation at 201 MW (MWh)[3]	545,836
CO_2 Emissions From California-based Natural Gas-Fired Power Plant Operations	
CO_2 emitted from CA natural gas-fired power plant[4] (lbs/million BTU)	117
Assumed Heat Rate (BTU/kWh)[5]	8,000
Natural gas consumed per MWh (million BTU)	8
CO_2 emitted from CA natural gas-fired power plant (lbs/MWh)	936
Metric tons (MT) of CO_2 per MWh[6]	0.4246
CO_2 Emissions Avoided by 201 MW Tule Wind Project Operations	
Tule's Annual CO_2 offset per MW of wind turbine capacity (MWh)	1,153
Tule's Annual CO_2 emissions, incl. amortized construction (MT)	337
Tule's Annual CO_2 Offset at 201 MW (MT)	**231,744**
Tule's Net Annual CO_2 Offset at 201 MW[7] (MT)	**231,407**
Tule's Annual CO_2 Offset at 201 MW for Avoided Water Use[8] (MT)	803
Tule's Net Annual CO_2 Offset at 201 MW, incl. Avoided Water Use (MT)	**232,210**
CO_2 Emissions Offset Lost by Alternative 5	
Alternative 5 annual CO_2 offset loss (72 turbines) (MT)[9]	**(120,749)**
Alternative 5 (Modified Project Layout) annual CO_2 offset loss (63 turbines) (MT)[10]	**(132,128)**

Table 2 Notes:

1. The 0.31 Tule Net Capacity Factor is based on three years of meteorological data measured at the site. This is a net capacity factor so losses in collecting and transforming the power to 138 kV for delivery to the San Diego Gas and Electric transmission system have been subtracted from the gross power production.
2. Calculation: 0.31 net capacity factor * 8,760
3. Calculation: Annual generation per MW * 201 MW
4. Source: *See* E3, "New Combined Cycle Gas Turbine (CCGT) Generation Resource, Cost, and Performance Assumptions" at 1 (November 2007), *available at* http://www.ethree.com/GHG/21%20Gas%20CCGT%20Assumptions%20v4.doc.
5. Source: *See* E3, "New Combined Cycle Gas Turbine (CCGT) Generation Resource, Cost, and Performance Assumptions" at 1, n.3 (November 2007), *available at* http://www.ethree.com/GHG/21%20Gas%20CCGT%20Assumptions%20v4.doc.
6. This calculation is a conservative estimation of the GHG emissions the Tule Wind Project will offset. The U.S. Energy Information Administration calculates that U.S. natural gas generation in 1999 emitted 337 million metric tons of CO_2 to generate 562 million MWh of electricity, for a CO_2 per MWh rate of .5996. *See* http://www.eia.doe.gov/electricity/page/co2_report/co2report.html#electric, Table 1.
7. Calculation: Tule's Annual CO_2 offset * 201 MW – Tule's Annual CO_2 emissions.
8. Source: Valorie Thompson, Ph.D., Scientific Resources Associated, Letter Report to Patrick O'Neill, HDR Inc. (Jan. 31, 2011).
9. Calculation: 201 MW annual pollution offset in MT * 52% reduction in energy generation potential.
10. Calculation: 201 MW annual pollution offset in MT * 56.9% reduction in energy generation potential.

2. Tule Wind Project's Ability to Offset Criteria Air Pollutant Emissions

Using the conservative assumption that the Tule Wind Project will displace electricity generation from the Palomar Power Plant (or a plant of similar efficiency), the Tule Wind Project will offset approximately 12.4 short tons/yr of oxides of nitrogen (NOx), 11.1 short tons/yr of particulate matter 10 microns or less in size (PM10), 14.7 short tons/yr of carbon monoxide (CO), 3.8 short tons/yr of oxides of sulfur (SOx), and 3.8 short tons/yr of volatile organic compounds (VOC). *See* Table 3, Tule Wind Project Criteria Air Pollutant Offset Calculation.

Table 3. Tule Wind Project Criteria Air Pollutant Offset Calculation

	NOx	PM_{10}	CO	SOx	VOC
Palomar Power Plant Average Hourly Emissions per 273 MW Unit (lb/hr)[1]	12.5	11.1	15.3	3.8	3.8
Pollutants emitted (lbs/MWh)[2]	0.046	0.041	0.056	0.014	0.014
Tule's annual pollutants emitted (lbs/yr)[3]	164	7	1,180	0	33
Tule's annual pollutant offset (201 MW)[4] (lbs/yr)	24,828	22,186	29,411	7,598	7,565
Tule's annual pollutant offset (201 MW) (short tons/yr)[5]	**12.4**	**11.1**	**14.7**	**3.8**	**3.8**
Criteria Air Pollutant Emissions Offset Lost by Alternative 5					
Tule's annual pollutant offset loss, Alternative 5 (72 turbines) (short tons/yr)[6]	(6.4)	(5.8	(7.6)	(2.0)	(2.0)
Tule's annual pollutant offset loss, Alternative 5 (Modified Project Layout) (63 turbines) (short tons/yr)[7]	(7.1)	(6.3)	(8.4)	(2.2)	(2.2)

Table 3 Notes:

1. Source: "Palomar Power Project", CEC Final Staff Assessment (January 2003), Table 10, p. 4.1-21, assuming each unit operated at 62ºF, 100% load, no duct burning.
2. Calculation: lbs pollutant/273 MW
3. Source: Table D.11-14, Tule Wind Project Daily Operation and Maintenance Emissions, annualized
4. Calculation: 545,836 Tule Annual Generation at 201 MW (128 turbine capacity) * Pounds Pollutant emitted per MWh – Tule Annual pollutants emitted.
5. Calculation: (annual pollution offset in lbs/yr) / (2,002.25 lbs per short ton).
6. Calculation: 201 MW annual pollution offset in short tons/yr * 52% reduction in energy generation potential.
7. Calculation: 201 MW annual pollution offset in short tons/yr * 56.9% reduction in energy generation potential.

3. Tule Wind Project's Ability to Offset Water Use

Using the conservative assumption that the Tule Wind Project will displace electricity generation from the Palomar Power Plant (or a plant of similar efficiency), the Tule Wind Project will offset approximately 149 million gallons of water per year (approximately 457 acre-feet of water). See Table 4, Tule Wind Project Water Conservation Calculation.

Table 4. Tule Wind Project Water Conservation Calculation

Tule Wind Project Electricity Generation	
Tule Net Capacity Factor (%)[1]	0.31
Annual generation per megawatt of wind turbine capacity (MWh)[2]	2,716
Tule Annual Generation (201 MW) (MWh)[3]	545,836
Tule Wind Project Operational Water Use	
Tule Annual Water Use (million gallons)[4]	.913
Palomar Natural Gas Fire Generation[5]	
Palomar Gas-fired Power Plant Water Use (gal/minute)	2,500
Gas-fired Power Plant Generation (MW)	546
Gas-fired Power Plant Water Use (gal/MWh)	274.73
Annual water use offset (201 MW) (million gallons)[6]	**149**
Water Use Offset Lost by Alternative 5	
Tule's Annual Water Offset Loss under Alternative 5 (72 turbines)(million gallons)[7]	**(77.48)**
Tule's Annual Water Offset Loss under Alternative 5 (63 turbines)(million gallons) [8]	**(84.78)**

Table 4 Notes:

1. The 0.31 Tule capacity factor is based on 6 years of meteorological data measured at the site. This is a net capacity factor so losses in collecting and transforming the power to 138 kV for delivery to the San Diego Gas and Electric transmission system have been subtracted from the gross power production.
2. Calculation: 0.31 net capacity factor * 8,760.
3. Calculation: Annual generation per MW * 201 MW
4. Based on anticipated operational water use of 2,500 gal/day at the Operations & Maintenance Building. See Draft EIR/EIS, pg. D.12-30.
5. Source: "Palomar Power Project", Cal. Energy Commission Final Staff Assessment, January 2003. p. 4.9-A24. The Palomar Energy Project utilizes reclaimed water from City of Escondido's Hale Avenue Resource Recovery Facility.
6. Calculation: (Tule Annual Generation (201 MW * (Gas-fired power plant water use/1,000,000) – Tule Annual Water Use)).
7. Calculation: 201 MW annual pollution offset in short tons/yr * 52% reduction in energy generation potential.
8. Calculation: 201 MW annual pollution offset in short tons/yr * 56.9% reduction in energy generation potential.

C. Alternative 5 Will Significantly Decrease the Tule Wind Project's Ability to Offset Existing Greenhouse Gas Emissions, Criteria Air Pollutant Emissions, and Water Use

As described in Table 1, above, if Alternative 5 is applied to the 134 turbine project layout, it will reduce the Tule Wind Project's ability to capture wind energy by approximately 52%. If Alternative 5 is applied to the Modified Project Layout, it will reduce the Tule Wind Project's ability to capture wind energy by approximately 56.9%.

Applying these reductions in wind energy capture to the previously calculated emissions offset benefits that would otherwise be provided by the Tule Wind Project provides an estimate of how Alternative 5 would reduce the Tule Wind Project's ability to offset existing CO_2 emissions, criteria air pollutant emissions, and water use.

As demonstrated in Table 5, below, if Alternative 5 is selected, it will result in the continued emissions of substantial amounts of GHG emissions, criteria air pollutants, and the continued use of substantial water associated with existing natural gas-fired generation.

Table 5. Alternative 5 Offset Loss Per Year

	CO_2 Emissions (MT)[1]	Water Use (million gallons)[2]	NOx (MT)[3]	PM10 (MT)	CO (MT)	SOx (MT)	VOC (MT)
Tule Wind Project Offsets	**232,210**	**149**	**12.4**	**11.1**	**14.7**	**3.8**	**3.8**
Alternative 5 Offset Loss (72 turbines)	(120,749)	(77.48)	(6.4)	(5.8	(7.6)	(2.0)	(2.0)
Alternative 5 Offset Loss, Modified Project Layout (63 turbines)	(132,128)	(84.78)	(7.1)	(6.3)	(8.4)	(2.2)	(2.2)

Table 5 Notes:

1. CO_2 emissions offset reduction drawn from Table 2, above.
2. Water use offset reduction drawn from Table 4, above.
3. Criteria air pollutant emissions offset reduction drawn from Table 3, above.

III. Conclusion

As described in Section D.15 of the DEIR/DEIS, the Tule Wind Project is designed to help California meet major public policy goals associated with the reduction of greenhouse gas emissions, the increase in renewable energy generation, reduction of water use, and reduction of criteria air pollutant emissions. In particular, the Tule Wind Project will help California meet its greenhouse gas targets under AB 32 and renewable energy portfolio standards.

Despite acknowledging this important public policy goals, the DEIR/DEIS currently does not document the degree to which the Tule Wind Project's anticipated offset of existing natural gas-fired greenhouse gas emissions, criteria air pollutant emissions, or water use will help the State achieve these goals. Please consider including the estimated emissions offset figures presented above in the Final EIR/EIS.

Furthermore, the DEIR/DEIS also does not include any information on the amount of existing natural gas-fired greenhouse gas emissions, criteria air pollutant emissions, or water use that would not be offset in the event that Alternative 5 is chosen and at

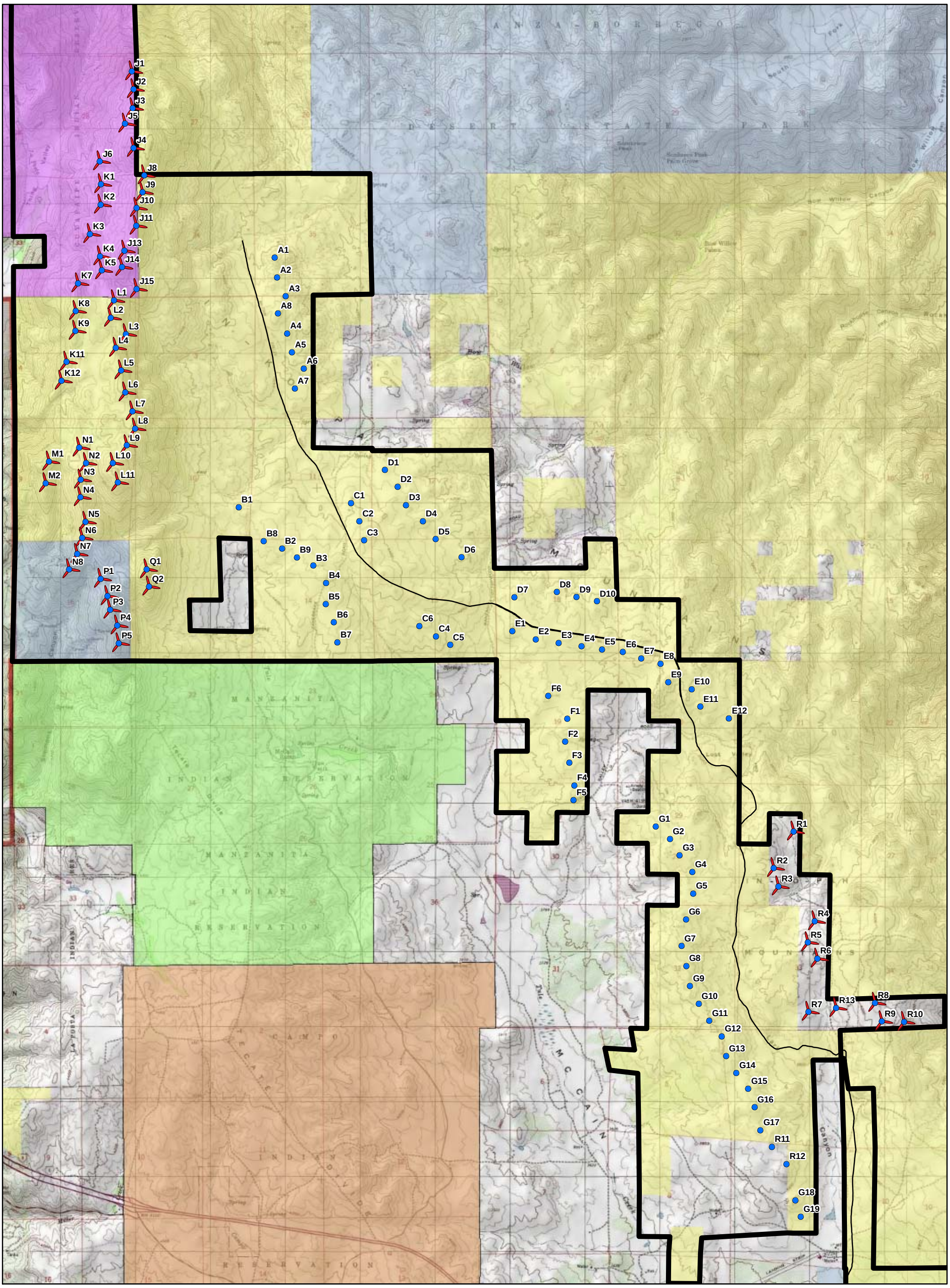
least 62 turbines are removed from the proposed project. Please consider including the reduced offset figures presented above in the Final EIR/EIS as a consequence of selecting Alternative 5.

Sincerely,

Edmund V. Clark, Chemical Engineer
IBERDROLA RENEWABLES, Inc.

Gennaro H. Crescenti, Director, Meteorologist
IBERDROLA RENEWABLES, Inc.

Enclosures



Legend

- Turbine Removed by Alternative 5
- Original 134 Turbines
- McCain Valley Road
- Site Boundary
- State
- BLM
- Campo Reservation
- Ewiiaapaayp Reservation
- Manzanita Reservation

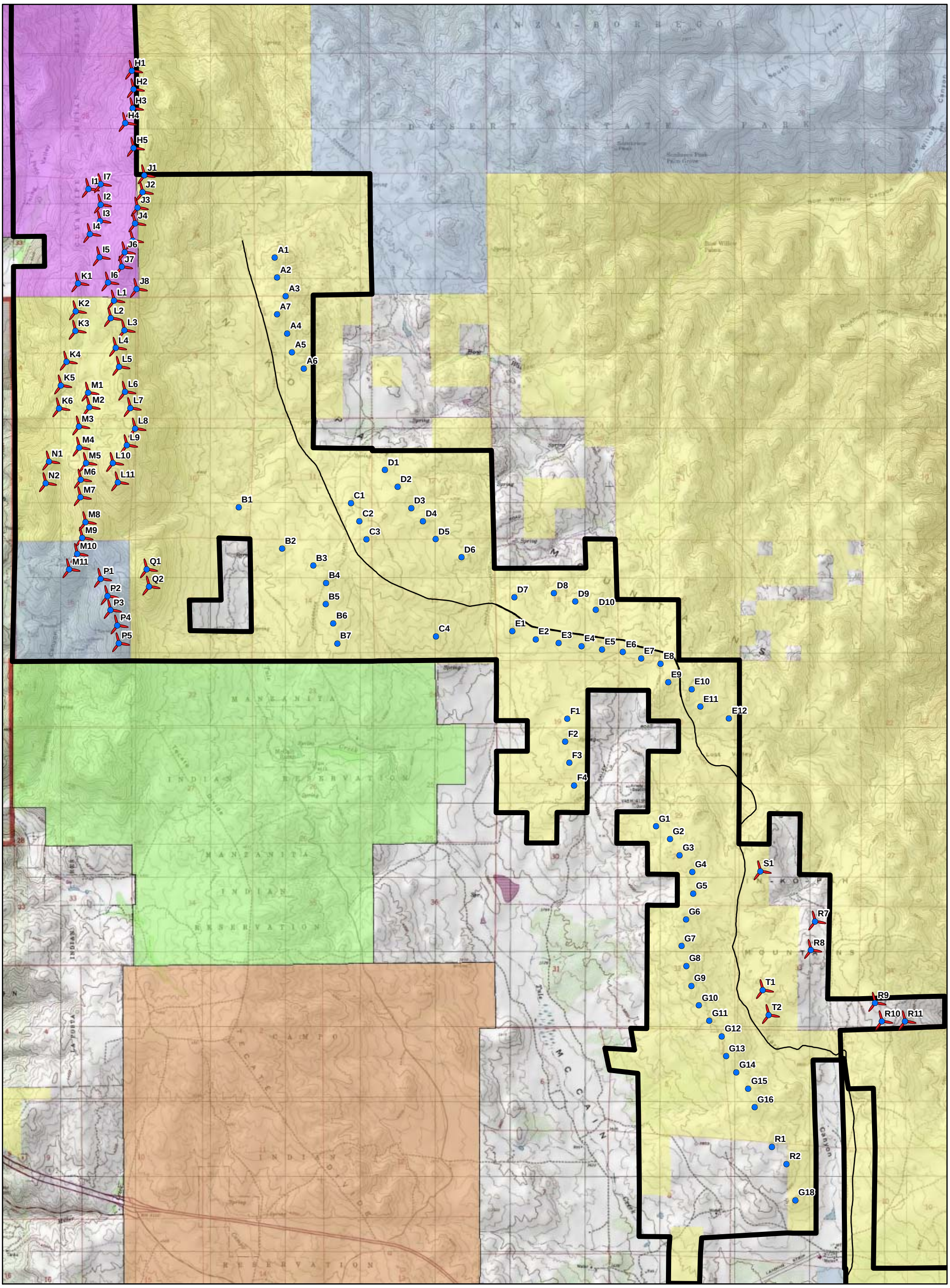
N

0 0.5 1
Miles

Original EIR Layout - Alternative 5

Tule Wind Project

IBERDROLA RENEWABLES



Current Modified Layout - Alternative 5

Tule Wind Project

Legend

- Modified 128 Turbines
- Turbine Removed by Alternative 5
- McCain Valley Road
- Site Boundary
- State
- BLM
- Campo Reservation
- Ewiiaapaayp Reservation
- Manzanita Reservation

N

0 0.5 1
Miles

IBERDROLA RENEWABLES

Edmund V Clark

Iberdrola Renewables

1125 NW Couch, Suite700, Portland, OR 97209

Phone: 503 796-7157

E-mail: Ed.Clark@IberdrolaRen.com

Current Occupation

As Director Business Development for Iberdrola Renewables responsible for the development of the Company's California and Pacific Northwest wind power plants; including the 200 megawatt Tule Wind Project in eastern San Diego County and the 300 megawatt Manzana Wind Project in Kern County, California.

Education

BS Chemical Engineering, Montana State University (1973)

MA Management, University of Redlands, (1987)

Professional Affiliations

Senior Member, American Institute of Chemical Engineers

Senior Member, Association of Energy Engineers

Experience

37 year career in energy production and conversion focused on the design, development, construction and operation of clean energy facilities. The last 8 years spent working on wind power project design and development. Prior work in simple- and combined-cycle gas fired plants, biomass, and clean coal facilities. Previous employers have included the Electric Power Research Institute--Advanced Power Systems Division, Texaco, Union Oil of California, American Natural Gas and PPM Energy.

GENNARO H. CRESCENTI

EDUCATION

M. S. Meteorology, Florida State University, 1988
B. S. Earth Science, Southern Connecticut State University, 1984

PROFESSIONAL EXPERIENCE

Iberdrola Renewables (formerly PPM Energy), Portland, OR

Director, Meteorology, May 2008 – Present
Manager, Meteorology, July 2007 – May 2008
Lead/Senior Meteorologist, April 2006 – July 2007

Manage and lead team of meteorologists, engineers, and analysts that is responsible for internal wind and solar resource and project energy assessment for Iberdrola Renewables. Provide meteorological support to Business Development, Renewable Origination, and Asset Management. Responsibilities include on-site surveys and staking locations for meteorology towers, sodars and lidars, quality assurance and quality control of on-site data sets, data analysis, wind resource and energy assessments, wind turbine layout design using GIS, wake loss determination, turbine micrositing, site suitability analysis, and operational performance of wind farms and reconciliation against original energy predictions.

FPL Energy, Juno Beach, FL

Meteorologist, February 2003 – April 2006

Provided meteorological support to development and operation of numerous wind farms. Responsibilities include wind resource assessments, site surveys, wake losses analysis, turbine layout and optimization, investigation of operating assets, relocation of underperforming wind turbines. Evaluation of external wind resource assessments and reports from external consultants, specification of meteorological instruments, configuration, and meteorological tower deployments. Areas of interest include short-range forecasting, seasonal probability outlooks, and long-term variability of wind resource, and application of advance sensor technologies.

NOAA Air Resources Laboratory, Idaho Falls, ID

Meteorologist, September 1997 – February 2003

Provided meteorological support to Department of Energy's (DOE) Idaho National Engineering and Environmental Laboratory (INEEL). Analyzed meteorological data from INEEL Mesonet, including developing climatology of atmospheric boundary layer over Snake River Plain from radar wind profiler and radio acoustic sounding system. Participated in transport and diffusion

experiments at several study sites (Dugway Proving Ground, Salt Lake City, Snake River Plain). Principal investigator of aircraft-based air-sea research studies using state-of-the-science instrumentation suite on Long-EZ aircraft. Helped in development of advanced instrumentation including extreme turbulence (ET) probe for measurement of turbulence in hurricane force winds. Continued research with Doppler sodars for various field studies.

NOAA Air Resources Laboratory, Research Triangle Park, NC

Physical Scientist, June 1992 – September 1997

Provided technical and scientific guidance to Environmental Protection Agency on meteorological instruments and observation techniques. Helped develop guidance on ground-based remote sensors including Doppler sodars, radar wind profilers, and radio acoustic sounding systems (RASS). Aided in development of meteorological guidance for the Photochemical Assessment Monitoring Station (PAMS) network for ozone nonattainment regions. Other research activities included investigation of air pollution episodes from coal-burning power plant in northern Thailand, effect of clouds on incoming UV-B radiation, and dispersion of inert tracer gases.

North Carolina State University, Raleigh, NC

Graduate Research Assistant, August 1991 – June 1992

Air-sea interaction research of light-wind regimes over tropical oceans to improve understanding behavior of large scale global phenomena.

Woods Hole Oceanographic Institution, Woods Hole, MA

Research Assistant III Meteorologist, April 1988 – August 1991

Responsibilities included testing and evaluation of various in-situ meteorological instruments to improve turbulent flux measurements over the ocean from ships and buoys. Variables included wind speed and direction, air temperature, relative humidity, barometric pressure, precipitation, incoming solar and longwave radiation. Participated as flight scientist in the Experiment on Rapidly Intensifying Cyclones Over the Atlantic (ERICA) and on research cruise deploying research buoys.

Florida State University, Tallahassee, FL

Graduate Research Assistant, August 1984 – March 1988

Conducted air-sea interaction research of nonhomogeneous marine atmospheric boundary layer across sea-surface temperature fronts. Participated in the Frontal Air-Sea Interaction Experiment (FASINEX) as flight scientist on NCAR Electra and NRL P3 aircraft. Aided in design of research flight plans and forecasts.

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

American Meteorological Society (1983 - Present)
AMS Committee on Measurements, (1997 - 2002), Chair (1998 - 2001)
AMS Energy Committee (2009 – Present)
AMS Renewable Energy Committee (2010 – Present), Co-chair (2011 – Present)

ANSI/ANS-3.11 Work Group for Determining Meteorological Information at Nuclear Facilities.

National Research Council (NRC) Research Advisor (July 1999 - February 2003)

NOAA / Office of Oceanic and Atmospheric Research (OAR) Outreach Committee (May 2000 - February 2003)

Chair, *Eleventh Symposium on Meteorological Observations and Instrumentation*, January 14-18, 2001, Albuquerque, NM, American Meteorological Society.

Organizer, *Short Course on the Introduction to Meteorological Instrumentation and Observation Techniques*, January 14, 2001, Albuquerque, NM, American Meteorological Society.

AWARDS

U. S. Department of Commerce Bronze Medal, October 2000, with Timothy L. Crawford and Jeffrey R. French, *for design and application of a novel airborne instrument system to advance scientific knowledge of air-sea exchange*.

U. S. Department of Commerce Bronze Medal, November 1994, with John E. Gaynor, Alan H. Huber, and J. J. Streicher, *for the provision of technical support to Thailand in an air pollution emergency*.

Scientific Resources Associated

March 3, 2011

Mr. Patrick O'Neill
HDR, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123

Dear Mr. O'Neill:

Scientific Resources Associated (SRA) has reviewed the information in the Global Climate Change Analysis for the Tule Wind Project proposed to be located in southeastern San Diego County, approximately 70 miles east of Downtown San Diego, in the vicinity of the unincorporated communities of Jacumba and Boulevard. The Tule Wind Project is proposing to construct a wind power facility, which will include 128 1.5 to 3.0-MW wind turbines, along with the necessary infrastructure to connect the wind turbines to the San Diego Gas & Electric (SDG&E) grid. The purpose of the project will be to provide electricity generated from the wind turbines to the grid. It is estimated that, upon completion, the Tule Wind Project will provide 201 MW of wind power.

The Tule Wind Project will assist SDG&E in meetings its renewable energy goals under the California Renewables Portfolio Standard. Established in 2002 under Senate Bill 1078 and accelerated in 2006 under Senate Bill 107, California's Renewables Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 20% by 2010. To date, SDG"&E has met a goal of 10.5% renewables, which is 9.5% below their current goal.

On September 15, 2009, Governor Arnold Schwarzenegger signed Executive Order (EO) S-21-09 directing the California Air Resources Board (CARB) to adopt regulations requiring 33 percent of electricity sold in the state come from renewable energy by 2020. On September 23, 2010, the California Air Resources Board approved a Renewable Electricity Standard regulation.

One of the key purposes of the RPS is to reduce statewide emissions of greenhouse gases (GHG) to meet the goals of AB 32, the California Global Warming Solutions Act of

2006. AB 32 sets forth a goal to reduce emissions of GHGs to 1990 levels by the year 2020. The ARB estimates, in it scoping plan, that full implementation of the 33% RPS will achieve a reduction of 21.3 million metric tons of CO_2-equivalent gases by the year 2020.

The Tule Wind Project will result in minor amounts of GHG emissions during construction and inspection and maintenance activities. The project will reduce GHG emissions from conventional power plants by eliminating the use of fossil fuels used in combustion sources, and by eliminating the embodied energy of water required for cooling of conventional power plants. Tule Wind, LLC, has calculated the emission reductions that will be realized through these reductions in fossil fuel and water use.

SRA has reviewed the calculations of GHG emission reductions that will be realized from the replacement of conventional power generation with power generated by the Tule Wind Project. The calculations are based on information from Tule Wind, LLC, regarding the project's proposed generation capacity and net capacity factor of 31 percent. These values are based on Tule Wind, LLC's engineering design for the facility and were not independently verified.

Based on calculations conducted by Tule Wind, LLC indicating that the project will generate 545,836 MWh of electricity, the project will reduce GHG emissions from electricity generation by 231,744 metric tons of CO_2e annually, assuming an average value for GHG emissions of 0.4246 metric tons of CO_2e per MWh in the U.S. The emission factor is adjusted from the Department of Energy's 2000 CO_2 emissions report, which estimated that the pounds of CO_2e per kWh was 1.341, on average. SRA has reviewed the Department of Energy's information on CO2e emissions from power generation in the United States. For natural gas-fired power plants, based on nationwide data from 2009, the average CO_2e emissions per kWh are 1.22 lbs/Kwh (http://www.eia.doe.gov/ask/environment_faqs.asp#electricity_fossil_fuels). Therefore, the emission factor used in the calculation of CO_2e emissions of 0.4246 metric tons of CO_2e per MWh is a conservative estimate. The operating emissions for the project will be 337 metric tons of CO_2e annually, which includes amortized construction emissions. Thus the net emission reduction associated with electricity generation would be 231,407 metric tons of CO_2e annually.

SRA has reviewed and verified the calculation of reductions in water use conducted by Tule Wind, LLC, which is based on estimated water use by the Palomar Energy Project in San Diego County. The calculation provides an estimate of the gallons of water required per MWh for a conventional natural gas-fired power plant to generate electricity. Based on these assumptions, it is estimated that the project will save 149 million gallons annually of water. SRA has independently calculated the project's reduction in GHG emissions through water use reductions assuming the CEC's value for the embodied energy of water of 12,700 kWh/gallon. The reduction in the embodied energy of water will be 1,892 MWh/year, for a total GHG reduction of 803 metric tons of CO_2e.

SRA has independently calculated the reductions in GHG emissions based on the methodologies and assumptions discussed above. The reduction in GHG emissions

realized by the Tule Wind Project is therefore estimated to be 232,210 metric tons of CO_2e annually.

SRA has also reviewed and independently verified the calculations of criteria pollutant emission reductions that will be realized from the replacement of conventional power generation with power generated by the Tule Wind Project. The calculations are based on the Palomar Energy Project's emissions, as reported in the CEC's Staff Assessment (http://www.energy.ca.gov/sitingcases/palomar/documents/2003-01-24_PALOMAR_FSA.PDF). The emissions are representative of a state of the art natural gas-fired power plant.

Based on these calculations, it is SRA's expert opinion that the project will offset a total of 231,901 metric tons of CO_2e greenhouse gases, as well as the following amounts of criteria pollutants:

Pollutant	**NOx**	**PM10**	**CO**	**SOx**	**VOC**
Lbs/year	24,828	22,186	29,411	7,598	7,565
Tons/year	12.4	11.1	14.7	3.8	3.8

The Tule Wind Project will therefore contribute both to SDG&E's goal of achieving a 33% RPS by 2020, and to the statewide goal of reducing GHG emissions to 1990 levels by the year 2020.

Sincerely,

Valorie L. Thompson, Ph.D.
Principal

Noxious Weeds and Non-Native Species Control Plan

Tule Wind Project
San Diego County, California

December 2010

Prepared for

U.S. Bureau of Land Management
California Desert District Office
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553

Prepared by

HDR Engineering, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123

and

Iberdrola Renewables, Inc.
1125 NW Couch Street, Suite 700
Portland, OR 97209

ONE COMPANY | *Many Solutions*℠

HDR

TABLE OF CONTENTS

ACRONYMS ..... **iii**

1.0 INTRODUCTION **1**

1.1 Plan Purpose 1
1.2 Noxious Weed Defined and Non-Native Species Catagorized 1
1.3 Objectives 2
1.4 Responsible Parties 3

2.0 LAWS AND REGULATIONS **3**

2.1 Federal laws and reGUlations 3
2.2 State and local laws and regulations 4
2.3 Conservation and managemnt Plans 4

3.0 EXISTING CONDITIONS **4**

4.0 WEED MANAGEMENT AREAS **5**

4.1 Temporary Impacts 5
4.2 Permanent impacts 9

5.0 MONITORING AND SURVEY METHODS **9**

5.1 Weed identifcation 9
5.2 Survey and MOnitoring 9
5.2.1 Monitoring Methods 10
5.2.2 Database and Mapping 10

6.0 NOXIOUS WEED AND NON-NATIVE PLANT SPECIES MANAGEMENT **10**

6.1 Species description and management strategy 10
6.2 Preventative measures 15
6.2.1 Construction 16
6.2.2 Operation 17
6.3 ERADICATION AND CONTROL METHODS 18
6.3.1 Physical Weed Removal Methods 18
6.3.2 Chemical Weed Removal Methods 18

7.0 REPORTING REQUIREMENTS **20**

7.1 REPORT CONTENT 20
7.1.1 Construction Reports 20
7.1.2 Long-term Monitoring Reports 20
7.2 REPORT PERIODS 21
7.2.1 Construction Reports 21
7.2.2 Long-term Monitoring Reports 21

8.0 REFERENCES **22**

APPENDICES

Appendix A Herbicide Treatment Standard Operating Procedures
Appendix B Conceptual Revegetation Plan
Appendix C Herbicides Approved for Use on BLM Lands

TABLES

Table 3-1. List of Non-Native Species Observed On-Site 6

ACRONYMS

BLM	Bureau of Land Management
Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CDFAC	California Department of Food and Agricultural Code
FNWA	Federal Noxious Weed Act
GIS	Geographic information system
IRI	Iberdrola Renewables, Inc.
kV	Kilovolt
LLC	Limited Liability Corporation
MPH	Miles per hour
MSDS	Material Safety Data Sheets
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
OHV	Off-highway vehicle
PEIS	Programmatic Environmental Impact Statement
PPA	Plant Protection Act
PUP	Pesticide Use Permit
SODAR	Sonic Detection and Ranging
T-line	Transmission Line
U.S.C.	United States Code
USEPA	U.S Environmental Protection Agency

This page intentionally left blank.

1.0 INTRODUCTION

Tule Wind, LLC, a wholly-owned subsidiary of Iberdrola Renewables, Inc. (IRI), is proposing to construct and operate the Tule Wind Project (proposed project) located near Boulevard, California. The proposed wind energy project will consist of: (1) up to 134 wind turbines; (2) access roads between turbines, including improvements to existing roadways and new roadways; (3) a 138 kilovolt (kV) overhead transmission line (T-line); (4) a 34.5 kV overhead and underground electrical collector cable system; (5) a 5-acre collector substation site; (6) a 5-acre operation and maintenance site; (7) a temporary 5-acre cement batch plant site; (8) a temporary10-acre parking area; (9) 19 two-acre temporary laydown areas; (10) two permanent meteorological towers; and (11) a Sonic Detection and Ranging (SODAR) System unit.

IRI developed this Noxious Weed and Non-native Species Control Plan to control noxious weeds and non-native species that could occur as a result of new surface disturbance activities in the project area. The overall project area is approximately 15,390 acres, with the proposed project footprint (impact extent) occurring on approximately 773 acres (230 temporary and 543 permanent). Data collected during surveys conducted from 2005 to 2010 have been incorporated into the plan in order to develop methods for monitoring and educating personnel on weed identification, and methods for avoiding and treating infestations. The survey corridor included the proposed project footprint and alternatives footprint (potential impact extent) and the surrounding buffer area that was surveyed for biological resources. IRI will work with the Bureau of Land Management (BLM), the State of California, and the County of San Diego to obtain seeding specifications to be compliant with required standards.

In addition to the Noxious Weed and Non-Native Species Control Plan, a Conceptual Revegetation Plan will be developed to mitigate impacts on plants and wildlife in the proposed project footprint. Control of the exotics will help the revegetation efforts.

1.1 PLAN PURPOSE

IRI developed this Noxious Weed and Non-Native Species Control Plan to control noxious weeds and non-native plant species that could occur as a result of project-related activities. The plan will comply with all applicable laws, ordinances, regulations, and standards. Weed management objectives for the proposed project are discussed in Section 1.3 and include prevention, infestation containment and control, monitoring, and reporting within the proposed project footprint.

1.2 NOXIOUS WEED DEFINED AND NON-NATIVE SPECIES CATAGORIZED

Section 403 of the Plant Protection Act (PPA) (7 *United States Code* [U.S.C.] 7701 et seq.) defines noxious weeds as:

> "*any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment* (USDA 2010)."

Noxious weeds are generally defined as non-native plants that colonize and dominate an area. These plants are able to out-compete other native plants because they often lack natural predators or

diseases. These plants establish in areas where soil has been disturbed, such as freshly graded roads or construction sites. New disturbance allows noxious weeds an opportunity to gain a foothold on a previously native area. Once established, noxious weeds may exclude native plants and reduce native forage for wildlife. Invasive plants can also compromise crops, create fire hazards, and disrupt groundwater resources.

The California Invasive Plant Inventory provides a uniform methodology for categorizing non-native invasive plants that threaten wildlands. Each plant within the inventory receives a High, Moderate, or Limited category based on ecological impacts, invasive potential, and ecological disturbance (Cal-IPC 2010):

- **High:** These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- **Moderate:** These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbances. Ecological amplitude and distribution may range from limited to widespread.
- **Limited:** These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Known species of noxious weeds and non-native plant species will be identified within the proposed project footprint during pre-construction surveys and construction activities, and will be monitored after competition of the project. Based on weed management recommendations presented in this document, existing individual species will be managed in order to minimize the impact and spread of noxious weeds and non-native species. During surveys conducted from 2005 to 2010, no federally designated noxious weed species were identified within the survey corridor; however, several non-native species were observed. **Table 3-1** in the Existing Conditions section includes a complete list of non-native species observed within the survey corridor during surveys conducted from 2005 to 2010.

1.3 OBJECTIVES

The objective of this report is to outline methodology for preventing, identifying, monitoring, and dealing with noxious weeds and non-native species within the proposed project footprint. Included in this report is a list and assessment of non-native species identified on-site during surveys, a list of target weeds that will be controlled, survey methods for identifying noxious weeds during construction and operation, weed control methods and reporting requirements. Considerations may be made for species that are widespread and naturalized where control may be impractical. When evaluating noxious weeds within the proposed project footprint, the appropriate objectives will be defined as necessary.

Noxious weed management objectives for the proposed project footprint include the following:

- **Eradication:** Eliminate individuals of a particular species from a specified area. This method of control will be the goal for most noxious weed species within the project footprint.
- **Suppression:** Reduce current noxious weed densities but won't necessarily reduce the total area or boundary of noxious weed infestations. This control method applies to widely distributed, high-density species where eradication is not feasible.
- **Containment/Prevention:** Prevent noxious weed expansion and spread. This control method focuses on inhibiting the spread of noxious weeds until suppression or eradication can be implemented.

1.4 RESPONSIBLE PARTIES

Ultimately, IRI is responsible for compliance with BLM's environmental regulations. However, contractors and other responsible parties will be in charge of implementing and enforcing the plan outlined in this report. The Environmental Compliance Manager will be responsible for implementing and monitoring the Noxious Weed and Non-Native Species Control Plan. The Construction Manager will have the responsibility of overseeing and enforcing the plan. As land manager for the majority of the land within the project boundary, BLM will have the final say in approving the plan and the oversight of the implementation.

2.0 LAWS AND REGULATIONSFEDERAL LAWS AND REGULATIONS

Federal Noxious Weed Act of 1974

The Federal Noxious Weed Act (FNWA) (Public Law 93-629; 7 U.S.C. 2801 et seq.; 88 Stat 2148, as amended 1988 and 1994) was enacted January 3, 1975, and established a federal program to control the spread of noxious weeds. This law provides for the control and management of non-native weeds that harm, or have the potential to harm, the interests of agriculture and commerce, wildlife resources, or public health. The Secretary of Agriculture was given the authority to designate non-native plants as noxious weeds and the ability to regulate the transactions and movement of noxious weeds. Prohibited under this law is the movement of any noxious weed identified by the Secretary of Agriculture into or through the U.S. except for those that are in compliance and possess applicable permits. In addition, the law requires each federal agency to develop a management program to control noxious weeds on federal lands under the agency's jurisdiction.

Plant Protection Act of 2000

The Plant Protection Act (PPA), as amended (7 U.S.C. 7701-7786), prohibits unauthorized movement of plant pests. No person shall import, enter, export, or move in interstate commerce any plant pest unless movement actions have been authorized under general or specific permit and is accordance with such regulations. The PPA defines a noxious weed as any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health or the environment. In general, the Secretary of Agriculture may prohibit or restrict the movement of any plant, plant product, biological control organism, noxious

weed, article or means of conveyance, if the Secretary determines that the prohibition is necessary to prevent the introduction into the United States.

2.2 STATE AND LOCAL LAWS AND REGULATIONS

California Food and Agricultural Code

The California Food and Agricultural Code (CDFAC) Section 403 mandates that, "The Department of Food and Agriculture shall prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds." In accordance with Section 403, the California Commissioner of Agriculture has the authority to control noxious weeds, provide funding for research and assistance to weed management entities for the control and abatement of noxious weeds in accordance with an approved integrated weed management plan. Compliance with an integrated weed management plan will result in an ecosystem-based control strategy that focuses on long-term prevention of weeds through the combination of techniques, such as biological controls, use of herbicides, modified land management and cultural practices, and will minimize the risks to human health, non-targeted organisms, and the environment.

2.3 CONSERVATION AND MANAGEMNT PLANS

The Bureau of Land Management

The BLM administers vegetation on nearly 216 million acres in 17 western states (BLM 2007). Management and control of vegetation and habitat enhancement is accomplished through a variety of treatments including, but not limited to, herbicides, prescribed fire and wildland fire use, manual and mechanical methods, and biological controls (BLM 2007). In response to threats of invasive vegetation and noxious weeds and the increased use of herbicides, the BLM composed the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), released on June 29, 2007. The PEIS analyzes and identifies the impacts on natural and human environment associated with herbicide use on public lands. **Appendix A** includes the *Herbicide Treatment Standard Operating Procedures* which identifies standard operating procedures for management controls and performance standards required for vegetation management treatments on BLM lands. Procedures listed in **Appendix A** have been incorporated into this management plan.

3.0 EXISTING CONDITIONS

Plant communities and vegetation types within the vicinity of the proposed project range from semi-desert scrub to mixed chaparral to oak woodland, and include big sagebrush, grassland, and riparian communities. Chaparral and scrub communities are the predominant vegetation communities. Chaparral communities include semi-desert chaparral, northern mixed chaparral, scrub oak chaparral, upper Sonoran manzanita chaparral, chamise chaparral, red shank chaparral, and southern north slope chaparral. Scrub communities include upper Sonoran subshrub scrub, montane buckwheat scrub and big sagebrush scrub. Semi-desert chaparral is the dominant vegetation in McCain Valley and is the most abundant community in the survey corridor. Additional vegetation communities occurring in the survey corridor include open and dense coast live oak woodland, southern riparian woodland,

southern willow scrub, mule fat scrub, and non-native grassland. Other land cover includes non-vegetated channels, agriculture, developed, and disturbed habitat.

Overall the survey corridor supports 20 different types of vegetation communities. With the exception of grazing in the grasslands and lowlands, and rural development along corridors in the southern portions, native vegetation communities within the survey corridor experience minimal human disturbance and exhibit a limited presence of exotic species outside of disturbed areas. No federally listed noxious weed species have been observed in the proposed project footprint. However, several non-native species were observed. **Table 3-1** lists the non-native species observed within the survey corridor and includes a Federal noxious weed rating, California Invasive Plant Council (Cal-IPC) rating and a California Department of Food and Agriculture (CDFA) rating for each species.

4.0 WEED MANAGEMENT AREAS

Noxious weed and non-native species management will occur within the proposed project footprint; however, certain areas (e.g., temporary and permanent impact areas) will require specific management considerations depending on a range of factors described in this section.

4.1 TEMPORARY IMPACTS

A number of construction-associated activities may temporarily impact vegetation within the proposed project. Direct temporary impacts are anticipated with clearing and grading of access roads, transmission corridors, and work areas at turbines and support structures. Up to 230 acres of temporary impacts are anticipated to occur as a result of the project. Temporary impacts to a vegetation community are such that the community is expected to recover to the pre-impacted state (e.g., temporarily widened access roads and construction work areas). Temporary impacts will result primarily from temporary construction work areas cleared/grubbed for each wind turbine tower pad; construction of temporary widened (36-foot-wide) roads between turbines; and temporary disturbance of a 50-foot x 150-foot (15 meters x 46 meters) area associated with overhead power collection line poles. Additional temporary impacts could occur from a temporary concrete batch plant at the Operations and Maintenance (O&M) facility location, construction staging areas, and from temporary security fencing. However, these impacts might occur within the existing permanent construction footprint. Temporary impacts associated with site monitoring and testing activities prior to project implementation, and associated with the ultimate decommissioning of the proposed project, could also occur.

Temporary impacts will occur in areas where cleared vegetation will be revegetated when construction activities are complete. Temporary impact areas will be monitored and managed during construction and operation of the proposed project.

Table 3-1. List of Non-Native Species Observed On-Site

Scientific Name / Common Name	Ecological Types Invaded and Comments	Federal Noxious Weed Listing	CDFA Rank*	Cal-IPC Rating*	Cal-IPC Impacts Rating	Cal-IPC Invasive Rating	Cal-IPC Distribution Rating
Avena barbata slender wild oat	Coastal scrub, grasslands, oak woodlands, forest. Very widespread, but impacts more sever in desert regions.	No	NR	Moderate	B	B	A
Avena fatua wild oat	Coastal scrub, chaparral, grasslands, woodland, forest. Very widespread, but impacts more sever in desert regions.	No	NR	Moderate	B	B	A
Bromus hordaceous soft brome	NE/NR	No	NR	NE/NR	NE/NR	NE/NR	NE/NR
Bromus madritensis ssp. *rubens* red brome	Scrub, grassland, desert washes, woodlands. Impacts most significant in desert areas.	No	NR	High	A	B	A
Bromus madritensis ssp. *madritensis* compact brome	NE/NR	No	NR	NE/NR	NE/NR	NE/NR	NE/NR
Bromus tectorum downy brome, cheatgrass	Interior scrub, woodlands, grasslands. Most widely distributed invasive plant in the U.S.	No	NR	High	A	B	A
Centaurea melitensis malta star-thistle, tocalote	Grasslands, oak woodlands. Impacts vary regionally.	No	C	Moderate	B	B	B
Cynodon dactylon Bermuda grass	Riparian scrub in southern CA. Common landscape weed, but can be very invasive in desert washes.	No	NR	Moderate	B	B	B
Erodium botrys long-beal filaree/ storksbill	Present in wildlands but known impacts are negligible. Often transient.	No	NR	Evaluated, not listed	D	C	A
Erodium cicutarium redstem filaree	Many habitats. Widespread. Impacts minor in wildlands. High density populations are transient.	No	NR	Limited	C	C	A
Erodium moschatum white-stem filaree/ storksbill	Primarily an agricultural weed, little impact in wildlands.	No	NR	Evaluated, not listed	D	C	A
Hirschfeldia incana shortpod mustard, summer mustard	Scrub, grassland, riparian areas. Impacts not well understood, but appear to be greater in Southern Calif.	No	NR	Moderate	B	B	A

Scientific Name / Common Name	Ecological Types Invaded and Comments	Federal Noxious Weed Listing	CDFA Rank*	Cal-IPC Rating*	Cal-IPC Impacts Rating	Cal-IPC Invasive Rating	Cal-IPC Distribution Rating
Hordeum marinum Mediterranean barley, hare barley, wall barley	Grasslands, wetlands. Impacts can be more severe locally, especially in wetlands.	No	NR	Moderate	B	B	A
Hypochaeris glabra smooth cat's ear	Scrub and woodlands. Widespread. Impacts appear to be minor. Some local variability.	No	NR	Limited	C	B	B
Lepidium campestre cow cress	NE/NR	No	NR	NR	NR	NR	NR
Lepidium perfoliatum clasping pepperweed	NE/NR	No	NR	NE/NR	NE/NR	NE/NR	NE/NR
Marubium vulgare horehound	Grasslands, scrub, riparian areas. Widespread. Impacts unknown. Impacts relatively minor.	No	NR	Limited	C	C	B
Medicago polymorpha burclover	Grasslands. Widespread weed of agriculture and disturbed areas. Impacts in wildlands minor.	No	NR	Limited	C	C	A
Ole europeae olive	Rarely escapes in CA but is a concern due to possibility of spread from planted groves.	No	NR	Limited	C	B	B
Pinus sp. pine/pinyon	NA	NA	NA	NA	NA	NA	NA
Polypogon monspeliensis annual beard grass	Margins of ponds and streams, seasonally wet places, edge of coastal dunes. Widespread. Impacts appear to be minor.	No	NR	Limited	C	C	B
Salsola tragus Russian thistle	Desert dunes and scrub, alkali playa. Widespread. Impacts minor in wildlands.	No	C	Limited	C	B	B
Schismus barbatus Mediterranean schimus	Shrub, thorn woodland. Widespread in deserts. Impacts can be more important locally.	No	NR	Limited	B	C	A
Sherardia arvensis field madder	NE/NR	No	NR	NE/NR	NE/NR	NE/NR	NE/NR
Sismbrium altissimum tumble/Jim Hill mustard	NE/NR	No	NR	NE/NR	NE/NR	NE/NR	NE/NR

Scientific Name / Common Name	Ecological Types Invaded and Comments	Federal Noxious Weed Listing	CDFA Rank*	Cal-IPC Rating*	Cal-IPC Impacts Rating	Cal-IPC Invasive Rating	Cal-IPC Distribution Rating
Sisymbrium irio London rocket	Scrub, grasslands. Widespread. Primarily in disturbed sites. Impacts vary locally.	No	NR	Moderate	B	B	A
Tamarix ramosissima saltcedar, tamarisk	Desert washes, riparian areas, coastal scrub.	No	B	High	A	A	A
Trifolium sp. clover	NA	NA	NA	NA	NA	NA	NA
Vulpia myuros rattail fescue	Coastal sage scrub, chaparral. Widespread. Rarely forms monotypic stands, but locally problematic.	No	NR	Moderate	B	B	A

Notes:

CDFA Rating:

A = A rated pests are subject to state enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.
B = B rated pests are at the discretion of the county commissioner subject to eradication, containment, suppression, control, or other holding action.
C = C rated pests are subject to regulations designed retard spread or to suppress at the discretion of the county commissioner.
Q = Q rated pests status is uncertain because of incomplete identification or inadequate information.
D = D rated pests have an extremely low likelihood of weediness.

Cal-IPC Ratings:

A = Severe
B = Moderate
C = Limited
D = None
U = Unknown

High These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbances. Ecological amplitude and distribution may range from limited to widespread.

Limited These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

NA = Not Applicable
NR = Not Rated/Not Ranked
NE = Not Evaluated

4.2 PERMANENT IMPACTS

A number of construction activities may permanently impact vegetation within the proposed project. Direct permanent impacts are anticipated as a result of vegetation removal from grading and clearing at turbine locations, support structure locations, and brush management. Access road construction will be the primary source of direct permanent impacts to vegetation communities within the proposed project. In addition, permanent impacts may result from site monitoring, testing activities, and decommissioning. An estimated maximum of 543 acres of permanent impacts are anticipated to occur as a result of the project. Direct permanent impacts affect the vegetation community such that it is not expected to recover to the pre-impacted state (e.g., permanent development of a site through grading and construction of structures). Permanent impacts will result from construction of linear turbine strings with a disturbance radius of 200 feet for each turbine pad, up to a maximum of 134 turbines, a combined 5-acre project substation and O&M facility, a 10-acre parking area, and a 20-foot-wide corridor along permanent access roads, transmission lines (overhead), and collector lines.

Direct permanent impacts will not be revegetated when construction activities are complete. Permanent impact areas will be monitored and managed during construction and operation of the proposed project.

5.0 MONITORING AND SURVEY METHODS

5.1 WEED IDENTIFCATION

Monitoring and removal of non-native species requires training and/or in plant identification. Plant identification training and field manuals will be provided to field staff including biological monitors, weed abatement contractors, project operators and staff, and construction workers. Non-native plant species will be identified using *The Jepson Manual, Higher Plants of California*.

Plant identification training will include:

- An in-field presentation containing pictures and descriptions of the known non-native species found within the proposed project footprint;
- An overview of the field manual;
- Instructions on management strategies for noxious weeds and non-native species that are observed within the proposed project footprint.

5.2 SURVEY AND MONITORING

Surveys and monitoring will ensure timely detection and eradication of non-native plant species, which are essential to the long-term management of noxious weed management.

5.2.1 Monitoring Methods

Construction Areas

Biological monitors will be present during site clearing and construction activities. Construction crews will be responsible for inspecting construction areas, identifying the presence of noxious weeds, and inspecting equipment cleaning facilities for weed seed removal. In addition, the biological monitor will verify that weed management activities prescribed in the field are consistent with activities outlined in this plan. Monitoring construction areas for non-native species arrivals will be conducted on a regular basis, and will consist of surveying the construction areas and access routes and documenting the presence of non-native plant species.

Revegetation Areas

Temporarily disturbed areas will be revegetated and will require ongoing monitoring. Based on the Conceptual Revegetation Plan, monitoring will be conducted regularly for a total of 10 years. The monitoring schedule shall be sufficiently flexible in order to address variable prescription regimens that have been determined in the Conceptual Revegetation Plan and approved by the regulatory agency. In addition, surveys and monitoring visits will identify areas of significant non-native species establishment.

General Operations Monitoring

General site monitoring of the proposed project will be conducted by grounds personnel on an ongoing basis. Non-native species control will be conducted, as needed, by project personnel. Monitoring will be conducted at a minimum of every other week during the growing season (February to June). Project personnel will be trained in non-native plant identification and non-native plant removal strategies.

5.2.2 Database and Mapping

Locations of new noxious weeds and non-native plant species occurrences and species data (detection date, growth stage, infestation extent, treatments implemented, results of treatment, and current status) will be maintained during the construction and operation within the proposed project footprint. This will not be required of previously established non-native species. A geographic information system (GIS) will be used to map and store data.

6.0 NOXIOUS WEED AND NON-NATIVE PLANT SPECIES MANAGEMENT

6.1 SPECIES DESCRIPTION AND MANAGEMENT STRATEGY

Descriptions of non-native plant species observed on-site are provided in this section. All non-native annual, perennial, tree, and shrub species occurring within temporary impact/revegetation areas would be controlled using management strategies identified in this plan. Management strategies encompass not only eradication, but also identify the means of eradication (methods for eradication are described in Section 6.3.1).

Temporary impact/revegetation areas would be maintained to achieve less than 10 percent cover of annual non-native vegetation and prevent the introduction of new non-native species to the site. Non-native perennial and tree/shrub species would be eradicated from temporary impact/revegetation areas.

Slender wild oat (*Avena barbata***)**
Family: Poaceae
Cal-IPC Inventory Rating: Moderate

Slender wild oat a winter annual grass that is common in almost every grassland area in California (Cal-IPC 2010).This species does well in sandy/poor soils and is often found along roads (Cal-IPC 2010).

Wild oat (*Avena fatua*)
Family: Poaceae
Cal-IPC Inventory Rating: Moderate

Wild oat is a winter annual grass. This species is a common agricultural weed and grows in most grassland sites within the state, particularly in sandy/poor soils, and is often associated with road verges (Cal-IPC 2010).

Soft brome (*Bromus hordaceous*)
Family: Poaceae
Cal-IPC Inventory Rating: Limited

Soft brome is an annual grass that is common at low elevations and especially in disturbed and open areas (Cal-IPC 2010). This species can thrive in soils that have low fertility and are often occupied by rare or sensitive native plant species (Cal-IPC 2010).

Red brome (*Bromus madritensis* ssp. *rubens* (=*B. rubens*))
Family: Poaceae
Cal-IPC Inventory Rating: High

Red brome is a cool-season annual grass that is commonly found throughout California (Cal-IPC 2010). This species is often found in disturbed areas, roadsides, agricultural fields, rangelands, and native habitats (Cal-IPC 2010).

Compact brome (*Bromus madritensis* ssp. *madritensis*)
Family: Poaceae
Cal-IPC Inventory Rating: Not rated or evaluated

Compact brome is an annual grass that is common in disturbed areas throughout California (Calflora 2010).

Downy brome, cheatgrass (*Bromus tectorum*)
Family: Poaceae
Cal-IPC Inventory Rating: High

Downy brome is an annual grass that commonly overcrowds native grasslands and croplands (Cal-IPC 2010).

Tocalote (*Centaurea melitensis*)
Family: Asteraceae
Cal-IPC Inventory Rating: Moderate

Tocalote is an annual herb that is common in grasslands and oak woodlands throughout California. Dense stands can displace native plants and animals; this species may also increase erosion and reduce water percolation (Cal-IPC 2010).

Bermuda grass (*Cynodon dactylon*)
Family: Poaceae
Cal-IPC Inventory Rating: Moderate.

Bermuda grass is a perennial grass that can escape cultivation and out-compete native species (Cal-IPC 2010).

Long-beak filaree/storksbill (*Erodium botrys*)
Family: Geraniaceae
Cal-IPC Inventory Rating: Evaluated but not rated

Long-beak filaree is an annual herb that is present in wildlands but known impacts are negligible (Cal-IPC 2010).

Redstem filaree (*Erodium cicutarium*)
Family: Geraniaceae
Cal-IPC Inventory Rating: Limited

Redstem filaree is an annual/biannual herb that is common throughout California and often associated with roadsides, grasslands, fields and semi-desert areas (Cal-IPC 2010).

White-stem filaree/storksbill (*Erodium moschatum*)
Family: Geraniaceae
Cal-IPC Inventory Rating: Evaluated but not rated

White-stem filaree is an annual herb that is primarily an agricultural weed but known impacts are negligible.

Short pod mustard (*Hirschfeldia incana*)
Family: Brassicaeae
Cal-IPC Inventory Rating: Moderate

Short pod mustard is a perennial forb that is common in scrub, grasslands, and riparian areas (Cal-IPC 2010). This species can produce large amounts of biomass, and matures early in the phonologic year, possibly usurping soil water before other native annual plants reach peak development (Cal-IPC 2010).

Mouse barley (*Hordeum marinum*)
Family: Poaceae
Cal-IPC Inventory Rating: Moderate

Mouse barley is an annual grass. Impacts can be more severe locally, especially in wetlands (Cal-IPC 2010).

Smooth cat's ear (*Hypochaeris glabra*)
Family: Asteraceae
Cal-IPC Inventory Rating: Limited

Smooth cat's ear is an annual herb found throughout California, commonly in scrub and woodland habitats (Cal-IPC 2010).

Field pepperweed (*Lepidium camestre*)
Family: Brassicaeae
Cal-IPC Inventory Rating: Not rated or evaluated

Field pepperweed is an annual or perennial herb that is characteristic of disturbed areas (Calflora 2010).

Clasping pepperweed (*Lepidium perfoliatum*)
Family: Brassicaceae
Cal-IPC Inventory Rating: Not rated or evaluated

Clasping pepperweed is an annual herb is a common non-native species in California (Calflora 2010).

Horehound (*Marubium vulgare*)
Family: Lamiaceae
Cal-IPC Inventory Rating: Limited

Horehound is a perennial shrub/forb/herb and is common in grasslands, scrub, and riparian areas (Cal-IPC 2010). This species is only browsed by livestock when no other forage material is present; this gives it a competitive advantage over more desirable grazing species (Cal-IPC 2010).

Burclover (*Medicago polymorpha*)
Family: Fabaceae
Cal-IPC Inventory Rating: Limited

Burclover is a perennial/annual forb/herb that is widespread in agriculture and disturbed areas (Cal-IPC 2010). This species is considered good forage for livestock but can out-compete native species in wildlands (Cal-IPC 2010).

Olive (*Olea europeae*)
Family: Oleaceae
Cal-IPC Inventory Rating: Limited

Olive is a shrub or tree that is currently a rare escapee in California but is of concern due to the possibility of spread from planted groves (Cal-IPC 2010). In some areas this species will displace native species and reduce light availability but in California the impacts on native species composition has been minor (Cal-IPC 2010).

Annual beard grass (*Polypogon monspeliensis*)
Family: Poaceae
Cal-IPC Inventory Rating: Limited

Annual beard grass is a winter or summer annual grass that is common in moist or wet areas that will form dense stands in appropriate conditions (Cal-IPC 2010).

Prickly Russian thistle/tumbleweed (*Salsola tragus*)
Family: Chenopdiaceae
Cal-IPC Inventory Rating: Limited

Prickly Russian thistle is a summer annual that is common in California especially in agricultural areas, deserts, roadsides, and other disturbed areas (Cal-IPC 2010). This species is an alternate host for *Circulifer tenellus*, which can carry the virus causing curly-top of some native species (Cal-IPC 2010).

Mediterranean schismus (*Schismus barbatus*)
Family: Poaceae
Cal-IPC Inventory Rating: Limited

Mediterranean schismus is an annual grass that is common in disturbed areas and throughout deserts in southern California (Cal-IPC 2010).

Field madder (*Sherardia arvensis*)
Family: Rubiaceae
Cal-IPC Inventory Rating: Not rated or evaluated

Field madder is an annual herb that is becoming naturalized in California (Calflora 2010). This species has not been rated or evaluated by Cal-IPC.

Tumble/Jim Hill mustard (*Sisymbrium altissimum*)
Family: Brassicaceae
Cal-IPC Inventory Rating: Not rated or evaluated

Tumble mustard is an annual herb that is characteristic of disturbed areas. This species has not been rated or evaluated by Cal-IPC.

London rocket (*Sisymbrium irio*)
Family: Brassicaceae
Cal-IPC Inventory Rating: Moderate

London rocket is a winter annual forb/herb that is often found in fields, pastures, waste areas, roadsides, and orchards (Cal-IPC 2010). This species is able to out-compete native species by maturing early in the year (Cal-IPC 2010).

Tamarisk/salt cedar (*Tamarix ramosissima*)
Family: Tamaricaeae
Cal-IPC Inventory Rating: High

Tamarisk is a shrub or tree that is common along streams and lake shores throughout California (Cal-IPC 2010). In some areas this species makes up 70 to 80 percent of the vegetation cover, substantially displacing native vegetation and reducing the value of riparian communities (Cal-IPC 2010).

Fescue (*Vulpia Myuros*)
Family: Poaceae
Cal-IPC Inventory Rating: Moderate

Fescue is an annual grass common in coastal sage scrub and chaparral habitats (Cal-IPC 2010). This species is one of many that have replaced perennial grasses in California. The presence of this species has contributed to the increased fire frequency in Southern California (Cal-IPC 2010).

6.2 PREVENTATIVE MEASURES

General prevention measures that will be implemented prior to and during construction activities and will inhibit the spread of weeds and their germination include the following:

- Project-related disturbances to ecologically sensitive areas will be avoided or minimized when possible. Sensitive residual areas that are impacted will be mitigated as appropriate.
- IRI will minimize the clearing of existing trees and shrubs during site design and construction to the greatest practicable extent.
- Temporary impacts to vegetation communities will be mitigated through revegetation of impacted areas. Revegetation will involve recontouring the land, replacing collected topsoil, and planting seed and/or container stock. Based on monitoring of the restoration area, maintenance activities such as weeding, replacement planting and supplemental watering may be necessary to achieve restoration standards. Revegetated areas will include all areas

temporarily impacted by construction, such as wind turbine construction sites, laydown/staging areas, and temporary access roads. Reclamation activities will be undertaken as early as possible on disturbed areas. Additional reclamation measures will be developed to address site-specific conditions, as necessary.

- Topsoil from decommissioning activities will be salvaged and reapplied during final reclamation. Areas of disturbed soil will be reclaimed using weed-free native shrubs, grasses, and forbs.
- All project vehicle movement will be restricted to existing access roads and access roads constructed as a part of the project, unless determined infeasible due to physical or safety constraints. Approval from a biological monitor will be obtained prior to any travel off of existing access roads.
- Vehicle wash and inspection stations will be maintained throughout the project area. Recorded vehicle inspection logs will be kept for all vehicles brought on and off the project site.
- Materials brought on-site will be closely monitored to minimize the potential for weed introduction.

6.2.1 Construction

Personnel Environmental Training

Environmental training for contractors and related personnel entering the project site will be provided prior to and during construction activities. Mandatory training will be required for contractors, subcontractors, inspection personnel, construction managers, construction personnel, and individuals transiting vehicles and equipment into the project area. The training will include non-native species identification and non-native species management strategies for the prevention and spread of non-native species, as well as eradication and control methods of existing and introduced non-native species.

Equipment Cleaning

Equipment cleaning will be required to prevent the spread of weed species into new habitats. The construction contractor will insure that all construction equipment (any vehicle leaving Interstate 8 into the project area) will be cleaned by high pressure air or water spray in order to remove dirt and mud that may contain seeds, roots, or rhizomes. The tracks, tires, and undercarriage will be washed including, but not limited to, the axles, frame, cross members, motor mounts, underneath steps, running boards, and front bumpers. Prior to entering the project area, equipment will be inspected to ensure they are free of any dirt or mud. During construction, all equipment will be cleaned after work in weed-contaminated soils. Cleaning stations will use either high pressure water or air to remove dirt and mud from equipment and will be located away from any sensitive biological resource. Sediment basins will be required if water is used for on-site equipment cleaning. Other construction-related vehicles (i.e., pick-up trucks) will be inspected and washed on an as-needed basis.

For equipment entering and leaving site, records and cleaning records will be kept stating the location, date and time, license plate/vehicle identification or serial number of equipment, and methods used. These records will be included in the monitoring reports.

Soil Management

Soil management will limit ground disturbances to the minimum feasible amount, and fugitive dust will be suppressed in order to minimize the spread of seeds. Soil management activities include revegetation of temporarily disturbed areas and the reclamation of topsoil. Revegetation will involve recontouring the land, replacing collected topsoil, and planting seed and/or container stock. Reclamation activities will be undertaken as early as possible on disturbed areas. Topsoil from excavations and construction activities will be segregated from sub-soil and reapplied to the surface of the ground during reclamation. During grading and construction activities, the contractor shall avoid transporting soil within proposed project footprint or outside of the proposed project footprint. Topsoil shall be stockpiled adjacent to the area from which they are removed to eliminate the transportation of soil-born non-native seeds, roots, and rhizomes. In addition, topsoil that is allowed to be stockpiled for the duration of a growing season (February to June) will be managed as described in this plan.

Weed-free Products

Weed-free products obtained from certified sources (i.e., free of primary noxious weeds) will be utilized. The contractor will ensure that straw or hay bales, gravel, mulch, and soil are free of weeds and, where feasible, mulch and soil will be generated or used from the proposed project footprint.

Site Reclamation

Reclamation would include revegetation of temporarily impacted vegetation communities and will be conducted in accordance with the Conceptual Revegetation Plan (**Appendix B**). Revegetation will involve recontouring the land, replacing collected topsoil, and planting seed and/or container stock. Reclamation activities will be undertaken as early as possible on disturbed areas.

6.2.2 Operation

Personnel Environmental Training

Environmental training for groundskeepers and maintenance personnel will be provided prior to and during operation activities. The training will include non-native species identification, management strategies for the prevention and spread of non-native species, as well as eradication and control methods of existing and introduced non-native species.

Infestation Containment and Control

Operation personnel will identify and flag areas which contain concentrations or new occurrences of non-native species. Access into these areas will be limited until non-native species management control measures can be implemented. Non-native species control measures will be implemented as described in Section 6.3.

6.3 ERADICATION AND CONTROL METHODS

6.3.1 Physical Weed Removal Methods

Physical control methods are applicable for removal of non-native species and can include hand pulling and mechanical clearing. Methods employed will depend on the species, size, and extent of the non-native species targeted and the root structure of each plant. Hand pulling is often most effective for localized non-native species control when the plant is large enough that it will not break and leave the root structures in place to resprout. This method is less effective in large areas or with species that spread through underground root systems.

6.3.2 Chemical Weed Removal Methods

Herbicide application is a widely employed, efficient, non-native species control method that is effective for large areas where hand pulling is not applicable. Herbicides will be employed in accordance with BLM requirements (BLM Handbook H-9011-1) and will use U.S. Environmental Protection Agency (USEPA)-registered herbicides that have been properly evaluated under the National Environmental Policy Act (NEPA). Pre- and post-emergent herbicides may be applied throughout the project. Pre-emergent herbicides are those that are integrated into the soil before the weed seed germinates and generally require irrigation or rainfall. Application of pre-emergent herbicides would occur in early fall prior to fall/early winter rain events. Post-emergent herbicides are applied directly to the weed while it is growing prior to seed set. Post-emergent treatment will occur between February and early April.

Any herbicides used as part of the weed control program will be mixed, handled, and applied in accordance with manufacturer's label instructions by a State-certified licensed contractor. No herbicide applications will be performed during unfavorable wind and weather conditions. Application of herbicides will not occur when either of the following conditions exist; wind speeds in excess of 6 miles per hour (mph) during liquid application or 15 mph during granular application, snow or ice are present, or the air temperature is above 90 degrees Fahrenheit. Herbicide containers will be returned to the contractor's facilities for disposal in accordance with applicable federal, state and local codes and regulations.

Permitting and Regulatory Requirements

Prior to application of any herbicide, contractors will obtain required permits from state and local authorities. In addition contractors will obtain a Pesticide Use Permit (PUP) from the BLM. Contractors applying herbicide measures must be a State-certified contractor and must be approved by the BLM. Only herbicides that are approved by the State of California and federal agency for use on BLM lands will be used within or adjacent to the project site. A list of approved herbicides is available in **Appendix C**.

Application and Handling

The following general precautions and procedures have been outlined in the BLM Handbook H-9011-11 (*Chemical Pest Control*); and Manuals 1112 (Safety), 9011 (Chemical Pest Control), 012 (Expenditure of Rangeland Insect Pest Control Funds), 9015 Integrated Weed Management), and

9220 (Integrated Pest Management), for use of herbicides on public lands (BLM 2007; the complete Herbicide Treatment Standard Operation Procedure can be found in **Appendix A**):

- Prepare operational and spill contingency plan in advance of treatment.
- Conduct pretreatment survey before applying herbicides.
- Select herbicide that is least damaging to the environment while providing the described results.
- Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures.
- Apply the least amount of herbicide needed to achieve the desired result.
- Follow herbicide applicators label for use and storage.
- Have licensed applicators apply herbicides.
- Use only USEPA-approved herbicides and follow product label directions and "advisory statements.
- Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warms of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment.
- Minimize the size of application area, when feasible.
- Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners and native habitat.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify adjacent landowners prior to treatment.
- Keep a copy of Material Safety Data Sheets (MSDS) at work site. MSDSs are available for review at http://wwwcdms.net/.
- Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location.
- Avoid accidental direct spray and spill conditions to minimize risks to resources.
- Take precautions to minimize drift by not applying herbicides when winds exceed >10 miles per hour, or a serious rainfall event is imminent.
- Use drift control agents and low volatile formulations.
- Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas.
- Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
- Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.

- Turn off applied treatment at the completion of spray runs and during turns to start another spray run.
- Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Clean off-highway vehicles (OHV) to remove seeds.

7.0 REPORTING REQUIREMENTS

7.1 REPORT CONTENT

Implementation of the noxious weed and non-native control plan will include the following data collection and reporting guidelines.

7.1.1 Construction Reports

Construction monitoring reports would be prepared throughout the duration of construction activities. Continuous reporting on the status of noxious weeds and non-native species within the proposed project footprint will be included in the construction monitoring reports. Noxious weed and non-native species reporting will include the following information:

- Location, type, extent, and density of noxious weed and non-native species. This will include mapping and photographs, as appropriate, as well as a description of conditions within the survey area.
- Management efforts, including date, location, type of treatment implemented, and results of treatment. Ongoing evaluation of treatment success will be included.
- Description on implementation and success of preventative measures, including status of equipment wash facilities and worker of environmental training program.
- Description of revegetation efforts undertaken, and their current status.

7.1.2 Long-term Monitoring Reports

Long-term monitoring will be required after construction and after implementation of site revegetation in the temporarily impacted areas. Noxious weed and non-native species management reports will be required as part of the ongoing site monitoring and will include the following information:

- Location, type, extent, and density of noxious weed and non-native species. This will include mapping and photographs, as appropriate, as well as a description of conditions within the survey area.
- Management efforts, including date, location, type of treatment implemented, and results of treatment. Ongoing evaluation of treatment success will be included.
- Description of revegetation efforts undertaken, and their current status.

7.2 REPORT PERIODS

7.2.1 Construction Reports

Biological monitors will keep daily records of construction activities during the proposed project. Included in these records will be the above-listed data (Sections 7.1.1 and 7.1.2). Daily records will be summarized in weekly reports. In addition, a single post-construction report will be produced summarizing the overall results of construction activities and will include data on noxious and non-native species management.

7.2.2 Long-term Monitoring Reports

Annual monitoring reports will be produced for the duration of the monitoring period (approximately 10 years). Monitoring activities will include the following:

- Monthly surveys following the completion of revegetation will be conducted for the first two years. The data and results will be presented on an annual basis.
- Quarterly surveys will be conducted in years three and four. The data and results will be presented on an annual basis.
- Thereafter, semi-annual surveys will be conducted for a total of 10 years. The data and results will be presented on an annual basis.
- At the conclusion of monitoring activities, or if success criteria is met before that, a final monitoring report will be produced that describes the outcome of the proposed revegetation activities and noxious weed and non-native species management efforts.

8.0 REFERENCES

BLM 2010 — Bureau of Land Management (BLM). 2010. Updating List of Approved Herbicide Formulations and Adjuvants. April 2, 2010. Available online: <http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_information/2010/IB_2010-060.html>. Accessed October 14, 2010.

BLM 2007 — BLM. 2007. Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. Appendix B. June 2007.

Calflora 2010 — Calflora. 2010. Information on California Plants for Education, Research and Conservation, Berkeley, California: The Calflora Database [a non-profit organization]. Available online: <http://www.calflora.org>. Accessed October 14, 2010.

Cal-IPC 2010 — Cal-IPC. 2010. California Invasive Plant Council. Berkeley, California. Plant Profiles. Available at http://www.cal-ipc.org. Accessed on October 14, 2010.

USDA 2010 — United States Department of Agriculture. Animal and Plant Health Inspection Service. July 21, 2010. Available online: <http://www.aphis.usda.gov/.> Accessed October 14, 2010.

APPENDIX A

Herbicide Treatment Standard Operating Procedures

APPENDIX A

Herbicide Treatment Standard Operating Procedures

To be prepared.

This page intentionally left blank.

APPENDIX B

Conceptual Revegetation Plan

APPENDIX B

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES

APPENDIX B

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES

This section identifies standard operating procedures (SOPs) that will be followed by the U.S. Department of the Interior Bureau of Land Management (USDI BLM) under all alternatives to ensure that risks to human health and the environment from herbicide treatment actions will be kept to a minimum. Standard operating procedures are the management controls and performance standards required for vegetation management treatments. These practices are intended to protect and enhance natural resources that could be affected by future vegetation treatments.

Prevention of Weeds and Early Detection and Rapid Response

Once weed populations become established, infestations can increase and expand in size. Weeds colonize highly disturbed ground and invade plant communities that have been degraded, but are also capable of invading intact communities. Therefore, prevention, early detection, and rapid response are the most cost-effective methods of weed control. Prevention, early detection, and rapid response strategies that reduce the need for vegetative treatments for noxious weeds should lead to a reduction in the number of acres treated using herbicides in the future by reducing or preventing weed establishment.

As stated in the BLM's *Partners Against Weeds: An Action Plan for the BLM*, prevention and public education are the highest priority weed management activities. Priorities are as follows:

- Priority 1: Take actions to prevent or minimize the need for vegetation control when and where feasible, considering the management objectives of the site.
- Priority 2: Use effective nonchemical methods of vegetation control when and where feasible.
- Priority 3: Use herbicides after considering the effectiveness of all potential methods or in combination with other methods or controls.

Prevention is best accomplished by ensuring the seeds and vegetatively reproductive plant parts of new weed species are not introduced into new areas.

The BLM is required to develop a noxious weed risk assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists. If the risk is moderate or high, the BLM may modify the project to reduce the likelihood of weeds infesting the site, and to identify control measures to be implemented if weeds do infest the site.

To prevent the spread of weeds, the BLM takes actions to minimize the amount of existing non-target vegetation that is disturbed or destroyed during project or vegetation treatment actions (Table B-1). During project planning, the following steps are taken:

- Incorporate measures to prevent introduction or spread of weeds into project layout, design, alternative evaluation, and project decisions.
- During environmental analysis for projects and maintenance programs, assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.
- Determine prevention and maintenance needs, to include the use of herbicides if needed, at the onset of project planning.
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

During project development, weed infestations are prioritized for treatment in project operating areas and along access routes. Weeds present on or near the site are identified, a risk assessment is completed, and weeds are controlled as necessary. Project staging areas are weed free, and travel through weed infested areas is avoided or minimized. Examples of prevention actions to be followed during project activities include cleaning all equipment and clothing before entering the project site; avoiding soil disturbance and the creation of other

soil conditions that promote weed germination and establishment; and using weed-free seed, hay, mulch, gravel, soil, and mineral materials on public lands where there is a state or county program in place.

Conditions that enhance invasive species abundance should be addressed when developing mitigation and prevention plans for activities on public lands. These conditions include excessive disturbance associated with road maintenance, poor grazing management, and high levels of recreational use. If livestock grazing is managed to maintain the vigor of native perennial plants, particularly grasses, the chance of weeds invading rangeland is much less. By carefully managing recreational use and educating the public on the potential impacts of recreational activities on vegetation, the amount of damage to native vegetation and soil can be minimized at high use areas, such as campgrounds and off-highway vehicle (OHV) trails. Early detection in recreation areas is focused on roads and trails, where much of the weed spread occurs.

The BLM participates in the National Early Warning and Rapid Response System for Invasive Plants (Figure B-1). The goal of this System to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes by:

- Early detection and reporting of suspected new plant species to appropriate officials;
- Identification and vouchering of submitted specimens by designated specialists;
- Verification of suspected new state, regional, and national plant records;
- Archival of new records in designated regional and plant databases;
- Rapid assessment of confirmed new records; and
- Rapid response to verified new infestations that are determined to be invasive.

Herbicide Treatment Planning

BLM Manual 9011 (*Chemical Pest Control*) outlines the policies, and BLM Handbook H-9011-1 (*Chemical Pest Control*) outlines the procedures, for use of herbicides on public lands. As part of policy, the BLM is required to thoroughly evaluate the need for chemical treatments and their potential for impact on the environment. The BLM is required to use only U.S. Environmental Protection Agency (USEPA)-registered herbicides that have been properly evaluated under National Environmental Policy Act (NEPA), and to carefully follow label directions and additional BLM requirements.

An operational plan is developed and updated for each herbicide project. The plan includes information on project specifications, key personnel responsibilities, and communication, safety, spill response, and emergency procedures. For application of herbicides not approved for aquatic use, the plan should also specify minimum buffer widths between treatment areas and water bodies. Recommended widths are provided in BLM Handbook H-9011-1 (*Chemical Pest Control*), but actual buffers are site and herbicide active ingredient specific, and are determined based on a scientific analysis of environmental factors, such as climate, topography, vegetation, and weather; timing and method of application; and herbicide risks to humans and non-target species. Table B-2 summarizes important SOPs that should be used when applying herbicides to help protect resources of concern on public lands.

Revegetation

Disturbed areas may be reseeded or planted with desirable vegetation when the native plant community cannot recover and occupy the site sufficiently.

Determining the need for revegetation is an integral part of developing a vegetation treatment. The most important component of the process is determining whether active (seeding/planting) or passive (natural recovery) revegetation is appropriate.

U.S. Department of the Interior policy states, “Natural recovery by native plant species is preferable to planting or seeding, either of natives or non-natives. However, planting or seeding should be used only if necessary to prevent unacceptable erosion or resist competition from non-native invasive species” (620 Departmental Memorandum 3 2004). This policy is reiterated in the USDI *Burned Area Emergency Stabilization and Rehabilitation* Manual, the BLM *Burned Area Emergency Stabilization and Rehabilitation* Manual (BLM H-1742-1), and the *Interagency Burned Area Rehabilitation Guidebook.*

TABLE B-1
Prevention Measures

BLM Activity	Prevention Measure
Project Planning	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds. • Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning. • Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes. • Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations. • Pre-treat high-risk sites for weed establishment and spread before implementing projects. • Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. • Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.
Project Development	• Minimize soil disturbance to the extent practical, consistent with project objectives. • Avoid creating soil conditions that promote weed germination and establishment. • To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives. • Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely. • Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material. • Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material. • Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled. • Prevent weed establishment by not driving through weed-infested areas. • Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area. • Avoid acquiring water for dust abatement where access to the water is through weed-infested sites. • Identify sites where equipment can be cleaned. Clean equipment before entering public lands. • Clean all equipment before leaving the project site if operating in areas infested with weeds. • Inspect and treat weeds that establish at equipment cleaning sites. • Ensure that rental equipment is free of weed seed. • Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Revegetation	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans. • Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation. • To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques. • Maintain stockpiled, uninfested material in a weed-free condition.

TABLE B-1 (Cont.)
Prevention Measures

BLM Activity	Prevention Measure
Revegetation (Cont.)	• Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. • Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings). • Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules. • Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project. • Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. • Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines). • Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way (ROW), and other areas of disturbed soils.

In addition to these handbooks and policy, use of native and non-native seed in revegetation and restoration is guided by BLM Manual 1745 (*Introduction, Transplant, Augmentation and Reestablishment of Fish, Wildlife and Plants)*. This manual states that native species shall be used, unless it is determined through the NEPA process that: 1) suitable native species are not available; 2) the natural biological diversity of the proposed management area will not be diminished; 3) exotic and naturalized species can be confined within the proposed management area; 4) analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment; or 5) resource management objectives cannot be met with native species.

When natural recovery is not feasible, revegetation can be used to stabilize and restore vegetation on disturbed sites and to eliminate or reduce the conditions that favor invasive species. Reseeding or replanting may be required when there is insufficient vegetation or seed stores to naturally revegetate the site.

To ensure revegetation success, there must be adequate soil for root development and moisture storage, which provides moisture to support the new plants. Chances for revegetation success are improved by selecting seed with high purity and percentage germination; selecting native species or cultivars adapted to the area; planting at proper depth, seeding rate, and time of the year for the region; choosing the appropriate planting method; and, where feasible, removing competing vegetation. Planting mixtures are adapted for the treatment area and site uses. A combination of forbs, perennial grasses, and shrubs is typically used on rangeland sites, while shrubs and trees might be favored for riparian and forestland sites. A mixture of several native plant species and types or functional groups enhances the value of the site for fish and wildlife and improves the health and aesthetic character of the site. Mixtures can better take advantage of variable soil, terrain, and climatic conditions, and thus are more likely to withstand insect infestations and survive adverse climatic conditions.

The USDI BLM Native Seed program was developed in response to Congressional direction to supply native plant material for emergency stabilization and longer-term rehabilitation and restoration efforts. The focus of the program is to increase the number of native plant species for which seed is available and the total amount of native seed available for these efforts. To date, the program has focused on native plant material needs of emergency stabilization and burned area rehabilitation in the Great Basin, but is expanding to focus on areas such as western Oregon, the Colorado Plateau, and most recently the Mojave Desert. The Wildland Fire Management Program funds and manages the effort.

The National Seed Warehouse is a storage facility for the native seed supply. Through a Memorandum of

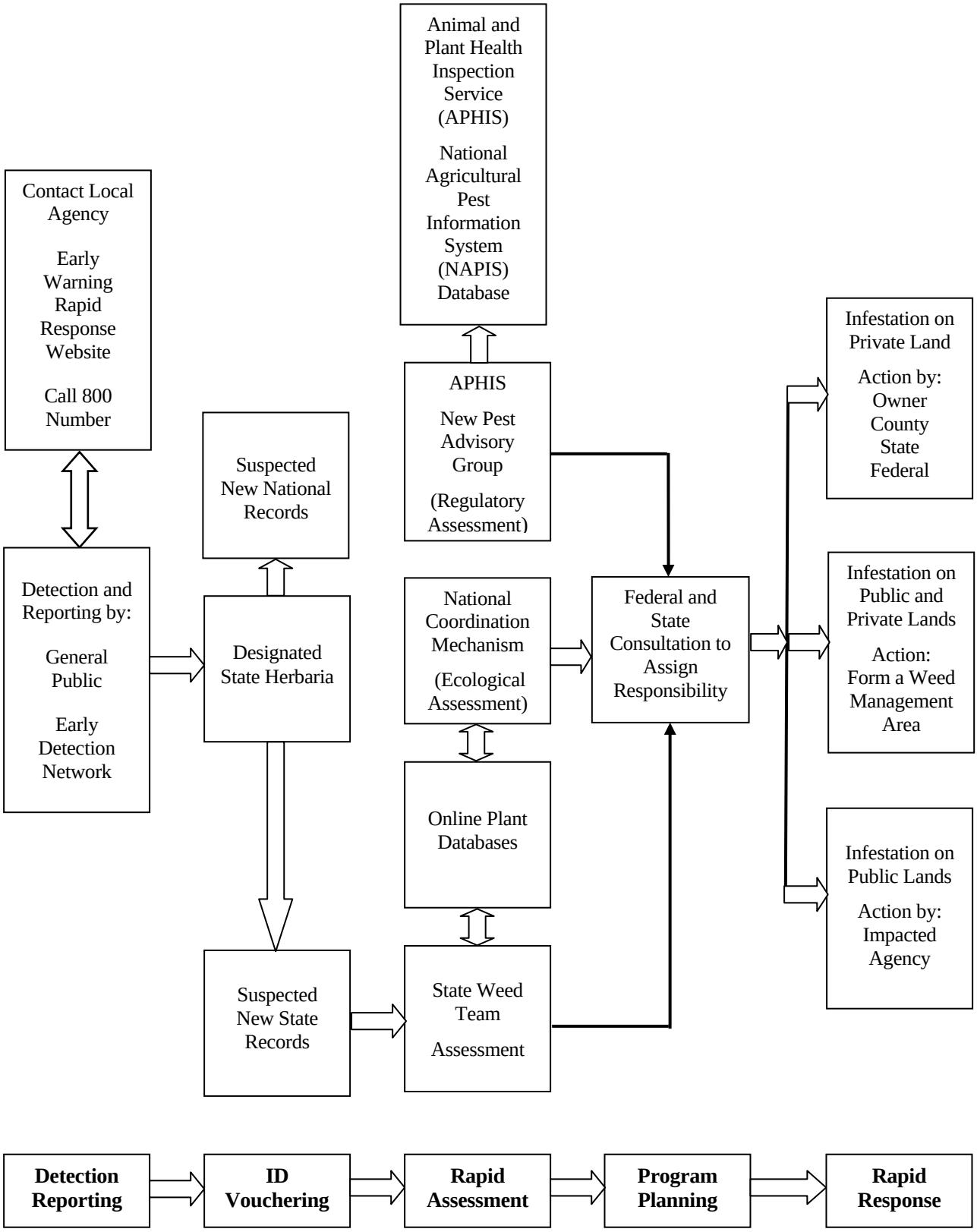


Figure B-1. National Early Warning and Rapid Response System for Invasive Plants.

Understanding with the BLM Idaho State Director, each state (Idaho, Oregon, Nevada, Utah and Colorado) can reserve an annual seed supply for purchase based on a reasonable projection of annual acreage to be stabilized or rehabilitated over a 5-year period.

The Great Basin Restoration Initiative (GBRI) grew out of concern for the health of the Great Basin after the wildfires of 1999. The goal of GBRI is to implement treatments and strategies to maintain functioning ecosystems and to proactively restore degraded ones at strategic locations. Native plants are emphasized in restoration projects where their use is practical and the potential for success is satisfactory. Monitoring is recommended to measure treatment success. To increase the availability of native plants, especially native forbs, the GBRI has established a collaborative native plant project, the Great Basin Native Plant Selection and Increase Project, to increase native plant availability and the technology to successfully establish these plants. This project is supported by funding from the BLM's Native Plant Initiative.

The BLM will follow the following SOPs when revegetating sites:

- Cultivate previously disturbed sites to reduce the amount of weed seeds in the soil seedbank.
- Revegetate sites once work is completed or soon after a disturbance.
- When available, use native seed of known origin as labeled by state seed certification programs.
- Use seed of non-native cultivars and species only when locally adapted native seed is not available or when it is unlikely to establish quickly enough to prevent soil erosion or weed establishment.
- Use seed that is free of noxious and invasive weeds, as determined and documented by a seed inspection test by a certified seed laboratory.
- Limit nitrogen fertilizer applications that favor annual grass growth over forb growth in newly seeded areas, especially where downy brome (cheatgrass) and other invasive annuals are establishing.
- Use clean equipment, free of plants and plant parts, on revegetation projects to prevent the inadvertent introduction of weeds into the site.
- Where important pollinator resources exist, include native nectar and pollen producing plants in the seed mixes used in restoration and reclamation projects. Include non-forage plant species in seed mixes for their pollinator/host relationships as foraging, nesting, or shelter species. Choose native plant species over manipulated cultivars, especially of forbs and shrubs, since natives tend to have more valuable pollen and nectar resources than cultivars. Ensure that bloom times for the flowers of the species chosen match the activity times for the pollinators. Maintain sufficient litter on the soil surfaces of native plant communities for ground-nesting bees.
- Where feasible, avoid grazing by domestic and wild animals on treatment sites until vegetation is well established. Where total rest from grazing is not feasible, efforts should be made to modify the amount and/or season of grazing to promote vegetation recovery within the treatment area. Reductions in grazing animal numbers, permanent or temporary fencing, changes in grazing rotation, and identification of alternative forage sources are examples of methods that could be used to remove, reduce or modify grazing impacts during vegetation recovery.

Special Precautions

Special Status Species

Federal policies and procedures for protecting federally-listed threatened and endangered plant and animal species, and species proposed for listing, were established by the Endangered Species Act of 1973 and regulations issued pursuant to the Act. The purposes of the Act are to provide mechanisms for the conservation of threatened and endangered species and their habitats. Under the Act, the Secretary of the Interior is required to determine which species are threatened or endangered and to issue recovery plans for those species.

Section 7 of the Act specifically requires all federal agencies to use their authorities in furtherance of the Act to carry out programs for the conservation of listed

species, and to ensure that no agency action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. Policy and guidance (BLM Manual 6840; *Special Status Species*) also stipulates that species proposed for listing must be managed at the same level of protection as listed species.

The BLM state directors may designate special status in cooperation with their respective state. These special status species must receive, at a minimum, the same level of protection as federal candidate species. The BLM will also carry out management for the conservation of state-listed species, and state laws protecting these species will apply to all BLM programs and actions to the extent that they are consistent with Federal Land Policy and Management Act (FLPMA) and other federal laws.

The BLM consulted with the U.S. Fish and Wildlife Service (UFWS) and National Marine Fisheries Service (NMFS) during development of the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) as required under Section 7 of the Endangered Species Act. As part of this process, the BLM prepared a formal consultation package that included a description of the program; species listed as threatened or endangered, species proposed for listing, and critical habitats that could be affected by the program; and a Biological Assessment (BA) that evaluated the likely impacts to listed species, species proposed for listing, and critical habitats from the proposed vegetation treatment program. Over 300 species were evaluated in the BA. The BA also provides broad guidance at a programmatic level for actions that will be taken by the BLM to avoid adversely impacting species or critical habitat.

Before any vegetation treatment or ground disturbance occurs, BLM policy requires a survey of the project site for species listed or proposed for listing, or special status species. This is done by a qualified biologist and/or botanist who consults the state and local databases and visits the site at the appropriate season. If a proposed project may affect a proposed or listed species or its critical habitat, the BLM consults with the USFWS and/or NMFS. A project with a “may affect, likely to adversely affect” determination requires formal consultation and receives a Biological Opinion from the USFWS and/or NMFS. A project with a “may affect, not likely to adversely affect” determination requires informal consultation and receives a concurrence letter from USFWS and/or NMFS, unless that action is implemented under the authorities of the alternative consultation agreement pursuant to counterpart regulations established for *National Fire Plan* projects.

Wilderness Areas

Wilderness areas, which are designated by Congress, are defined by the Wilderness Act of 1964 as places “where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.” The BLM manages 175 Wilderness Areas encompassing over 7.2 million acres.

Activities allowed in wilderness areas are identified in wilderness management plans prepared by the BLM. The BLM does not ordinarily treat vegetation in wilderness areas, but will control invasive and noxious weeds when they threaten lands outside wilderness area or are spreading within the wilderness and can be controlled without serious adverse impacts to wilderness values.

Management of vegetation in a wilderness area is directed toward retaining the natural character of the environment. Tree and shrub removal is usually not allowed, except for fire, insect, or disease control. Reforestation is generally prohibited except to repair damage caused by humans in areas where natural reforestation is unlikely. Only native species and primitive methods, such as hand planting, are allowed for reforestation.

Tools and equipment may be used for vegetation management when they are the minimum amount necessary for the protection of the wilderness resource. Motorized tools may only be used in special or emergency cases involving the health and safety of wilderness visitors, or the protection of wilderness values.

Habitat manipulation using mechanical or chemical means may be allowed to protect threatened and endangered species and to correct unnatural conditions, such as weed infestations, resulting from human influence.

The BLM also manages a total of 610 Wilderness Study Areas (WSAs) encompassing nearly 14.3 million acres. These are areas that have been determined to have wilderness characteristics worthy of consideration for wilderness designation. The BLM’s primary goals in WSAs are to manage them so as to not impair their wilderness values and to maintain their suitability for

preservation as wilderness until Congress makes a determination on their future.

In WSAs, the BLM must foster a natural distribution of native species of plants and animals by ensuring that ecosystems and processes continue to function naturally.

Cultural Resources

The effects of BLM actions on cultural resources are addressed through compliance with the National Historic Preservation Act, as implemented through a national Programmatic Agreement (*Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*) and state-specific protocol agreements with State Historic Preservation Officers (SHPOs). The BLM's responsibilities under these authorities are addressed as early in the vegetation management project planning process as possible.

The BLM meets its responsibilities for consultation and government-to-government relationships with Native American tribes by consulting with appropriate tribal representatives prior to taking actions that affect tribal interests. The BLM's tribal consultation policies are detailed in BLM Manual 8120 (*Tribal Consultation Under Cultural Resource Authorities)* and Handbook H-8120-1 (*Guidelines for Conducting Tribal Consultation).* The BLM consulted with Native American tribes and Alaska Native groups during development of the PEIS. Information gathered on important tribal resources and potential impacts to these resources from herbicide treatments is presented in the analysis of impacts.

When conducting vegetation treatments, field office personnel consult with relevant parties (including tribes, native groups, and SHPOs), assess the potential of the proposed treatment to affect cultural and subsistence resources, and devise inventory and protection strategies suitable to the types of resources present and the potential impacts to them.

Herbicide treatments, for example, are unlikely to affect buried cultural resources, but might have a negative effect on traditional cultural properties comprised of plant foods or materials significant to local tribes and native groups. These treatments require inventory and protection strategies that reflect the different potential of each treatment to affect various types of cultural resources.

Impacts to significant cultural resources are avoided through project redesign or are mitigated through data recovery, recordation, monitoring, or other appropriate measures. When cultural resources are discovered during vegetation treatment, appropriate actions are taken to protect these resources.

TABLE B-2
Standard Operating Procedures for Applying Herbicides

Resource Element	Standard Operating Procedure
Guidance Documents	BLM Handbook H-9011-1 (*Chemical Pest Control*); and manuals 1112 (*Safety*), 9011 (*Chemical Pest Control*), 9012 (*Expenditure of Rangeland Insect Pest Control Funds*), 9015 (*Integrated Weed Management)*, and 9220 (*Integrated Pest Management*).
General	• Prepare operational and spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to the environment while providing the desired results. • Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures. • Apply the least amount of herbicide needed to achieve the desired result. • Follow herbicide product label for use and storage. • Have licensed applicators apply herbicides. • Use only USEPA-approved herbicides and follow product label directions and "advisory" statements. • Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment. • Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas. • Minimize the size of application area, when feasible. • Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners. • Post treated areas and specify reentry or rest times, if appropriate. • Notify adjacent landowners prior to treatment. • Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at http://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spill conditions to minimize risks to resources. • Consider surrounding land uses before aerial spraying. • Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence). • Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground. • Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent. • Use drift control agents and low volatile formulations. • Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas. • Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species. • Turn off applied treatments at the completion of spray runs and during turns to start another spray run. • Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Clean OHVs to remove seeds.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Air Quality See Manual 7000 (*Soil, Water, and Air Management*)	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil See Manual 7000 (*Soil, Water, and Air Management*)	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected. • Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility. • Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.
Water Resources See Manual 7000 (*Soil, Water, and Air Management*)	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs. • Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments. • Use local historical weather data to choose the month of treatment. Considering the phenology of the target species, schedule treatments based on the condition of the water body and existing water quality conditions. • Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity. • Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies. • Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies. • Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
Wetlands and Riparian Areas	• Use a selective herbicide and a wick or backpack sprayer. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
Vegetation See Handbook H-4410-1 (*National Range Handbook*), and manuals 5000 (*Forest Management*) and 9015 (*Integrated Weed Management*)	• Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Use native or sterile species for revegetation and restoration projects to compete with invasive species until desired vegetation establishes. • Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for revegetation and other activities. • Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Pollinators	• Complete vegetation treatments seasonally before pollinator foraging plants bloom. • Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily. • Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment. • Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources. • Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources. • Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula. • Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use appropriate buffer zones based on label and risk assessment guidance. • Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use herbicides of low toxicity to wildlife, where feasible. • Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Threatened, Endangered, and Sensitive Species See Manual 6840 (*Special Status Species*)	• Survey for special status species before treating an area. Consider effects to special status species when designing herbicide treatment programs. • Use a selective herbicide and a wick or backpack sprayer to minimize risks to special status plants. • Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.
Livestock See Handbook H-4120-1 (*Grazing Management*)	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible. • As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable. • Use herbicides of low toxicity to livestock, where feasible. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources. • Avoid use of diquat in riparian pasture while pasture is being used by livestock. • Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary. • Provide alternative forage sites for livestock, if possible.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wild Horses and Burros	• Minimize using herbicides in areas grazed by wild horses and burros. • Use herbicides of low toxicity to wild horses and burros, where feasible. • Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
Cultural Resources and Paleontological Resources See handbooks H-8120-1 (*Guidelines for Conducting Tribal Consultation*) and H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*), and manuals 8100 (*The Foundations for Managing Cultural Resources*), 8120 (*Tribal Consultation Under Cultural Resource Authorities*), and 8270 (*Paleontological Resource Management*) See also: *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act* and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes. • Follow BLM Handbook H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts. • Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments. • Work with tribes to minimize impacts to these resources. • Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
Visual Resources See handbooks H-8410-1 (*Visual Resource Inventory*) and H-8431-1 (*Visual Resource Contrast Rating*), and manual 8400 (*Visual Resource Management*)	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation. • Consider the surrounding land use before assigning aerial spraying as an application method. • Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area. • If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II). • Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low-growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) revegetating the site following treatment. • When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management (VRM) objectives.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wilderness and Other Special Areas See handbooks H-8550-1 (*Management of Wilderness Study Areas (WSAs)*), and H-8560-1 (*Management of Designated Wilderness Study Areas*), and Manual 8351 (*Wild and Scenic Rivers*)	• Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area. • Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation. • Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration. • Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds. • Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness. • Give preference to herbicides that have the least impact on non-target species and the wilderness environment. • Implement herbicide treatments during periods of low human use, where feasible. • Address wilderness and special areas in management plans. • Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (*Land Use Planning Handbook, Appendix C*)	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas. • Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post signs noting exclusion areas and the duration of exclusion, if necessary. • Use herbicides during periods of low human use, where feasible.
Social and Economic Values	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas. • Post treated areas and specify reentry or rest times, if appropriate. • Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions. • Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Control public access until potential treatment hazards no longer exist, per herbicide product label instructions. • Observe restricted entry intervals specified by the herbicide product label. • Notify local emergency personnel of proposed treatments. • Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area. • Consult with Native American tribes and Alaska Native groups to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide treatments. • To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies, including chemicals, for herbicide treatment projects through local suppliers. • To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated pest management program for projects proposing local use of herbicides.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Rights-of-way	• Coordinate vegetation management activities where joint or multiple use of a ROW exists. • Notify other public land users within or adjacent to the ROW proposed for treatment. • Use only herbicides that are approved for use in ROW areas.
Human Health and Safety	• Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide product label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide product label. • Provide public notification in newspapers or other media where the potential exists for public exposure. • Have a copy of MSDSs at work site. • Notify local emergency personnel of proposed treatments. • Contain and clean up spills and request help as needed. • Secure containers during transport. • Follow label directions for use and storage. • Dispose of unwanted herbicides promptly and correctly.

APPENDIX C

Herbicides Approved for Use on BLM Lands

Listing of Herbicides Approved for Use on BLM Lands*

				Update November 13, 2009	
	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	**EIS/ROD & COURT**			**EPA REG.**	**CA**
INGREDIENT	**INJUNCTIONS**	**TRADE NAME**	**MANUFACTURER**	**NUMBER**	**REG. ****
Bromacil	AK, AZ, CA, CO, ID, MT, ND,	Bromacil 80DF	Alligare, LLC	81927-4	Y
	NE, NM, NV, OK, SD, TX, UT,	Hyvar X	DuPont	352-287	Y
	WA, WY	Hyvar XL	DuPont	352-346	Y
Bromacil +	AK, AZ, CA, CO, ID, MT, ND,	Bromacil/Diuron 40/40	Alligare, LLC	81927-3	Y
Diuron	NE, NM, NV, OK, SD, TX, UT,	Krovar I DF	DuPont	352-505	Y
	WA, WY	Weed Blast Res. Weed Cont.	Loveland Products Inc.	34704-576	N
		DiBro 2+2	Nufarm Americas Inc.	228-227	Y
		DiBro 4+4	Nufarm Americas Inc.	228-235	N
		DiBro 4+2	Nufarm Americas Inc.	228-386	N
		Weed Blast 4G	SSI Maxim	34913-19	N
Chlorsulfuron	AK, AZ, CA, CO, ID, MT, ND,	Telar DF	DuPont	352-522	Y
	NE, NM, NV, OK, SD, TX, UT,	Telar XP	DuPont	352-654	Y
	WA, WY	NuFarm Chlorsulf Pro 75 WDG Herbicide	Nufarm Americas Inc.	228-672	N
		Chlorsulfuron E-Pro 75 WDG	Nufarm Americas Inc.	79676-72	N
Clopyralid	AK, AZ, CA, CO, ID, MT, ND,	Spur	Albaugh, Inc.	42750-89	N
	NE, NM, NV, OK, SD, TX, UT,	Pyramid R&P	Albaugh, Inc.	42750-94	N
	WA, WY	Clopyralid 3	Alligare, LLC	42750-94-81927	Y
		Cody Herbicide	Alligare, LLC	81927-28	Y
		Reclaim	Dow AgroSciences	62719-83	N
		Stinger	Dow AgroSciences	62719-73	Y
		Transline	Dow AgroSciences	62719-259	Y
		CleanSlate	Nufarm Americas Inc.	228-491	Y
Clopyralid +	AK, AZ, CA, CO, ID, MT, ND,	Commando	Albaugh, Inc.	42750-92	N
2,4-D	NE, NM, NV, OK, SD, TX, UT,	Curtail	Dow AgroSciences	62719-48	N
	WA, WY	Cutback	Nufarm Americas Inc.	71368-72	N

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
2,4-D	AK, AZ, CA, CO, ID, MT, ND,	Agrisolution 2,4-D LV6	Agriliance, L.L.C.	1381-101	N
	NE, NM, NV, OK, OR, SD, TX,	Agrisolution 2,4-D Amine 4	Agriliance, L.L.C.	1381-103	N
	UT, WA, WY	Agrisolution 2,4-D LV4	Agriliance, L.L.C.	1381-102	N
		2,4-D Amine 4	Albaugh, Inc./Agri Star	42750-19	Y
		2,4-D LV 4	Albaugh, Inc./Agri Star	42750-15	Y
		Solve 2,4-D	Albaugh, Inc./Agri Star	42750-22	Y
		2,4-D LV 6	Albaugh, Inc./Agri Star	42750-20	N
		Five Star	Albaugh, Inc./Agri Star	42750-49	N
		D-638	Albaugh, Inc./Agri Star	42750-36	N
		2,4-D LV6	Helena Chem. Co.	4275-20-5905	N
		2,4-D Amine	Helena Chem. Co.	5905-72	N
		Opti-Amine	Helena Chem. Co.	5905-501	N
		Barrage HF	Helena	5905-529	N
		HardBall	Helena	5905-549	N
		Unison	Helena	5905-542	N
		Amine 4CA 2,4-D Weed Killer	Loveland Products Inc.	34704-5	Y
		Clean Amine	Loveland Products Inc.	34704-120	N
		Low Vol 4 Ester Weed Killer	Loveland Products Inc.	34704-124	N
		Low Vol 6 Ester Weed Killer	Loveland Products Inc.	34704-125	N
		LV-6 Ester Weed Killer	Loveland Products Inc.	34704-6	Y
		Saber	Loveland Products Inc.	34704-803	N
		Saber CA	Loveland Products Inc.	34704-803	Y
		Salvo	Loveland Products Inc.	34704-609	N
		Savage DF	Loveland Products Inc.	34704-606	Y
		Aqua-Kleen	Nufarm Americas Inc.	71368-4	N
		Aqua-Kleen	Nufarm Americas Inc.	228-378	N
		Esteron 99C	Nufarm Americas Inc.	62719-9-71368	N
		Weedar 64	Nufarm Americas Inc.	71368-1	Y
		Weedone LV-4	Nufarm Americas Inc.	228-139-71368	Y
		Weedone LV-4 Solventless	Nufarm Americas Inc.	71368-14	Y
		Weedone LV-6	Nufarm Americas Inc.	71368-11	Y
		Formula 40	Nufarm Americas Inc.	228-357	Y
		2,4-D LV 6 Ester	Nufarm Americas Inc.	228-95	Y

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
2,4-D - cont.	AK, AZ, CA, CO, ID, MT, ND,	Platoon	Nufarm Americas Inc.	228-145	N
	NE, NM, NV, OK, OR, SD, TX,	WEEDstroy AM-40	Nufarm Americas Inc.	228-145	Y
	UT, WA, WY	Hi-Dep	PBI Gordon Corp.	2217-703	N
		2,4-D Amine	Setre (Helena)	5905-72	N
		Barrage LV Ester	Setre (Helena)	5905-504	N
		2,4-D LV4	Setre (Helena)	5905-90	N
		2,4-D LV6	Setre (Helena)	5905-93	N
		Clean Crop Amine 4	UAP-Platte Chem. Co.	34704-5 CA	Y
		Clean Crop Low Vol 6 Ester	UAP-Platte Chem. Co.	34704-125	N
		Salvo LV Ester	UAP-Platte Chem. Co.	34704-609	N
		2,4-D 4# Amine Weed Killer	UAP-Platte Chem. Co.	34704-120	N
		Clean Crop LV-4 ES	UAP-Platte Chem. Co.	34704-124	N
		Savage DF	UAP-Platte Chem. Co.	34704-606	Y
		Cornbelt 4 lb. Amine	Van Diest Supply Co.	11773-2	N
		Cornbelt 4# LoVol Ester	Van Diest Supply Co.	11773-3	N
		Cornbelt 6# LoVol Ester	Van Diest Supply Co.	11773-4	N
		Amine 4	Wilbur-Ellis Co.	2935-512	N
		Lo Vol-4	Wilbur-Ellis Co.	228-139-2935	N
		Lo Vol-6 Ester	Wilbur-Ellis Co.	228-95-2935	N
		Agrisolution 2,4-D LV6	Winflied Solutions, LLC	1381-101	N
		Agrisolution 2,4-D Amine 4	Winfield Solutions, LLC	1381-103	N
		Agrisolution 2,4-D LV4	Winfield Solutions, LLC	1381-102	N
Dicamba	AK, AZ, CA, CO, ID, MT, ND,	Dicamba DMA	Albaugh, Inc./Agri Star	42750-40	N
	NE, NM, NV, OK, OR, SD, TX,	Vision	Albaugh, Inc.	42750-98	N
	UT, WA, WY	Cruise Control	Alligare, LLC	42750-40-81927	N
		Banvel	Arysta LifeScience N.A. Corp.	66330-276	Y
		Clarity	BASF Ag. Products	7969-137	Y
		Rifle	Loveland Products Inc.	34704-861	Y
		Banvel	Micro Flo Company	51036-289	Y
		Diablo	Nufarm Americas Inc.	228-379	Y
		Vanquish Herbicide	Nufarm Americas Inc.	228-397	Y
		Vanquish	Syngenta	100-884	N
		Sterling Blue	Winfield Solutions, LLC	7969-137-1381	Y

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
2,4-D	NE, NM, NV, OK, OR, SD, TX,	Range Star	Albaugh, Inc./Agri Star	42750-55	N
	UT, WA, WY	Weedmaster	BASF Ag. Products	7969-133	Y
		Rifle-D	Loveland Products Inc.	34704-869	N
		KambaMaster	Nufarm Americas Inc.	71368-34	N
		Veteran 720	Nufarm Americas Inc.	228-295	Y
		Brash	Winfield Solutions, LLC	1381-202	N
Dicamba +	AZ, CO, ID, MT, ND, NE, NM,	Distinct	BASF Ag. Products	7969-150	N
Diflufenzopyr	NV, OK, SD, TX, UT, WA, WY	Overdrive	BASF Ag. Products	7969-150	N
Diquat	AK, AZ, CA, CO, ID, MT, ND, NE,	Reward	Syngenta Crop Prot., Inc.	100-1091	Y
	NM, NV, OK, SD, TX, UT, WA, WY	NuFarm Diquat Pro 2L Herbicide	Nufarm Americas Inc.	228-675	N
		Nufarm Diquat 2L Herbicide	Nufarm Americas Inc.	228-675	N
		Diquat E-Pro 2L	Nufarm Americas Inc.	79676-75	Y
Diuron	AK, AZ, CA, CO, ID, MT, ND,	Diuron 80DF	Agriliance, L.L.C.	9779-318	N
	NE, NM, NV, OK, SD, TX, UT,	Diuron 80DF	Alligare, LLC	81927-12	Y
	WA, WY	Karmex DF	DuPont	352-692	Y
		Karmex XP	DuPont	352-692	Y
		Karmex IWC	DuPont	352-692	Y
		Direx 4L	DuPont	352-678	Y
		Direx 80DF	Griffin Company	1812-362	Y
		Direx 4L	Griffin Company	1812-257	Y
		Diuron 4L	Loveland Products Inc.	34704-854	Y
		Diuron 80 WDG	Loveland Products Inc.	34704-648	N
		Diuron 80WDG	UAP-Platte Chem. Co.	34704-648	N
		Vegetation Man. Diuron 80 DF	Vegetation Man., LLC	66222-51-74477	N
		Diuron-DF	Wilbur-Ellis	00352-00-508-02935	N
		Diuron 80DF	Winfield Solutions, LLC	9779-318	N

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Fluridone	AK, AZ, CA, CO, ID, MT, ND,	Avast!	SePRO	67690-30	Y
	NE, NM, NV, OK, SD, TX, UT,	Sonar AS	SePRO	67690-4	Y
	WA, WY	Sonar Precision Release	SePRO	67690-12	Y
		Sonar Q	SePRO	67690-3	Y
		Sonar SRP	SePRO	67690-3	Y
Glyphosate	AK, AZ, CA, CO, ID, MT, ND,	Aqua Star	Albaugh, Inc./Agri Star	42750-59	Y
	NE, NM, NV, OK, OR, SD, TX,	Forest Star	Albaugh, Inc./Agri Star	42570-61	Y
	UT, WA, WY	Gly Star Original	Albaugh, Inc./Agri Star	42750-60	Y
		Gly Star Plus	Albaugh, Inc./Agri Star	42750-61	Y
		Gly Star Pro	Albaugh, Inc./Agri Star	42750-61	Y
		Glyphosate 4 PLUS	Alligare, LLC	81927-9	Y
		Glyphosate 5.4	Alligare, LLC	81927-8	Y
		Glyfos	Cheminova	4787-31	Y
		Glyfos PRO	Cheminova	67760-57	Y
		Glyfos Aquatic	Cheminova	4787-34	Y
		ClearOut 41	Chem. Prod. Tech., LLC	70829-2	N
		ClearOut 41 Plus	Chem. Prod. Tech., LLC	70829-3	N
		Accord Concentrate	Dow AgroSciences	62719-324	Y
		Accord SP	Dow AgroSciences	62719-322	Y
		Accord XRT	Dow AgroSciences	62719-517	Y
		Accord XRT II	Dow AgroSciences	62719-556	Y
		Glypro	Dow AgroSciences	62719-324	Y
		Glypro Plus	Dow AgroSciences	62719-322	Y
		Rodeo	Dow AgroSciences	62719-324	Y
		Mirage	Loveland Products Inc.	34704-889	Y
		Mirage Plus	Loveland Products Inc.	34704-890	Y
		Aquamaster	Monsanto	524-343	Y
		Roundup Original	Monsanto	524-445	Y
		Roundup Original II	Monsanto	524-454	Y
		Roundup Original II CA	Monsanto	524-475	Y
		Honcho	Monsanto	524-445	Y
		Honcho Plus	Monsanto	524-454	Y

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Glyphosate - cont.	AK, AZ, CA, CO, ID, MT, ND,	Roundup PRO	Monsanto	524-475	Y
	NE, NM, NV, OK, OR, SD, TX,	Roundup PRO Concentrate	Monsanto	524-529	Y
	UT, WA, WY	Roundup PRO Dry	Monsanto	524-505	Y
		Roundup PROMAX	Monsanto	524-579	Y
		Aqua Neat	Nufarm Americas Inc.	228-365	Y
		Credit Xtreme	Nufarm Americas Inc.	71368-81	Y
		Foresters	Nufarm Americas Inc.	228-381	Y
		Razor	Nufarm Americas Inc.	228-366	Y
		Razor Pro	Nufarm Americas Inc.	228-366	Y
		GlyphoMate 41	PBI Gordon Corp.	2217-847	Y
		AquaPro Aquatic Herbicide	SePRO Corporation	62719-324-67690	Y
		Rattler	Setre (Helena)	524-445-5905	Y
		Buccaneer	Tenkoz	55467-10	Y
		Buccaneer Plus	Tenkoz	55467-9	Y
		Mirage Herbicide	UAP-Platte Chem. Co.	524-445-34704	Y
		Mirage Plus Herbicide	UAP-Platte Chem. Co.	524-454-34704	Y
		Glyphosate 4	Vegetation Man., LLC	73220-6-74477	Y
		Cornerstone	Winfield Solutions, LLC	1381-191	Y
		Cornerstone Plus	Winfield Solutions, LLC	1381-192	Y
		Rascal	Winfield Solutions, LLC	1381-191	N
		Rascal Plus	Winfield Solutions, LLC	1381-192	N
Glyphosate +	AK, AZ, CA, CO, ID, MT, ND,	Landmaster BW	Albaugh, Inc./Agri Star	42570-62	N
2,4-D	NE, NM, NV, OK, OR, SD, TX,	Campaign	Monsanto	524-351	N
	UT, WA, WY	Landmaster BW	Monsanto	524-351	N
Glyphosate +	AK, AZ, CA, CO, ID, MT, ND,	Fallowmaster	Monsanto	524-507	N
Dicamba	NE, NM, NV, OK, OR, SD, TX,	GlyKamba	Nufarm Americas Inc.	71368-30	N
	UT, WA, WY				

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Hexazinone	AK, AZ, CA, CO, ID, MT, ND,	Velpar ULW	DuPont	352-450	N
	NE, NM, NV, OK, SD, TX, UT,	Velpar L	DuPont	352-392	Y
	WA, WY	Velpar DF	DuPont	352-581	Y
		Pronone MG	Pro-Serve	33560-21	N
		Pronone 10G	Pro-Serve	33560-21	Y
		Pronone 25G	Pro-Serve	33560-45	N
Hexazinone +	AK, AZ, CO, ID, MT, ND, NE,	Westar	DuPont Crop Protection	352-626	Y
Sulfometuron methyl	NM, NV, OK, SD, TX, UT, WA, WY	Oustar	DuPont Crop Protection	352-603	Y
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of these herbicides is prohibited.					
Imazapic	AZ, CO, ID, MT,ND, NE, NM,	Panoramic 2SL	Alligare, LLC	66222-141-81927	N
	NV, OK, SD, TX, UT, WA, WY	Plateau	BASF	241-365	N
		Imazapic E 2 SL	Etigra, LLC	79676-65	N
Imazapic +	AZ, CO, ID, MT,ND, NE, NM,	Journey	BASF	241-417	N
Glyphosate	NV, OK, SD, TX, UT, WA, WY				
Imazapyr	AK, AZ, CA, CO, ID, MT, ND,	Imazapyr 2SL	Alligare, LLC	81927-23	N
	NE, NM, NV, OK, SD, TX, UT,	Imazapyr 4SL	Alligare, LLC	81927-24	N
	WA, WY	Ecomazapyr 2SL	Alligare, LLC	81927-22	N
		Arsenal Railroad Herbicide	BASF	241-273	N
		Chopper	BASF	241-296	Y
		Arsenal Applicators Conc.	BASF	241-299	N
		Arsenal	BASF	241-346	N
		Arsenal PowerLine	BASF	241-431	N
		Stalker	BASF	241-398	N

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Imazapyr - cont.	AK, AZ, CA, CO, ID, MT, ND,	Habitat	BASF	241-426	Y
	NE, NM, NV, OK, SD, TX, UT,	Imazapyr E-Pro 2 - VM &	Etigra, LLC	81959-8	Y
	WA, WY	Aquatic Herbicide			
		Imazapyr E-Pro 4 - Forestry	Etigra, LLC	81959-9	N
		Imazapyr E-Pro 2E - Site Prep & Basal	Etigra, LLC	81959-7	N
		Polaris	Nufarm Americas Inc.	228-534	Y
		Polaris AC	Nufarm Americas Inc.	241-299-228	Y
		Polaris AC	Nufarm Americas Inc.	228-480	Y
		Polaris AQ	Nufarm Americas Inc.	241-426-228	Y
		Polaris RR	Nufarm Americas Inc.	241-273-228	N
		Polaris SP	Nufarm Americas Inc.	228-534	Y
		Polaris SP	Nufarm Americas Inc.	241-296-228	Y
		Polaris Herbicide	Nufarm Americas Inc.	241-346-228	N
		SSI Maxim Arsenal 0.5G	SSI Maxim Co., Inc.	34913-23	N
		Ecomazapyr 2 SL	Vegetation Man., LLC	74477-6	N
		Imazapyr 2 SL	Vegetation Man., LLC	74477-4	N
		Imazapyr 4 SL	Vegetation Man., LLC	74477-5	N
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND, NE,	Mojave 70 EG	Alligare, LLC	74477-9-81927	N
Diuron	NM, NV, OK, SD, TX, UT, WA, WY	Sahara DG	BASF	241-372	N
		Imazuron E-Pro	Etigra, LLC	79676-54	N
		SSI Maxim Topsite 2.5G	SSI Maxim Co., Inc.	34913-22	N
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND,	Lineage Clearstand	DuPont	352-766	N
Metsulfuron methyl	NE, NM, NV, OK, SD, TX, UT,				
	WA, WY				

Listing of Herbicides Approved for Use on BLM Lands*

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD & COURT INJUNCTIONS	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND,	Lineage HWC	DuPont	352-765	N
Sulfometuron methyl +	NE, NM, NV, OK, SD, TX, UT,	Lineage Prep	DuPont	352-767	N
Metsulfuron methyl	WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of these herbicides is prohibited.					
Metsulfuron methyl	AK, AZ, CO, ID, MT, ND, NE,	MSM 60	Alligare, LLC	81927-7	N
	NM, NV, OK, SD, TX, UT, WA,	Escort DF	DuPont	352-439	N
	WY	Escort XP	DuPont	352-439	N
		MSM E-AG 60 EG Herbicide	Etigra, LLC	81959-14	N
		MSM E-Pro 60 EG Herbicide	Etigra, LLC	81959-14	N
		Patriot	Nufarm Americas Inc.	228-391	N
		PureStand	Nufarm Americas Inc.	71368-38	N
		Metsulfuron Methyl DF	Vegetation Man., L.L.C.	74477-2	N
Metsulfuron methyl +	AK, AZ, CO, ID, MT, ND, NE,	Cimarron Extra	DuPont	352-669	N
Chlorsulfuron	NM, NV, OK, SD, TX, UT, WA,	Cimarron Plus	DuPont	352-670	N
	WY				
Metsulfuron methyl +	AK, AZ, CO, ID, MT, ND, NE, NM	Cimarron MAX	DuPont	352-615	N
Dicamba + 2,4-D	NV, OK, SD, TX, UT, WA, WY				
Picloram	AZ, CO, ID, MT, ND, NE, NM,	Triumph K	Albaugh, Inc.	42750-81	N
	NV, OK, OR, SD, TX, UT, WA,	Triumph 22K	Albaugh, Inc.	42750-79	N
	WY	Picloram K	Alligare, LLC	42750-81-81927	N
		Picloram K	Alligare, LLC	81927-17	N
		Picloram 22K	Alligare, LLC	42750-79-81927	N
		Picloram 22K	Alligare, LLC	81927-18	N
		Grazon PC	Dow AgroSciences	62719-181	N
		OutPost 22K	Dow AgroSciences	62719-6	N
		Tordon K	Dow AgroSciences	62719-17	N
		Tordon 22K	Dow AgroSciences	62719-6	N
		Trooper 22K	Nufarm Americas Inc.	228-535	N

Listing of Herbicides Approved for Use on BLM Lands*

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD & COURT INJUNCTIONS	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Picloram +	AZ, CO, ID, MT, ND, NE, NM,	GunSlinger	Albaugh, Inc.	42750-80	N
2,4-D	NV, OK, OR, SD, TX, UT, WA,	Picloram + D	Alligare, LLC	42750-80-81927	N
	WY	Picloram + D	Alligare, LLC	81927-16	N
		Tordon 101M	Dow AgroSciences	62719-5	N
		Tordon 101 R Forestry	Dow AgroSciences	62719-31	N
		Tordon RTU	Dow AgroSciences	62719-31	N
		Grazon P+D	Dow AgroSciences	62719-182	N
		HiredHand P+D	Dow AgroSciences	62719-182	N
		Pathway	Dow AgroSciences	62719-31	N
		Trooper 101	Nufarm Americas Inc.	228-561	N
		Trooper P + D	Nufarm Americas Inc.	228-530	N
Picloram +	AZ, CO, ID, MT, ND, NE, NM,	Trooper Extra	Nufarm Americas Inc.	228-586	N
2,4-D +	NV, OK, OR, SD, TX, UT, WA,				
Dicamba	WY				
Sulfometuron methyl	AK, AZ, CA, CO, ID, MT, ND,	SFM 75	Alligare, LLC	81927-26	Y
	NE, NM, NV, OK, SD, TX, UT	Oust DF	DuPont	352-401	N
	WA, WY	Oust XP	DuPont	352-601	Y
		SFM E-Pro 75EG	Etigra, LLC	79676-16	Y
		Spyder	Nufarm Americas Inc.	228-408	Y
		SFM 75	Vegetation Man., L.L.C.	72167-11-74477	Y
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of these herbicides is prohibited.					
Sulfometuron methyl +	AK, AZ, CA, CO, ID, MT, ND,	Landmark XP	DuPont	352-645	Y
Chlorsulfuron	NE, NM, NV, OK, SD, TX, UT				
	WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide is prohibited.					

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Sulfometuron methyl +	AK, AZ, CA, CO, ID, MT, ND,	Oust Extra	DuPont	352-622	N
Metsulfuron methyl	NE, NM, NV, OK, SD, TX, UT				
	WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide is prohibited.					
Tebuthiuron	AZ, CA, CO, ID, MT, ND, NE,	Spike 20P	Dow AgroSciences	62719-121	Y
	NM, NV, OK, SD, TX, UT, WA,	Spike 80DF	Dow AgroSciences	62719-107	Y
	WY	SpraKil S-5 Granules	SSI Maxim Co., Inc.	34913-10	Y
Tebuthiuron +	AZ, CA, CO, ID, MT, ND, NE,	SpraKil SK-13 Granular	SSI Maxim Co., Inc.	34913-15	Y
Diuron	NM, NV, OK, SD, TX, UT, WA,	SpraKil SK-26 Granular	SSI Maxim Co., Inc.	34913-16	Y
	WY				
Triclopyr	AK, AZ, CA, CO, ID, MT, ND,	Triclopyr 4EC	Alligare, LLC	72167-53-74477	Y
	NE, NM, NV, OK, SD, TX, UT	Triclopyr 3	Alligare, LLC	81927-13	Y
	WA, WY	Triclopry 4	Alligare, LLC	81927-11	Y
		Element 3A	Dow AgroSciences	62719-37	Y
		Element 4	Dow AgroSciences	62719-40	Y
		Forestry Garlon XRT	Dow AgroSciences	62719-553	Y
		Garlon 3A	Dow AgroSciences	62719-37	Y
		Garlon 4	Dow AgroSciences	62719-40	Y
		Garlon 4 Ultra	Dow AgroSciences	62719-527	Y
		Remedy	Dow AgroSciences	62719-70	Y
		Remedy Ultra	Dow AgroSciences	62719-552	Y
		Pathfinder II	Dow AgroSciences	62719-176	Y
		Relegate	Nufarm Americas Inc.	228-521	Y
		Tahoe 3A	Nufarm Americas Inc.	228-384	Y
		Tahoe 3A	Nufarm Americas Inc.	228-518	Y
		Tahoe 3A	Nufarm Americas Inc.	228-520	Y
		Tahoe 4E	Nufarm Americas Inc.	228-385	Y
		Tahoe 4E Herbicide	Nufarm Americas Inc.	228-517	Y
		Renovate 3	SePRO Corporation	62719-37-67690	Y

Listing of Herbicides Approved for Use on BLM Lands*

	STATES WITH APPROVAL				
	BASED UPON CURRENT				
ACTIVE	EIS/ROD & COURT			EPA REG.	CA
INGREDIENT	INJUNCTIONS	TRADE NAME	MANUFACTURER	NUMBER	REG. **
Triclopyr (cont.)	AK, AZ, CA, CO, ID, MT, ND,	Renovate OTF	SePRO Corporation	67690-42	Y
	NE, NM, NV, OK, SD, TX, UT	Ecotriclopyr 3 SL	Vegetation Man., LLC	72167-49-74477	N
	WA, WY	Triclopyr 3 SL	Vegetation Man., LLC	72167-53-74477	N
Triclopyr +	AK, AZ, CA, CO, ID, MT, ND,	Everett	Alligare, LLC	81927-29	Y
2,4-D	NE, NM, NV, OK, SD, TX, UT,	Crossbow	Dow AgroSciences	62719-260	Y
	WA, WY	Candor	Nufarm Americas Inc.	228-565	Y
Triclopyr +	AK, AZ, CA, CO, ID, MT, ND,	Prescott Herbicide	Alligare, LLC	81927-30	Y
Clopyralid	NE, NM, NV, OK, SD, TX, UT,	Redeem R&P	Dow AgroSciences	62719-337	Y
	WA, WY	Brazen	Nufarm Americas Inc.	228-564	Y

*** Refer to the complete label prior to considering the use of any herbicide formulation. Label changes can impact the intended use through, such things as, creation or elimination of Special Local Need (SLN) or 24 (c) registrations, changes in application sites, rates and timing of application, county restrictions, etc.**

**** Just because a herbicide has a Federal registration, and is approved under the current EIS, it may or may not be registered for use in California. This column identifies those formulations for which there is a California registration.**

Attachment D.3.1. Comparison of Tule and Draft EIR/EIS KOPs.

Tule KOP	Tule Class	Tule Overall Visual Impact Rating	ECOs KOP	ECOs Class	Viewer Impact Classification (ECOs)	KOP Visual Difference
KOP 1- I-8 at Ribbonwood Road	Class C- Common	Minor	No visual produced for this view			
KOP 2 - Ribbonwood Road North of I-8	Class B- Above Average	Moderate	KOP 10: Community of Boulevard, Ribbonwood Road, view toward Tule Wind Project site and Alternative Tule Wind sites– Residents and Recreationists (Figure D.3-15A)	Class B – Above Average	High	Same photo as in the Visual report. Existing KOP 10 is slightly zoomed in with less roadway showing the ES. In the VS hardly any roadway is showing, indicated that it is more zoomed in. AVS is zoomed in even more, no roadway showing.
KOP 3- I-8 at McCain Valley Road	Class C- Common	Minor	KOP 11: McCain Valley Road Northbound, view toward Tule Wind Project site– Public land recreationists (Figure D.3-16A)	Class B- Above Average	Medium	Same photo as in the Visual Report, but more zoomed out to the east. There is a transmission line added in the existing setting that is not included in our KOP 3. Our view shows a portion of a guide wire. It looks like was added to the picture afterwards. VS1 looks like the same scale as the existing setting. VS2 has a view that was not included in the Visual Report, not consistent with the

Tule KOP	Tule Class	Tule Overall Visual Impact Rating	ECOs KOP	ECOs Class	Viewer Impact Classification (ECOs)	KOP Visual Difference
						previous picture. Please consider removing redundant KOP 11 – VS2 because no existing condition for this simulation is shown, and it uses cloudy conditions.
KOP 4 - McCain Valley Road at Rough Acres Ranch	Class C- Common	Minor	KOP 12: McCain Valley Road, Lark Canyon OHV Entrance, view toward Tule Wind Project site–Public land recreationists (Figure D.3-17A and Figure D.3-17B)	Class B – Above Average	Medium	KOP 12 (ES2) is a different view than our KOP 4. View is more zoomed out. View of McCain Road 2 in the Visual Report is the same as the KOP 12 (ES1)
KOP 5 - McCain Valley Road at Lark Canyon OHV Area	Class C –Common	Minor	KOP 13: Lark Canyon Staging Area, view toward Tule Wind Project site–Public land recreationists (Figure D.3-18A)	Class C – Common	Medium	KOP 13 has the same view and scale as our KOP 5.
KOP 6 - McCain Valley Road at Carrizo Gorge Scenic Lookout	Class B – Above Average	Moderate	KOP 14: Carrizo Overlook, view toward Tule Wind Project site–Public land recreationists (Figure D.3-19A)	Class A – Exceptional	High	KOP 14 has the same view and scale as our KOP 6.
KOP 7 - Cottonwood Campground	Class B – Above Average	Moderate	No visual produced for this view			
KOP 8 – McCain Valley Road at Northern Terminus	Class B – Above Average	Moderate	No visual produced for this view			
KOP 9 - Old Highway 80 and Existing Boulevard Substation	Class C – Common	Minor	KOP 15: Old Highway 80 Westbound, view toward ECO Substation Alternative	Class B- Above Average	Medium to High	KOP 15 has the same view as our KOP 9. The transmission line crosses

Tule KOP	Tule Class	Tule Overall Visual Impact Rating	ECOs KOP	ECOs Class	Viewer Impact Classification (ECOs)	KOP Visual Difference
			Project site–State highway motorists, residents, and recreationists (Figure D.3-20A)			the road in KOP 15 and not in our KOP 9. The view is actuate, but the location may not.
No visual produced for this view			KOP 16: McCain Valley Road, BLM In-Ko-Pah ACEC, view toward Tule Wind Alternative Project sites–Public land recreationists (Figure D.3-21A). (Reduced alternative component location)	Class A – Exceptional	High	

U S Department
of Transportation
**Federal Aviation
Administration**

Mission Support Services
800 Independence Avenue SW
Washington DC 20591

NOV 0 2010

Mr. Tom Vinson
Director of Federal Regulatory Affairs
American Wind Energy Association
1501 M St. NW, Suite 1000
Washington, DC 20005

Dear Mr. Vinson:

It has come to our attention that the Federal Aviation Administration's position on the use of Audio Visual Warning Systems (AVWS) on wind turbines or wind farms has generated confusion.

The FAA accepts requests from the sponsors for AVWS, as an alternative to conventional lighting systems and will analyze and approve these systems on a case-by-case basis during aeronautical studies conducted under title 14 of the Code of Federal Regulations, part 77. The FAA has not extended this approval for the use of AVWS on wind turbines or wind farms.

FAA standards for lighting of wind turbines are based on a study conducted in 2005 of these structures and various lighting scenarios. This study predated the arrival of AVWS and consequently, these systems were not included in the study, nor has the FAA adopted standards for these systems. Therefore, the FAA is unable to approve requests for AVWS to light wind turbines or wind farms.

We have begun our study of these systems and currently are identifying locations for studying AVWS on wind farm applications. We also have efforts underway with the Bureau of Land Management to identify and coordinate additional applications to study. We expect to complete this study and have standards in place by the end of 2011. Advisory Circular No. 70/7460-1K, Obstruction Marking and Lighting will be updated to incorporate the new standards for AVWS.

Sincerely,

Sheri Edgett Baron

Federal Aviation Administration

Memorandum

Date: JUN 15 2009

To: Obstruction Evaluation Services Personnel

From: Kevin Haggerty
Manager, Obstruction Evaluation Services

Subject: Changes to Federal Aviation Administration (FAA) Advisory Circular (AC) 70/7460-1K, Obstruction Marking and Lighting

We are preparing changes to FAA AC 70/7460-1K, Obstruction Marking and Lighting. The changes will incorporate Audio Visual Warning Systems (AVWS) as an acceptable form of marking and lighting that will meet established technical standards to identify an obstruction to air navigation.

AVWS is an all-weather, day and night, low-voltage, Radar-based obstacle avoidance system that utilizes current obstruction lighting products and does not require additional equipment in an aircraft.

AVWS activates obstruction lighting and audio signals to alert pilots of potential collisions with obstacles such as power lines, wind turbines, bridges, and towers. The obstruction lights and audio warnings are inactive when there is no air traffic in the area of the obstruction.

The FAA has analyzed and reviewed the Obstruction Collision Avoidance System (OCAS™) and has determined that OCAS™ provides an equivalent level of safety and is a suitable alternative to the marking and lighting requirements of obstacles as recommended in FAA AC 70/7460-1K.

OCAS™ is the first AVWS to be installed, tested, and approved in the National Airspace System (NAS).

The OES will accept, analyze, and approve an AVWS as an alternative to conventional lighting systems on a case-by-case basis.

OES personnel shall:

1. Review each FAA Form 7460-1, Notice of Proposed Construction or Alteration, for requests to use an AVWS.

2. If an AVWS is indicated, select "AVWS" as the requested Marking and Lighting.
3. Ensure that Technical Operations and Spectrum Engineering are selected to provide comment on the aeronautical study.
4. Business rules will be incorporated into the Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) System based on AVWS as the Requested Marking/Lighting to override current auto screens and ensure proper coordination. If AVWS is not selected as the Requested Marking/Lighting, ensure that the case is manually unlocked for review from AF and FM.
5. Before the issuance of the Determination, ensure that comments from Technical Operations and Spectrum Engineering are reviewed and specifically acknowledge that the AVWS was reviewed, approved, or conditionally approved (e.g., No Audio).
6. Adjudicate all AVWS concerns and indicate in the Additional Information section that AVWS is approved for the specific study with or without conditions or limitations prior to the issuance of a Determination of No Hazard to Air Navigation.
7. If AVWS is approved with conditions or limitations or if AVWS is not approved: provide your supervisor with the Aeronautical Study Number and wait for approval to issue the Determination of No Hazard to Air Navigation.
8. Ensure that the 7460-2, Notice of Actual Construction or Alteration, indicates that AVWS is installed.

The OES will incorporate an AVWS section to the external OE/AAA Web site to inform the public about AVWS and its benefits in the NAS.

Please direct any questions or comments to the Manager, OES.

HDR | ONE COMPANY *Many Solutions*℠

Memo

To: Patrick O'Neill, HDR	
From: Pamela Cecere, Lori Arena, and Mario Osorio, HDR	Project: Tule Wind Project
Date: March 3, 2011	

RE: Tule Wind Project – Visual Resources Analysis

The information in this memorandum supports the following changes to the Tule-VIS-4 and Tule-VIS-5 impact determinations for the Draft East County Substation/Tule Wind/Energia Sierra Juarez U.S. Generator-Tie Environmental Impact Report/Environmental Impact Statement (DEIR/DEIS) pertaining to the Tule Wind Project (Project).

Impact Tule-VIS-4:

Under Impact Tule-VIS-4, an adverse significant impact would occur only if "the project would create a substantial new source of light or glare that would adversely affect day or nighttime views in the area." The DEIR/DEIS analysis erroneously states that the Project would adversely affect nighttime views in the area due to the required FAA obstruction lighting and flashing red or white lights which would be visible to residents, recreationists, and motorists on Interstate 8 (I-8). The Operations and Maintenance (O&M) building lighting would not impact dark skies, but would be visible to residences in the general area due to the general lack of existing nighttime lighting in the area. This memorandum presents information to support the change in impact classification for Tule-VIS-4 from a Class I (significant and unmitigable) impact to a Class III (less than significant) impact.

Impact Tule-VIS-5:

Under Impact Tule-VIS-5, an adverse significant impact would occur only if "the construction of the Tule Wind Project or the presence of project components would result in an inconsistency with federal, state, or local regulations, plans, and standards applicable to the protection of visual resources" thus negating a specific jurisdictional agency's attempt to reduce or avoid unnecessary visual impacts. The DEIR/DEIS incorrectly concludes that: 1) the Project is not consistent with County regulations and policies (Draft and Existing) that are provided to protect the environment by minimizing light pollution for the protection of community character or rural areas, ecosystems, and astronomical research; 2) the Project is not consistent with the County of San Diego Existing General Plan Mountain Empire Subregional Plan (Scenic Highway Goal) due to visual impacts to I-8 as a third priority rated roadway; and 3) operation of the Obstacle Collision Avoidance System (OCAS) would result in light trespass that could likely extend beyond the spill light thresholds identified by the County that would cause an inconsistency with Section 6324 of the County of San Diego Zoning Ordinance. This memorandum presents information to support the change in impact classification for Tule-VIS-5 from a Class I (significant and unmitigable) impact to a Class III (less than significant) impact.

The visual resource analysis, as described in the DEIR/DEIS for the Project, addresses all existing Federal, state, and local light pollution, dark sky, and scenic highway policies and regulations, in addition to draft policies and regulations as described within the County of San Diego Draft General Plan. A brief description of the dark sky policies, FAA regulations, and scenic highway policies included in this analysis of the Project are provided below. An analysis of the Project's compliance and project design features proposed as part of the Project's

implementation is also provided to support the change in impact classification for Tule-VIS-4 and Tule-VIS-5.

Policies Pertaining to Dark Sky Conditions

Federal

- BLM Eastern San Diego County Resource Management Plan. As part of the BLM's Eastern San Diego Resource Management Plan (RMP), public lands are typically designated according to VRM Classes, ranging from Class I to Class IV. The BLM plan and policies for public lands in the project area are contained in the Eastern San Diego County RMP. The majority of the project area is located within BLM land and has a visual resource management class rating of Class IV. This class rating allows for "the level of change to the characteristic landscape can be high". This classification permits greater visual change due to energy projects.
- FAA Advisory Circular 70/7460-1K (FAA 2007) requires that all airspace obstructions over 200 feet in height or in close proximity to an airfield have obstruction lighting.

  Chapter 13 of FAA Advisory Circular 70/7460-1K (FAA 2007) is dedicated to marking and lighting wind turbine farms (wind turbine farms are defined as wind turbine developments containing three or more turbines of heights over 200 feet aboveground level). As listed in Chapter 13, general standards established for wind turbine farm lighting include:

  - Not all wind turbine units within an installation or farm need to be lighted.
  - Obstruction lights within a group of wind turbines should have unlighted separations or gaps of not more than ½ statute mile of the integrity of the group appearance is to be maintained. This is especially critical if the arrangement of objects is essentially linear.
  - Nighttime wind turbine obstruction lighting should consist of the preferred FAA L-864 aviation red-colored flashing lights (20–40 flashes per minute is the standard flashing range for this lighting type).
  - Daytime lighting of wind turbine farms is not required as long as the turbine structures are painted in a bright white color or light off-white color most often found on wind turbines.
  - Light fixtures should be placed as high as possible on the turbine nacelle, so as to be visible from 360 degrees.
  - For wind turbine farms in a linear turbine configuration, place a light on each turbine positioned at each end of the line or string of turbines. In the event that the last segment is significantly short, push the lit turbine back toward the starting point to present a well-balanced string of lights. High concentrations of lights should be avoided.

County

- San Diego County Light Pollution Code (Title 5, Div. 9, Sections 59.101-59.113 of the County Code of Regulatory Ordinances) as added by Ordinance No. 6900, effective January 18, 1995 and amended July 17, 1986 by Ordinance No. 7155 and April 20, 2005 by Ordinance No. 9716.
  - The Light Pollution Code (LPC), also known as the Dark Sky Ordinance, was adopted to "minimize light pollution for the enjoyment and use of property and the

night environment by the citizens of San Diego County and to protect the Palomar and Mount Laguna observatories from the effects of light pollution that have a detrimental effect on astronomical research by restricting the permitted use of outdoor light fixtures on private property" (Sec. 59.101).

- San Diego County General Plan, Conservation Element (Part X), Chapter 7 Astronomical Dark Sky, discusses the importance of maintaining dark skies in the County. This chapter makes several findings pertaining to suitable observatory site criteria. Chapter 7 also sets out several policy and action programs designed to limit light pollution and ensure the protection of dark skies in the County, including minimizing development impacts on the useful life of the observatories, assisting in the regulation of dark sky conservation, amending ordinances to control potentially significant adverse effects to Palomar and Mount Laguna observatories, and designing future roadways and development in a way suitable for the protection of dark skies near the observatories.
- County of San Diego Zoning Ordinance (Section 6320, 6322, 6324) (County of San Diego 2010d). Sections 6320, 6322, and 6324 of the Zoning Ordinance contains performance standards for glare caused by all commercial and industrial uses in residential, commercial, and identified industrial zones.
- County of San Diego Draft Mountain Empire Subregional Plan Policy LU 3.1.1 and 3.1.2 encourages development to preserve dark skies with reduced lighting and increased shielding requirements and encourages increased resources or methods for enforcement of preservation of dark skies, respectively.
    - The Draft General Plan and the Mountain Empire Subregional Plan are currently in draft form and have not been formally adopted by the County of San Diego. Therefore, the Project would not be subject to these policies.
- County of San Diego Draft General Plan Update – Conservation and Open Space Element (Policies COS-11.1 and COS-11.2) (County of San Diego 2010)
    - The Draft General Plan is currently in draft form and has not been formally adopted by the County of San Diego. Therefore, the Project would not be subject to these policies.
- Mountain Empire Subregional Plan, Chapter 6 Conservation, Environmental Resource Goal (Adopted 1979, Amended 1995), Policy 6, " the dark night sky is a significant resource for the Subregion and appropriate steps shall be taken to preserve it."

Policies Pertaining to Scenic Highways

State

- *California Department of Transportation: Scenic Highway Program:* The California Scenic Highway Program was created in 1963 to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to California highways. The State Scenic Highway system includes both "designated" scenic highways and "eligible" scenic highways. An "eligible" state highway becomes "designated" after a local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives the designation. Within the project area, there are no designated state scenic highways. Both I-8 and SR-94 are eligible state scenic highways.
- *California State Historic Routes:* Old Highway 80 is a designated California State Historic Route. In 2006, the state legislature granted this designation in recognition of the highway's "outstanding natural, cultural, historic, and scenic qualities. This designation

does not influence the "future planning or development of adjacent public and private properties" (Assembly Concurrent Resolution (ACR) 123 (State of California Legislature 2006)).

County

- *San Diego County General Plan Scenic Highway Element:* The County of San Diego General Plan does not contain a separate element for visual or aesthetic resources; however, the General Plan does address visual quality under the Scenic Highways Element (1986). The purpose of the San Diego County General Plan Scenic Highway Element is to protect and enhance the County's scenic, historic, and recreational resources within a network of scenic highway corridors. The Scenic Highways Element identifies scenic highways and contains a list of priorities for future designation and protection measures. The list identifies the route's priority for scenic corridor planning and implementation. Within the project area, I-8 from SR-79 east to the Imperial County line, and SR-94 from SR-125 to I-8, are both listed as third priority San Diego County scenic routes.
- *Mountain Empire Subregional Plan:* The protection of scenic and visual resources in the Mountain Empire Subregion is acknowledged under the Scenic Highway Goal contained within the Mountain Empire Subregional Plan which states "Establish a network of scenic highway corridors within which scenic, historical and recreational resources are protected and enhanced".

Tule Wind Project – Dark Sky Compliance

The Tule Wind Project Plan of Development and DEIR/DEIS describe the proper use of lighting to meet FAA lighting requirements as well as local policies for preservation of dark skies through various applicant proposed measures (APMs) and design features incorporated into the Project's design:

- To minimize visual impacts, all of the turbine components will be finished using low-reflectivity neutral white colors in compliance with FAA regulations. In addition, approximately one-third to one-half of the turbine structures will be lit with synchronized red flashing lights per FAA regulations. Red flashing lights are proposed to be used because they are both more evident from aircrafts and less diminishing to dark sky conditions.

  FAA has prepared guidance (USDOT FAA *Advisory Circular Obstruction Marking and Lighting*) for lighting wind farms with structures over 200-feet in height. The tallest structure proposed on site (wind turbines measured from base to blade tip) would be approximately 492 feet high; and therefore, on-site turbines would require obstruction lighting. FAA prefers the use of L-864 red-colored flashing lights as these lights are the most conspicuous to aircraft. The red-colored flashing light is also the least intrusive lighting with regard to preserving dark sky conditions because the red lighting preserves the natural night vision as the human eye is less sensitive to red lighting than white or other colored lighting.

  The use of red strobe lighting, as opposed to white strobe lighting, allows observers to "dark adapt" in areas within sight of the turbines. Red strobe lighting remains the least obtrusive type of lighting according to the International Dark Sky Association (IDA) http://www.darksky.org/mc/page.do;jsessionid=FC0FBB24FBB 299EBEC39174BC11AA3A4.mc0?sitePageId=119791. As described in the DEIR/DEIS, exterior lighting installed on turbines would be restricted to the minimum required

number of lights and would only include the minimum intensity of FAA aviation warning lights to meet FAA standards.

Furthermore, it should be noted that the DEIR/DEIS proposes mitigation (see MM VIS-4b) to incorporate Obstacle Collision Avoidance System (OCAS) onto the Project's wind turbines. Mitigation Measure VIS-4b states "The project applicant shall install the OCAS lighting system on all proposed wind turbines in order to minimize nighttime lighting impacts attributed to the operation of FAA-required obstruction lighting. As the OCAS and other Audio Visual Warning Systems (AVWS) have been approved by the FAA and are considered to be suitable alternatives to the marking and lighting requirements as recommended in FAA Advisory Circular (AC) 70/7460-1K, installation of this system would be compatible with FAA requirement."

Correspondence from the FAA states that approval for the use of AVWS is not extended to wind turbines or wind farms, and "FAA is unable to approve requests for AVWS to light wind turbines or wind farms". Compliance with FAA regulations will be met through utilizing red-colored flashing lights on wind turbines as mentioned above.

Given the applicable dark sky and light pollution policies, the Project visual resource evaluation and project design features account for the preservation and protection of dark sky conditions in accordance with the County of San Diego regulations.

- The County of San Diego Light Pollution Code applies to the Project and is intended to restrict the permitted use of outdoor light fixtures emitting undesirable light into the night sky that have a detrimental effect on astronomical research. The Operations and Maintenance (O&M) facility is the only permanent building that will require outdoor lighting. Project design feature APM AES-7 will establish compliance with the County standard to use Class II lamp source and shielding requirements to illuminate walkways, roadways, equipment yards, parking lots and outdoor security. Other security lighting for construction purposes will be limited to construction storage areas for security and will be removed upon completion of construction. The Project will adhere to the San Diego County Light Pollution Code to minimize light pollution to the night environment and would therefore be incompliance with the San Diego County Light Pollution Code.
- The O&M facility is the only permanent building that will require outdoor lighting. The Project will adhere to the San Diego County Light Pollution Code to minimize light pollution to the night environment and would not have an adverse effect to Palomar and Mount Laguna observatories. Fully shielded low pressure sodium lighting will be used on outdoor fixtures to reduce or eliminate detrimental lighting impacts to the nearby Palomar observatory which is more than 8 miles from the project site. The use of low pressure sodium lighting with shielding is the most effective way of reducing light pollution and is used for lighting surrounding astronomical observatories to best preserve dark sky conditions.

  The Project will include exterior lighting on turbines as aviation warning lights as described in APM TULE-AES-4. Red-colored strobe lighting will be used as this color preserves the dark sky conditions and is less sensitive to the human eye. This lighting type is considered less obtrusive by the International Dark Sky Association (IDA). Given the compliance with the County Light Pollution Code relative to mandatory FAA lighting, the Project will be incompliance with the San Diego County General Plan, Conservation Element (Part X) Chapter 7 Astronomical Dark Sky.
- The Project would not significantly produce a light source that would impact night skies; therefore, the Project would comply with the Mountain Empire Subregional Plan, Chapter

6 Conservation, Environmental Resource Goal, Policy 6 that states that appropriate steps should be taken to preserve dark night sky.

- The Draft General Plan and the Mountain Empire Subregional Plan are currently in draft form and have not been formally adopted by the County of San Diego. Therefore, the Project would not be subject to these policies.

Tule Wind Project –Scenic Highway Compliance

- There are only two official scenic highways located in San Diego County, with neither located adjacent to the Project. Interstate 8 is currently not listed as a state scenic highway or scenic corridor by the California Department of Transportation (CALTRANS) Scenic Highway Program, although it is listed as eligible. The San Diego County Scenic Highway Element, Policy 1 supports the ongoing County scenic highway system, of which roadways are rated in three categories (first, second, and third priority). Currently the County has six first priority routes, 16 second priority routes, and 35 third-priority routes listed, of which I-8 is identified as a third-priority. The Mountain Empire Subregional Plan also lists I-8 to be listed as a scenic highway from SR-79 east to the Imperial County Line in the Scenic Highways Goal. Considering the low status rating of I-8 as a scenic highway and the current CALTRANS scenic highway status, it is unlikely that I-8 will be designated as scenic highway in the near future; therefore, the Project would be consistent with the State scenic highway program and the Scenic Highway Goal Mountain Empire Subregional Plan.
- Old Highway 80 is designated as a California State Historic Route. This designation does not influence future planning or development of adjacent public and private properties" (Assembly Concurrent Resolution (ACR) 123 (State of California Legislature 2006); therefore, the development of the Project would not have a visual impact to Old Highway 80.

Conclusion

Implementation of the FAA lighting and security lighting is not anticipated to contribute a significant additional light source that would impact night skies to the Boulevard area. As previously described, the Project will adhere to the San Diego County Light Pollution Code to minimize light pollution to the night environment. Operation of the AVWS remains unapproved by the FAA and therefore will not be utilized for the Project. However, the Project will utilize red colored FAA lighting for the turbines and Class II lamp source and shielding requirements for the O&M building as required by the County of San Diego. This information presented supports a change in impact determination for Tule VIS-4 from an adverse, significant and unmitigable impact (Class I) to a less than significant impact (Class III) in the DEIR/DEIS.

Construction of the Project would not impact scenic or historic highways. I-8 is considered to be a third priority roadway and is currently not listed as a scenic highway by CALTRANS Scenic Highway Program. Considering the low status rating of I-8 as a scenic highway and the current CALTRANS scenic highway status, it is unlikely that I-8 will be designated as scenic highway in the near future; therefore, the Project would be consistent with the State scenic highway program and the County plans and policies. In addition, Old Highway 80 is considered a "historic highway", not a scenic highway and would not be subject to visual impacts due to the Project.

San Diego County plans and policies that are currently in draft form are not applicable to the Project; therefore, the Project need not comply with such regulations. No additional new sources of light or glare have been identified; therefore, the Project would be consistent with all other

plans and polices relative to protection of visual resources. This information supports a change in impact determination for Tule-VIS-5 from an adverse, significant and unmitigable impact (Class I) to a less than significant impact (Class III) in the DEIR/DEIS.

GATZKE DILLON & BALLANCE LLP
ATTORNEYS & COUNSELORS AT LAW
EMERALD LAKE CORPORATE CENTRE
1525 FARADAY AVENUE, SUITE 150
CARLSBAD, CALIFORNIA 92008
TELEPHONE 760.431.9501
FACSIMILE 760.431.9512
WWW.GDANDB.COM

OF COUNSEL
MICHAEL SCOTT GATZKE
ANTHONY T. DITTY

February 22, 2011

Iain Fisher, California Public Utilities Commission
Greg Thomsen, Bureau of Land Management
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Proposed Tule Wind Power Project

Dear Bureau of Land Management and California Public Utilities Commission:

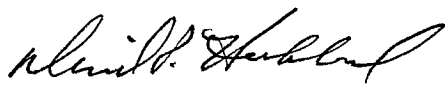
This firm represents EcoLogic Partners, Inc. ("EcoLogic"), a consortium of family-oriented recreation groups committed to preserving public access to the great outdoor venues of the western United States. Our voting members include the American Sand Association, the San Diego Off-Road Coalition, the Off-Road Business Association, and the American Motorcyclists Association District 37. I am writing today to express EcoLogic's support for the proposed Tule Wind Power Project, and to urge the Bureau of Land Management and the California Public Utilities Commission to certify and approve the project's EIS/EIR.

There is no longer any question that the United States, if it is to achieve any kind of lasting energy independence, must develop alternative energy sources. Wind power facilities, when placed in the proper location, have demonstrated their ability to meet this mandate and be part of the nation's much needed multi-platform energy policy. Unfortunately, alternative energy facilities often generate more opposition than support. This is primarily because wind and solar projects tend to be placed in scenic, undeveloped areas that provide significant recreational benefits to the general public. As a result, there is a built-in tension between the need to develop alternative energy facilities and the need to preserve public recreational land.

EcoLogic, however, is happy to report that the people behind the Tule Wind Project have taken the steps necessary to eliminate this tension and mitigate the project's impacts on public recreation. Through their efforts and cooperative spirit, they have convinced EcoLogic that the project will be able to harness the rare wind resources of McCain Valley, while also preserving and enhancing recreational opportunity in Lark Canyon. For this reason, EcoLogic supports the Tule Wind Project.

We look forward to receiving news that the Project and EIS/EIR have been approved. Please feel free to contact me with any questions.

Sincerely,



David P Hubbard
of
Gatzke Dillon & Ballance LLP

DPH:rlf

Revised Table D.7-6 Attributes of Recorded Archaeological Sites by Eligibility Assessment and Survey

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
Class III Eligible Sites (n=23)						
37-024023	Class III	Intersects BIA, Private, BLM	Records Search	Historic	Highway 80	Segments of road are contributing elements to NRHP listing
SDI-4788	Class III	BLM, State, Private	Records Search	Prehistoric	Artifact Scatter	Potentially Eligible
SDI-10330/ Tule-TQ-21	Class III	BLM	Records Search	Prehistoric	Small Habitation	Potentially Eligible
SDI-10359	Class III	BLM, Private	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-17817	Class III	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-19001/ 19003	Class III	BLM, Private	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-19018	Class III	BLM	Records Search	Prehistoric	Small Habitation	Potentially Eligible
SDI-7150	Class III	BLM	Records Search	Prehistoric	Small Habitation	Potentially Eligible
SDI-9223/ 17816	Class III	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-19364/ SPBB-S-1	Class III	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-20071/ Tule-BC-35	Class III	Private	New	Prehistoric	Large Habitation	Potentially Eligible
SDI-20087/ Tule-BC-54	Class III	State, Private	New	Prehistoric	Small Habitation	Potentially Eligible
SDI-20109/ Tule-CW-11	Class III	Private	New	Prehistoric	Small Habitation	Potentially Eligible
SDI-20110/ Tule-CW-12	Class III	BLM, Private	New	Prehistoric	Small Habitation	Potentially Eligible
SDI-20113/ Tule-CW-17	Class III	BLM, Private	New	Prehistoric	Small Habitation	Potentially Eligible
P-37-031680/ Tule-CW-25/ Structure ID 58	Class III	Private	New	Historic	Home Site	Potentially Eligible
SDI-20042/ Tule-EP-08/ Structure ID 25, 33, 59, 60	Class III	Private	New	Both	Large Habitation and Historic Homesite	Potentially Eligible
Tule-TQ-02	Class III	Manzanita	New	Prehistoric	Small Habitation	Potentially Eligible
Tule-TQ-03	Class III	Manzanita	New	Prehistoric	Small Habitation	Potentially Eligible
Tule-TQ-04	Class III	Campo	New	Prehistoric	Small Habitation	Potentially Eligible
Tule-TQ-38	Class III	BLM	New	Prehistoric	Small Habitation	Potentially Eligible
Tule-TQ-42	Class III	Private	New	Prehistoric	Small Habitation	Potentially Eligible
Tule-TQ-45	Class III	BLM	New	Prehistoric	Small Habitation	Potentially Eligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
Class III Ineligible Sites and Sites with Uncertain Eligibility (n=154)						
SDI-1151	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-6897	Class III	Private	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-6900	Class III	Private	Records Search	Both	BMS and HPRD	Likely Ineligible
SDI-9225	Class III	BLM	Records Search	Prehistoric	Large Habitation	Likely Ineligible
SDI-9229	Class III	BLM	Records Search	Prehistoric	Large Habitation	Likely Ineligible
SDI-10596	Class III	BLM	Records Search	Prehistoric	Large Habitation	Likely Ineligible
SDI-16786	Class III	Private	Records Search	Historic	HPRD	Likely Ineligible
SDI-16824	Class III	Private	Records Search	Historic	HPRD and foundations	Likely Ineligible
SDI-16827	Class III	Private	Records Search	Historic	HPRD and structural remains	Uncertain
SDI-17118	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-17119	Class III	BLM	Records Search	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-17815	Class III	BLM	Records Search	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-17822	Class III	BLM	Records Search	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-17829	Class III	BLM	Records Search	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-17830	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-18050	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-18054	Class III	BLM	Records Search	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-19867/Tule-TQ-07	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-18993	Class III	Private	Records Search	Historic	HPRD	Likely Ineligible
SDI-18994	Class III	Private	Records Search	Historic	HPRD	Likely Ineligible
SDI-19000	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19002	Class III	BLM	Records Search	Prehistoric	Large Habitation	Likely Ineligible
SDI-19045	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19291	Class III	BLM	Records Search	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-19301	Class III	BLM	Records Search	Prehistoric	Small Habitation	Likely Ineligible
SDI-19853/ SDGE-BC-5/ SPED-S-18	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19854/ SPED-S-1/ SDGE-BC-6	Class III	BLM	Records Search	Both	Lithic Scatter and HPRD	Likely Ineligible
SDI-19857/ SDGE-BC-9	Class III	Private	Records Search	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-19860/ SDGE-BC-13	Class III	BLM	Records Search	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-19849/ SDGE-BC-37	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
SDI-19868/ SDGE-BW-83	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19869/ SDGE-BW-84	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19935/ SDGE-BW-128	Class III	BLM	Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-19872/ SDGE-BW-130	Class III	Private	Records Search	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-19851/ SPED-S-5	Class III		Records Search	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20043/ Tule-BC-01	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20044/ Tule-BC-02	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
SDI-20045/ Tule-BC-03	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20046/ Tule-BC-04	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20049/ Tule-BC-09	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20050/ Tule-BC-10	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20052/ Tule-BC-12	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20053/ Tule-BC-13	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20054/ Tule-BC-14	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20055/ Tule-BC-15	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20056/ Tule-BC-16	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-20057/ Tule-BC-17	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-20058/ Tule-BC-18	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031613/ Tule-BC-19	Class III	Private	New	Historic	HPRD	Likely Ineligible
P-37-031614/ Tule-BC-20	Class III	Private	New	Historic	HPRD	Likely Ineligible
P-37-031615/ Tule-BC-21	Class III	Private	New	Historic	HPRD	Likely Ineligible
SDI-20059/ Tule-BC-22	Class III	Private	New	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-20060/ Tule-BC-23	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20061/ Tule-BC-24	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20062/ Tule-BC-25	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-20063/ Tule-BC-27	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20064/ Tule-BC-28	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20065/ Tule-BC-29	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20066/ Tule-BC-30	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20067/ Tule-BC-31	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20068/ Tule-BC-32	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20069/ Tule-BC-33	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
SDI-20070/ Tule-BC-34	Class III	Private	New	Both	Large Habitation and Historic Homesite	Likely Ineligible
SDI-20072/ Tule-BC-36	Class III	Private	New	Prehistoric	Lithic Scatter	Likely Ineligible
SDI-20073/ Tule-BC-39	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20074/ Tule-BC-40	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20075/ Tule-BC-41	Class III	BLM, Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20076/ Tule-BC-42	Class III	State, Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20089/ Tule-BC-56	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20090/ Tule-BC-57	Class III	Private	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20091/ Tule-BC-58	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20099/ Tule-BC-66	Class III	BIA	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20100/ Tule-BC-67	Class III	BIA	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20101/ Tule-BC-68	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
P-37-031659/ Tule-BC-69	Class III	State	New	Historic	Mining Site	Likely Ineligible
SDI-20102/ Tule-BC-72	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20103/ Tule-BC-73	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031662/ Tule-BC-74	Class III	State	New	Historic	Mining Site	Likely Ineligible
SDI-20104/ Tule-CW-01	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
Tule-CW-02/ LD-S-2	Class III	State	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20106/ Tule-CW-04	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20107/ Tule-CW-05	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
P-37-031667/ Tule-CW-07	Class III	Private	New	Historic	HPRD	Likely Ineligible
SDI-20108/ Tule-CW-10	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20111/ Tule-CW-15	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20112/ Tule-CW-16	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
P-37-031676/ Tule-CW-19	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031676/ Tule-CW-20	Class III	State	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031676/ Tule-CW-21	Class III	Private	New	Historic	HPRD	Likely Ineligible
P-37-031676/ Tule-CW-22	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
P-37-031676/ Tule-CW-23	Class III	Private	New	Prehistoric	Lithic Scatter	Likely Ineligible
P-37-031676/ Tule-CW-24	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031592/ Tule-EP-01	Class III	Private	New	Prehistoric	Bedrock Milling Station	Likely Ineligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
P-37-031592/ Tule-EP-02/ Structure ID 1	Class III	Private	New	Historic	Home Site	Uncertain
P-37-031592/ Tule-EP-03	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
P-37-031594/ Tule-EP-07	Class III	Private	New	Historic	HPRD	Likely Ineligible
Tule-TQ-01	Class III	Manzanita	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-05	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-06	Class III	Unknown	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-08	Class III	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
Tule-TQ-09	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
Tule-TQ-10	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
Tule-TQ-11	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-12	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-13	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-16	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-17	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
Tule-TQ-18	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
Tule-TQ-19	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-20	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-22	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-23	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
Tule-TQ-24	Class III	Private	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
Tule-TQ-25	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-26	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-27	Class III	Private	New	Prehistoric	Lithic Scatter	Likely Ineligible
Tule-TQ-28	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-29	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-30	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-31	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-32	Class III	Private	New	Historic	Can Scatter	Likely Ineligible
Tule-TQ-33	Class III	Private	New	Historic	Can Scatter	Likely Ineligible
Tule-TQ-34	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-35	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-36	Class III	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
Tule-TQ-37	Class III	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-39	Class III	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
Tule-TQ-40	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-41	Class III	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
Tule-TQ-43	Class III	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-44	Class III	Private	New	Prehistoric	Small Habitation	Likely Ineligible
Tule-TQ-46/ Structure ID 2	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-47/ Structure ID 3	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-48/ Structure ID 4	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-49/ Structure ID 5	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-50/ Structure ID 6	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-51/ Structure ID 7	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-52/ Structure ID 8, 9, 10	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-53/ Structure ID 11-13, 15-21, 23-24	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-54/ Structure ID 14	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-55/ Structure ID 22	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-56/ Structure ID 26	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-57/ Structure ID 27	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-58/ Structure ID 28	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-59/ Structure ID 29	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-60/ Structure ID 30	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-61/ Structure ID 53	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-62/ Structure ID 31	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-63/ Structure ID 32, 34	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-64/ Structure ID 35	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-65/ Structure ID 52	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-66/ Structure ID 51	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-67/ Structure ID 54-56	Class III	Private	New	Historic	Home Site/ Structure	Uncertain
Tule-TQ-68/ Structure ID 57	Class III	Private	New	Historic	Home Site/ Structure	Uncertain

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
Class II Sample Eligible Sites (n=10)						
SDI-4009	Class II	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-4010	Class II	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-7151	Class II	BLM, Private	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-7154	Class II	BLM	Records Search	Prehistoric	Small Habitation	Potentially Eligible
SDI-8434	Class II	BIA	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-15746	Class II	BLM	Records Search	Prehistoric	Large Habitation	Potentially Eligible
SDI-20077/ Tule-BC-43	Class II	BLM	New	Prehistoric	Large Habitation	Potentially Eligible
SDI-20096/ Tule-BC-63	Class II	BLM	New	Prehistoric	Artifact Scatter	Potentially Eligible
SDI-20105/ Tule-CW-03	Class II	BLM	New	Prehistoric	Artifact Scatter	Potentially Eligible
SDI-20125/ Tule-CW-43	Class II	Private	New	Prehistoric	Small Habitation	Potentially Eligible
Class II Sample Ineligible Sites (n=33)						
SDI-5162	Class II	Private	Records Search	Prehistoric	Small Habitation	Likely Ineligible
SDI-5171	Class II	Private	Records Search	Prehistoric	Small Habitation	Likely Ineligible
SDI-9224	Class II	BLM	Records Search	Prehistoric	Small Habitation	Likely Ineligible
SDI-20047/ Tule-BC-05	Class II	BLM	New	Prehistoric	Lithic Scatter	Likely Ineligible
P-37-031601/ Tule-BC-06	Class II	BLM	New	Historic	HPRD	Likely Ineligible
SDI-20048/ Tule-BC-07	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20051/ Tule-BC-11	Class II	BLM, Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20078/ Tule-BC-44	Class II	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
SDI-20079/ Tule-BC-46	Class II	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
SDI-20080/ Tule-BC-47	Class II	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20081/ Tule-BC-48	Class II	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20082/ Tule-BC-49	Class II	BLM	New	Prehistoric	Small Habitation	Likely Ineligible
SDI-20083/ Tule-BC-50	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20084/ Tule-BC-51	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20085/ Tule-BC-52	Class II	Private	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20086/ Tule-BC-53	Class II	Private	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20088/ Tule-BC-55	Class II	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20092/ Tule-BC-59	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20093/ Tule-BC-60	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20094/ Tule-BC-61	Class II	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible

Site	Survey	Landholder	New or Existing?	Age	Site Type	Potential Eligibility NRHP Status
SDI-20095/ Tule-BC-62	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20097/ Tule-BC-64	Class II	BIA	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20098/ Tule-BC-65	Class II	BIA	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20119/ Tule-CW-30	Class II	BLM	New	Prehistoric	Bedrock Milling Station	Likely Ineligible
SDI-20120/ Tule-CW-31	Class II	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20121/ Tule-CW-33	Class II	BLM	New	Prehistoric	Ceramic Scatter	Likely Ineligible
SDI-20122/ Tule-CW-34	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031685/ Tule-CW-35	Class II	Private	New	Historic	HPRD	Likely Ineligible
P-37-031686/ Tule-CW-36	Class II	Private	New	Historic	HPRD	Likely Ineligible
SDI-20123/ Tule-CW-40	Class II	BLM	New	Prehistoric	Artifact Scatter	Likely Ineligible
P-37-031688/ Tule-CW-41	Class II	Private	New	Historic	Home Site	Likely Ineligible
SDI-20124/ Tule-CW-42	Class II	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible
SDI-20126/ Tule-CW-44	Class II	Private	New	Prehistoric	Artifact Scatter	Likely Ineligible

Wind Turbine Sound and Health Effects
An Expert Panel Review

Prepared by (in alphabetical order):

W. David Colby, M.D.

Robert Dobie, M.D.

Geoff Leventhall, Ph.D.

David M. Lipscomb, Ph.D.

Robert J. McCunney, M.D.

Michael T. Seilo, Ph.D.

Bo Søndergaard, M.Sc.

Prepared for:

American Wind Energy Association

and

Canadian Wind Energy Association

December 2009

Printed on Recycled and Recyclable Paper

Contents

Section **Page**

Executive Summary **ES-1**

1 **Introduction** **1-1**
1.1 Expert Panelists 1-1
1.2 Report Terminology 1-2

2 **Methodology** **2-1**
2.1 Formation of Expert Panel 2-1
2.2 Review of Literature Directly Related to Wind Turbines 2-1
2.3 Review of Potential Environmental Exposures 2-1

3 **Overview and Discussion** **3-1**
3.1 Wind Turbine Operation and Human Auditory Response to Sound 3-1
3.1.1 Overview 3-1
3.1.2 The Human Ear and Sound 3-2
3.1.3 Sound Produced by Wind Turbines 3-3
3.1.4 Sound Measurement and Audiometric Testing 3-5
3.2 Sound Exposure from Wind Turbine Operation 3-6
3.2.1 Infrasound and Low-Frequency Sound 3-6
3.2.2 Vibration 3-9
3.2.3 Vestibular System 3-11
3.3 Potential Adverse Effects of Exposure to Sound 3-12
3.3.1 Speech Interference 3-12
3.3.2 Noise-Induced Hearing Loss 3-13
3.3.3 Task Interference 3-13
3.3.4 Annoyance 3-13
3.3.5 Sleep Disturbance 3-13
3.3.6 Other Adverse Health Effects of Sound 3-13
3.3.7 Potential Health Effects of Vibration Exposure 3-14
3.4 Peer-Reviewed Literature Focusing on Wind Turbines, Low-Frequency Sound, and Infrasound 3-15
3.4.1 Evaluation of Annoyance and Dose-Response Relationship of Wind Turbine Sound 3-15
3.4.2 Annoyance 3-16
3.4.3 Low-Frequency Sound and Infrasound 3-17

4 **Results** **4-1**
4.1 Infrasound, Low-Frequency Sound, and Annoyance 4-1
4.1.1 Infrasound and Low-Frequency Sound 4-2
4.1.2 Annoyance 4-2
4.1.3 Other Aspects of Annoyance 4-3
4.1.4 Nocebo Effect 4-4

Section **Page**

4.1.5 Somatoform Disorders 4-4
4.2 Infrasound, Low-frequency Sound and Disease 4-5
4.2.1 Vibroacoustic Disease 4-5
4.2.2 High-Frequency Exposure 4-6
4.2.3 Residential Exposure: A Case Series 4-6
4.2.4 Critique 4-7
4.3 Wind Turbine Syndrome 4-8
4.3.1 Evaluation of Infrasound on the Vestibular System 4-8
4.3.2 Evaluation of Infrasound on Internal organs 4-9
4.4 Visceral Vibratory Vestibular Disturbance 4-10
4.4.1 Hypothesis 4-10
4.4.2 Critique 4-11
4.5 Interpreting Studies and Reports 4-11
4.6 Standards for Siting Wind Turbines 4-13
4.6.1 Introduction 4-13
4.6.2 Noise Regulations and Ordinances 4-13
4.6.3 Wind Turbine Siting Guidelines 4-13

5 Conclusions 5-1

6 References 6-1

Appendices

A Fundamentals of Sound
B The Human Ear
C Measuring Sound
D Propagation of Sound
E Expert Panel Members

Tables

1-1 Definitions of Acoustical Terms 1-2
3-1 Typical Sound Pressure Levels Measured in the Environment and Industry 3-2
3-2 Hearing Thresholds in the Infrasonic and Low Frequency Range 3-7

Figures

3-1 Sound Produced by Wind Turbine Flow 3-4
3-2 Hearing Contours for Equal Loudness Level (ISO:226, 2003) 3-9
3-3 Comparison of Excitation of an Object by Vibration and by Sound 3-10
C-1 Weighting Networks C-2

Acronyms and Abbreviations

μPa	microPascal
ACOEM	American College of Occupational and Environmental Medicine
ANSI	American National Standards Institute
AWEA	American Wind Energy Association
ASHA	American Speech-Language-Hearing Association
CanWEA	Canadian Wind Energy Association
dB	decibel
dBA	decibel (on an A-weighted scale)
DNL	day-night-level
DSM-IV-TR	*Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition
EPA	U.S. Environmental Protection Agency
FDA	Food and Drug Administration
FFT	Fast Fourier Transform
GI	gastrointestinal
HPA	Health Protection Agency
Hz	Hertz
IARC	International Agency for Research on Cancer
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
IEC	International Engineering Consortium
ISO	International Organization for Standardization
Km	kilometer
kW	kilowatt
L_{eq}	equivalent level
LPALF	large pressure amplitude and low frequency
m/s	meters per second
m/s^2	meters per second squared
NIESH	National Institute of Environmental Health Sciences
NIHL	noise-induced hearing loss
NIOSH	National Institute for Occupational Safety and Health
N/m^2	Newtons per square meter
NRC	National Research Council
NTP	National Toxicology Program
ONAC	Office of Noise Abatement and Control
OSHA	Occupational Safety and Health Administration
Pa	Pascal
UK	United Kingdom
VAD	vibroacoustic disease
VVVD	vibratory vestibular disturbance
VEMP	vestibular evoked myogenic potential response
WHO	World Health Organization

Executive Summary

People have been harnessing the power of the wind for more than 5,000 years. Initially used widely for farm irrigation and millworks, today's modern wind turbines produce electricity in more than 70 countries. As of the end of 2008, there were approximately 120,800 megawatts of wind energy capacity installed around the world (Global Wind Energy Council, 2009).

Wind energy enjoys considerable public support, but it also has its detractors, who have publicized their concerns that the sounds emitted from wind turbines cause adverse health consequences.

In response to those concerns, the American and Canadian Wind Energy Associations (AWEA and CanWEA) established a scientific advisory panel in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines. This multidisciplinary panel is comprised of medical doctors, audiologists, and acoustical professionals from the United States, Canada, Denmark, and the United Kingdom. The objective of the panel was to provide an authoritative reference document for legislators, regulators, and anyone who wants to make sense of the conflicting information about wind turbine sound.

The panel undertook extensive review, analysis, and discussion of the large body of peer-reviewed literature on sound and health effects in general, and on sound produced by wind turbines. Each panel member contributed a unique expertise in audiology, acoustics, otolaryngology, occupational/ environmental medicine, or public health. With a diversity of perspectives represented, the panel assessed the plausible biological effects of exposure to wind turbine sound.

Following review, analysis, and discussion of current knowledge, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

SECTION 1

Introduction

The mission of the American Wind Energy Association (AWEA) is to promote the growth of wind power through advocacy, communication, and education. Similarly, the mission of the Canadian Wind Energy Association (CanWEA) is to promote the responsible and sustainable growth of wind power in Canada. Both organizations wish to take a proactive role in ensuring that wind energy projects are good neighbors to the communities that have embraced wind energy.

Together AWEA and CanWEA proposed to a number of independent groups that they examine the scientific validity of recent reports on the adverse health effects of wind turbine proximity. Such reports have raised public concern about wind turbine exposure. In the absence of declared commitment to such an effort from independent groups, the wind industry decided to be proactive and address the issue itself. In 2009, AWEA and CanWEA commissioned this report. They asked the authors to examine published scientific literature on possible adverse health effects resulting from exposure to wind turbines.

The objective of this report is to address health concerns associated with sounds from industrial-scale wind turbines. Inevitably, a report funded by an industry association will be subject to charges of bias and conflicts of interest. AWEA and CanWEA have minimized bias and conflicts of interest to the greatest possible extent through selection of a distinguished panel of independent experts in acoustics, audiology, medicine, and public health. This report is the result of their efforts.

1.1 Expert Panelists

The experts listed below were asked to investigate and analyze existing literature and publish their findings in this report; their current positions and/or qualifications for inclusion are also provided.

- W. David Colby, M.D.**:** Chatham-Kent Medical Officer of Health (Acting); Associate Professor, Schulich School of Medicine & Dentistry, University of Western Ontario
- Robert Dobie, M.D.**:** Clinical Professor, University of Texas, San Antonio; Clinical Professor, University of California, Davis
- Geoff Leventhall, Ph.D**.:** Consultant in Noise Vibration and Acoustics, UK
- David M. Lipscomb, Ph.D**.:** President, Correct Service, Inc.
- Robert J. McCunney, M.D.**:** Research Scientist, Massachusetts Institute of Technology Department of Biological Engineering; Staff Physician, Massachusetts General Hospital Pulmonary Division; Harvard Medical School
- Michael T. Seilo, Ph.D**.:** Professor of Audiology, Western Washington University

- Bo Søndergaard, M.Sc. (Physics**):** Senior Consultant, Danish Electronics Light and Acoustics (DELTA)

Mark Bastasch, an acoustical engineer with the consulting firm of CH2M HILL, acted as technical advisor to the panel.

1.2 Report Terminology

Certain terms are used frequently throughout this report. Table 1-1 defines these terms. An understanding of the distinction between "sound" and "noise" may be particularly useful to the reader.

TABLE 1-1
Definitions of Acoustical Terms

Term	Definitions
Sound	Describes wave-like variations in air pressure that occur at frequencies that can stimulate receptors in the inner ear and, if sufficiently powerful, be appreciated at a conscious level.
Noise	Implies the presence of sound but also implies a response to sound: noise is often defined as unwanted sound.
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals (µPa).
A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Hertz (Hz)	A unit of measurement of frequency; the number of cycles per second of a periodic waveform.
Infrasound	According to the International Electrotechnical Commission's (IEC's) IEC 1994, infrasound is: Acoustic oscillations whose frequency is below the low-frequency limit of audible sound (about 16 Hz). However this definition is incomplete as infrasound at high enough levels is audible at frequencies below 16 Hz. (IEC (1994): 60050-801:1994 International Electrotechnical Vocabulary - Chapter 801: Acoustics and electroacoustics).
Low-frequency sound	Sound in the frequency range that overlaps the higher infrasound frequencies and the lower audible frequencies, and is typically considered as 10 Hz to 200 Hz, but is not closely defined.

Source: HPA, 2009.

SECTION 2

Methodology

Three steps form the basis for this report: formation of an expert panel, review of literature directly related to wind turbines, and review of potential environmental exposures.

2.1 Formation of Expert Panel

The American and Canadian wind energy associations, AWEA and CanWEA, assembled a distinguished panel of independent experts to address concerns that the sounds emitted from wind turbines cause adverse health consequences.

The objective of the panel was to provide an authoritative reference document for the use of legislators, regulators, and people simply wanting to make sense of the conflicting information about wind turbine sound.

The panel represented expertise in audiology, acoustics, otolaryngology, occupational/ environmental medicine, and public health. A series of conference calls were held among panel members to discuss literature and key health concerns that have been raised about wind turbines. The calls were followed by the development of a draft that was reviewed by other panel members. Throughout the follow-up period, literature was critically addressed.

2.2 Review of Literature Directly Related to Wind Turbines

The panel conducted a search of Pub Med under the heading "Wind Turbines and Health Effects" to research and address peer-reviewed literature. In addition, the panel conducted a search on "vibroacoustic disease." The reference section identifies the peer and non-peer reviewed sources that were consulted by the panel.

2.3 Review of Potential Environmental Exposures

The panel conducted a review of potential environmental exposures associated with wind turbine operations, with a focus on low frequency sound, infrasound, and vibration.

SECTION 3

Overview and Discussion

This section summarizes the results of the review and analysis conducted by the expert panel and responds to a number of key questions:

- How do wind turbine operations affect human auditory response?
- How do we determine the loudness and frequency of sound and its effects on the human ear?
- How do wind turbines produce sound?
- How is sound measured and tested?
- What is vibration?
- **W**hat type of exposure to wind turbines is more likely to be perceived by humans (low frequency sound, infrasound or vibration)?
- Can sounds in the low frequency range, most notably the infrasonic range, adversely affect human health? Even when such levels are below the average person's ability to hear them?
- How does the human vestibular system respond to sound?
- What are the potential adverse effects and health implications of sound exposure?
- What does scientific literature say about wind turbines, low frequency sound, and infrasound?

3.1 Wind Turbine Operation and Human Auditory Response to Sound

3.1.1 Overview

The normal operation of a wind turbine produces sound and vibration, arousing concern about potential health implications. This section addresses the fundamental principles associated with sound and vibration, sound measurement, and potential adverse health implications. Sound from a wind turbine arises from its mechanical operation and the turning of the blades.

3.1.2 The Human Ear and Sound

The human ear is capable of perceiving a wide range of sounds, from the high-pitched sounds of a bird song to the low-pitched sound of a bass guitar. Sounds are perceived based on their loudness (i.e., volume or sound pressure level) or pitch (i.e., tonal or frequency content). The standard unit of measure for sound pressure levels is the decibel (dB). The standard unit used to describe the tonal or frequency content is the Hertz (Hz), measured in cycles per second)—Appendix A provides more information on the fundamentals of sound. Customarily, the young, non-pathological ear can perceive sounds ranging from 20 Hz to 20,000 Hz. Appendix B provides more information on the human ear.

Frequencies below 20 Hz are commonly called "infrasound," although the boundary between infrasound and low frequency sound is not rigid. Infrasound, at certain frequencies and at high levels, can be audible to some people. Low frequency sound is customarily referred to as that between 10 Hz and 200 Hz, but any definition is arbitrary to some degree. Low frequency sound is the subject of concern to some with respect to potential health implications.

TABLE 3-1
TYPICAL SOUND PRESSURE LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1000 feet) Shout (0.5 feet)	100	
N.Y. subway station Heavy truck (50 feet)	90	Very annoying Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet) Freeway traffic (50 feet)	70 to 80	
	70	Intrusive (Telephone use difficult)
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living room Bedroom	40	
Library Soft whisper (5 feet)	30	Very quiet
Broadcasting/Recording studio	20	
	10	Just audible

Adapted from Table E, "Assessing and Mitigating Noise Impacts", NY DEC, February 2001.

Table 3-1 shows sound pressure levels associated with common activities. Typically, environmental and occupational sound pressure levels are measured in decibels on an A-weighted scale (dBA). The A-weighted scale de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear. For comparison, the sound from a wind turbine at distances between 1,000 and 2,000 feet is generally within 40 to 50 dBA.

Section 3.2 discusses the effects of exposure to wind turbine sound. Section 3.3 describes the potential adverse effects of sound exposure as well as the health implications.

3.1.3 Sound Produced by Wind Turbines

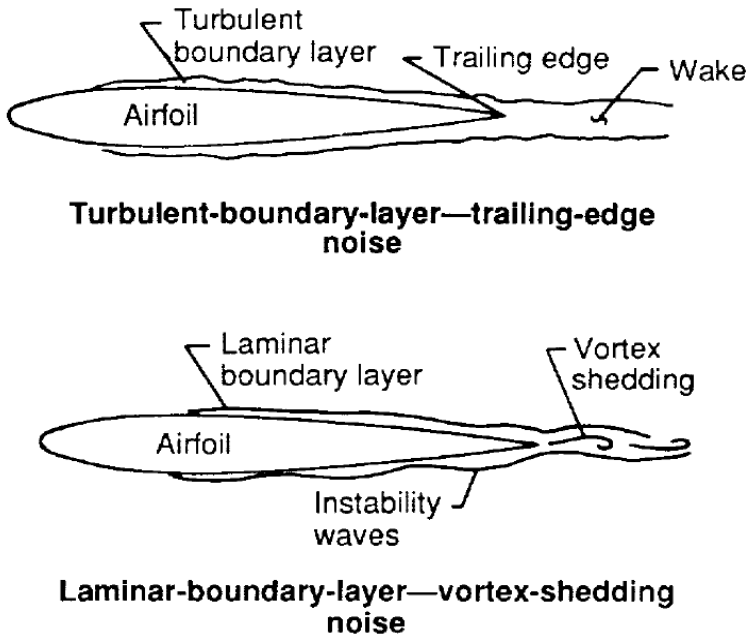
Wind turbine sound originates from either a mechanical or aerodynamic generation mechanism. Mechanical sound originates from the gearbox and control mechanisms. Standard noise control techniques typically are used to reduce mechanical sound. Mechanical noise is not typically the dominant source of noise from modern wind turbines (except for an occasional gear tone).

The aerodynamic noise is present at all frequencies, from the infrasound range over low frequency sound to the normal audible range and is the dominant source. The aerodynamic noise is generated by several mechanisms as is described below. The aerodynamic noise tends to be modulated in the mid frequency range, approximately 500 to 1,000 Hz.

Aerodynamic sound is produced by the rotation of the turbine blades through the air. A turbine blade shape is that of an airfoil. An airfoil is simply a structure with a shape that produces a lift force when air passes over it. Originally developed for aircraft, airfoil shapes have been adapted to provide the turning force for wind turbines by employing a shape which causes the air to travel more rapidly over the top of the airfoil than below it. The designs optimize efficiency by minimizing turbulence, which produces drag and noise. An aerodynamically efficient blade is a quiet one.

The aerodynamic sound from wind turbines is caused by the interaction of the turbine blade with the turbulence produced both adjacent to it (turbulent boundary layer) and in its near wake (see Figure 3-1) (Brooks et al., 1989). Turbulence depends on how fast the blade is moving through the air. A 100-meter-diameter blade, rotating once every three seconds, has a tip velocity of just over 100 meters per second. However, the speed reduces at positions closer to the centre of rotation (the wind turbine hub). The main determinants of the turbulence are the speed of the blade and the shape and dimensions of its cross-section.

FIGURE 3-1
Sound Produced by Wind Turbine Flow



The following conclusions have been derived from the flow conditions shown in Figure 3-1 (Brooks et al., 1989):

- At high velocities for a given blade, turbulent boundary layers develop over much of the airfoil. Sound is produced when the turbulent boundary layer passes over the trailing edge.
- At lower velocities, mainly laminar boundary layers develop, leading to vortex shedding at the trailing edge.

Other factors in the production of aerodynamic sound include the following:

- When the angle of attack is not zero—in other words, the blade is tilted into the wind—flow separation can occur on the suction side near to the trailing edge, producing sound.
- At high angles of attack, large-scale separation may occur in a stall condition, leading to radiation of low frequency sound.
- A blunt trailing edge leads to vortex shedding and additional sound.
- The tip vortex contains highly turbulent flow.

Each of the above factors may contribute to wind turbine sound production. Measurements of the location of the sound source in wind turbines indicate that the dominant sound is produced along the blade—nearer to the tip end than to the hub. Reduction of turbulence sound can be facilitated through airfoil shape and by good maintenance. For example, surface irregularities resulting from damage or to accretion of additional material, may increase the sound.

Aerodynamic sound has been shown to be generated at higher levels during the downward motion of the blade (i.e., the three o'clock position). This results in a rise in level of approximately once per second for a typical three-bladed turbine. This periodic rise in level is also referred to as amplitude modulation, and as described above for a typical wind turbine, the modulation frequency is 1 Hz (once per second). In other words, the sound level rises and falls about once per second. The origin of this amplitude modulation is not fully understood. It was previously assumed that the modulation was caused when the blade went past the tower (given the tower disturbed the airflow), but it is now thought to be related to the difference in wind speed between the top and bottom of the rotation of a blade and directivity of the aerodynamic noise (Oerlemans and Schepers, 2009).

In other words, the result of aerodynamic modulation is a perceivable fluctuation in the sound level of approximately once per second. The frequency content of this fluctuating sound is typically between 500 Hz and 1,000 Hz, but can occur at higher and lower frequencies. That is, the sound pressure levels between approximately 500 and 1,000 Hz will rise and fall approximately once per second. It should be noted, however, that the magnitude of the amplitude modulation that is observed when standing beneath a tower does not always occur at greater separation distances. A study in the United Kingdom (UK) also showed that only four out of about 130 wind farms had a problem with aerodynamic modulation and three of these have been solved (Moorhouse et al., 2007).

In addition to the sound levels generated by the turbines, environmental factors affect the levels received at more distant locations. For example, warm air near the ground causes the turbine sound to curve upwards, away from the ground, which results in reduced sound levels, while warm air in a temperature inversion may cause the sound to curve down to the earth resulting in increased sound levels. Wind may also cause the sound level to be greater downwind of the turbine—that is, if the wind is blowing from the source towards a receiver—or lower, if the wind is blowing from the receiver to the source. Most modeling techniques, when properly implemented, account for moderate inversions and downwind conditions. Attenuation (reduction) of sound can also be influenced by barriers, ground surface conditions, shrubbery and trees, among other things.

Predictions of the sound level at varying distances from the turbine are based on turbine sound power levels. These turbine sound power levels are determined through standardized measurement methods.

3.1.4 Sound Measurement and Audiometric Testing

A sound level meter is a standard tool used in the measurement of sound pressure levels. As described in Section 3.1.2, the standard unit of sound pressure level (i.e., volume) is dB and the standard unit used to describe the pitch or frequency is Hz (cycles per second). A sound level meter may use the A-weighting filter to adjust certain frequency ranges (those that humans detect poorly), resulting in a reading in dBA (decibels, A-weighted). Appendix C provides more information on the measurement of sound. The pitch or frequencies (sometimes referred to as sound level spectrum) can be quantified using a sound level meter that includes a frequency analyzer. Octave band, one-third octave band, and narrow band (such as Fast Fourier Transform, or FFT) are three common types of frequency analyzers.

Consider, for example, a routine audiometric test (hearing test) in which a person sits in a booth and wears headphones, through which sounds are transmitted to evaluate hearing. Outside the booth, a technician turns a dial which yields certain frequencies (for example, 125 Hz, a low-pitched sound, or 4,000 Hz, a high-pitched sound) and then the technician raises the volume of each frequency until the person recognizes the sound of each tone. This is a standard approach used to measure thresholds for many reasons, including noise-induced hearing loss (NIHL). As the technician raises the volume of the designated frequency, the sound level (in dB) is noted. People who need more than 25 dB at more than one frequency to hear the sound (ie loudness of the tone) are considered to have an abnormal test.

The effects of prolonged, high-level sound exposure on hearing have been determined through audiometric tests of workers in certain occupations. The studies have been published in major medical journals and subjected to the peer review process (see, for example, McCunney and Meyer, 2007). Studies of workers have also served as the scientific basis for regulations on noise in industry that are overseen by the Occupational Safety and Health Administration (OSHA). Workers in noise-intensive industries have been evaluated for NIHL and certain industries are known to be associated with high noise levels, such as aviation, construction, and areas of manufacturing such as canning. Multiyear worker studies suggest that prolonged exposure to high noise levels can adversely affect hearing. The levels considered sufficiently high to cause hearing loss are considerably higher than one could experience in the vicinity of wind turbines. For example, prolonged, unprotected high exposure to noise at levels greater than 90 dBA is a risk for hearing loss in occupational settings such that OSHA established this level for hearing protection. Sound levels from wind turbines do not approach these levels (50 dBA at a distance of 1,500 feet would be a conservative estimate for today's turbines). Although the issue of NIHL has rarely been raised in opposition to wind farms, it is important to note that the risk of NIHL is directly dependent on the intensity (sound level) and duration of noise exposure and therefore it is reasonable to conclude that there is no risk of NIHL from wind turbine sound. Such a conclusion is based on studies of workers exposed to noise and among whom risk of NIHL is not apparent at levels less than 75 dBA.

3.2 Sound Exposure from Wind Turbine Operation

This section addresses the questions of (1) whether sounds in the low frequency range, most notably the infrasonic range, adversely affect human health, and whether they do so even when such levels are below the average person's ability to hear them; (2) what we are referring to when we talk about vibration; and (3) how the human vestibular system responds to sound and disturbance.

3.2.1 Infrasound and Low-Frequency Sound

Infrasound and low frequency sound are addressed in some detail to offer perspective on publicized hypotheses that sound from a wind turbine may damage health even if the noise levels are below those associated with noise-induced hearing loss in industry. For example, it has been proposed that sounds that contain low frequency noise, most notably within the infrasonic level, can adversely affect health even when the levels are below the average person's ability to detect or hear them (Alves-Pereira and Branco, 2007b).

Comprehensive reviews of infrasound and its sources and measurement have been published (Berglund and Lindvall, 1995; Leventhall et al., 2003). Table 3-2 shows the sound pressure level, in decibels, of the corresponding frequency of infrasound and low frequency sound necessary for the sound to be heard by the average person (Leventhall et al., 2003).

TABLE 3-2
Hearing Thresholds in the Infrasonic and Low Frequency Range

Frequency (Hz)	4	8	10	16	20	25	40	50	80	100	125	160	200
Sound pressure level (dB)	107	100	97	88	79	69	51	44	32	27	22	18	14

NOTE:
Average hearing thresholds (for young healthy people) in the infrasound (4 to 20 Hz) and low frequency region (10 to 200 Hz).

Source: Leventhall et al., 2003

As Table 3-2 indicates, at low frequencies, a much higher level sound is necessary for a sound to be heard in comparison to higher frequencies. For example, at 10 Hz, the sound must be at 97 dB to be audible. If this level occurred at the mid to high frequencies, which the ear detects effectively, it would be roughly equivalent to standing without hearing protection directly next to a power saw. Decibel for decibel, the low frequencies are much more difficult to detect than the high frequencies, as shown in the hearing threshold levels of Table 3-2.

Table 3-2 also shows that even sounds as low as 4 Hz can be heard if the levels are high enough (107 dB). However, levels from wind turbines at 4 Hz are more likely to be around 70 dB or lower, and therefore inaudible. Studies conducted to assess wind turbine noise have shown that wind turbine sound at typical distances does not exceed the hearing threshold and will not be audible below about 50 Hz (Hayes 2006b; Kamperman and James, 2008). The hearing threshold level at 50 Hz is 44 dB, as shown in Table 3-2. Recent work on evaluating a large number of noise sources between 10 Hz and 160 Hz suggests that wind turbine noise heard indoors at typical separation distances is modest on the scale of low frequency sound sources (Pedersen, 2008). The low levels of infrasound and low frequency sound from wind turbine operations have been confirmed by others (Jakobsen, 2004; van den Berg, 2004).

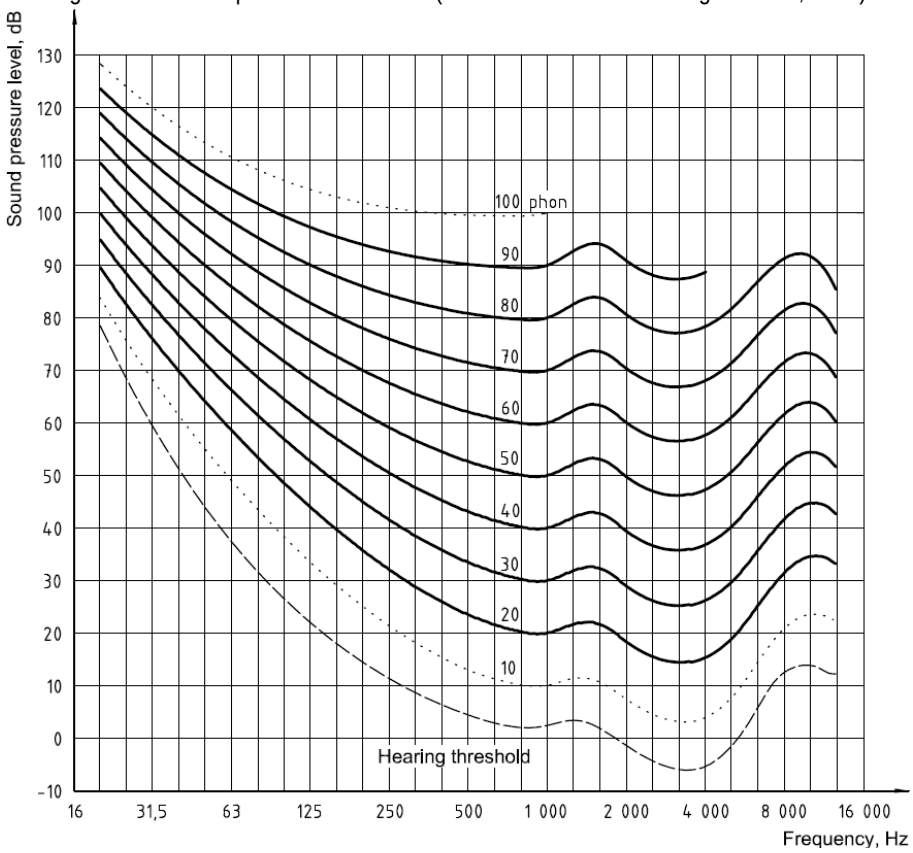
The low frequency sound associated with wind turbines has attracted attention recently since the A-weighting scale that is used for occupational and environmental regulatory compliance does not work well with sounds that have prominently low frequency components. Most environmental low frequency sound problems are caused by discrete tones (pitch or tones that are significantly higher in level (volume) than the neighboring frequencies); from, for example, an engine or compressor, not by continuous broadband sound. The high frequency sounds are assessed by the A-weighted measurement and, given their shorter wavelengths, are controlled more readily. Low frequency sounds may be irritating to some people and, in fact, some low frequency sound complaints prove impossible to resolve (Leventhall et al., 2003). This observation leads to a perception that there is something special, sinister, and harmful about low frequency sound. To the contrary, most external sound when heard indoors is biased towards low frequencies due to the efficient building attenuation of higher frequencies. One may recognize this when noise

from a neighbor's stereo is heard within their home—the bass notes are more pronounced than the higher frequency sounds. Any unwanted sound, whether high frequency or low frequency, can be irritating and stressful to some people.

Differences in how a low frequency sound and high frequency sound are perceived are well documented. Figure 3-2 shows that lower-frequency sounds typically need to be at a high sound pressure level (dB) to be heard. Figure 3-2 also demonstrates that as the frequency lowers, the audible range is compressed leading to a more rapid rise in loudness as the level changes in the lower frequencies. At 1,000 Hz, the whole range covers about 100 dB change in sound pressure level, while at 20 Hz the same range of loudness covers about 50 dB (note the contours displayed in Figure 3-2 are in terms of phons, a measure of equal loudness; for additional explanation on phons, the reader is referred to http://www.sfu.ca/sonic-studio/handbook/Phon.html [Truax, 1999]). As the annoyance of a given sound increases as loudness increases, there is also a more rapid growth of annoyance at low frequencies. However, there is no evidence for direct physiological effects from either infrasound or low frequency sound at the levels generated from wind turbines, indoors or outside. Effects may result from the sounds being audible, but these are similar to the effects from other audible sounds.

Low frequency sound and infrasound are further addressed in Section 3.3, Potential Adverse Effects of Exposure to Sound.

FIGURE 3-2
Hearing Contours for Equal Loudness Level (International Standards Organization, 2003)



3.2.2 Vibration

Vibration, assumed to result from inaudible low frequency sounds, has been postulated to have a potential adverse effect on health. This section defines vibration, describes how it is measured, and cites studies that have addressed the risk of vibration on health.

Vibration refers to the way in which energy travels through solid material, whether steel, concrete in a bridge, the earth, the wall of a house or the human body. Vibration is distinguished from sound, which is energy flowing through gases (like air) or liquids (like water).

As higher frequency vibrations attenuate rapidly, it is low frequencies which are of potential concern to human health. When vibration is detected through the feet or through the seat, the focus of interest is the vibration of the surface with which one is in contact—for example, when travelling in a vehicle.

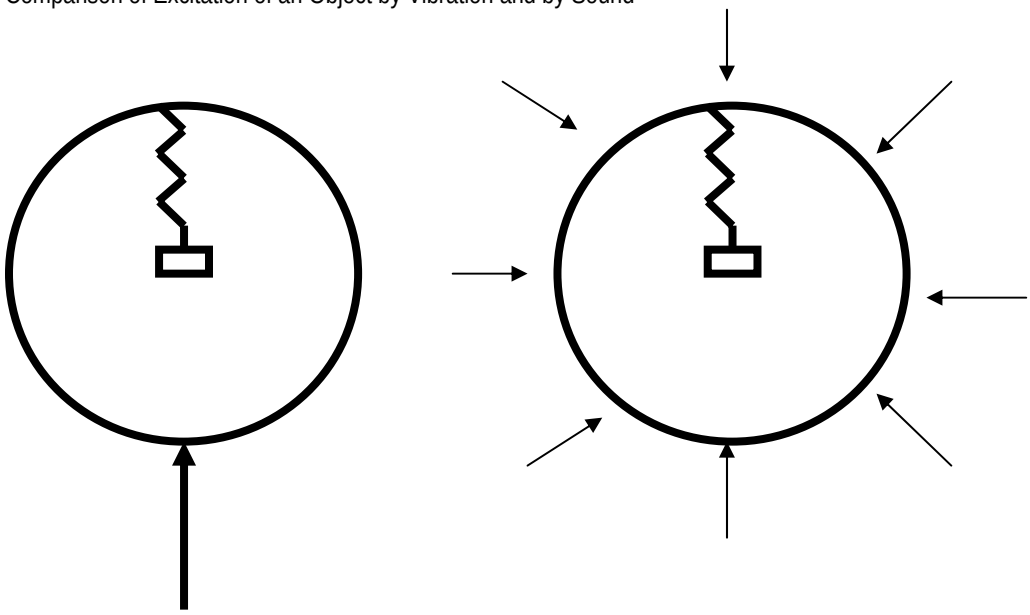
Vibration is often measured by the acceleration of the surface in meters per second, squared (m/s^2), although other related units are used. Vibration can also be expressed in decibels, where the reference excitation level used in buildings is often $10^{-5} m/s^2$ and the vibration level is $20\log (A/10^{-5})$ dB, where A is the acceleration level in m/s^2.

The threshold of perception of vibration by humans is approximately 0.01 m/s^2. If a frequency of excitation (vibration) corresponds with a resonant frequency of a system, then

excitation at the resonant frequency is greater than at other frequencies. However, excitation by sound is not the same as excitation by mechanical excitation applied at, say, the feet.

Figure 3-3 shows an object excited by point mechanical vibration and by sound. The object contains a resiliently suspended system. For example, if the object was the body, the suspended system might be the viscera (internal organs of the body). The left hand of the figure can be interpreted as the body vibrated by input to the feet. The vibration of the viscera will be maximum at the resonant frequency[1] of the suspended system, which, for viscera, is about 4 Hz. When excitation is by long wavelength low frequency sound waves, as shown at the right of the figure, not only is the force acting on the body much smaller than for vibration input, but, as the wavelength is much greater than the dimensions of the body, it is acting around the body in a compressive manner so that there is no resultant force on the suspended system and it does not vibrate or resonate.

FIGURE 3-3
Comparison of Excitation of an Object by Vibration and by Sound



Unfortunately, this lack of effect has not been addressed by those who have suggested the mechanical vibration response of the body instead of the acoustic response as a potential health consequence. This oversight has led to inaccurate conclusions. For example, Dr. Nina Pierpont bases one of her key hypotheses for the cause of "wind turbine syndrome" on such an egregious error (Pierpont, 2009, pre-publication draft). Although not a recognized medical diagnosis, "wind turbine syndrome" has been raised as a concern for proposed projects—refer to Section 4.3 for more information.

Vibration of the body by sound at one of its resonant frequencies occurs only at very high sound levels and is not a factor in the perception of wind turbine noise. As will be discussed

[1] A common example of resonance is pushing a child on a swing in which energy is given to the swing to maximize its oscillation.

below, the sound levels associated with wind turbines do not affect the vestibular or other balance systems.

3.2.3 Vestibular System

The vestibular system of the body plays a major role in maintaining a person's sense of balance and the stabilization of visual images. The vestibular system responds to pressure changes (sound pressure, i.e., decibels) at various frequencies. At high levels of exposure to low frequency sound, nausea and changes in respiration and blood pressure may occur. Studies have shown, however, that for these effects to occur, considerably high noise levels (greater than 140 dB, similar in sound level of a jet aircraft heard 80 feet away) are necessary (Berglund et al., 1996).

Head vibration resulting from low frequency sound has been suggested as a possible cause of a variety of symptoms that some hypothesize as being associated with wind turbines. In order to properly assess this hypothesis, this section addresses the human vestibular system. The "vestibular system" comprises the sense organs in the vestibular labyrinth, in which there are five tiny sensory organs: three semicircular canals that detect head rotation and two chalk-crystal-studded organs called otoliths (literally "ear-stones") that detect tilt and linear motion of the head. All five organs contain hair cells, like those in the cochlea, that convert motion into nerve impulses traveling to the brain in the vestibular nerve.

These organs evolved millions of years before the middle ear. Fish, for example, have no middle ear or cochlea but have a vestibular labyrinth nearly identical to ours (Baloh and Honrubia, 1979). The vestibular organs are specialized for stimulation by head position and movement, not by airborne sound. Each vestibular organ is firmly attached to the skull, to enable them to respond to the slightest head movement. In contrast, the hair cells in the cochlea are not directly attached to the skull; they do not normally respond to head movement, but to movements of the inner ear fluids.

The otolith organs help fish hear low frequency sounds; even in primates, these organs will respond to head vibration (i.e., bone-conducted sound) at frequencies up to 500 Hz (Fernandez and Goldberg, 1976). These vibratory responses of the vestibular system can be elicited by *airborne* sounds, however, only when they are at a much higher level than normal hearing thresholds[2] (and much higher than levels associated with wind turbine exposure). Thus, they do not help us hear but appear to be vestiges of our evolutionary past.

The vestibular nerve sends information about head position and movement to centers in the brain that also receive input from the eyes and from stretch receptors in the neck, trunk, and

[2] Young et al. (1977) found that neurons coming from the vestibular labyrinth of monkeys responded to head vibration at frequencies of 200-400 Hz, and at levels as low as 70 to 80 dB below gravitational force. However, these neurons could not respond to airborne sound at the same frequencies until levels exceeded 76 dB sound pressure level (SPL), which is at least 40 dB higher than the normal threshold of human hearing in this frequency range. Human eye movements respond to 100 Hz head vibration at levels 15 dB below audible levels (Todd et al., 2008a). This does not mean that the vestibular labyrinth is more sensitive than the cochlea to airborne sound, because the impedance-matching function of the middle ear allows the cochlea to respond to sounds that are 50-60 dB less intense than those necessary to cause detectable head vibration. Indeed, the same authors (Todd et al., 2008b) found that for airborne sound, responses from the cochlea could always be elicited by sounds that were below the threshold for vestibular responses. Similarly, Welgampola et al. (2003) found that thresholds for vestibular evoked myogenic potential response (VEMP) were higher than hearing thresholds and stated: "the difference between hearing thresholds and VEMP thresholds is much greater for air conducted sounds than for bone vibration." In other words, the vestigial vestibular response to sound is relatively sensitive to bone conduction, which involves vibration of the whole head, and much less sensitive to air conduction.

legs (these stretch receptors tell which muscles are contracted and which joints are flexed, and provide the "proprioceptive" sense of the body's position and orientation in space). The brain integrates vestibular, visual, and proprioceptive inputs into a comprehensive analysis of the position and movement of the head and body, essential for the sense of balance, avoidance of falls, and keeping the eyes focused on relevant targets, even during movement.

Perception of the body's position in space may also rely in part on input from receptors in abdominal organs (which can shift back and forth as the body tilts) and from pressure receptors in large blood vessels (blood pools in the legs when standing, then shifts back to the trunk when lying down). These "somatic graviceptors" (Mittelstaedt, 1996) could be activated by whole-body movement and possibly by structure-borne vibration, or by the blast of a powerful near explosion, but, as described in Section 4.3.2, it is unlikely that intra-abdominal and intra-thoracic organs and blood vessels could detect airborne sound like that created by wind turbines.

Trauma, toxins, age-related degeneration, and various ear diseases can cause disorders of the vestibular labyrinth. A labyrinth not functioning properly can cause a person to feel unsteady or even to fall. Since the semicircular canals of the ear normally detect head rotation (such as shaking the head to indicate "no"), one of the consequences of a dysfunctional canal is that a person may feel a "spinning" sensation. This reaction is described as vertigo, from the Latin word to turn. In normal conversation, words like vertigo and dizziness can be used in ambiguous ways and thus make careful interpretation of potential health claims problematic. "Dizzy," for example, may mean true vertigo or unsteadiness, both of which may be symptoms of inner ear disease. A person who describes being "dizzy" may actually be experiencing light-headedness, a fainting sensation, blurred vision, disorientation, or almost any other difficult-to-describe sensation in the head. The word "dizziness" can represent different sensations to each person, with a variety of causes. This can make the proper interpretation of research studies in which dizziness is evaluated a challenge to interpret.

Proper diagnostic testing to evaluate dizziness can reduce errors in misclassifying disease. The vestibular labyrinth, for example, can be tested for postural stability. Information from the semicircular canals is fed to the eye muscles to allow us to keep our eyes focused on a target; when the head moves; this "vestibulo-ocular reflex" is easily tested and can be impaired in vestibular disorders (Baloh and Honrubia, 1979).

3.3 Potential Adverse Effects of Exposure to Sound

Adverse effects of sound are directly dependent on the sound level; higher frequency sounds present a greater risk of an adverse effect than lower levels (see Table 3-2). Speech interference, hearing loss, and task interference occur at high sound levels. Softer sounds may be annoying or cause sleep disturbance in some people. At normal separation distances, wind turbines do not produce sound at levels that cause speech interference, but some people may find these sounds to be annoying.

3.3.1 Speech Interference

It is common knowledge that conversation can be difficult in a noisy restaurant; the louder the background noise, the louder we talk and the harder it is to communicate. Average

levels of casual conversation at 1 meter (arm's length) are typically 50 to 60 dBA. People raise their voices—slightly and unconsciously at first—when ambient levels exceed 50 to 55 dBA, in order to keep speech levels slightly above background noise levels. Communication at arm's length requires conscious extra effort when levels exceed about 75 dBA. Above ambient levels of 80 to 85 dBA, people need to shout or get closer to converse (Pearsons et al., 1977; Webster, 1978). Levels below 45 dBA can be considered irrelevant with respect to speech interference.

3.3.2 Noise-Induced Hearing Loss

Very brief and intense sounds (above 130 dBA, such as in explosions) can cause instant cochlear damage and permanent hearing loss, but most occupational NIHL results from prolonged exposure to high noise levels between 90 and 105 dBA (McCunney and Meyer 2007). Regulatory (OSHA, 1983) and advisory (NIOSH, 1998) authorities in the U.S. concur that risk of NIHL begins at about 85 dBA, for an 8-hour day, over a 40-year career. Levels below 75 dBA do not pose a risk of NIHL. Thus, the sound levels associated with wind turbine operations would not cause NIHL because they are not high enough.

3.3.3 Task Interference

Suter (1991) reviewed the effects of noise on performance and behavior. Simple tasks may be unaffected even at levels well above 100 dBA, while more complex tasks can be disrupted by intermittent noise as low as 75 dBA. Speech sounds are usually more disruptive than nonspeech sounds. Levels below 70 dBA do not result in task interference.

3.3.4 Annoyance

Annoyance as a possible "effect" of wind turbine operations is discussed in detail in later sections of this report (Sections 3.4 and 4.1). In summary, annoyance is a subjective response that varies among people to many types of sounds. It is important to note that although annoyance may be a frustrating experience for people, it is not considered an adverse health effect or disease of any kind. Certain everyday sounds, such as a dripping faucet—barely audible—can be annoying. Annoyance cannot be predicted easily with a sound level meter. Noise from airports, road traffic, and other sources (including wind turbines) may annoy some people, and, as described in Section 4.1, the louder the noise, the more people may become annoyed.

3.3.5 Sleep Disturbance

The U.S. Environmental Protection Agency (EPA) document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (1974) recommends that indoor day-night-level (DNL) not exceed 45 dBA. DNL is a 24-hour average that gives 10 dB extra weight to sounds occurring between 10p.m. and 7 a.m., on the assumption that during these sleep hours, levels above 35 dBA indoors may be disruptive.

3.3.6 Other Adverse Health Effects of Sound

At extremely high sound levels, such as those associated with explosions, the resulting sound pressure can injure any air-containing organ: not only the middle ear (eardrum

perforations are common) but also the lungs and intestines (Sasser et al., 2006). At the other extreme, any sound that is chronically annoying, including very soft sounds, may, for some people, create chronic stress, which can in turn lead to other health problems. On the other hand, many people become accustomed to regular exposure to noise or other potential stressors, and are no longer annoyed. The hypothesis that chronic noise exposure might lead to chronic health problems such as hypertension and heart disease has been the subject of hundreds of contradictory studies of highly variable quality, which will not be reviewed in this document. Other authors have reviewed this literature, and some of their conclusions are quoted below:

> "It appears not likely that noise in industry can be a direct cause of general health problems…, except that the noise can create conditions of psychological stress…which can in turn cause physiological stress reactions…" (Kryter, 1980)

> "Epidemiological evidence on noise exposure, blood pressure, and ischemic heart disease is still limited." (Babisch, 2004), and "contradictory' (Babisch, 1998), but "there is some evidence…of an increased risk in subjects who live in noisy areas with outdoor noise levels of greater than 65 - 70 dBA." (Babisch, 2000)

> "The present state of the art does not permit any definite conclusion to be drawn about the risk of hypertension." (van Dijk, Ettema, and Zielhuis, 1987)

> "At this point, the relationship between noise induced hearing loss and hypertension must be considered as possible but lacking sufficient evidence to draw causal associations." (McCunney and Meyer, 2007)

3.3.7 Potential Health Effects of Vibration Exposure

People may experience vibration when some part of the body is in direct contact with a vibrating object. One example would be holding a chainsaw or pneumatic hammer in the hands. Another would be sitting in a bus, truck, or on heavy equipment such as a bulldozer. Chronic use of vibrating tools can cause "hand-arm vibration syndrome," a vascular insufficiency condition characterized by numbness and tingling of the fingers, cold intolerance, "white-finger" attacks, and eventually even loss of fingers due to inadequate blood supply. OSHA does not set limits for vibration exposure, but the American National Standards Institute (ANSI) (2006) recommends that 8-hour workday exposures to hand-arm vibration (5 to 1400 Hz, summed over three orthogonal axes of movement) not exceed acceleration values of 2.5 m/s^2.

Excessive whole-body vibration is clearly linked to low back pain (Wilder, Wasserman, and Wasserman, 2002) and may contribute to gastrointestinal and urinary disorders, although these associations are not well established. ANSI (1979) recommends 8-hour limits for whole-body vibration of 0.3 m/s^2, for the body's most sensitive frequency range of 4 to 8 Hz. This is about 30 times more intense than the weakest vibration that people can detect (0.01 m/s^2).

Airborne sound can cause detectable body vibration, but this occurs only at very high levels—usually above sound pressure levels of 100 dB (unweighted) (Smith, 2002; Takahashi et al., 2005; Yamada et al., 1983). There is no scientific evidence to suggest that modern wind turbines cause perceptible vibration in homes or that there is an associated health risk.

3.4 Peer-Reviewed Literature Focusing on Wind Turbines, Low-Frequency Sound, and Infrasound

This section addresses the scientific review of the literature that has evaluated wind turbines, the annoyance effect, low frequency sound, and infrasound.

3.4.1 Evaluation of Annoyance and Dose-Response Relationship of Wind Turbine Sound

To date, three studies in Europe have specifically evaluated potential health effects of people living in proximity to wind turbines (Pedersen and Persson Waye, 2004; Pedersen and Persson Waye, 2007; Pedersen et al., 2009). These studies have been primarily in Sweden and the Netherlands. Customarily, an eligible group of people are selected for possible participation in the study based on their location with respect to a wind turbine. Control groups have not been included in any of these reports.

In an article published in August 2009, investigators reported the results of their evaluation of 725 people in the Netherlands, who lived in the vicinity of wind turbines (Pedersen et al., 2009). The potential study population consisted of approximately 70,000 people living within 2.5 kilometers of a wind turbine at selected sites in the Netherlands. The objective of the study was to (1) assess the relationship between wind turbine sound levels at dwellings and the probability of noise annoyance, taking into account possible moderating factors, and (2) explore the possibility of generalizing a dose response relationship for wind turbine noise by comparing the results of the study with previous studies in Sweden.

Noise impact was quantified based on the relationship between the sound level (dose) and response with the latter measured as the proportion of people annoyed or highly annoyed by sound. Prior to this study, dose response curves had been modeled for wind turbines. Previous studies have noted different degrees of relationships between wind turbine sound levels and annoyance (Wolsink et al., 1993; Pedersen and Persson Waye, 2004; Pedersen and Persson Waye, 2007).

Subjective responses were obtained through a survey. The calculation of the sound levels (dose) in Sweden and the Netherlands were similar. A dose response relationship was observed between calculated A-weighted sound pressure levels and annoyance. Sounds from wind turbines were found to be more annoying than several other environmental sources at comparable sound levels. A strong correlation was also noted between noise annoyance and negative opinion of the impact of wind turbines on the landscape, a finding in earlier studies as well. The dominant quality of the sound was a swishing, the quality previously found to be the most annoying type.

The authors concluded that this study could be used for calculating a dose response curve for wind turbine sound and annoyance. The study results suggest that wind turbine sound is easily perceived and, compared with sound from other sources, is annoying to a small percentage of people (5 percent at 35 to 40 dBA).

In this study, the proportion of people who reported being annoyed by wind turbine noise was similar to merged data from two previous Swedish studies (Pederson and Persson

Waye, 2004; Pedersen and Persson Waye, 2007). About 5 percent of respondents were annoyed at noise levels between 35 to 40 dBA and 18 percent at 40 to 45 dBA.

Pedersen et al. also reported significant dose responses between wind turbine sound and self-reported annoyance (Pedersen and Persson Waye, 2004). High exposed individuals responded more (78 percent) than low exposed individuals (60 percent), which suggests that bias could have played a role in the final results.

An analysis of two cross-sectional socio-acoustic studies—one that addressed flat landscapes in mainly rural settings (Pedersen and Persson Waye, 2004) and another in different terrains (complex or flat) and different levels of urbanization (rural or suburban) (Pedersen and Persson Waye, 2007)—was performed (Pedersen, 2008). Approximately 10 percent of over 1000 people surveyed via a questionnaire reported being very annoyed at sound levels of 40 dB and greater. Attitude toward the visual impact of the wind turbines had the same effect on annoyance. Response to wind turbine noise was significantly related to exposure expressed as A-weighted sound pressure levels dB. Among those who could hear wind turbine sound, annoyance with wind turbine noise was highly correlated to the sound characteristics: swishing, whistling, resounding and pulsating/throbbing (Pedersen, 2008).

A similar study in Sweden evaluated 754 people living near one of seven sites where wind turbine power was greater than 500 kilowatt (kW) (Pedersen and Persson Waye, 2007). Annoyance was correlated with sound level and also with negative attitude toward the visual impact of the wind turbines. Note that none of these studies included a control group. Earlier field studies performed among people living in the vicinity of wind turbines showed a correlation between sound pressure level and noise annoyance; however, annoyance was also influenced by visual factors and attitudes toward the impact of the wind turbines on the landscape. Noise annoyance was noted at lower sound pressure levels than annoyance from traffic noise. Although some people may be affected by annoyance, there is no scientific evidence that noise at levels created by wind turbines could cause health problems (Pedersen and Högskolan, 2003).

3.4.2 Annoyance

A feeling described as "annoyance" can be associated with acoustic factors such as wind turbine noise. There is considerable variability, however, in how people become "annoyed" by environmental factors such as road construction and aviation noise, among others (Leventhall, 2004). Annoyance is clearly a subjective effect that will vary among people and circumstances. In extreme cases, sleep disturbance may occur. Wind speed at the hub height of a wind turbine at night may be up to twice as high as during the day and may lead to annoyance from the amplitude modulated sound of the wind turbine (van den Berg, 2003). However, in a study of 16 sites in 3 European countries, only a weak correlation was noted between sound pressure level and noise annoyance from wind turbines (Pedersen and Högskolan, 2003).

In a detailed comparison of the role of noise sensitivity in response to environmental noise around international airports in Sydney, London, and Amsterdam, it was shown that noise sensitivity increases one's perception of annoyance independently of the level of noise exposure (van Kamp et al., 2004).

In a Swedish study, 84 out of 1,095 people living in the vicinity of a wind turbine in 12 geographical areas reported being fairly or very annoyed by wind turbines (Pedersen, 2008). It is important to note that no differences were reported among people who were "annoyed" in contrast to those who were not annoyed with respect to hearing impairment, diabetes, or cardiovascular disease. An earlier study in Sweden showed that the proportion of people "annoyed" by wind turbine sound is higher than for other sources of environmental noise at the same decibel level (Pedersen and Persson Waye, 2004).

3.4.3 Low-Frequency Sound and Infrasound

No scientific studies have specifically evaluated health effects from exposure to low frequency sound from wind turbines. Natural sources of low frequency sound include wind, rivers, and waterfalls in both audible and non-audible frequencies. Other sources include road traffic, aircraft, and industrial machinery. The most common source of infrasound is vehicular (National Toxicology Program, 2001).

Infrasound at a frequency of 20 Hz (the upper limit of infrasound) is not detectable at levels lower than than 79 dB (Leventhall et al., 2003). Infrasound at 145 dB at 20 Hz and at 165 dB at 2 Hz can stimulate the auditory system and cause severe pain (Leventhall, 2006).These noise levels are substantially higher than any noise generated by wind turbines. The U.S. Food and Drug Administration (FDA) has approved the use of infrasound for therapeutic massage at 70 dB in the 8 to 14 Hz range (National Toxicology Program, 2001). In light of the FDA approval for this type of therapeutic use of infrasound, it is reasonable to conclude that exposure to infrasound in the 70 dB range is safe. According to a report of the National Research Council (NRC), low frequency sound is a concern for older wind turbines but not the modern type (National Research Council, 2007).

SECTION 4

Results

This section discusses the results of the anaylsis presented in Section 3. Potential effects from infrasound, low frequency sound, and the fluctuating aerodynamic "swish" from turbine blades are examined. Proposed hypotheses between wind turbine sound and physiological effects in the form of vibroacoustic disease, "wind turbine syndrome," and visceral vibratory vestibular disturbance are discussed.

4.1 Infrasound, Low-Frequency Sound, and Annoyance

Sound levels from wind turbines pose no risk of hearing loss or any other nonauditory effect. In fact, a recent review concluded that "Occupational noise-induced hearing damage does not occur below levels of 85 dBA." (Ising and Kruppa, 2004) The levels of sound associated with wind turbine operations are considerably lower than industry levels associated with noise induced hearing loss.

However, some people attribute certain health problems to wind turbine exposure. To make sense of these assertions, one must consider not only the sound but the complex factors that may lead to the perception of "annoyance." Most health complaints regarding wind turbines have centered on sound as the cause. There are two types of sounds from wind turbines: mechanical sound, which originates from the gearbox and control mechanisms, and the more dominant aerodynamical sound, which is present at all frequencies from the infrasound range over low frequency sound to the normal audible range.

Infrasound from natural sources (for example, ocean waves and wind) surrounds us and is below the audible threshold. The infrasound emitted from wind turbines is at a level of 50 to 70 dB, sometimes higher, but well below the audible threshold. There is a consensus among acoustic experts that the infrasound from wind turbines is of no consequence to health. One particular problem with many of these assertions about infrasound is that is that the term is often misused when the concerning sound is actually low frequency sound, not infrasound.

Under many conditions, low frequency sound below about 40 Hz cannot be distinguished from environmental background sound from the wind itself. Perceptible (meaning above both the background sound and the hearing threshold), low frequency sound can be produced by wind turbines under conditions of unusually turbulent wind conditions, but the actual sound level depends on the distance of the listener from the turbine, as the sound attenuates (falls off) with distance. The higher the frequency, the greater the sound attenuates with distance—Appendix D provides more information on the propagation of sound. The low frequency sound emitted by spinning wind turbines could possibly be annoying to some when winds are unusually turbulent, but there is no evidence that this level of sound could be harmful to health. If so, city dwelling would be impossible due to the similar levels of ambient sound levels normally present in urban environments. Nevertheless, a small number of people find city sound levels stressful.

It is not usually the low frequency nonfluctuating sound component, however, that provokes complaints about wind turbine sound. The fluctuating aerodynamic sound (swish) in the 500 to 1,000 Hz range occurs from the wind turbine blades disturbing the air, modulated as the blades rotate which changes the sound dispersion characteristics in an audible manner. This fluctuating aerodynamic sound is the cause of most sound complaints regarding wind turbines, as it is harder to become accustomed to fluctuating sound than to sound that does not fluctuate. However, this fluctuation does not always occur and a UK study showed that it had been a problem in only four out of 130 UK wind farms, and had been resolved in three of those (Moorhouse et al., 2007).

4.1.1 Infrasound and Low-Frequency Sound

Infrasound occurs at frequencies less than 20 Hz. At low and inaudible levels, infrasound has been suggested as a cause of "wind turbine syndrome" and vibroacoustic disease (VAD)—refer to Section 4.2.1 for more information on VAD. For infrasound to be heard, high sound levels are necessary (see Section 3, Table 3-2). There is little risk of short term acute exposure to high levels of infrasound. In experiments related to the Apollo space program, subjects were exposed to between 120 and 140 dB without known harmful effects. High level infrasound is less harmful than the same high levels of sound in the normal audible frequency range.

High levels of low frequency sound can excite body vibrations (Leventhall, 2003). Early attention to low frequency sound was directed to the U.S. space program, studies from which suggested that 24-hour exposures to 120 to 130 dB are tolerable below 20 Hz, the upper limit of infrasound. Modern wind turbines produce sound that is assessed as infrasound at typical levels of 50 to 70 dB, below the hearing threshold at those frequencies (Jakobsen, 2004). Jakobsen concluded that infrasound from wind turbines does not present a health concern. Fluctuations of wind turbine sound, most notably the swish-swish sounds, are in the frequency range of 500 to 1,000 Hz, which is neither low frequency sound nor infrasound. The predominant sound from wind turbines, however, is often mischaracterized as infrasound and low frequency sound. Levels of infrasound near modern-scale wind farms are in general not perceptible to people. In the human body, the beat of the heart is at 1 to 2 Hz. Higher-frequency heart sounds measured externally to the body are in the low frequency range (27 to 35 dB at 20 to 40 Hz), although the strongest frequency is that of the heartbeat (Sakai, Feigen, and Luisada, 1971). Lung sounds, measured externally to the body are in the range of 5 to 35 dB at 150 to 600 Hz (Fiz et al., 2008). Schust (2004) has given a comprehensive review of the effects of high level low frequency sound, up to 100 Hz.

4.1.2 Annoyance

Annoyance is a broad topic on which volumes have been written. Annoyance can be caused by constant amplitude and amplitude modulated sounds containing rumble (Bradley, 1994).

As the level of sound rises, an increasing number of those who hear it may become distressed, until eventually nearly everybody is affected, although to different degrees. This is a clear and easily understood process. However, what is not so clearly understood is that when the level of the sound reduces, so that very few people are troubled by it, there remain a small number who may be adversely affected. This occurs at all frequencies, although there seems to be more subjective variability at the lower frequencies. The effect of low

frequency sound on annoyance has recently been reviewed (Leventhall, 2004). The standard deviation of the hearing threshold is approximately 6 dB at low frequencies (Kurakata and Mizunami, 2008), so that about 2.5 percent of the population will have 12 dB more sensitive hearing than the average person. However, hearing sensitivity alone does not appear to be the deciding factor with respect to annoyance. For example, the same type of sound may elicit different reactions among people: one person might say "Yes, I can hear the sound, but it does not bother me," while another may say, "The sound is impossible, it is ruining my life." There is no evidence of harmful effects from the low levels of sound from wind turbines, as experienced by people in their homes. Studies have shown that peoples' attitudes toward wind turbines may affect the level of annoyance that they report (Pedersen et al., 2009).

Some authors emphasize the psychological effects of sounds (Kalveram, 2000; Kalveram et al., 1999). In an evaluation of 25 people exposed to five different wind turbine sounds at 40 dB, ratings of "annoyance" were different among different types of wind turbine noise (Persson Waye and Öhrström, 2002).

None of the psycho-acoustic parameters could explain the difference in annoyance responses. Another study of more than 2,000 people suggested that personality traits play a role in the perception of annoyance to environmental issues such as sound (Persson et al., 2007). Annoyance originates from acoustical signals that are not compatible with, or that disturb, psychological functions, in particular, disturbance of current activities. Kalveram et al. (1999) suggest that the main function of noise annoyance is as a warning that fitness may be affected but that it causes little or no physiological effect. Protracted annoyance, however, may undermine coping and progress to stress related effects. It appears that this is the main mechanism for effects on the health of a small number of people from prolonged exposure to low levels of noise.

The main health effect of noise stress is disturbed sleep, which may lead to other consequences. Work with low frequencies has shown that an audible low frequency sound does not normally become objectionable until it is 10 to 15 dB above hearing threshold (Inukai et al., 2000; Yamada, 1980). An exception is when a listener has developed hostility to the noise source, so that annoyance commences at a lower level.

There is no evidence that sound at the levels from wind turbines as heard in residences will cause direct physiological effects. A small number of sensitive people, however, may be stressed by the sound and suffer sleep disturbances.

4.1.3 Other Aspects of Annoyance

Some people have concluded that they have health problems caused directly by wind turbines. In order to make sense of these complaints, we must consider not only the sound, but the complex factors culminating in annoyance.

There is a large body of medical literature on stress and psychoacoustics. Three factors that may be pertinent to a short discussion of wind turbine annoyance effects are the nocebo effect, sensory integration dysfunction and somatoform disorders.

4.1.4 Nocebo Effect

The nocebo effect is an adverse outcome, a worsening of mental or physical health, based on fear or belief in adverse effects. This is the opposite of the well known placebo effect, where belief in positive effects of an intervention may produce positive results (Spiegel, 1997). Several factors appear to be associated with the nocebo phenomenon: expectations of adverse effects; conditioning from prior experiences; certain psychological characteristics such as anxiety, depression and the tendency to somatize (express psychological factors as physical symptoms; see below), and situational and contextual factors. A large range of reactions include hypervagotonia, manifested by idioventricular heart rhythm (a slow heart rate of 20 to 50 beats per minute resulting from an intrinsic pacemaker within the ventricles which takes over when normal sinoatrial node regulation is lost), drowsiness, nausea, fatigue, insomnia, headache, weakness, dizziness, gastrointestinal (GI) complaints and difficulty concentrating (Sadock and Sadock, 2005, p.2425). This array of symptoms is similar to the so-called "wind turbine syndrome" coined by Pierpont (2009, pre-publication draft). Yet these are all common symptoms in the general population and no evidence has been presented that such symptoms are more common in persons living near wind turbines. Nevertheless, the large volume of media coverage devoted to alleged adverse health effects of wind turbines understandably creates an anticipatory fear in some that they will experience adverse effects from wind turbines. Every person is suggestible to some degree. The resulting stress, fear, and hypervigilance may exacerbate or even create problems which would not otherwise exist. In this way, anti-wind farm activists may be creating with their publicity some of the problems that they describe.

4.1.5 Somatoform Disorders

There are seven somatoform disorders in the Fourth Edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) (American Psychiatric Association, 2000). Somatoform disorders are physical symptoms which reflect psychological states rather than arising from physical causes. One common somatoform disorder, Conversion Disorder, is the unconscious expression of stress and anxiety as one or more physical symptoms (Escobar and Canino, 1989). Common conversion symptoms are sensations of tingling or discomfort, fatigue, poorly localized abdominal pain, headaches, back or neck pain, weakness, loss of balance, hearing and visual abnormalities. The symptoms are not feigned and must be present for at least six months according to DSM-IV-TR and two years according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) (WHO, 1993). ICD-10 specifies the symptoms as belonging to four groups: (1) Gastrointestinal (abdominal pain, nausea, bloating/gas/, bad taste in mouth/excessive tongue coating, vomiting/regurgitation, frequent/loose bowel movements); (2) Cardiovascular (breathlessness without exertion, chest pains); (3) Genitourinary (frequency or dysuria, unpleasant genital sensations, vaginal discharge), and (4) Skin and Pain (blotchiness or discoloration of the skin, pain in the limbs, extremities or joints, paresthesias). ICD-10 specifies that at least six symptoms must be present in two or more groups.

One feature of somatoform disorders is *somatosensory amplification*, a process in which a person learns to feel body sensations more acutely and may misinterpret the significance of those sensations by equating them with illness (Barsky, 1979). *Sensory integration dysfunction*

describes abnormal sensitivity to any or all sensory stimuli (sound, touch, light, smell, and taste). There is controversy among researchers and clinicians as to whether sensory integration problems exist as an independent entity or as components of a pervasive developmental disorder (Sadock and Sadock, 2005, p. 3135), but their presence can lead to overestimation of the likelihood of being ill (Sadock and Sadock, 2005, p. 1803). Sensory integration dysfunction as such is not listed in the DSM-IV-TR or in the ICD-10.

Day-to-day stressors and adverse life events provide multiple stimuli to which people respond, and that response is often somatic due to catecholamines and activation of the autonomic nervous system. This stress response can become conditioned as memory. There is some evidence that poor coping mechanisms (anger impulsivity, hostility, isolation, lack of confiding in others) are linked to physiological reactivity, which is associated with somatic sensation and amplification (Sadock and Sadock, 2005, p. 1806).

In summary, the similarities of common human stress responses and conversion symptoms to those described as "wind turbine syndrome" are striking. An annoyance factor to wind turbine sounds undoubtedly exists, to which there is a great deal of individual variability. Stress has multiple causes and is additive. Associated stress from annoyance, exacerbated by the rhetoric, fears, and negative publicity generated by the wind turbine controversy, may contribute to the reported symptoms described by some people living near rural wind turbines.

4.2 Infrasound, Low-frequency Sound and Disease

Some reports have suggested a link between low frequency sound from wind turbines and certain adverse health effects. A careful review of these reports, however, leads a critical reviewer to question the validity of the claims for a number of reasons, most notably (1) the level of sound exposure associated with the putative health effects, (2) the lack of diagnostic specificity associated with the health effects reported, and (3) the lack of a control group in the analysis.

4.2.1 Vibroacoustic Disease

Vibroacoustic disease (VAD) in the context of exposure of aircraft engine technicians to sound was defined by Portuguese researchers as a whole-body, multi-system entity, caused by chronic exposure to large pressure amplitude and low frequency (LPALF) sound (Alves-Pereira and Castelo Branco, 2007a; Alves-Pereira and Castelo Branco, 2007b; Alves-Pereira and Castelo Branco, 2007c; Alves-Pereira and Castelo Branco, 2007d). VAD, the primary feature of which is thickening of cardiovascular structures, such as cardiac muscle and blood vessels, was first noted among airplane technicians, military pilots, and disc jockeys (Maschke, 2004; Castelo Branco, 1999). Workers had been exposed to high levels for more than 10 years. There are no epidemiological studies that have evaluated risk of VAD from exposure to infrasound. The likelihood of such a risk, however, is remote in light of the much lower vibration levels in the body itself. Studies of workers with substantially higher exposure levels have not indicated a risk of VAD. VAD has been described as leading from initial respiratory infections, through pericardial thickening to severe and life-threatening illness such as stroke, myocardial infarction, and risk of malignancy (Alves-Pereira and Castelo Branco, 2007a).

4.2.2 High-Frequency Exposure

All of the exposures of subjects for whom the VAD concept was developed, were dominated by higher frequency sounds, a critical point since the frequency range claimed for VAD-inducing sound is much wider than the frequency range of exposures experienced by the aircraft technicians who were diagnosed with VAD (Castelo Branco, 1999). Originally, proponents of the VAD concept had proposed a "greater than 90 dB" criterion for VAD. However, now some claim that VAD will result from exposure to almost any level of infrasound and low frequency sound at any frequency below 500 Hz. This assertion is an extraordinary extrapolation given that the concept of VAD developed from observations that a technician, working around military aircraft on the ground, with engines operating, displayed disorientation (Castelo Branco, 1999). Sound levels near aircraft were very high. In an evaluation of typical engine spectra of carrier based combat aircraft operating on the ground, the spectra peaked at frequencies above 100 Hz with sound levels from 120 to 135 dB close to the aircraft (Smith, 2002). The levels drop considerably, however, into the low frequency region.

There is an enormous decibel difference between the sound exposure of aircraft technicians and the sound exposure of people who live near wind turbines. Animal experiments indicated that exposure levels necessary to cause VAD were 13 weeks of continuous exposure to approximately 100 dB of low frequency sound (Mendes et al., 2007). The exposure levels were at least 50 to 60 dB higher than wind turbine levels in the same frequency region (Hayes, 2006a).

4.2.3 Residential Exposure: A Case Series

Extrapolation of results from sound levels greater than 90 dB and at predominantly higher frequencies (greater than 100 Hz) to a risk of VAD from inaudible wind turbine sound levels of 40 to 50 dB in the infrasound region, is a new hypothesis. One investigator, for example, has claimed that wind turbines in residential areas produce acoustical environments that can lead to the development of VAD in nearby home-dwellers (Alves-Pereira and Castelo Branco, 2007a).

This claim is based on comparison of only two infrasound exposures. The first is for a family which has experienced a range of health problems and which also complained of disturbances from low frequency sound. The second is for a family which lived near four wind turbines, about which they have become anxious (Alves-Pereira and Castelo Branco, 2007a; Alves-Pereira and Castelo Branco, 2007b).

The first family (Family F), was exposed to low levels of infrasound consisting of about 50 dB at 8 Hz and 10 Hz from a grain terminal about 3 kilometers (km) away and additional sources of low frequency sound, including a nearer railway line and road. The second family (Family R) lives in a rural area and was described as exposed to infrasound levels of about 55 dB to 60 dB at 8 Hz to 16 Hz. These exposures are well below the hearing threshold and not uncommon in urban areas. Neither the frequency nor volume of the sound exposures experienced by Families F or R are unusual. Exposure to infrasound (< 20 Hz) did not exceed 50 dB.

4.2.3.1 Family F—Exposure to Low Levels of Infrasound

Family F has a long history of poor health and a 10-year-old boy was diagnosed with VAD due to exposure to infrasound from the grain terminal (Alves-Pereira and Castelo Branco, 2007a; Castelo Branco et al., 2004). However, the infrasound levels are well below hearing threshold and are typical of urban infrasound, which occurs widely and to which many people are exposed.

According to the authors, the main effect of VAD was demonstrated by the 10-year-old boy in the family, as pericardial thickening.[3] However, the boy has a history of poor health of unknown etiology (Castelo Branco et al., 2004). Castelo Branco (1999) has defined pericardial thickening as an indicator of VAD and assumes that the presence of pericardial thickening in the boy from Family F must be an effect of VAD, caused by exposure to the low-level, low frequency sound from the grain terminal. This assumption excludes other possible causes of pericardial thickening, including viral infection, tuberculosis, irradiation, hemodialysis, neoplasia with pericardial infiltration, bacterial, fungal, or parasitic infections, inflammation after myocardial infarction, asbestosis, and autoimmune diseases. The authors did not exclude these other possible causes of pericardial thickening.

4.2.3.2 Family R—Proximity to Turbines and Anxiety

Family R, living close to the wind turbines, has low frequency sound exposure similar to that of Family F. The family does not have symptoms of VAD, but it was claimed that "Family R. will also develop VAD should they choose to remain in their home." (Alves-Pereira and Castelo Branco, 2007b). In light of the absence of literature of cohort and case control studies, this bold statement seems to be unsubstantiated by available scientific literature.

4.2.4 Critique

It appears that Families F and R were self-selected complainants. Conclusions derived by Alves-Pereira and Castelo Branco (2007b) have been based only on the poor health and the sound exposure of Family F, using this single exposure as a measure of potential harmful effects for others. There has been no attempt at an epidemiological study.

Alves-Pereira and Castelo Branco claim that exposure at home is more significant than exposure at work because of the longer periods of exposure (Alves-Pereira and Castelo Branco, 2007e). Because an approximate 50 dB difference occurs between the exposure from wind turbines and the exposure that induced VAD (Hayes, 2006a), it will take 10^5 years (100,000 years) for the wind turbine dose to equal that of one year of the higher level sound.

Among published scientific literature, this description of the two families is known as a case series, which are of virtually no value in understanding potential ***causal associations*** between exposure to a potential hazard (i.e., low frequency sound) and a potential health effect (i.e., vibroacoustic disease). Case reports have value but primarily in generating hypotheses to test in other studies such as large groups of people or in case control studies. The latter type of study can systematically evaluate people with pericardial thickening who live near wind turbines in comparison to people with pericardial thickening who do not live

[3] Pericardial thickening is unusual thickening of the protective sac (pericardium) which surrounds the heart. For example, see http://www.emedicine.com/radio/topic191.htm.

near wind turbines. Case reports need to be confirmed in larger studies, most notably cohort studies and case-control studies, before definitive cause and effect assertions can be drawn. The reports of the two families do not provide persuasive scientific evidence of a link between wind turbine sound and pericardial thickening.

Wind turbines produce low levels of infrasound and low frequency sound, yet there is no credible scientific evidence that these levels are harmful. If the human body is affected by low, sub-threshold sound levels, a unique and not yet discovered receptor mechanism of extraordinary sensitivity to sound is necessary—a mechanism which can distinguish between the normal, relatively high-level "sound" inherent in the human body[4] and excitation by external, low-level sound. Essential epidemiological studies of the potential effects of exposure at low sound levels at low frequencies have not been conducted. Until the fuzziness is clarified, and a receptor mechanism revealed, no reliance can be placed on the case reports that the low levels of infrasound and low frequency sound are a cause of vibroacoustic disease.[5]

The attribution of dangerous properties to low levels of infrasound continues unproven, as it has been for the past 40 years. No foundation has been demonstrated for the new hypothesis that exposure to sub-threshold, low levels of infrasound will lead to vibroacoustic disease. Indeed, human evolution has occurred in the presence of natural infrasound.

4.3 Wind Turbine Syndrome

"Wind turbine syndrome" as promoted by Pierpont (2009, pre-publication draft) appears to be based on the following two hypotheses:

1. Low levels of airborne infrasound from wind turbines, at 1 to 2 Hz, directly affect the vestibular system.

2. Low levels of airborne infrasound from wind turbines at 4 to 8 Hz enter the lungs via the mouth and then vibrate the diaphragm, which transmits vibration to the viscera, or internal organs of the body.

The combined effect of these infrasound frequencies sends confusing information to the position and motion detectors of the body, which in turn leads to a range of disturbing symptoms.

4.3.1 Evaluation of Infrasound on the Vestibular System

Consider the first hypothesis. The support for this hypothesis is a report apparently misunderstood to mean that the vestibular system is more sensitive than the cochlea to low levels of both sound and vibration (Todd et al., 2008a). The Todd report is concerned with vibration input to the mastoid area of the skull, and the corresponding detection of these vibrations by the cochlea and vestibular system. The lowest frequency used was 100 Hz,

[4] Body sounds are often used for diagnosis. For example see Gross, V., A. Dittmar, T. Penzel, F., Schüttler, and P. von Wichert.. (2000): "The Relationship between Normal Lung Sounds, Age, and Gender. " *American Journal of Respiratory and Critical Care Medicine*. Volume 162, Number 3: 905 - 909.

[5] This statement should not be interpreted as a criticism of the work of the VAD Group with aircraft technicians at high noise levels.

considerably higher than the upper limit of the infrasound frequency (20 Hz). The report does not address air-conducted sound or infrasound, which according to Pierpont excites the vestibular system by airborne sound and by skull vibration. This source does not support Pierpont's hypothesis and does not demonstrate the points that she is trying to make.

There is no credible scientific evidence that low levels of wind turbine sound at 1 to 2 Hz will directly affect the vestibular system. In fact, it is likely that the sound will be lost in the natural infrasonic background sound of the body. The second hypothesis is equally unsupported with appropriate scientific investigations. The body is a noisy system at low frequencies. In addition to the beating heart at a frequency of 1 to 2 Hz, the body emits sounds from blood circulation, bowels, stomach, muscle contraction, and other internal sources. Body sounds can be detected externally to the body by the stethoscope.

4.3.2 Evaluation of Infrasound on Internal organs

It is well known that one source of sound may mask the effect of another similar source. If an external sound is detected within the body in the presence of internally generated sounds, the external sound must produce a greater effect in the body than the internal sounds. The skin is very reflective at higher frequencies, although the reflectivity reduces at lower frequencies (Katz, 2000). Investigations at very low frequencies show a reduction of about 30 dB from external to internal sound in the body of a sheep (Peters et al., 1993). These results suggest an attenuation (reduction) of low frequency sound by the body before the low frequency sound reaches the internal organs.

Low-level sounds from outside the body do not cause a high enough excitation within the body to exceed the internal body sounds. Pierpont refers to papers from Takahashi and colleagues on vibration excitation of the head by high levels of external sound (over 100 dB). However, these papers state that response of the head at frequencies below 20 Hz was not measurable due to the masking effect of internal body vibration (Takahashi et al., 2005; Takahashi et al., 1999). When measuring chest resonant vibration caused by external sounds, the internal vibration masks resonance for external sounds below 80 dB excitation level (Leventhall, 2006). Thus, the second hypothesis also fails.

To recruit subjects for her study, Pierpont sent out a general call for anybody believing their health had been adversely affected by wind turbines. She asked respondents to contact her for a telephone interview. The case series results for ten families (37 subjects) are presented in Pierpont (2009, pre-publication draft). Symptoms included sleep disturbance, headache, tinnitus, ear pressure, vertigo, nausea, visual blurring, tachycardia, irritability, concentration, memory, panic attacks, internal pulsation, and quivering. This type of study is known as a case series. A case series is of limited, if any, value in evaluating causal connections between an environmental exposure (in this case, sound) and a designated health effect (so called "wind turbine syndrome"). This particular case series is substantially limited by selection bias, in which people who already think that they have been affected by wind turbines "self select" to participate in the case series. This approach introduces a significant bias in the results, especially in the absence of a control group who do not live in proximity of a wind turbine. The results of this case series are at best hypothesis-generating activities that do not provide support for a causal link between wind turbine sound and so-called "wind turbine syndrome."

However, these so called "wind turbine syndrome" symptoms are not new and have been published previously in the context of "annoyance" to environmental sounds (Nagai et al., 1989; Møller and Lydolf, 2002; Mirowska and Mroz, 2000). The following symptoms are based on the experience of noise sufferers extending over a number of years: distraction, dizziness, eye strain, fatigue, feeling vibration, headache, insomnia, muscle spasm, nausea, nose bleeds, palpitations, pressure in the ears or head, skin burns, stress, and tension (Leventhall, 2002).

The symptoms are common in cases of extreme and persistent annoyance, leading to stress responses in the affected individual and may also result from severe tinnitus, when there is no external sound. The symptoms are exhibited by a small proportion of sensitive persons and may be alleviated by a course of psychotherapy, aimed at desensitization from the sound (Leventhall et al., 2008). The similarity between the symptoms of noise annoyance and those of "wind turbine syndrome" indicates that this "diagnosis" is not a pathophysiological effect, but is an example of the well-known stress effects of exposure to noise, as displayed by a small proportion of the population. These effects are familiar to environmental noise control officers and other "on the ground" professionals.

"Wind turbine syndrome," not a recognized medical diagnosis, is essentially reflective of symptoms associated with noise annoyance and is an unnecessary and confusing addition to the vocabulary on noise. This syndrome is not a recognized diagnosis in the medical community. There are no unique symptoms or combinations of symptoms that would lead to a specific pattern of this hypothesized disorder. The collective symptoms in some people exposed to wind turbines are more likely associated with annoyance to low sound levels.

4.4 Visceral Vibratory Vestibular Disturbance

4.4.1 Hypothesis

In addition to case reports of symptoms reported by people who live near wind turbines, Pierpont has proposed a hypothesis that purports to explain how some of these symptoms arise: visceral vibratory vestibular disturbance (VVVD) (Pierpont, 2009, pre-publication draft). VVVD has been described as consisting of vibration associated with low frequencies that enters the body and causes a myriad of symptoms. Pierpont considers VVVD to be the most distinctive feature of a nonspecific set of symptoms that she describes as "wind turbine syndrome." As the name VVVD implies, wind turbine sound in the 4 to 8 Hz spectral region is hypothesized to cause vibrations in abdominal viscera (e.g., intestines, liver, and kidneys) that in turn send neural signals to the part of the brain that normally receives information from the vestibular labyrinth. These signals hypothetically conflict with signals from the vestibular labyrinth and other sensory inputs (visual, proprioceptive), leading to unpleasant symptoms, including panic. Unpleasant symptoms (especially nausea) can certainly be caused by sensory conflict; this is how scientists explain motion sickness. However, this hypothesis of VVVD is implausible based on knowledge of sensory systems and the energy needed to stimulate them. Whether implausible or not, there are time-tested scientific methods available to evaluate the legitimacy of any hypothesis and at this stage, VVVD as proposed by Pierpont is an untested hypothesis. A case series of 10 families recruited to participate in a study based on certain symptoms would not be considered evidence of causality by research or policy institutions such as the International Agency for Research on

Cancer (IARC) or EPA. As noted earlier in this report, a case series of self-selected patients does not constitute evidence of a causal connection.

4.4.2 Critique

Receptors capable of sensing vibration are located predominantly in the skin and joints. A clinical neurological examination normally includes assessment of vibration sensitivity. It is highly unlikely, however, that airborne sound at comfortable levels could stimulate these receptors, because most of airborne sound energy is reflected away from the body. Takahashi et al. (2005) used airborne sound to produce chest or abdominal vibration that exceeded ambient body levels. This vibration may or may not have been detectable by the subjects. Takahashi found that levels of 100 dB sound pressure level were required at 20 to 50 Hz (even higher levels would have been required at lower and higher frequencies). Sounds like this would be considered by most people to be very loud, and are well beyond the levels produced by wind turbines at residential distances. Comparison of the responses to low frequency airborne sound by normal hearing and profoundly deaf persons has shown that deaf subjects can detect sound transmitted through their body only when it is well above the normal hearing threshold (Yamada et al., 1983). For example, at 16 Hz, the deaf persons' average threshold was 128 dB sound pressure level, 40 dB higher than that of the hearing subjects. It has also been shown that, at higher frequencies, the body surface is very reflective of sound (Katz, 2000). Similarly, work on transmission of low frequency sound into the bodies of sheep has shown a loss of about 30 dB (Peters et al., 1993)

The visceral receptors invoked as a mechanism for VVVD have been shown to respond to static gravitational position changes, but not to vibration (that is why they are called graviceptors). If there were vibration-sensitive receptors in the abdominal viscera, they would be constantly barraged by low frequency body sounds such as pulsatile blood flow and bowel sounds, while external sounds would be attenuated by both the impedance mismatch and dissipation of energy in the overlying tissues. Finally, wind turbine sound at realistic distances possesses little, if any, acoustic energy, at 4 to 8 Hz.

It has been hypothesized that the vestibular labyrinth may be "abnormally stimulated" by wind turbine sound (Pierpont, 2009, pre-publication draft). As noted in earlier sections of this report, moderately loud airborne sound, at frequencies up to about 500 Hz, can indeed stimulate not only the cochlea (the hearing organ) but also the otolith organs. This is not abnormal, and there is no evidence in the medical literature that it is in any way unpleasant or harmful. In ordinary life, most of us are exposed for hours every day to sounds louder than those experienced at realistic distances from wind turbines, with no adverse effects. This assertion that the vestibular labyrinth is stimulated at levels below hearing threshold is based on a misunderstanding of research that used bone-conducted vibration rather than airborne sound. Indeed, those who wear bone conduction hearing aids experience constant stimulation of their vestibular systems, in addition to the cochlea, without adverse effects.

4.5 Interpreting Studies and Reports

In light of the unproven hypotheses that have been introduced as reflective of adverse health effects attributed to wind turbines, it can be instructive to review the type of research studies that can be used to determine definitive links between exposure to an environmental

hazard (in this case, sound and vibration emissions from wind turbines) and adverse health effects (the so-called "wind turbine syndrome").

How do we know, for example, that cigarettes cause lung cancer and that excessive noise causes hearing loss? Almost always, the first indication that an exposure might be harmful comes from the informal observations of doctors who notice a possible correlation between an exposure and a disease, then communicate their findings to colleagues in case reports, or reports of groups of cases (*case series*). These initial observations are usually uncontrolled; that is, there is no comparison of the people who have both exposure and disease to control groups of people who are either non-exposed or disease-free. There is usually no way to be sure that the apparent association is statistically significant (as opposed to simple coincidence), or that there is a causal relationship between the exposure and the disease in question, without control subjects. For these reasons, case reports and case series cannot prove that an exposure is really harmful, but can only help to develop hypotheses that can then be tested in controlled studies (Levine et al., 1994; Genovese, 2004; McLaughlin, 2003).

Once suspicion of harm has been raised, controlled studies (case-control or cohort) are essential to determine whether or not a causal association is likely, and only after multiple independent-controlled studies show consistent results is the association likely to be broadly accepted (IARC, 2006).

Case-control studies compare people with the disease to people without the disease (ensuring as far as possible that the two groups are well-matched with respect to all other variables that might affect the chance of having the disease, such as age, sex, and other exposures known to cause the disease). If the disease group is found to be much more likely to have had the exposure in question, and if multiple types of error and bias can be excluded (Genovese, 2004), a causal link is likely. Multiple case-control studies were necessary before the link between smoking and lung cancer could be proved.

Cohort studies compare people with the exposure to well-matched control subjects who have not had that exposure. If the exposed group proves to be much more likely to have the disease, assuming error and bias can be excluded, a causal link is likely. After multiple cohort studies, it was clear that excessive noise exposure caused hearing loss (McCunney and Meyer, 2007).

In the case of wind turbine noise and its hypothetical relationships to "wind turbine syndrome" and vibroacoustic disease, the weakest type of evidence—case series—is available, from only a single investigator. These reports can do no more than suggest hypotheses for further research. Nevertheless, if additional and independent investigators begin to report adverse health effects in people exposed to wind turbine noise, in excess of those found in unexposed groups, and if some consistent syndrome or set of symptoms emerges, this advice could change. Thus, at this time, "wind turbine syndrome" and VVVD are unproven hypotheses (essentially unproven ideas) that have not been confirmed by appropriate research studies, most notably cohort and case control studies. However, the weakness of the basic hypotheses makes such studies unlikely to proceed.

4.6 Standards for Siting Wind Turbines

4.6.1 Introduction

While the use of large industrial-scale wind turbines is well established in Europe, the development of comparable wind energy facilities in North America is a more recent occurrence. The growth of wind and other renewable energy sources is expected to continue. Opponents of wind energy development argue that the height and setback regulations established in some jurisdictions are too lenient and that the noise limits which are applied to other sources of noise (either industrial or transportation) are not sufficient for wind turbines for a variety of reasons. Therefore, they are concerned that the health and well-being of some residents who live in the vicinity (or close proximity to) of these facilities is threatened. Critics maintain that wind turbine noise may present more than an annoyance to nearby residents especially at night when ambient levels may be low. Consequently, there are those who advocate for a revision of the existing regulations for noise and setback pertaining to the siting of wind installations (Kamperman and James, 2009). Some have indicated their belief that setbacks of more than 1 mile may be necessary. While the primary purpose of this study was to evaluate the potential for adverse health effects rather than develop public policy, the panel does not find that setbacks of 1 mile are warranted.

4.6.2 Noise Regulations and Ordinances

In 1974, EPA published a report that examined the levels of environmental noise necessary to protect public health and welfare (EPA, 1974). Based on the analysis of available scientific data, EPA specified a range of day-night sound levels necessary to protect the public health and welfare from the effects of environmental noise, with a reasonable margin of safety. Rather than establishing standards or regulations, however, EPA simply identified noise levels below which the general public would not be placed at risk from any of the identified effects of noise. Each federal agency has developed its own noise criteria for sources for which they have jurisdiction (i.e., the Federal Aviation Administration regulates aircraft and airport noise, the Federal Highway Administration regulates highway noise, and the Federal Energy Regulatory Commission regulates interstate pipelines (Bastasch, 2005). State and local governments were provided guidance by EPA on how to develop their own noise regulations, but the establishment of appropriate limits was left to local authorities to determine given each community's differing values and land use priorities (EPA, 1975).

4.6.3 Wind Turbine Siting Guidelines

Establishing appropriate noise limits and setback distances for wind turbines has been a concern of many who are interested in wind energy. There are several approaches to regulating noise, from any source, including wind turbines. They can generally be classified as absolute or relative standards or a combination of absolute and relative standards. Absolute standards establish a fixed limit irrespective of existing noise levels. For wind turbines, a single absolute limit may be established regardless of wind speed (i.e., 50 dBA) or different limits may be established for various wind speeds (i.e., 40 dBA at 5 meters per second [m/s] and 45 dBA at 8 m/s). The Ontario Ministry of Environment (2008) wind turbine noise guidelines is an example of fixed limits for each integer wind speed between 4 and 10 meters per second. Relative standards limit the increase over existing levels and may

also establish either an absolute floor or ceiling beyond which the relative increase is not considered. That is, for example, if a relative increase of 10 dBA with a ceiling of 50 dBA is allowed and the existing level is 45 dBA, a level of 55 dBA would not be allowed. Similarly, if a floor of 40 dBA was established and the existing level is 25 dBA, 40 dBA rather than 35 dBA would be allowed. Fixed distance setbacks have also been discussed. Critics of this approach suggest that fixed setbacks do not take into account the number or size of the turbines nor do they consider other potential sources of noise within the project area. It is clear that like many other sources of noise, a uniform regulator approach for wind turbine noise has not been established either domestically or internationally.

A draft report titled *Environmental Noise and Health in the UK*, published for comment in 2009 by the Health Protection Agency (HPA) on behalf of an ad hoc expert group, provides insightful comments on the World Health Organization's noise guidelines (WHO, 1999). The HPA draft report can be viewed at the following address:

http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1246433634856

The HPA report states the following:

It is important to bear in mind that the WHO guideline values, like other WHO guidelines, are offered to policymakers as a contribution to policy development. They are not intended as standards in a formal sense but as a possible basis for the development of standards. By way of overall summary, the 1998 NPL report noted [a British report titled *Health-Based Noise Assessment Methods – A Review and Feasibility Study* (Porter et al., 1998) as quoted in HPA 2009]:

> *The WHO guidelines represent a consensus view of international expert opinion on the lowest noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. The guidelines form a starting point for policy development. However, it will clearly be important to consider the costs and benefits of reducing noise levels and, as in other areas, this should inform the setting of objectives.*
> (From: HPA, 2009, p. 77)

The HPA report further states the following:

> *Surveys have shown that about half of the UK population lives in areas where daytime sound levels exceed those recommended in the WHO Community Noise Guidelines. About two-thirds of the population live in areas where the night-time guidelines recommended by WHO are exceeded. (p. 81)*
>
> *That sleep can be affected by noise is common knowledge. Defining a dose-response curve that describes the relationship between exposure to noise and sleep disturbance has, however, proved surprisingly difficult. Laboratory studies and field studies have generated different results. In part this is due to habituation to noise which, in the field, is common in many people. (p. 82)*
>
> *Our examination of the evidence relating to the effects of environmental noise on health has demonstrated that this is a rapidly developing area. Any single report will, therefore, need to be revised within a few years. We conclude and recommend that an*

> *independent expert committee to address these issues on a long-term basis be established. (p. 82)*

The statements cited above from the HPA and WHO documents address general environmental noise concerns rather than concerns focused solely on wind turbine noise.

SECTION 5

Conclusions

Many countries have turned to wind energy as a key strategy to generate power in an environmentally clean manner. Wind energy enjoys considerable public support, but it has its detractors, who have publicized their concerns that the sounds emitted from wind turbines cause adverse health consequences.

The objective of the panel was to develop an authoritative reference document for the use of legislators, regulators, and citizens simply wanting to make sense of the conflicting information about wind turbine sound. To this end, the panel undertook extensive review, analysis, and discussion of the peer-reviewed literature on wind turbine sound and possible health effects. The varied professional backgrounds of panel members (audiology, acoustics, otolaryngology, occupational and environmental medicine, and public health) were highly advantageous in creating a diversity of informed perspectives. Participants were able to examine issues surrounding health effects and discuss plausible biological effects with considerable combined expertise.

Following review, analysis, and discussion, the panel reached agreement on three key points:

- There is nothing unique about the sounds and vibrations emitted by wind turbines.
- The body of accumulated knowledge about sound and health is substantial.
- The body of accumulated knowledge provides no evidence that the audible or subaudible sounds emitted by wind turbines have any direct adverse physiological effects.

The panel appreciated the complexities involved in the varied human reactions to sound, particularly sounds that modulate in intensity or frequency. Most complaints about wind turbine sound relate to the aerodynamic sound component (the swish sound) produced by the turbine blades. The sound levels are similar to the ambient noise levels in urban environments. A small minority of those exposed report annoyance and stress associated with noise perception.

This report summarizes a number of physical and psychological variables that may influence adverse reactions. In particular, the panel considered "wind turbine syndrome" and vibroacoustic disease, which have been claimed as causes of adverse health effects. The evidence indicates that "wind turbine syndrome" is based on misinterpretation of physiologic data and that the features of the so-called syndrome are merely a subset of annoyance reactions. The evidence for vibroacoustic disease (tissue inflammation and fibrosis associated with sound exposure) is extremely dubious at levels of sound associated with wind turbines.

The panel also considered the quality of epidemiologic evidence required to prove harm. In epidemiology, initial case reports and uncontrolled observations of disease associations

need to be confirmed through controlled studies with case-control or cohort methodology before they can be accepted as reflective of casual connections between wind turbine sound and health effects. In the area of wind turbine health effects, no case-control or cohort studies have been conducted as of this date. Accordingly, allegations of adverse health effects from wind turbines are as yet unproven. Panel members agree that the number and uncontrolled nature of existing case reports of adverse health effects alleged to be associated with wind turbines are insufficient to advocate for funding further studies.

In conclusion:

1. Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.
2. Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.
3. Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.
4. A major cause of concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.

SECTION 6

References

Alves-Pereira, M., and N.A.A. Castelo Branco. 2007a. Public Health and Noise Exposure: The Importance of Low Frequency Noise. *Proceedings of the Inter-Noise 2007 Conference*. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.

Alves-Pereira, M., and N.A.A. Castelo Branco. 2007b. In-Home Wind Turbine Noise is Conducive to Vibroacoustic Disease. *Proceedings of the Second International Meeting on Wind Turbine Noise.* Lyon, France: September 20-21, 2007. INCE/Europe.

Alves-Pereira, M., and N.A.A. Castelo Branco. 2007c. The Scientific Arguments Against Vibroacoustic Disease. *Proceedings of the Inter-Noise 2007 Conference.* Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.

Alves-Pereira, M., and N.A.A. Castelo Branco. 2007d. Infrasound and Low Frequency Noise Dose Responses: Contributions. *Proceedings of the Inter-Noise 2007 Conference.* Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.

Alves-Pereira, M., and N.A.A. Castelo Branco. 2007e. Infrasound and low frequency noise dose responses: Contributions. *Proceedings of the Inter-Noise 2007 Conference,* CDRom. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.

American National Standards Institute (ANSI). 2006. *Guide for the Measurement and Evaluation of Human Exposure to Vibration Transmitted to the Hand*, ANSI S2.70-2006. New York: Acoustical Society of America.

American National Standards Institute (ANSI). 1979. *Guide for the Evaluation of Human Exposure to Whole-Body Vibration*, ANSI S3.18-1979. New York: Acoustical Society of America.

American Psychiatric Association. 2000. *Diagnostic and Statistical Manual of Mental Disorders*, 4th Ed. Text rev. Washington DC.

Babisch, W. 2004. Health Aspects of Extra-Aural Noise Research. *Noise & Health* 6(22): 69-81.

Babisch, W. 2000. Traffic Noise and Cardiovascular Disease: Epidemiological Review and Synthesis. *Noise & Health* 2(8): 9–32.

Babisch, W. 1998. Epidemiological Studies of the Cardiovascular Effects of Occupational Noise—A Critical Appraisal. *Noise & Health* 1(1): 24—39.

Baloh, R.W. and V. Honrubia. 1979. *Clinical Neurophysiology of the Vestibular System.* Philadelphia, Pennsylvania: F. A. Davis Company.

Barsky, A.J. 1979. Patients who amplify body symptoms. *Annals of Internal Medicine* 91: 63.

Bastasch, M. 2005. Regulation of Wind Turbine Noise in the Western U.S. *Proceedings of the 1st International Conference on Wind Turbine Noise: Perspectives for Control*. Berlin. October 17-18, 2005. INCE/Europe.

Berglund, B., P. Hassmen, and R. F. Job. 1996. Sources and effects of low frequency noise. *Journal of the Acoustical Society of America* 99: 2985-3002

Berglund, B. and T. Lindvall. 1995. Community Noise. *Archives of the Centre for Sensory Research, Karolinska Institute, Stockholm University Vol 2, Issue 1*.

Brooks, Thomas F., D. Stuart Pope, and Michael A. Marcolini. 1989. Airfoil self-noise and prediction. L-16528; NAS 1.61:1218; NASA-RP-1218. http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19890016302_1989016302.pdf

Bradley, J. S. 1994. Annoyance Caused by Constant Amplitude and Amplitude Modulated Sounds Containing Rumble. *Noise Control Engineering Journal* 42: 203-208.

Castelo Branco, N.A.A. 1999. The Clinical Stages of Vibroacoustic Disease. *Aviation, Space and Environmental Medicine* 70 (3 II Suppl.): A32-A39.

Castelo Branco, N.A.A., A. Araujo, J. Jonaz de Melo, and M. Alves-Pereira. 2004. Vibroacoustic Disease in a Ten Year Old Male. *Proceedings of the Inter-Noise 2004 Conference.* Prague: Czech Acoustical Society and the International Institute of Noise Control Engineering

Escobar, J, and G. Canino. 1989. Unexplained physical complaints: Psychopathology and epidemiological correlates. *British Journal of Psychiatry* 154 [Suppl 4]: 24.

Fernandez, C., and J.M. Goldberg. 1976. Physiology of Peripheral Neurons Innervating Otolith Organs of the Squirrel Monkey. III: Response dynamics. *Journal of Neurophysiology* 39: 996.

Fiz, J. A., J. Gnitecki, S.S. Kraman, H. Pasterkamp and G.R. Wodicka. 2008. Effect of Body Position on Lung Sounds in Healthy Young Men. *Chest* 133 (3): 729-736.

Genovese E. 2004. Evidence-based medicine: What does it mean? Why do we care? In Occupational Medicine Practice Guidelines, ed Glass LS, American College of Occcupational and Environmental Medicine, OEM Press, Beverly Farms, MA.

Global Wind Energy Council. 2009. Global Wind 2008 Report. http://www.gwec.net/fileadmin/documents/Publications/Global%20Wind%202008%20Report.pdf.

Gross, V., A. Dittmar, T. Penzel, F. Schüttler, and P. von Wichert. 2000. The Relationship Between Normal Lung Sounds, Age, and Gender. *American Journal of Respiratory and Critical Care Medicine.* 162 (3): 905 - 909.

Hayes, M. 2006a. Low Frequency and Infrasound Noise Emissions from Wind Farms and the Potential for Vibroacoustic Disease. *Proceedings of the 12th International Meeting on Low Frequency Noise and Vibration and Its Control.* Bristol: Journal of Low Frequency Noise, Vibration and its Control, INCE/Europe, and EAA.

Hayes, M. 2006b. The Measurement of Low Frequency Noise at Three UK Wind Farms. URN No.: 06/1412 http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk//whatwedo/energy/sources/renewables/explained/wind/onshore-offshore/page31267.html.

Health Protection Agency (HPA). 2009. *Environmental Noise and Health in the UK*. Dr. Andy Moorhouse, Ed. http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1246433634856.

IEC. 1994. 60050-801:1994 International Electrotechnical Vocabulary - Chapter 801: Acoustics and electroacoustics.

International Agency for Research on Cancer. 2006. IARC monographs on the evaluation of carcinogenic risk to humans: Preamble. World Health Organization, International Agency for Research on Cancer: Lyon, France.

Inukai, Y., N. Nakamura, and H. Taya. 2000. Unpleasantness and Acceptable Limits of Low Frequency Sound. *Journal of Low-frequency Noise and Vibration* 19: 135-140.

Ising, H. and B. Kruppa. 2004. Health Effects Caused by Noise: Evidence in the Literature from the Past 25 Years. *Noise and Health* 6 (23): 5-13.

International Standards Organization (ISO). 2003. ISO 226. Acoustics—Normal equal-loudness contours.

Jakobsen, J. 2004. Infrasound Emission from Wind Turbines. *Proceedings of the 11th International Meeting on Low Frequency Noise and Vibration and its Control.* Maastricht: MultiScience Publishing Company.

Kalveram, K. T. 2000. How Acoustical Noise Can Cause Physiological and Psychological Reactions. *Proceedings of the 5th International Symposium of Transport Noise and Vibration*. St. Petersburg, Russia: East European Acoustical Society.

Kalveram, K Th, Dassow, J & Vogt, J (1999) How information about the source influences noise annoyance. *Proceedings of the 137th meeting of the Acoustical Society of America.* Seattle, Washington: Acoustical Society of America.

Kamperman G.W. and R. R. James. 2009. Guidelines for selecting wind turbine sites. *Sound and Vibration*: 8-12. July. http://www.sandv.com/home.htm.

Kamperman, G. W. and R. R. James. 2008. Simple Guidelines for Siting Wind Turbines to Prevent Health Risks. *Proceedings NoiseCon 2008*. Dearborn, Michigan: Institute of Noise Control Engineering.

Katz, B. 2000. Acoustic Absorption Coefficient of Human Hair and Skin within the Audible Frequency Range. *JASA* 108. pp. 2238-2242.

Kryter K.D. 1980. Physiological Acoustics and Health. *Journal of the Acoustical Society of America* 68: 10–14.

Kurakata, K., and T. Mizunami. 2008. The statistical distribution of normal hearing thresholds for low frequency tones. *Journal of Low Frequency Noise, Vibration and Active Control* 27: 97-104.

Leventhall, H.G. 2006. Somatic Responses to Low Frequency Noise. *Proceedings of the 12th International Meeting: Low Frequency Noise and Vibration and its Control.* Bristol: Journal of Low Frequency Noise, Vibration and its Control, INCE/Europe, and EAA.

Leventhall, H.G. 2004. Low Frequency Noise and Annoyance. *Noise and Health* 6 923: 59-72.

Leventhall, H.G. 2002. 35 Years of Low Frequency Noise—Stephens Medal Lecture. *Proceedings of Institue of Acoustics.* Stratford, UK: Institute of Acoustics.

Leventhall, H. G., S. Benton, and P. Pelmear. 2003. *A Review of Published Research on Low Frequency Noise and its Effects.* http://www.defra.gov.uk/environment/noise/research/lowfrequency/pdf/lowfreqnoise.pdf. Accessed 2003.

Leventhall, H. G., S. Benton, and D. Robertson. 2008. Coping Strategies for Low Frequency Noise. *Journal of Low Frequency Noise and Vibration* 27: 35-52.

Levine M, Walter S, Lee H, Haines T, Holbrook Am Moyer V. 1994. How to use an article about harm. *Journal of the American Medical Association* 271: 1615-1619.

Maschke C. 2004. Introduction to the special issue of low frequency noise. *Noise and Health* 6: 1-2.

McCunney, R.J. and J. Meyer. 2007. Occupational Exposure to Noise. *Environmental and Occupational Medicine, 4th Edition*. W. M. Rom, ed. Baltimore: Lippincott Williams and Wilkins. pp. 1295-1238.

McLaughlin J.K. 2003. Epidemiology and Biostatistics. McCunney R.J. (ed) *A Practical Approach to Occupational and Environmental Medicine.* Baltimore.

Mendes, J., J. Martins dos Santos, P. Oliveira, J. da Fonseca, A. Aguas, and N.A.A. Castelo Branco. 2007. Low frequency noise effects on the periodontium of the Wistar rat - a light microscopy study. *European Journal of Anatomy* 11 (1): 27-30

Mirowska, M., and E. Mroz. 2000. Effect of low frequency noise at low levels on human health in light of questionnaire investigation. *Proceedings of the Inter-Noise 2000 Conference.* 5: 2809 - 2812.

Mittelstaedt, H. 1996. Somatic graviception. *Biological Psychology* 42: 53-74.

Møller, H., and M. Lydolf. 2002. A questionnaire survey of complaints of infrasound and low frequency noise. *Journal of Low Frequency Noise and Vibration* 21: 53-65.

Moorhouse, A., M. Hayes, S. von Hunerbein, B. Piper, and M. Adams. 2007. Research into Aerodynamic Modulation of Wind Turbine Noise. *Report: Department of Business Enterprise and Regulatory Reform. www.berr.gov.uk/files/file40570.pdf*.

Nagai, N., M. Matsumoto, Y. Yamsumi, T. Shiraishi, K. Nishimura, K. Matsumoto, K. Myashita, and S. Takeda. 1989. Process and emergence of the effects of infrasonic

and low frequency noise on inhabitants. *Journal of Low Frequency Noise and Vibration* 8: 87-89.

National Institute for Occupational Safety and Health (NIOSH). 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. NIOSH, Cincinnati OH.

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects NRC, Washington, DC.

National Toxicology Program (NTP). National Institute of Environmental Health Sciences (NIESH). 2001. Infrasound: brief review of the toxicological literature. Prepared in part by Integrated Laboratory systems (NIEHS contract N01-E3 -65402 (Haneke K.E. and B.C. Carson, authors).

New York Department of Environmental Conservation. 2001. Assessing and Mitigating Noise Impacts. Available at http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf.

Occupational Safety and Health Administration (OSHA). 1983. Occupational Noise Exposure: Hearing Conservation Amendment; Final Rule. Federal Register 48 (46): 9738-9784.

Oerlemans, S. and G. Schepers. 2009. Prediction of wind turbine noise directivity and swish. *Proceedings of the 3rd International Conference on Wind Turbine Noise.* Aalborg, Denmark. June 17-19, 2009. INCE/Europe.

Ontario Ministry of Environment. 2008. Noise Guidelines for Wind Farms. Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities. http://www.ene.gov.on.ca/publications/4709e.pdf

Pearsons K.S., R.L. Bennett, and S. Fidell. 1977. Speech levels in various noise environments. Report No. EPA-600/1-77-025. Washington DC, Environmental Protection Agency, 1977.

Pedersen, E., R. Bakker, J. Bouma, and F. van den Berg. 2009. Response to noise from modern wind farms in The Netherlands. *Journal of the Acoustical Society of America* August 126: 634-643

Pedersen, and H. Högskolan. 2003. *Noise Annoyance from Wind Turbines*. Report 5308. Swedish Environmental Protection Agency.

Pedersen, E. and K Persson Waye. 2008. Wind turbines-low level noise sources interfering with restoration. *Environmental Research Letters* 3: 1-5

Pedersen, E. and K. Persson Waye. 2007. Wind turbine noise, annoyance and self-reported health and wellbeing in different living environments, *Occupational and Environmental Medicine* 64: 480–486.

Pedersen, E. and K. Persson Waye. 2004. Perception and annoyance due to wind turbine noise: A dose–response relationship, *Journal of the Acoustical Society of America* 116: 3460–3470.

Pedersen, E., L. R.-M. Hallberg, and K. Persson Waye. 2007. Living in the vicinity of wind turbines—A grounded theory study. *Qualitative Research in Psychology* 4: 49–63.

Pedersen, T. H. 2008. Low frequency noise from large Wind Turbines - A procedure for evaluation of the audibility for low frequency sound and a literature study. *DELTA Report EP- 06*.

Persson Waye, K. 2004. Effects of low frequency noise on sleep. *Noise and Health* 6 (23): 87-91.

Persson Waye, K. and E. Öhrström 2002. Psycho-acoustic characters of relevance for annoyance of wind turbine noise. *J. Sound & Vibration* 250 (1): 65-73.

Persson R. M. Albin, J.Ardö, J. Björk, and K. Jakobsson. 2007. Trait anxiety and modeled exposure determinants of self reported annoyance to sound, air pollution and other environmental factors in the home. *International Archives of Occupational and Environmental Health* 18: 179-191

Peters, A. J. M., R.M. Abrams, K.J. Gerhardt, and S.K. Griffiths. 1993. Transmission of airborne sound from 50 to 20,000 Hz into the abdomen of sheep. *Journal of Low Frequency Noise and Vibration* 12: 16-24.

Pierpont, N. 2009, pre-publication draft. *Wind Turbine Syndrome: a report on a natural experiment.* http://www.windturbinesyndrome.com/wp-content/uploads/2009/03/ms-ready-for-posting-on-wtscom-3-7-09.pdf.

Porter, N.D., I.H. Flindell, and B.F. Berry. 1998. Health-Based Noise Assessment Methods—A Review and Feasibility Study. NPL Report CMAM 16.

Sadock, B. J., and V.A. Sadock, Eds. 2005. *Kaplan & Sadock's Comprehensive Textbook of Psychiatry*, 8th Edition. Philadelphia, PA: Lippincott Williams & Wilkins.

Sakai, A. L.P. Feigen and A.A. Luisada. 1971. Frequency distribution of the heart sounds in normal man. *Cardiovascular Research* 5 (3): 358-363.

Sasser, S.M., R.W. Sattin, R.C. Hunt, and J. Krohmer. 2006. Blast lung injury. *Prehospital Emergency Care* 10: 165-72.

Schust, M. 2004. Effects of low frequency noise up to 100 Hz. *Noise & Health* 6 (23): 73-85.

Smith, S.D. 2002. Characterizing the effect of airborne vibration on human body vibration response. *Aviation, Space and Environmental Medicine* 73: 36 - 45.

Spiegel, H. 1997. 1997. Nocebo: The power of suggestibility. *Preventive Medicine* 26: 616.

Suter, AH. 1991. Noise and its Effects. Report to the Administrative Conference of the United States. http://www.nonoise.org/library/suter/suter.htm.

Takahashi, Y., K. Kanada, Y. Yonekawa, and N. Harada. 2005. A study on the relationship between subjective unpleasantness and body surface vibrations induced by high-level low-frequency pure tones. *Industrial Health* 43: 580-587.

Takahashi, Y., Y. Yonekawa, K. Kanada, and S. Maeda. 1999. A pilot study on human body vibration induced by low frequency noise. *Industrial Health* 37: 28-35.

Todd, N., S.M. Rosengren, and J.G. Colebatch. 2008a. Tuning and sensitivity of the human vestibular system to low frequency vibration. *Neuroscience Letters* 444: 36-41.

Todd, N.P., S.M. Rosengren, and J.G. Colebatch. 2008b. A source analysis of short-latency evoked potentials produced by air- and bone-conducted sound. *Journal of Clinical Neurophysiology* 119: 1881-94.

Truax, Barry, ed. 1999. Handbook for Acoustic Ecology, Second Edition. Originally published by the World Soundscape Project, Simon Fraser University, and ARC Publications, 1978

U.S. Environmental Protection Agency (EPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. EPA/ONAC 550/9-74-004, March 1974. http://www.nonoise.org/library/levels/levels.htm.

U.S. Environmental Protection Agency (EPA). 1975. Model Noise Control Ordinance. http://www.nonoise.org/epa/Roll16/roll16doc6.pdf.

van den Berg, G. P. 2004: Do Wind Turbines produce significant low frequency sound levels? *Proc 11th International Meeting on Low Frequency Noise and Vibration and its Control, Maastricht August 2004*, 367-376.

van den Berg, G. P. 2003. Effects of the wind profile at night on wind turbine noise. *Journal of Sound and Vibration*. http://www.nowap.co.uk/docs/windnoise.pdf.

Van Dijk F.J.H., J.H. Ettema, and R.L. Zielhuis. 1987. Non-auditory effects of noise: VII. Evaluation, conclusions, and recommendations. *International Archives of Occupational and Environmental Health* 59: 147—152.

van Kamp , M. Haines, J. Hatfield, R.F. Job, S.A. Stanfield and R.K. Stellato. 2004. The role of noise sensitivity in the noise response relation: A comparison of three international airport studies. *Journal of the Acoustical Society of America* 116: 3471-79.

Webster, J.C. 1978. Speech interference aspects of noise. In *Noise and Audiology*, ed. Lipscomb DL, Baltimore: University Park Press.

Wilder D.G., D.E. Wasserman, and J. Wasserman. 2002. Occupational vibration exposure. In Physical and Biological Hazards of the Workplace, ed. Wald PH, Stave GM. John Wiley and Sons, New York.

Wolsink, M., M. Sprengers, A. Keuper, T.H. Pedersen, and C.A. Westra. 1993. Annoyance from wind turbine noise on sixteen sites in three countries. *Proceedings of the European Community Wind Energy Conference*. Lübeck, Travemünde. 273–276.

World Health Organization (WHO). 1999. Guidelines for Community Noise (edited by B. Berglund, T. Lindvall, D. Schwela, K-T. Goh). The World Health Organization, Geneva, Switzerland. ISBN: 9971: 9971-88-770-3 http://whqlibdoc.who.int/hq/1999/a68672.pdf.

World Health Organization (WHO). 1993. International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), *Classification of Mental and Behavioural Disorders*. Geneva.

Yamada, S., 1980. Hearing of low frequency sound and influence on the body. Conference on Low Frequency Noise and Hearing. Aalborg, Denmark. 95-102. (Eds. H Møller and P Rubak).

Yamada, S., M. Ikuji, S. Fujikata, T. Watanabe, and T. Kosaka. 1983. Body sensations of low frequency noise of ordinary persons and profoundly deaf persons. *Journal of Low Frequency Noise and Vibration* 2: 32-36.

Young, E.D., C. Fernandez, and J.M. Goldberg. 1977. Responses of squirrel monkey vestibular neurons to audio-frequency sound and head vibration. *Acta Otolaryngol* 84: 352-60.

Additional References

Alberts, D. 2006. Primer for Addressing Wind Turbine Noise. http://www.maine.gov/doc/mfs/windpower/pubs/pdf/AddressingWindTurbineNoise.pdf.

American National Standards Institute. 1996. *American National Standard Specification for Audiometers*, ANSI S3.6-1996. New York: Acoustical Society of America.

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: a Review of the Current White, Grey and Published Literature 2008. http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf.

Copes, R. and K. Rideout. Wind Turbines and Health: A Review of Evidence. Ontario Agency for Health Protection and Promotion 2009. http://www.oahpp.ca/Documents/Wind%20Turbines%20-%20Sept%2010%202009.pdf.

Draft New Zealand standard for wind turbine sound. http://shop.standards.co.nz/drafts/DZ6808-DZ6808Publiccommentdraft.pdf.

Hellwig, R. and Lampeter, R. 2009. Critiques on Kamperman and James paper on wind turbine noise. March. http://www.dekalbcounty.org/Planning/Exhibit_M.pdf.

Stelling, K. and D. Phyt. 2009. Summary of recent research on adverse health effects of wind turbines. http://windconcernsontario.files.wordpress.com/2009/08/adverse-health-effects-of-wind-turbines1.pdf.

Fox Business. 2009. Ontario citizen takes legal aim at government of Ontario's flagship Green Energy Act. http://www.foxbusiness.com/story/markets/industries/energy/ontario-citizen-takes-legal-aim-government-ontarios-flagship-green-energy-act/.

Industrial Wind Action Group. 2009. Maine Osteopathic Association Resolution: Wind Energy and Public Health. http://www.windaction.org/documents/23515.

Kamperman, G. and R. James. 2008. Why noise criteria are necessary for proper siting of wind turbines. http://www.windturbinesyndrome.com/wp-content/uploads/2008/11/kamperman-and-james-9-pp.pdf.

Kamperman, G., and R. James. 2008. The how to guide to siting wind turbines to prevent health risks from sound. http://www.savethebluffs.ca/archives/files/kamperman-james-8-26-08-report.pdf.

Klug, H. Noise from wind turbines—standards and noise reduction procedures. http://www.sea-acustica.es/Sevilla02/envgen013.pdf.

Keith, S. E., D. S. Michaud, and S. H. P. Bly. 2008. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. Journal of Low Frequency Noise, Vibration and Active Control, 27 (4):253-265.

Ramakrishnan, R. 2007. Acoustic Consulting Report Prepared for the Ontario Ministry of the Environment: Wind Turbine Facilities Noise Issues. Aiolos Engineering Corporation. https://ospace.scholarsportal.info/bitstream/1873/13073/1/283287.pdf.

Regan, B. and T.G. Casey. 2006. Wind Turbine Noise Primer, *Canadian Acoustics Journal* 34 (2).

Rogers, A. and J. Manwell . Wright, S. 2002. Wind turbine acoustic noise. http://www.ceere.org/rerl/publications/whitepapers/Wind_Turbine_Acoustic_Noise_Rev2006.pdf/

Soysai, H., and O. Soysai. Wind farm noise and regulations in the eastern United States. 2007. *Proceedings of the Second International Meeting on Wind Turbine Noise.* Lyon, France: September 20-21, 2007. INCE/Europe.

State of Rhode Island, Department of Environmental Management. 2009. *Terrestrial Wind Turbine Siting Report*. http://www.dem.ri.gov/cleannrg/pdf/terrwind.pdf.

Ward, W.D, L.H. Royster, and J.D. Royster. 2003. Anatomy and Physiology of the Ear: Normal and Damaged Hearing. In *The Noise Manual*, Eds. Berger EH, Royster LH, Royster JD, Driscoll DP, Layne M. AIHA Press, Fairfax VA.

Welgampola, M.S., S.M. Rosengren, G.M. Halmagyi, and J.G. Colebatch. 2003. Vestibular activation by bone conducted sound. *Journal of Neurology, Neurosurgery and Psychiatry* 74: 771-778.

Wilder, D.G., D.E. Wasserman, and J. Wasserman. 2002. Occupational Vibration Exposure. In *Physical and Biological Hazards of the Workplace*, Ed. Wald PH, Stave GM. John Wiley and Sons, New York.

World Health Organization (WHO). 2009. Night Noise Guidelines for Europe. The World Health Organization, Geneva, Switzerland. http://www.euro.who.int/document/e92845.pdf.

APPENDIX A
Fundamentals of Sound

APPENDIX A

Fundamentals of Sound

The following appendix provides additional background information on sound and how it is defined.

One atmospheric pressure is given by 100,000 pascals (Pa), where one pascal is one Newton per square meter (N/m^2), and a sound pressure of 94 dB re 20μPa is given by 1 Pa (See later for decibels). The frequency of the fluctuations may be between 20 times a second (20 Hz), and up to 20,000 times a second (20,000 Hz) for the "audible" noise. Frequencies below 20 Hz are commonly called "infrasound," although there is a very fuzzy boundary between infrasound and low frequency noise. Infrasound at high levels is audible. Low frequency noise might be from about 10 Hz to about 200 Hz.

In addition to frequency, the quantities which define a sound wave include:

- Pressure, P
- Wavelength, λ
- Velocity, c = 340m/s approx, depending on temperature

The velocity and wavelength are related by: velocity = wavelength x frequency,

Relating frequency and wavelength by velocity gives

Freq Hz	16	31.5	63	125	250	500	1000	2000	4000
Wavelength m	21	11	5.4	2.7	1.4	0.68	0.34	0.17	0.085

Low frequencies have long wavelengths. It is useful to develop an appreciation of frequencies and related wavelengths, since this helps an understanding of noise propagation and control.

Sound pressure in a wave is force per unit of area of the wave and has units of N/m^2, which is abbreviated to Pa. The sound pressure fluctuates above and below atmospheric pressure by a very small amount.

The sound power is a characteristic of the source, and is its rate of production of energy, expressed in watts. The sound power is the fundamental property of the source, whilst the sound pressure at a measurement location depends on the transmission path from source to receiver. Most sound sources, including wind turbines, are specified in terms of their sound power. The sound power of a wind turbine is typically in the 100-105 dBA range, which is similar to that of a leaf blower. The sound power is used to predict propagation of the sound, where the source is assumed to be at the hub.

Sound Levels

The decibel is the logarithm of the ratio between two values of a quantity such as power, pressure or intensity, with a multiplying constant to give convenient numerical factors. Logarithms are useful for compressing a wide range of quantities into a smaller range. For example:

$\log_{10}10 = 1$
$\log_{10}100 = 2$
$\log_{10}1000 = 3$

The ratio of 1000:10 is compressed into a ratio of 3:1.

This approach is advantageous for handling sound levels, where the ratio of the highest to the lowest sound which we are likely to encounter is as high as 1,000,000 to 1. A useful development, many years ago, was to take the ratios with respect to the quietest sound which we can hear. This is the threshold of hearing at 1,000 Hz, which is 20 microPascals (μPa) ($2x10^{-5}$Pa) of pressure for the average young healthy person. Sound powers in decibels are taken with respect to a reference level of 10^{-12} watts.

When the word "level" is added to the word for a physical quantity, decibel levels are implied, denoted by L_X, where $_X$ is the symbol for the quantity.

$$\text{Pressure level} \quad L_p = 20\log_{10}\left[\frac{P}{P_0}\right] \text{ dB}$$

where P is the measured pressure and P_0 is the reference pressure level of $2x10^{-5}$ Pa

A little calculation allows us to express the sound pressure level at a distance from a source of known sound power level as

Sound pressure level, $L_P = L_w - 20\log[r] - 11$ dB

Where L_p is the sound pressure level
L_w is the sound power level of the source
r is the distance from the source

This is the basic equation for spherical sound propagation. It is used in prediction of wind turbine sound but, in a real calculation, has many additions to it, to take into account the atmospheric, ground and topographic conditions. However, as a simple calculation, the sound level at a distance of 500m from a source of sound power 100 dBA is 35 dBA.

Equivalent level (Leq): This is a steady level over a period of time, which has the same energy as that of the fluctuating level actually occurring during that time. A-weighted equivalent level, designated LAeq, is used for many legislative purposes, including for assessment of wind turbine sound.

Percentiles (LN)L These are a statistical measure of the fluctuations in overall noise level, that is, in the envelope of the noise, which is usually sampled a number of times per second, typically ten times. The most used percentiles are L90 and L10. The L90 is the level exceeded for 90 percent of the time and represents a low level in the noise. It is often used to assess

background noise. The L10 is the level exceeded for 10 percent of the time and is a measure of the higher levels in a noise. Modern computing sound level meters give a range of percentiles. Note that the percentile is a statistical measure over a specified time interval.

Frequency Analysis

This gives more detail of the frequency components of a noise. Frequency analysis normally uses one of three approaches: octave band, one-third octave band or narrow band.

Narrow band analysis is most useful for complex tonal noises. It could be used, for example, to determine a fan tone frequency, to find the frequencies of vibration transmission from machinery or to detect system resonances. All analyses require an averaging over time, so that the detail of fluctuations in the noise is normally lost.

Criteria for assessment of noise are based on dBA, octave bands, or 1/3-octave band measurements. These measures clearly give increasingly detailed information about the noise.

APPENDIX B

The Human Ear

APPENDIX B

The Human Ear

Humans have ears with three general regions:

1. An *outer ear,* including an ear (auditory) canal
2. An air-containing *middle ear* that includes an eardrum and small bones called ossicles (three in mammals, one in other animals)
3. An *inner ear* that includes organs of hearing (in mammals, this is the organ of Corti in the cochlea) and balance (vestibular labyrinth)

Airborne sound passes thorough the ear canal, making the eardrum and ossicles vibrate, and this vibration then sets the fluids of the cochlea into motion. Specialized "hair cells" convert this fluid movement into nerve impulses that travel to the brain along the auditory nerve. The hair cells, nerve cells, and other cells in the cochlea can be damaged by excessive noise, trauma, toxins, ear diseases, and as part of the aging process. Damage to the cochlea causes "sensorineural hearing loss," the most common type of hearing loss in the United States.

It is essential to understand the role of the middle ear, as well as the difference between air conduction and bone conduction. The middle ear performs the essential task of converting airborne sound into inner ear fluid movement, a process known as impedance matching (air is a low-impedance medium, meaning that its molecules move easily in response to sound pressure, while water is a high-impedance medium). Without impedance matching, over 99.9 percent of airborne sound energy is reflected away from the body. The middle ear enables animals living in air to hear very soft sounds that would otherwise be inaudible, but it is unnecessary for animals that live in water, because sound traveling in water passes easily into the body (which is mostly water). When a child has an ear infection, or an adult places earplugs in his ears, a "conductive hearing loss" dramatically reduces the transmission of airborne sound into the inner ear. People with conductive hearing loss can still hear sounds presented directly to the skull by "bone conduction." This is how both humans and fishes hear underwater or when a vibrating tuning fork is applied to the head, but it requires much more acoustic energy than air conduction hearing.

APPENDIX C

Measuring Sound

APPENDIX C

Measuring Sound

A sound level meter is the standard way of measuring sound. Environmental sound is normally assessed by the A-weighting. Although hand-held instruments appear to be easy to use, lack of understanding of their operation and limitations, and the meaning of the varied measurements which they can give, may result in misleading readings.

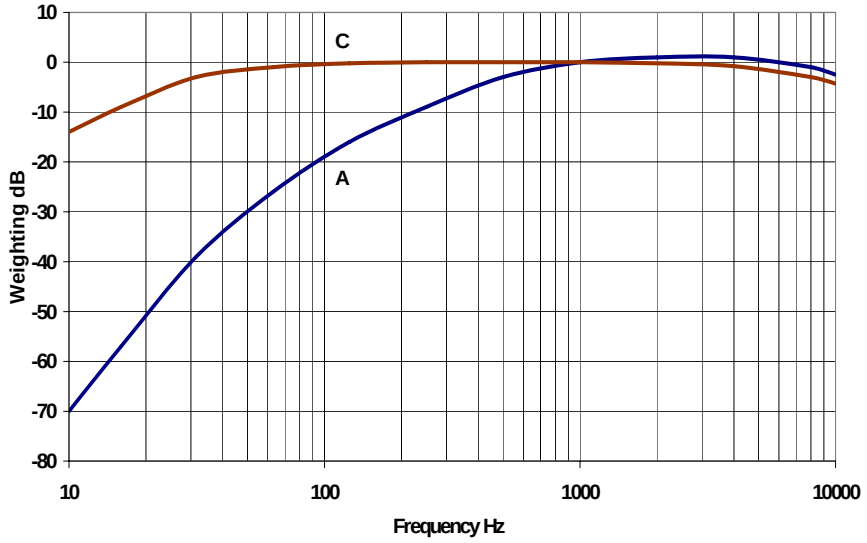
The weighting network and electrical filters are an important part of the sound level meter, as they give an indication of the frequency components of the sound. The filters are as follows:

- A-weighting: on all meters
- C-weighting: on most meters
- Linear (Z-weighting): on many meters
- Octave filters: on some meters
- Third octave filters: on some meters
- Narrow band: on a few meters

Sound level meter weighting networks are shown in Figure C-1. Originally, the A-weighting was intended for low levels of noise. C-weighting was intended for higher levels of noise. The weighting networks were based on human hearing contours at low and high levels and it was hoped that their use would mimic the response of the ear. This concept, which did not work out in practice, has now been abandoned and A- and C-weighting are used at all levels. Linear weighting is used to detect low frequencies. A specialist G-weighting is used for infrasound below 20 Hz.

Figure C-1 shows that the A-weighting depresses the levels of the low frequencies, as the ear is less sensitive to these. There is general consensus that A-weighting is appropriate for estimation of the hazard of NIHL. With respect to other effects, such as annoyance, A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies, or contains prominent low frequency tones, the A-weighting may not give a valid measure. Compared with other noise sources, wind turbine spectra, as heard indoors at typical separation distances, have less low frequency content than most other sources (Pedersen, 2008).

FIGURE C-1
Weighting Networks



APPENDIX D
Propagation of Sound

APPENDIX D

Propagation of Sound

The propagation of noise from wind turbines is determined by a number of factors, including:

- Geometrical spreading, given by K = 20log[r] –11 dB, at a distance r
- Molecular absorption. This is conversion of acoustic energy to heat and is frequency dependent
- Turbulent scattering from local variations in wind velocity and air temperature and is moderately frequency dependent
- Ground effects—reflection, topography and absorption are frequency dependent; their effects increasing as the frequency increases
- Near surface effects—temperature and wind gradients.

The sound pressure at a point, distant from source, is given by

$$L_P = L_W - K - D - A_A - A_G \qquad \text{(dB)}$$

In which:

L_P is the sound pressure at the receiving point

L_W is the sound power of the turbine in decibels re 10^{-12} watts

K is the geometrical spreading term, which is inherent in all sources

D is a directivity index, which takes non-uniform spreading into account

A_A is an atmospheric absorption and other near surface effects term

A_G is a ground absorption and other surface effects term

Near surface meteorological effects are complex, as wind and temperature gradients affect propagation through the air.

APPENDIX E

Expert Panel Members

APPENDIX E

Expert Panel Members

Members of the expert panel are listed below. Biographies of each member are provided following the list.

Expert Panel Members

W. David Colby, M.D.

Chatham-Kent Medical Officer of Health (Acting)
Associate Professor, Schulich School of Medicine & Dentistry, University of Western Ontario

Robert Dobie, M.D.

Clinical Professor, University of Texas, San Antonio
Clinical Professor, University of California, Davis

Geoff Leventhall, Ph.D.

Consultant in Noise Vibration and Acoustics, UK

David M. Lipscomb, Ph.D.

President, Correct Service, Inc.

Robert J. McCunney, M.D.

Research Scientist, Massachusetts Institute of Technology Department of Biological Engineering,
Staff Physician, Massachusetts General Hospital Pulmonary Division; Harvard Medical School

Michael T. Seilo, Ph.D.

Professor of Audiology, Western Washington University

Bo Søndergaard, M.Sc. (Physics)

Senior Consultant, Danish Electronics Light and Acoustics (DELTA)

Technical Advisor

Mark Bastasch

Acoustical Engineer, CH2M HILL

Panel Member Biographies

W. David Colby, M.D.

W. David Colby M.Sc., M.D., FRCPC, is a fellow of the Royal College of Physicians and Surgeons of Canada in Medical Microbiology. Dr Colby is the Acting Medical Officer of Health in Chatham-Kent, Ontario and Associate Professor of Medicine, Microbiology/Immunology and Physiology/Pharmacology at the Schulich School of Medicine and Dentistry at the University of Western Ontario. He received his M.D. from the University of Toronto and completed his residency at University Hospital, London, Ontario. While still a resident he was given a faculty appointment and later was appointed Chief of Microbiology and Consultant in Infectious Diseases at University Hospital. Dr Colby lectures extensively on antimicrobial chemotherapy, resistance and fungal infections in addition to a busy clinical practice in Travel Medicine and is a Coroner for the province of Ontario. He has received numerous awards for his teaching. Dr. Colby has a number of articles in peer-reviewed journals and is the author of the textbook *Optimizing Antimicrobial Therapy: A Pharmacometric Approach.* He is a Past President of the Canadian Association of Medical Microbiologists. On the basis of his expertise in Public Health, Dr Colby was asked by his municipality to assess the health impacts of wind turbines. The report, titled *The Health Impact of Wind Turbines: A Review of the Current White,Grey, and Published Literature* is widely cited internationally.

Robert Dobie, M.D.

Robert Dobie, M.D., is clinical professor of otolaryngology at both the University of Texas Health Science Center at San Antonio and the University of California-Davis. He is also a partner in Dobie Associates, a consulting practice specializing in hearing and balance, hearing conservation, and ear disorders. The author of over 175 publications, his research interests include age-related and noise-induced hearing loss, as well as tinnitus and other inner ear disorders. He is past president of the Association for Research in Otolaryngology, past chair of the Hearing and Equilibrium Committee of the American Academy of Otolaryngology-Head and Neck Surgery, and has served on the boards and councils of many other professional organizations and scholarly journals.

Geoff Leventhall, Ph.D.

Geoff is a UK-based noise and vibration consultant who works internationally. His academic and professional qualifications include Ph.D. in Acoustics, Fellow of the UK Institute of Physics, Honorary Fellow of the UK institute of Acoustics (of which he is a former President), Distinguished International Member of the USA Institute of Noise Control Engineering, Member of the Acoustical Society of America.

He was formerly an academic, during which time he supervised 30 research students to completion of their doctoral studies in acoustics. Much of his academic and consultancy work has been on problems of infrasound and low frequency noise and control of low frequency noise by active attenuation

He has been a member of a number of National and International committees on noise and acoustics and was recently a member of two committees producing reports on effects of noise on health: the UK Health Protection Agency Committee on the Health Effects of

Ultrasound and Infrasound and the UK Department of Health Committee on the Effects of Environmental Noise on Health.

David M. Lipscomb, Ph.D.

Dr. David M. Lipscomb received a Ph. D. in Hearing Science from the University of Washington (Seattle) in 1966. Dr. Lipscomb taught at the University of Tennessee for more than two decades in the Department of Audiology and Speech Pathology. While he was on the faculty, Dr. Lipscomb developed and directed the department's Noise Research Laboratory. During his tenure at Tennessee and after he moved to the Pacific Northwest in 1988, Dr. Lipscomb has served as a consultant to many entities including communities, governmental agencies, industries, and legal organizations.

Dr. Lipscomb has qualified in courts of law as an expert in Audiology since 1966. Currently, he investigates incidents to determine whether an acoustical warning signal provided warning to individuals in harms way, and, if so, at how many seconds before an incident. With his background in clinical and research audiology, he undertakes the evaluation of hearing impairment claims for industrial settings and product liability.

Dr. Lipscomb was a bioacoustical consultant to the U. S. Environmental Protection Agency Office of Noise Abatement and Control (ONAC) at the time the agency was responding to Congressional mandates contained in the Noise Control Act of 1972. He was one of the original authors of the Criteria Document produced by ONAC, and he served as a reviewer for the ONAC document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. Dr. Lipscomb's experience in writing and reviewing bioacoustical documentation has been particularly useful in his review of materials for AWEA regarding wind farm noise concerns.

Robert J. McCunney, M.D.

Robert J. McCunney, M.D., M.P.H., M.S., is board certified by the American Board of Preventive Medicine as a specialist in occupational and environmental medicine. Dr. McCunney is a staff physician at Massachusetts General Hospital's pulmonary division, where he evaluates and treats occupational and environmental illnesses, including lung disorders ranging from asbestosis to asthma to mold related health concerns, among others. He is also a clinical faculty member of Harvard Medical School and a research scientist at the Massachusetts Institute of Technology Department of Biological Engineering, where he participates in epidemiological research pertaining to occupational and environmental health hazards.

Dr. McCunney received his B.S. in chemical engineering from Drexel University, his M.S. in environmental health from the University of Minnesota, his M.D. from the Thomas Jefferson University Medical School and his M.P.H. from the Harvard School of Public Health. He completed training in internal medicine at Northwestern University Medical Center in Chicago. Dr. McCunney is past president of the American College of Occupational and Environmental Medicine (ACOEM) and an accomplished author. He has edited numerous occupational and environmental medicine textbooks and over 80 published articles and book chapters. He is the Editor of all three editions of the text book, *A Practical Approach to Occupational and Environmental Medicine*, the most recent edition of which was published in 2003. Dr. McCunney received the Health Achievement Award from ACOEM in 2004.

Dr. McCunney has extensive experience in evaluating the effects of noise on hearing via reviewing audiometric tests. He has written book chapters on the topic and regularly lectures at the Harvard School of Public Health on "Noise and Health."

Michael T. Seilo, Ph.D.

Dr. Michael T. Seilo received his Ph.D. in Audiology from Ohio University in 1970. He is currently a professor of audiology in the Department of Communication Sciences and Disorders at Western Washington University in Bellingham, Washington where he served as department chair for a total of more than twenty years. Dr. Seilo is clinically certified by the American Speech-Language-Hearing Association (ASHA) in both audiology and speech-language pathology and is a long-time member of ASHA, the American Academy of Audiology, and the Washington Speech and Hearing Association.

For many years Dr. Seilo has taught courses in hearing conservation at both the graduate and undergraduate level. His special interest areas include speech perception and the impact of noise on human hearing sensitivity including tinnitus.

Dr. Seilo has consulted with industries on the prevention of NIHL and he has collaborated with other professionals in the assessment of hearing-loss related claims pertaining to noise.

Bo Søndergaard, M.Sc. (Physics)

Bo Søndergaard has more than 20 years of experience in consultancy in environmental noise measurements, predictions and assessment. The last 15 years with an emphasis on wind turbine noise. Mr. Søndergaard is the convenor of the MT11 work group under IEC TC88 working with revision of the measurement standard for wind turbines IEC 61400-11. He has also worked as project manager for the following research projects: Low Frequency Noise from Large Wind Turbines for the Danish Energy Authority, Noise and Energy optimization of Wind Farms, and Noise from Wind Turbines in Wake for Energinet.dk.

Technical Advisor Biography

Mark Bastasch

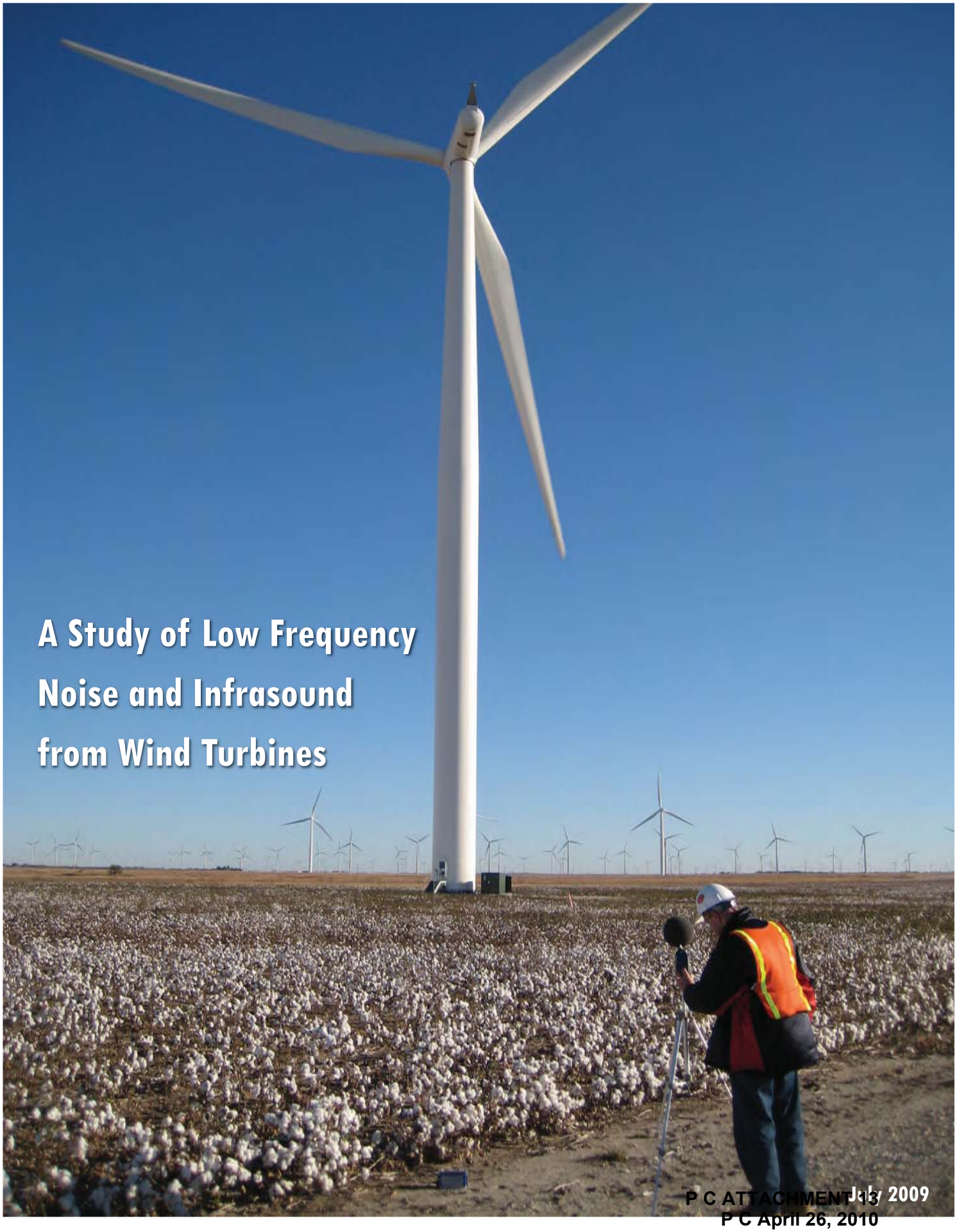
Mr. Bastasch is a registered acoustical engineer with CH2M HILL. Mr. Bastasch assisted AWEA and CanWEA in the establishment of the panel and provided technical assistance to the panel throughout the review process. Mr. Bastasch's acoustical experience includes preliminary siting studies, regulatory development and assessments, ambient noise measurements, industrial measurements for model development and compliance purposes, mitigation analysis, and modeling of industrial and transportation noise. His wind turbine experience includes some of the first major wind developments including the Stateline project, which when built in 2001 was the largest in the world. He also serves on the organizing committee of the biannual International Wind Turbine Noise Conference, first held in Berlin, Germany, in 2005.

Acknowledgements

We acknowledge the following person for suggestions and comments on the manuscript. The final responsibility for the content remains with the authors.

Richard K. Jennings, M.D. —Psychiatrist, Retired

Prepared for **NextEra Energy Resources, LLC**, *700 Universe Boulevard, Juno Beach, FL 33408*



A Study of Low Frequency Noise and Infrasound from Wind Turbines

July 2009

P C ATTACHMENT 13
P C April 26, 2010

Prepared by **Epsilon Associates, Inc.**, *3 Clock Tower Place, Suite 250, Maynard, MA 01754*

A Study of Low Frequency Noise and Infrasound from Wind Turbines

Prepared for:
NextEra Energy Resources, LLC
700 Universe Boulevard
Juno Beach, FL 33408

Prepared by:
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754

Robert D. O'Neal, INCE, CCM
Robert D. Hellweg, Jr., P.E., INCE Bd. Certified
Richard M. Lampeter, INCE

July 2009

Report No. 2433-01

P C ATTACHMENT 13
P C April 26, 2010

TABLE OF CONTENTS

ES EXECUTIVE SUMMARY 0-1

1.0 INTRODUCTION 1-1

2.0 DEFINITIONS 2-1
- 2.1 Low Frequency Noise/Sound 2-1
- 2.2 Infrasound 2-1

3.0 EFFECTS OF LOW FREQUENCY SOUND AND INFRASOUND 3-1
- 3.1 Humans 3-1
  - 3.1.1 Threshold of hearing 3-1
  - 3.1.2 Loudness 3-1
  - 3.1.3 Non-auditory perceptions 3-2
- 3.2 Residential Structures 3-2
  - 3.2.1 Airborne Vibration 3-2
  - 3.2.2 Ground borne Vibration 3-2

4.0 GUIDELINES AND CRITERIA 4-1
- 4.1 United States Government 4-1
- 4.2 American National Standards (voluntary) 4-1
  - 4.2.1 ANSI/ASA S12.9-2007/Part 5 4-1
  - 4.2.2 ANSI S12.9-2005/Part 4 4-1
  - 4.2.3 ANSI/ASA S12.2-2008 4-3
- 4.3 Other Criteria 4-6
  - 4.3.1 World Health Organization (WHO) 4-6
  - 4.3.2 The UK Department for Environment, Food, and Rural Affairs (DEFRA) 4-6
  - 4.3.3 C-weighted minus A-weighted (L_{pC}- L_{pA}) 4-8
  - 4.3.4 Threshold of hearing 4-8
  - 4.3.5 Ground-Borne Vibration 4-9

5.0 LITERATURE REVIEW 5-1
- 5.1 H. Moeller and C. S. Pedersen (2004) 5-1
- 5.2 Leventhall (2003) 5-1
- 5.3 Leventhall (2006) 5-1
- 5.4 Delta (2008) 5-1
- 5.5 Hayes McKenzie (2006) 5-2
- 5.6 Howe (2006) 5-2
- 5.7 Branco (2004) 5-3
- 5.8 French National Academy of Medicine (2006) 5-3

6.0 REPRESENTATIVE WIND TURBINES 6-1

7.0 FIELD PROGRAM 7-1
7.1 GE 1.5sle and Siemens SWT-2.3-93 7-1
7.2 Measurement Equipment 7-2

8.0 RESULTS AND COMPARISON TO CRITERIA 8-1
8.0.1 Audibility 8-1
8.0.2 UK DEFRA Disturbance Criteria 8-1
8.0.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements 8-1
8.0.4 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements 8-2
8.1 Siemens SWT-2.3-93 8-2
8.1.1 Outdoor Measurements - Siemens SWT-2.3-93 8-2
8.1.1.1 Outdoor Audibility 8-2
8.1.1.2 UK DEFRA Disturbance Criteria – Outdoor measurements 8-2
8.1.1.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements 8-3
8.1.2 Indoor Measurements - Siemens SWT-2.3-93 8-3
8.1.2.1 Indoor Audibility 8-3
8.1.2.2 UK DEFRA Disturbance Criteria – Indoor Measurements 8-4
8.1.2.3 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements 8-4
8.2 GE 1.5sle 8-4
8.2.1 Outdoor Measurements - GE 1.5sle 8-4
8.2.1.1 Outdoor Audibility 8-5
8.2.1.2 UK DEFRA Disturbance Criteria – Outdoor measurements 8-5
8.2.1.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements 8-5
8.2.2 Indoor Measurements - GE 1.5sle 8-5
8.2.2.1 Indoor Audibility 8-6
8.2.2.2 UK DEFRA Disturbance Criteria – Indoor Measurements 8-6
8.2.2.3 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements 8-6
8.3 Noise Reduction from Outdoor to Indoor 8-7
8.4 Ground-Borne Vibration 8-8

9.0 CONCLUSION 9-1

10.0 BIBLIOGRAPHY 10-1

P C ATTACHMENT 13
P C April 26, 2010

ES EXECUTIVE SUMMARY

Early down-wind wind turbines in the US created low frequency noise; however current up-wind wind turbines generate considerably less low frequency noise. The results of Epsilon Associates, Inc. (Epsilon) analysis and field testing indicate that there is no audible infrasound either outside or inside homes at the any of the measurement sites – the closest site was approximately 900 feet from a wind farm. Wind farms at distances beyond 1000 feet meet the ANSI standard for low frequency noise in bedrooms, classrooms, and hospitals, meet the ANSI standard for thresholds of annoyance from low frequency noise, and there should be no window rattles or perceptible vibration of light-weight walls or ceilings within homes. In homes there may be slightly audible low frequency noise (depending on other sources of low frequency noise); however, the levels are below criteria and recommendations for low frequency noise within homes. In accordance with the above findings and in conjunction with our extensive literature search of scientific papers and reports, there should be no adverse public health effects from infrasound or low frequency noise at distances greater than 1000 feet from the wind turbine types measured by Epsilon: GE 1.5sle and Siemens SWT 2.3-93.

Siemens SWT 2.3-93 Wind Turbine. Outdoor measurements of Siemens SWT 2.3-93 wind turbines under high output and relatively low ground wind speed (which minimized effects of wind noise) at 1000 feet indicate that infrasound is inaudible to the most sensitive people (more than 20 dB lower than median thresholds of hearing); that outdoor equivalent ANSI/ASA S12.2 perceptible vibration criteria are met; that the low frequency sounds are compatible with ANSI S12.9 Part 4 levels for minimal annoyance and beginning of rattles; that levels meet outdoor equivalent UK Department for Environment, Food and Rural Affairs (DEFRA) disturbance-based guidelines for use by Environmental Health Officers, and that low frequency sounds might be audible in some cases. Based on the comparisons made to these criteria, there are no low frequency noise problems from Siemens SWT 2.3-93 wind turbines at 1000 feet or beyond.

Indoor measurements of two homes with windows open and closed of Siemens SWT 2.3-93 wind turbines at approximately 920 feet (under high output, maximum noise, and high ground winds) and at 1060 feet (under moderate-high output, maximum noise and relatively low ground winds) indicate infrasound is inaudible to the most sensitive people (more than 25 dB lower than median thresholds of hearing). The low frequency noise at 50 Hz and above might be slightly audible depending on background noises within the home or other external noises. The ANSI/ASA S12.2 low frequency criteria for bedrooms, classrooms and hospitals were met, as were the criteria for moderately perceptible vibrations in light-weight walls and ceilings. DEFRA disturbance based guidelines were met for steady low frequency sounds and were within 2 dB for non-steady low frequency sounds. Based on the comparisons made to these criteria, there are no low frequency noise problems indoors from Siemens SWT 2.3-93 wind turbines at 920 feet or beyond.

GE 1.5sle Wind Turbine. Outdoor measurements of GE 1.5sle wind turbines under high output and relatively low ground wind speed (which minimized effects of wind noise) at 1000 feet indicate that infrasound is inaudible to the most sensitive people (more than 20 dB lower than median thresholds of hearing); that outdoor equivalent ANSI/ASA S12.2 perceptible vibration criteria are

met; that the low frequency sounds are compatible with ANSI S12.9 Part 4 levels for minimal annoyance and beginning of rattles; that levels meet or are within 1 dB of outdoor equivalent DEFRA disturbance-based guidelines; and that the low frequency sounds might be audible in some cases. Based on the comparisons made to these criteria, there are no low frequency noise problems from GE 1.5sle wind turbines at 1000 feet or beyond.

Indoor measurements with windows open and closed of GE 1.5sle wind turbines at approximately 950 feet (under moderate output, maximum noise, and high ground winds) and at approximately 1025 feet (under moderate output, within 1.5 dBA of maximum noise, and high ground winds) indicate infrasound is inaudible to the most sensitive people (more than 25 dB lower than median thresholds of hearing). The low frequency noise at or above 50 or 63 Hz might be slightly audible depending on background noises within the home or other external noises. The ANSI/ASA S12.2 low frequency criteria for bedrooms, classrooms and hospitals were met, as were the criteria for moderately perceptible vibrations in light-weight walls and ceilings. DEFRA disturbance based guidelines were met for steady low frequency sounds and non-steady low frequency sounds. Based on the comparisons made to these criteria, there are no low frequency noise problems indoors for GE 1.5sle wind turbines at distances beyond 950 feet.

Conclusions. Siemens SWT 2.93-93 and GE 1.5sle wind turbines at maximum noise at a distance more than 1000 feet from the nearest residence do not pose a low frequency noise problem. At this distance the wind farms:

- meet ANSI/ASA S12.2 indoor levels for low frequency sound for bedrooms, classrooms and hospitals;
- meet ANSI/ASA S12.2 indoor levels for moderately perceptible vibrations in light-weight walls and ceilings;
- meet ANSI S12.9 Part 4 thresholds for annoyance and beginning of rattles;
- meet UK DEFRA disturbance based guidelines;
- have no audible infrasound to the most sensitive listeners;
- might have slightly audible low frequency noise at frequencies at 50 Hz and above depending on other sources of low frequency noises in homes, such as refrigerators or external traffic or airplanes; and
- meet ANSI S2.71 recommendations for perceptible ground-borne vibration in residences during night time hours.

1.0 INTRODUCTION

Epsilon Associates, Inc. ("Epsilon") has been retained by NextEra Energy Resources, LLC ("NextEra"), formerly FPL Energy, to investigate whether the operation of their wind turbines may create unacceptable levels of low frequency noise and infrasound. This question has been posed to NextEra, and other wind energy developers and operators of utility-scale wind turbines. NextEra is one of the world's largest generators of wind power with approximately 6,400 net megawatts (MW) as of April 2009.

Epsilon determined all means, methods, and the testing protocol without interference or direction from NextEra. No limitations were placed on Epsilon by NextEra with respect to the testing protocol or upon the analysis methods.

This report is composed of two distinct sections: the first portion defines terms, discusses known effects of low frequency sound, and presents scientific guidelines and standards used to evaluate low frequency sound. The second portion of the report examines specific wind turbines used by NextEra, including data from field measurements at operating wind farms, and compares the measured data to guidelines and standards. In addition, each NextEra wind turbine vendor supplied detailed, reference sound level data in both A-weighted and octave band format in accordance with the international standard IEC 61400-11, "Wind Turbine Generator Systems-Part 11; Acoustic Noise Measurement Techniques." These data were used as an aide to focus the field portion of the measurement program.

2.0 DEFINITIONS

2.1 Low Frequency Noise/Sound

The frequency range 20 – 20,000 Hz is commonly described as the range of *"audible"* noise. The frequency range of low frequency sound is generally from 20 Hertz (Hz) to 200 Hz, and the range below 20 Hz is often described as "*infrasound*". However, audibility extends to frequencies below 20 Hz.

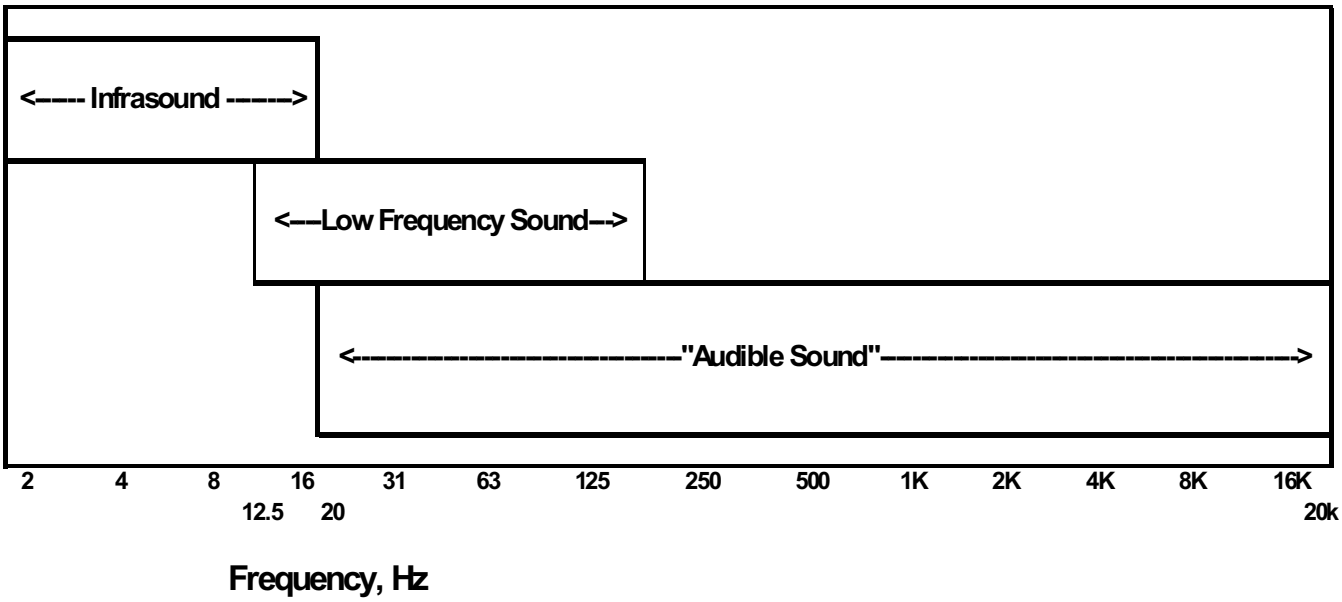
Low frequency sound has several definitions. American National Standards ANSI/ASA S12.2 and ANSI S12.9 Part 4 have provisions for evaluating low frequency noise, and these special treatments apply only to sounds in the octave bands with 16, 31.5, and 63-Hz mid-band frequencies. For these reasons, in this paper on wind turbine noise, we use the term "low frequency noise" to include 12.5 Hz – 200 Hz with emphasis on the 16 Hz, 31Hz and 63 Hz octave bands with a frequency range of 11 Hz to 89 Hz.

2.2 Infrasound

IEC 60050-801:1994 "International Electrotechnical Vocabulary – Chapter 801: Acoustics and electroacoustics" defines "*infrasound*" as "Acoustic oscillations whose frequency is below the low frequency limit of audible sound (about 16 Hz)." This definition is *incorrect* since sound remains audible at frequencies well below 16 Hz provided that the sound level is sufficiently high. In this paper we define infrasound to be below 20 Hz, which is the limit for the standardized threshold of hearing.

Figure 2.2-1 shows these frequency regions and their common labels. Since there is no sharp change in hearing at 20 Hz, the division into "low-frequency sound" and "infrasound" should only be considered "practical and conventional."

Figure 2.2-1 Frequency Range of "Infrasound", "Low Frequency Sound", and "Audible Sound".



3.0 EFFECTS OF LOW FREQUENCY SOUND AND INFRASOUND

3.1 Humans

3.1.1 Threshold of hearing

Moeller and Pedersen (2004) present an excellent summary on human perception of sound at frequencies below 200 Hz. The ear is the primary organ for sensing infrasound. Hearing becomes gradually less sensitive for decreasing frequencies. But, humans with a normal hearing organ can perceive infrasound at least down to a few hertz if the sound level is sufficiently high.

The threshold of hearing is standardized for frequencies down to 20 Hz (ISO 226:2003). Based on extensive research and data, Moeller and Pedersen propose normal hearing thresholds for frequencies below 20 Hz (see Figure 3.1-1). Moeller and Pedersen suggest that the curve for normal hearing is "probably correct within a few decibels, at least in most of the frequency range."

The hearing thresholds show considerable variability from individual to individual with a standard deviation among subjects of about 5 dB independent of frequency between 3 Hz and 1000 Hz with a slight increase at 20 – 50 Hz. This implies that the audibility threshold for 97.5% of the population is greater than the values in Figure 3.1-1 minus 10 dB and for 84% of the population is greater than the values in Figure 3.1-1 minus 5 dB. Moeller and Pedersen suggest using the pure-tone thresholds in Figure 3.1-1 for non-sinusoidal sound; this relationship is what is used in ISO 226 (International Organization for Standardization) for frequencies down to 20 Hz.

Below 20 Hz as frequency decreases, if the noise source is tonal, the tonal sensation ceases. Below 20 Hz tones are perceived as discontinuous. Below 10 Hz it is possible to perceive the single cycles of a tone, and the perception changes into a sensation of pressure at the ears.

3.1.2 Loudness

Below 100 Hz, the dynamic range of the auditory system decreases with decreasing frequency, and the compressed dynamic range has an effect on equal loudness contours: a slight change in sound level can change the perceived loudness from barely audible to loud. This combined with the large variation in individual hearing may mean that a low frequency sound that is inaudible to some may be audible to others, and may be relatively loud to some of those for whom it is audible. Loudness for low frequency sounds grows considerably faster above threshold than for sounds at higher frequencies. (Moeller and Pedersen, 2004)

3.1.3 Non-auditory perceptions

Non-auditory perception of low frequency and infrasound occurs only at levels above the auditory threshold. In the frequency range of 4 – 25 Hz and at "*levels 20 - 25 dB above [auditory] threshold it is possible to feel vibrations* in various parts of the body, e.g., the lumbar, buttock, thigh and calf regions. A feeling of pressure may occur in the upper part of the chest and the throat region" [emphasis added]. (Moeller and Pedersen, 2004).

3.2 Residential Structures

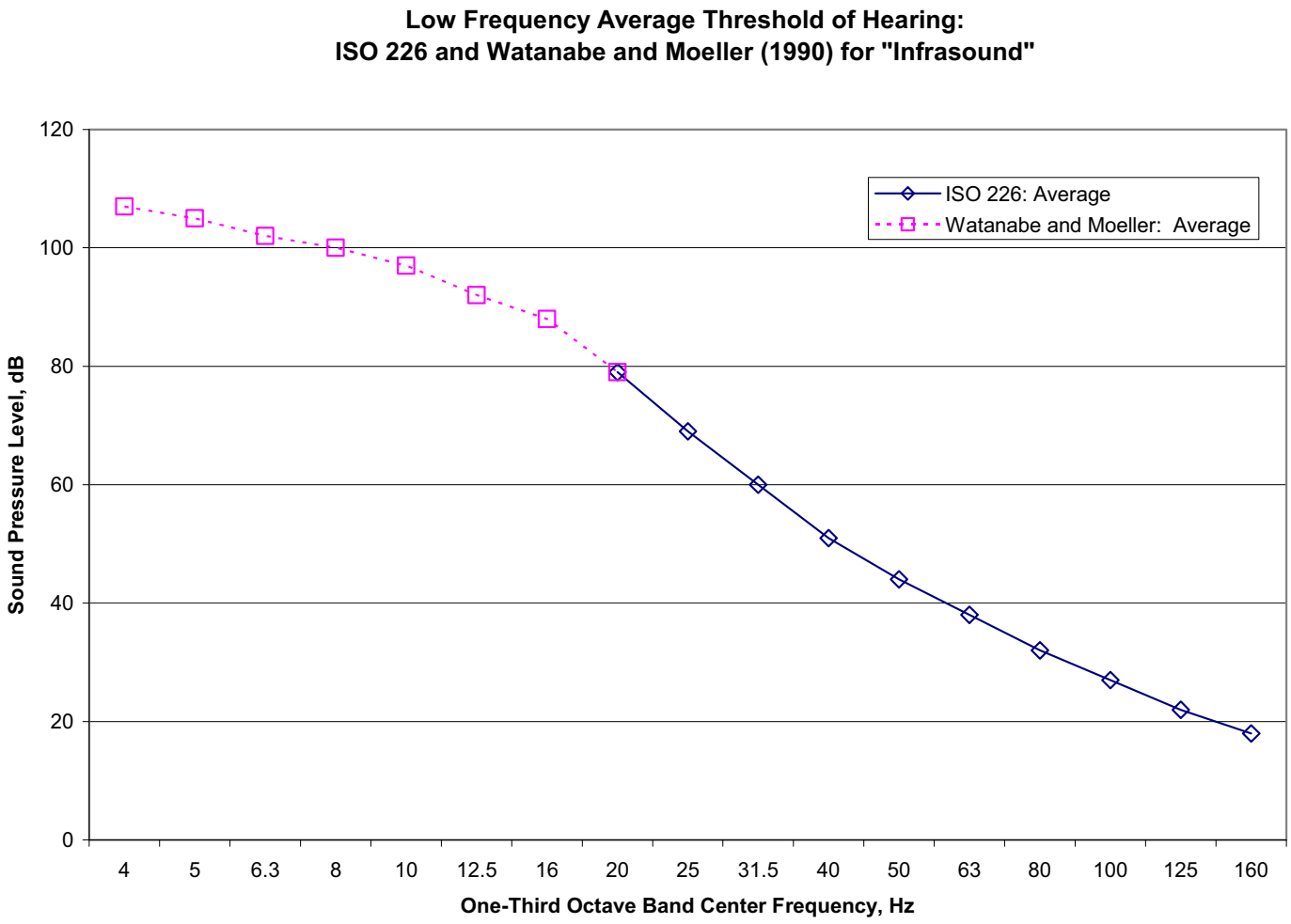
3.2.1 Airborne Vibration

Outdoor low frequency sounds of sufficient amplitude can cause building walls to vibrate and windows to rattle. Homes have low values of transmission loss at low frequencies, and low frequency noise of sufficient amplitude may be audible within homes. Window rattles are not low frequency noise, but may be caused by low frequency noise.

3.2.2 Ground borne Vibration

While not studied nearly as extensively as noise, a few papers were found that examined ground borne vibration from wind turbines (Styles, P. et al, 2005; Hayes McKenzie Partnership, 2006; Gastmeier and Howe (2008)). Measurement of ground borne vibration associated with wind turbine operations were detectable with instruments but were below the threshold of perception, even within the wind farm (Gastmeier and Howe 2008; Snow, D.J., 1997).

Figure 3.1-1 Low Frequency Average Threshold of Hearing



P.C. ATTACHMENT 13
P.C. April 26, 2010

4.0 GUIDELINES AND CRITERIA

4.1 United States Government

There are no specific criteria for low frequency noise in the United States. The US Environmental Protection Agency (EPA) has guidelines for the protection of public health with an adequate margin of safety in terms of annual average A-weighted day-night average sound level (L_{dn}), but there are no corrections or adjustments for low frequency noise. The US Department of Transportation (DOT) has A-weighted sound pressure level criteria for highway projects and airports, but these do not have adjustments for low frequency noise.

4.2 American National Standards (voluntary)

4.2.1 ANSI/ASA S12.9-2007/Part 5

ANSI/ASA S12.9-2007/Part 5 "Quantities and Procedures for description and measurement of environmental sound. Part 5: Sound Level Descriptors for Determination of Compatible Land Use" has an informative annex which provides guidance for designation of land uses compatible with existing or predicted sound levels. The noise metric in ANSI S12.9 Part 5 is the annual average of the adjusted day-night average outdoor sound level (DNL). Ranges of the DNL are outlined, within which a specific region of compatibility may be drawn. These ranges take into consideration the transmission loss in sound level from outside to inside buildings as commonly constructed in that locality and living habits there. There are adjustments to day-night average sound level to account for the presence of low frequency noise, and the adjustments are described in ANSI S12.9 Part 4.

4.2.2 ANSI S12.9-2005/Part 4

ANSI S12.9-2005 Part 4 "Quantities and Procedures for description and measurement of environmental sound. Part 4: Noise assessment and prediction of long-term community response" provides procedures for assessing outdoor environmental sounds and provides for *adjustments* to measured or predicted adjusted annual outdoor day-night A-weighted sound level to account "for the change in annoyance caused by … sounds with strong low-frequency content…"

ANSI S12.9 Part 4 does not specifically define the frequency range for "low-frequency" sounds; however, evaluation methods for low frequency noise in Annex D use a sum of the sound pressure levels in the 16, 31 and 63 Hz octave bands. Procedures apply only when the difference in exterior C-weighted and A-weighted sound levels is greater than 10 dB, $(L_{pC} - L_{pA}) > 10$ dB. Complicated procedures are given for adjustments to L_{Aeq} and L_{dn} values. Adjustments are significant for high levels of low frequency sound.

ANSI S12.9 Part 4 states: "Generally, annoyance is minimal when octave-band sound pressure levels are less than 65 dB at 16, 31.5, and 63-Hz mid-band frequencies. However, low-frequency sound characterized by rapidly fluctuating amplitude … may cause annoyance when these octave-band sound pressure levels are less than 65 dB."

For sounds with strong low-frequency content, adjusted sound exposure level (LNE) is calculated from low-frequency sound pressure level L_{LF} by:

$$LNE = 2(L_{LF} - 65) + 55 + 10\log(t/1)$$

$$= 2\,L_{LF} - 75 + 10\log(t/1) \qquad \text{(Equation D.1 of ANSI S12.9 Part 4)}$$

where L_{LF} is 10 times the logarithm of the ratio of time-mean square sound pressures in the 16, 31.5, and 63-Hz octave bands divided by the square of the reference sound pressure and

t is the time duration of interest, in seconds, over which the low-frequency sound is present.

The factor of 2 in equation (D.1) accounts for the rapid increase in annoyance with sound pressure level at low frequencies. ANSI S12.9 Part 4 states: "Equation (D.1) also accounts for the additional annoyance from rattles that begins when the low-frequency sound pressure level [L_{LF}] exceeds 75 dB." Later, ANSI S12.9/Part 4 has a contradictory recommendation: "To prevent the likelihood of noise-induced rattles, the low-frequency sound pressure level [L_{LF}] should be less than 70 dB."

ANSI S12.9 /Part 4 identifies two thresholds: annoyance is minimal when the 16, 31.5 and 63 Hz octave band sound pressure levels are each less than 65 dB and there are no rapidly fluctuations of the low frequency sounds. The second threshold is for increased annoyance which begins when rattles occur, which begins at L_{LF} 70 - 75 dB. Since determination of L_{LF} involves integrating concurrently the sound pressures in the three octave bands, an energy sum of the levels in each of these separate bands results in an upper bound to L_{LF}. (The sound pressure level from the summation of these bands will always be less than L_{LF} since the sound pressures are not in phase within these three bands.)

It should be noted that a recent study on low frequency noise from aircraft operations (Hodgdon, Atchley, Bernhard 2007) reported that an expert panel was critical of using this L_{LF} metric because it had not previously been used to characterize aircraft noise and its reliance on the 16 Hz band since aircraft data does not extend down to 16 Hz and can not be used with the FAA Integrated Noise Model.

The adjustment procedure for low frequency noise to the average annual A-weighted sound pressure level in ANSI S12.9 Part 4 uses a different and more complicated metric and procedure (Equation D.1) than those used for evaluating low frequency noise in rooms contained in ANSI/ASA S12.2. (See section 4.2.3). Since we are evaluating low frequency

P C ATTACHMENT 13
P C April 26, 2010

noise and not A-weighted levels, we do not recommend using the procedure for adjusting A-weighted levels. Instead we recommend using the following two guidelines from ANSI S12.4 Part 9: a sound pressure level of 65 dB in each of the 16-, 31.5-, and 63 Hz octave bands as an indicator of minimal annoyance, and 70 - 75 dB for the summation of the sound pressure levels from these three bands as an indicator of possible increased annoyance from rattles. This method is conservative since the sum of the levels in the three bands will always be less than L_{LF}.

4.2.3 ANSI/ASA S12.2-2008

ANSI/ASA S12.2-2008 discusses criteria for evaluating room noise, and has two separate provisions for evaluating low frequency noise: (1) the potential to cause perceptible vibration and rattles, and (2) meeting low frequency portions of room criteria curves.

Vibration and Rattles: Clause 6 and Table 6 of this standard contain limiting values of sound pressure levels for vibrations and rattles from low frequency noise. The frequency range is not defined, but limiting values and discussion relate only to octave-bands with center frequencies of 16, 31 and 63 Hz. This is the same narrow frequency range from low-frequency sounds as in ANSI S12.9/Part 4. Therefore, ANSI S12.9 Part 4 and ANSI/ASA S12.2 are consistent in evaluating and assessing low frequency sounds both for annoyance (interior and exterior measurements) and vibration (interior measurements) by using sound pressure levels only in the 16, 31 and 63 Hz octave-bands.

ANSI/ASA S12.2 presents limiting levels at low frequencies for assessing (a) the probability of *clearly* perceptible acoustically induced vibration and rattles in lightweight wall and ceiling constructions, and (b) the probability of *moderately* perceptible acoustically induced vibration in similar constructions. These 16, 31.5 and 63 Hz octave band sound pressure level values are presented in Table 4.2-1. One set of values is for when "clearly perceptible vibration and rattles" is likely, and a lower set of values is for when "moderately perceptible vibration and rattles" is likely.

Table 4.2-1 Measured interior sound pressure levels for perceptible vibration and rattle in lightweight wall and ceiling structures. [ANSI/ASA S12.2-2008]

Condition	Octave-band center frequency (Hz)		
	16	31.5	63
Clearly perceptible vibration and rattles likely	75 dB	75 dB	80 dB
Moderately perceptible vibration and rattles likely	65 dB	65 dB	70 dB

Since indoor measurements are not always possible, for comparison to outdoor sound levels the indoor criteria from ANSI/ASA S12.2 should be adjusted. Outdoor to indoor low frequency noise reductions have been reported by Sutherland for aircraft and highway noise

for open and closed windows (Sutherland 1978) and by Hubbard for aircraft and wind turbine noise for closed windows (Hubbard 1991). Table 4.2-2 presents the average low frequency octave band noise reductions from outdoor to indoors from these two papers for open and closed windows. Sutherland only reported values down to 63 Hz; whereas Hubbard presented values to less than 10 Hz. The closed window conditions of Hubbard were used to estimate noise reductions less than 63 Hz by applying the difference between values for open and closed windows from Sutherland data at 63 Hz. It should be noted that the attenuation for wind turbines in Hubbard is based on only three homes at two different wind farms, whereas the traffic and aircraft data are for many homes. The wind turbine open window values were obtained from the wind turbine closed window values by subtracting the difference in values between windows closed and open obtained by Sutherland.

Table 4.2-2 Average low frequency octave band noise reductions from outdoor to indoors in dB (based on Sutherland (1978) and Hubbard (1991))

Noise Source	Window condition	Octave Band Center Frequency		
		16 Hz	31.5 Hz	63 Hz
Average aircraft and traffic sources	Closed windows	16	15	18
Average aircraft and traffic sources	Open Windows	(11)*	(10)*	12
Average Wind Turbine	Closed Windows	8	11	14
Average Wind Turbine	**Open Windows**	**(3)*+**	**(6)* +**	**9+**

* No data are available for windows open below 63 Hz octave band. The values for 16 Hz and 31 Hz were obtained by subtracting the difference between the levels for 63 Hz closed and open conditions to the 16 and 31 Hz closed values.

\+ Used in this report to determine equivalent outdoor criteria from indoor criteria

To be conservative, we use the open window case instead of closed windows. To be further conservative, we use the wind turbine data (adjusted to open windows), which is based on only three homes. However, it should be noted that it is possible for some homes to have some slight amplification at low frequencies with windows open due to possible room resonances. Applying the outdoor to indoor attenuations for wind turbine sources with windows open given in the last row of Table 4.2-2 to the ANSI/ASA S12.2 indoor sound pressure levels in Table 4.2-1 yields the *equivalent* outdoor sound pressure levels that are consistent with the indoor criteria and are presented in Table 4.2-3.

Table 4.2-3 *Equivalent* outdoor sound pressure levels for perceptible vibration and rattle in lightweight wall and ceiling structures based on Tables 4.2-1 and 4.2-2 above for wind turbines.

Condition	Octave-band center frequency (Hz)		
	16	31.5	63
Clearly perceptible vibration and rattles likely	78 dB	81 dB	89 dB
Moderately perceptible vibration and rattles likely	68 dB	71 dB	79 dB

Room Criteria Curves: ANSI/ASA S12.2 has three primary methods for evaluating the suitability of noise within rooms: a survey method - A-weighted sound levels, an engineering method – noise criteria (NC) curves and a method for evaluating low-frequency fluctuating noise using room noise criteria (RNC) curves. "The RNC method should be used to determine noise ratings when the noise from HVAC systems at low frequencies is *loud* and is suspected of containing *sizeable fluctuations or surging*." [emphasis added] The NC curves are appropriate to evaluate low frequency noise from wind turbines in homes since wind turbine noise does not have significant fluctuating low frequency noise sufficient to warrant using RNC curves and since A-weighted sound levels do not adequately determine if there are low frequency problems. [ANSI/ASA S12.2. section 5.3 gives procedures for determining if there are large fluctuations of low frequency noise.]

Annex C.2 of this standard contains recommendations for bedrooms, which are the most stringent rooms in homes: NC and RNC criteria curve between 25 and 30. The recommended NC and RNC criteria for schools and private rooms in hospitals are the same. The values of the sound pressure levels in the 16 – 250 Hz octave bands for NC curves 25 and 30 are shown in Table 4.2-4.

Table 4.2-4 Octave band sound pressure levels for noise criteria curves NC-25 and NC-30. [From Table 1 of ANSI/ASA S12.2]

	Octave-band-center frequency in Hz				
	16	31.5	63	125	250
NC-25	80	65	54	44	37
NC-30	81	68	57	48	41

ANSI/ASA S12.2 also presents a method to determine if the levels below 500 Hz octave band are too high in relation to the levels in the mid-frequencies which could create a condition of "spectrum imbalance". The method for this evaluation is:

- Calculate the speech interference level (SIL) for the measured spectrum. [SIL is the arithmetic average of the sound pressure levels in the 500, 1000, 2000 and 4000 Hz octave bands.] Select the NC curve equal to the SIL value.

- Plot the measured spectra and the NC curve equal to the SIL value on the same graph and determine the differences between the two curves in the octave bands below 500 Hz.

- Estimate the likelihood that the excess low-frequency levels will annoy occupants of the space using Table 4.2-5.

Table 4.2-5 Measured sound pressure level deviations from an NC (SIL) curve that may lead to serious complaints [From ANSI/ASA S12.2:2008].

	Measured Spectrum – NC(SIL), dB			
Octave-band frequency, Hz = >	31.5	63	125	250
Possible serious dissatisfaction	*	6 - 9	6 - 9	6 - 9
Likely serious dissatisfaction	*	>9	>9	>9

*Insufficient data available to evaluate

4.3 Other Criteria

4.3.1 World Health Organization (WHO)

No specific low frequency noise criteria are proposed by the WHO. The Guidelines for Community Noise report (WHO, 1999) mentions that if the difference between dBC and dBA is greater than 10 decibels, then a frequency analysis should be performed to determine if there is a low frequency issue. A document prepared for the World Health Organization states that "there is no reliable evidence that infrasounds below the hearing threshold produce physiological or psychological effects. Infrasounds slightly above detection threshold may cause perceptual effects but these are of the same character as for 'normal' sounds. Reactions caused by extremely intense levels of infrasound can resemble those of mild stress reaction and may include bizarre auditory sensations, describable as pulsation and flutter" [Berglund (1995) p. 41]

4.3.2 The UK Department for Environment, Food, and Rural Affairs (DEFRA)

The report prepared by the University of Salford for the UK Department for Environment, Food, and Rural Affairs (DEFRA) on low frequency noise proposed one-third octave band sound pressure level L_{eq} criteria and procedures for assessing low frequency noise [DEFRA (2005)]. The guidelines are based on complaints of disturbance from low frequency sounds and are intended to be used by Environmental Health Officers. Reports by Hayes (2006) and others refer to the proposed criteria as "DEFRA criteria." Tables 4.3-1 and 4.3-2 present

P C ATTACHMENT 13
P C April 26, 2010

the DEFRA criteria for assessment of low frequency noise measured indoors. The criteria are "based on 5 dB below the ISO 226 (2003) average threshold of audibility for steady [low frequency] sounds." However, the DEFRA criteria are at 5 dB lower than ISO 226 only at 20 - 31.5 Hz; at higher frequencies the criteria are equal to the Swedish criteria which are higher levels than ISO 226 less 5 dB. For frequencies lower than 20 Hz, DEFRA uses the thresholds from Watanabe and Moeller (1990) less 5 dB. In developing the DEFRA guidelines, The University of Salford reviewed and considered existing low frequency noise criteria from several European countries.

The DEFRA criteria are based on measurements in an unoccupied room. Hayes Mackenzie (2006) noted that measurements should be made with windows closed; however, we conservatively used windows open conditions for our assessment. If the low frequency sound is "steady" then the criteria may be relaxed by 5 dB. A low frequency noise is considered steady if either of the conditions a) or b) below is met in the third octave band which exceeds the criteria by the greatest margin:

a) L_{10}-L_{90} < 5dB

b) the rate of change of sound pressure level (Fast time weighting) is less than 10 dB per second

Applying indoor to outdoor one-third octave band transfer functions for open windows (from analysis in Sutherland (1978) and Hubbard (1991) yields *equivalent* one-third octave band sound pressure level proposed DEFRA criteria for outdoor sound levels. Table 4.3-1 presents both the indoor DEFRA proposed criteria and equivalent proposed criteria for outdoors for non-steady low-frequency sounds. Table 4.3-2 presents the DEFRA proposed criteria for a steady low frequency sound.

Table 4.3-1 DEFRA proposed criteria for the assessment of low frequency noise disturbance: *indoor* and *equivalent outdoor* L_{eq} one-third sound pressure levels for *non-steady* low frequency sounds. [DEFRA (2005)]

Location	One-Third Octave Band Center Frequency, Hz												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Indoor L_{eq}, dB	92	87	83	74	64	56	49	43	42	40	38	36	34
Equivalent Outdoor L_{eq}, dB	94	89	86	78	68.5	61	56	51	51	49	47	45	43

Table 4.3-2 DEFRA criteria for the assessment of low frequency noise disturbance: *indoor* and *equivalent outdoor* L_{eq} one-third sound pressure levels for *steady* low frequency sounds. [DEFRA (2005)]

Location	One-Third Octave Band Center Frequency, Hz												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Indoor L_{eq}, dB	97	92	88	79	69	61	54	48	47	45	43	41	39
Equivalent Outdoor* L_{eq}, dB	99	94	91	83	73.5	66	61	56	56	54	52	50	48

* With windows open

4.3.3 C-weighted minus A-weighted (L_{pC}- L_{pA})

Leventhall (2003) and others indicate that the difference in C-weighted and A-weighted sound pressure levels can be a predictor of annoyance. Leventhall states that if (L_{pC} – L_{pA}) is greater than 20 dB there is "a potential for a low frequency noise problem." He further states that (L_{pC} – L_{pA}) cannot be a predictor of annoyance but is a simple indicator that further analysis may be needed. This is due in part to the fact that the low frequency noise may be inaudible even if (L_{pC} – L_{pA}) is greater than 20 dB.

4.3.4 Threshold of hearing

ISO 226:2003 gives one-third octave band threshold of hearing down to 20 Hz. Watanabe and Moeller (1990) have extended these to 10 Hz and lower, and the values are reported in Moeller and Pedersen (2004). Denmark has established low frequency noise criteria based on audibility. The Danish criteria are "based on hearing thresholds for the 10% most sensitive people in an ontologically unselected population aged 50-60 years. These 10% thresholds are typically about 4-5 dB lower than the average threshold for ontologically normal young adults (18-25 years) as given in ISO 226." [DEFRA (2005)]. Other reports indicate that the standard deviation of these thresholds is also about 5 dB. Table 4.3-3 presents one-third octave band threshold of hearing according to ISO 226 and Watanabe and Moeller. The second row in Table 4.3-3 presents the values that are 5 dB less than the threshold.

Table 4.3-3 Threshold of audibility from ISO 226 and Watanabe and Moeller (1990)

	One-Third Octave band center frequency, Hz																
	4	5	6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Threshold	107	105	102	100	97	92	88	79	69	60	51	44	38	32	27	22	18
Threshold – 5 dB	102	100	97	95	92	87	83	74	64	55	46	39	33	27	22	17	13

P C ATTACHMENT 13
P C April 26, 2010

The average threshold of hearing values in Table 4.3-3 are also shown in Figure 3.1-1.

4.3.5 Ground-Borne Vibration

ANSI S2.71-1983 (formerly ANSI S3.29-1983) presents recommendations for magnitudes of ground-borne vibration which humans will perceive and possibly react to within buildings. A basic rating is given for the most stringent conditions, which correspond to the approximate threshold of perception of the most sensitive humans. From the base rating, multiplication factors should be applied according to the location of the receiver; for continuous sources of vibration in residences at nighttime, the multiplication factor is 1.0 – 1.4.

ANSI S2.71-1983 presents one-third octave band acceleration or velocity ratings for z-axis, and x-, y-axis vibrations. For spaces in which the occupants may be sitting, standing, or lying at various times, the standard recommends using a combined axis rating which is obtained from the most stringent rating for each axis. Measurements in each of the 3 axes should be compared to the combined axis rating. Table 4.3-4 presents the base response velocity ratings for the combined axis. The velocity ratings are for root-mean-square (RMS) values.

Table 4.3-4 Base response one-third octave band RMS velocity ratings for the three biodynamic vibration axes and combined axis (From ANSI S2.71-1983 (R2006)

One-Third Octave band center frequency, Hz	Velocity (RMS), m/s		
	z axis	x, y axis	Combined axis
1	1.6×10^{-3}	5.7×10^{-4}	5.7×10^{-4}
1.25	1.1×10^{-3}	4.6×10^{-4}	4.6×10^{-4}
1.6	8.0×10^{-4}	3.6×10^{-4}	3.6×10^{-4}
2	5.6×10^{-4}	2.9×10^{-4}	2.9×10^{-4}
2.5	4.0×10^{-4}	2.9×10^{-4}	2.4×10^{-4}
3.15	2.9×10^{-4}	2.9×10^{-4}	2.1×10^{-4}
4	2.0×10^{-4}	2.9×10^{-4}	1.7×10^{-4}
5	1.6×10^{-4}	2.9×10^{-4}	1.4×10^{-4}
6.3	1.3×10^{-4}	2.9×10^{-4}	1.2×10^{-4}
8	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
10	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
12.5	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
16	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
20	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
25	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
31.5	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
40	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
50	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
63	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}
80	1.0×10^{-4}	2.9×10^{-4}	1.0×10^{-4}

5.0 LITERATURE REVIEW

Epsilon performed an extensive literature search of over 100 scientific papers, technical reports and summary reports on low frequency sound and infrasound - hearing, effects, measurement, and criteria. The following paragraphs briefly summarize the findings from some of these papers and reports.

5.1 H. Moeller and C. S. Pedersen (2004)

Moeller and Pedersen (2004) present a comprehensive summary on hearing and non-auditory perception of sound at low and infrasonic regions, some of which has been cited in sections 3.1.1, 3.1.2, and 3.1.3 of this report.

5.2 Leventhall (2003)

Leventhall presents an excellent study on low frequency noise from all sources and its effects. The report presents criteria in place at that time. Included are figures and data relating cause and effects.

5.3 Leventhall (2006)

Leventhall reviewed data and allegations on alleged problems from low frequency noise and infrasound from wind turbines. Leventhall concluded the following: "It has been shown that there is insignificant infrasound from wind turbines and that there is normally little low frequency noise." "Turbulent air inflow conditions cause enhanced levels of low frequency noise, which may be disturbing, but the overriding noise from wind turbines is the fluctuating audible swish, mistakenly referred to as "infrasound" or "low frequency noise". "Infrasound from wind turbines is below the audible threshold and of no consequence". Other studies have shown that wind turbine generated infrasound levels are below threshold of perception and threshold of feeling and body reaction.

5.4 Delta (2008)

The Danish Energy Authority project on "low frequency noise from large wind turbines" comprises a series of investigations in the effort to give increased knowledge on low frequency noise from wind turbines. One of the conclusions of the study is that wind turbines do not emit audible infrasound, with levels that are "far below the hearing threshold." Audible low frequency sound may occur both indoors and outdoors, "but the levels in general are close to the hearing and/or masking level." "In general the noise in the critical band up to 100 Hz is below both thresholds". The summary report notes that for road traffic noise (in the vicinity of roads) the low frequency noise levels are higher [than wind turbine] both indoors and outdoors.

5.5 Hayes McKenzie (2006)

Hayes McKenzie performed a study for the UK Department of Trade & Industry (DTI) to investigate complaints of low frequency noise that came from three of the five farms with complaints out of 126 wind farms in the UK. The study concluded that:

- Infrasound associated with modern wind turbines is not a source which will result in noise levels that are audible or which may be injurious to the health of a wind farm neighbor.
- Low frequency noise was measureable on a few occasions, but below DEFRA criteria. Wind turbine noise may result in indoor noise levels within a home that is just above the threshold of audibility; however, it was lower than that of local road traffic noise.
- The common cause of the complaints was not associated with low frequency noise but the occasional audible modulation of aerodynamic noise, especially at night. Data collected indoors showed that the higher frequency modulated noise levels were insufficient to awaken the residents at the three sights; however, once awake, this noise could result in difficulties in returning to sleep.

The UK Department of Trade and Industry, which is now the UK Department for Business Enterprise and Regulatory Reform (BERR), summarized the Hayes McKenzie report: "The report concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines." [BERR (2007)]

5.6 Howe (2006)

Howe performed extensive studies on wind turbines and infrasound and concluded that infrasound was not an issue for modern wind turbine installations – "while infrasound can be generated by wind turbines, it is concluded that infrasound is not of concern to the health of residences located nearby." Since then Gastmeier and Howe (2008) investigated an additional situation involving the alleged "perception of infrasound by individual." In this additional case, the measured indoor infrasound was at least 30 dB below the perception threshold given by Watanabe and Moeller (1990) as presented in Table 4.3-3. Gastmeier and Howe (2008) also performed vibration measurements at the residence and nearest wind turbine, and concluded that the vibration levels were well below the perception limits discussed in ISO 2631-2.

P C ATTACHMENT 13
P C April 26, 2010

5.7 Branco (2004)

Branco and other Portuguese researchers have studied possible physiological affects associated with high amplitude low frequency noise and have labeled these alleged effects as "Vibroacoustic Disease" (VAD). "Vibroacoustic disease (VAD) is a whole-body, systemic pathology, characterized by the abnormal proliferation of extra-cellular matrices, and caused by excessive exposure to low frequency noise." Hayes (2007, 2008) concluded that levels from wind farms are not likely to cause VAD after comparing noise levels from alleged VAD cases to noise levels from wind turbines in homes of complainers. Noise levels in aircraft in which VAD has been hypothesized are considerably higher than wind turbine noise levels. Hayes also concluded that it is "unlikely that symptoms will result through induced internal vibration from incident wind farm noise." [Hayes (2007)] Other studies have found no VAD indicators in environmental sound that have been alleged by VAD proponents. [ERG (2001)]

5.8 French National Academy of Medicine (2006)

French National Academy of Medicine recommended "*as a precaution* construction should be suspended for wind turbines with a capacity exceeding 2.5 MW located within 1500 m of homes." [emphasis added] However, this precaution is not because of definitive health issues but because:

- sound levels one km from some wind turbine installations "occasionally exceed allowable limits" for France (note that the allowable limits are long term averages)
- French prediction tools for assessment did not take into account sound levels created with wind speeds greater than 5 m/s.
- Wind turbine noise has been compared to aircraft noise (even though the sound levels of wind turbine noise are significantly lower), and exposure to high level aircraft noise "involves neurobiological reactions associated with an increased frequency of hypertension and cardiovascular illness. Unfortunately, no such study has been done near wind turbines." [Gueniot (2006)].

In March 2008, the French Agency for Environmental and Occupational Health Safety (AFSSET) published a report on "the health impacts of noise generated by wind turbines", commissioned by the Ministries of Health and Environment in June 2006 following the report of the French National Academy of Medicine in March 2006. [AFSSET (2008)] The AFSSET study recommends that one does not define a fixed distance between wind farms and homes, but rather to model the acoustic impact of the project on a case-by-case basis. One of the conclusions of the AFSSET report is: "The analysis of available data shows: The absence of identified direct health consequences concerning the auditory effects or specific effects usually associated with exposure to low frequencies at high level." ("L'analyse des données disponibles met en évidence: L'absence de conséquences sanitaires directes recensées en ce qui concerne les effets auditifs, ou les effets spécifiques généralement attachés à l'exposition à des basses fréquences à niveau élevé.")

6.0 REPRESENTATIVE WIND TURBINES

At the direction of NextEra, two types of utility-scale wind turbines were studied:

- General Electric (GE) 1.5sle (1.5 MW), and
- Siemens SWT-2.3-93 (2.3 MW).

Typical hub height for these wind turbines is 80 meters above ground level (AGL).

Sound levels for these wind turbine generators (WTGs) vary as a function of wind speed from cut-in wind speed to maximum sound level. Table 6.0-1 below lists the reference sound power levels of each WTG as a function of wind speed at 10 meters AGL as provided by the manufacturer. This is in conformance with the sound level standard for wind turbines [IEC 61400-11].

Table 6.0-1 Sound power levels as a Function of Wind Speed (dBA)

Wind Speed at 10 meters AGL (m/s)	GE 1.5 sle 80 m hub height; 77 m rotor diameter	Siemens SWT-2.3-93 80 m hub height; 92.4 m rotor diameter
3	<96	ND
4	<96	ND
5	99.1	99
6	103.0	103.4
7	≤104	104.9
8	≤104	105.1
9	≤104	105.0
10	≤104	105.0

ND = No Data available

Each wind turbine manufacturer applied the uncertainty factor K of 2 dBA to guarantee the turbine's sound power level. (According to IEC TS 61400-14, K accounts for both measurement variations and production variation.) The results in Section 8.0 use the manufacturer's guaranteed value, that is, 2 dBA above the levels in Table 6.0-1.

One-third octave band sound power level data have also been provided for each turbine reflective of the highest A-weighted level (typically a wind speed of 8 m/s or greater at 10 m AGL). These data are reference (not guaranteed) data, and are summarized below in Table 6.0-2. Cut-in wind speed for the GE 1.5 sle wind turbine is 3.5 m/s while the Siemens wind turbine has a cut-in wind speed of 4 m/s. The last two rows in Table 6.0-2 contain the overall A-weighted sound power levels from Table 6.0-1 and the guaranteed values.

Table 6.0-2 One-Third Octave Sound Power Levels at 8 m/s (un-weighted, dB)

1/3 Octave Band Center Frequency, Hz	GE 1.5 sle 80 m hub height; 77 m rotor diameter	Siemens SWT-2.3-93 80 m hub height; 92.4 m rotor diameter
25	ND	109.0
31.5	ND	105.7
40	ND	105.3
50	106.4	105.3
63	106.1	104.8
80	105.1	104.7
100	103.9	104.8
125	102.8	105.3
160	105.8	103.2
200	101.6	103.7
250	100.6	105.0
315	100.6	102.5
400	99.1	100.2
500	97.0	97.8
630	95.1	95.8
800	94.8	93.5
1000	92.8	92.7
1250	91.7	90.6
1600	90.5	88.2
2000	88.4	87.1
2500	85.8	85.6
3150	83.6	83.9
4000	81.2	82.1
5000	78.1	80.8
6300	76.0	79.9
8000	72.4	79.4
10000	73.3	80.0
Overall - Reference	104 dBA	105 dBA
Guaranteed	106 dBA	107 dBA

ND = No data provided.

P.C. ATTACHMENT 13
P.C. April 26, 2010

7.0 FIELD PROGRAM

Real-world data were collected from operating wind turbines to compare to the low frequency noise guidelines and criteria discussed previously in Section 4.0. These data sets consisted of outdoor measurements at various reference distances, and concurrent indoor/outdoor measurements at residences within the wind farm. Epsilon determined all means, methods, and the testing protocol without interference or direction from NextEra. No limitations were placed on Epsilon by NextEra with respect to the testing protocol or upon the analysis methods.

7.1 GE 1.5sle and Siemens SWT-2.3-93

Field measurements were conducted in order to measure sound levels at operating wind turbines, and compare them to the guidelines and criteria discussed in this report. NextEra provided access to the Horse Hollow Wind Farm in Taylor and Nolan Counties, Texas in November 2008 to collect data on the GE 1.5 sle and Siemens SWT-2.3-93 wind turbines. The portion of the wind farm used for testing is relatively flat with no significant terrain. The land around the wind turbines is rural and primarily used for agriculture and cattle grazing. The siting of the sound level measurement locations was chosen to minimize local noise sources except the wind turbines and the wind itself.

Two noise consultants collected sound level and wind speed data over the course of one week under a variety of operational conditions. Weather conditions were dry the entire week with ground level winds ranging from calm to 28 mph (1-minute average). In order to minimize confounding factors, the data collection tried to focus on periods of maximum sound levels from the wind turbines (moderate to high hub height winds) and light to moderate ground level winds.

Ground level (2 meters AGL) wind speed and direction were measured continuously at one representative location. Wind speeds near hub height were also measured continuously using the permanent meteorological towers maintained by the wind farm.

A series of simultaneous interior and exterior sound level measurements were made at four houses owned by participating landowners within the wind farm. Two sets were made of the GE WTGs, and two sets were made of the Siemens WTGs. Data were collected with both windows open and windows closed. Due to the necessity of coordinating with the homeowners in advance, and reasonable restrictions of time of day to enter their homes, the interior/exterior measurement data sets do not always represent ideal conditions. However, enough data were collected to compare to the criteria and draw conclusions on low frequency noise.

Sound level measurements were also made simultaneously at two reference distances from a string of wind turbines under a variety of wind conditions. Using the manufacturer's sound level data discussed in Section 6.0, calculations of the sound pressure levels as a function of distance in flat terrain were made to aid in deciding where to collect data in the field. Based on this analysis, two distances from the nearest wind turbine were selected - 1000 feet and 1500 feet - and were then used where possible during the field program.

Distances much larger than 1,500 feet were not practical since an adjacent turbine string could be closer and affect the measurements, or would put the measurements beyond the boundaries of the wind farm property owners. Brief background sound level measurements were conducted several times during the program whereby the Horse Hollow Wind Farm operators were able to shutdown the nearby WTGs for a brief (20 minutes) period. This was done in real time using cell phone communication.

All the sound level measurements described above were attended by the noise consultants. One series of unattended overnight measurements was made at two locations for approximately 15 hours to capture a larger data set. One measurement was set up approximately 1,000 feet from a GE 1.5 sle WTG and the other was set up approximately 1,000 feet from a Siemens WTG. The location was chosen based on the current wind direction forecast so that the sound level equipment would be downwind for the majority of the monitoring period. By doing this, the program was able to capture periods of strong hub-height winds and moderate to low ground-level winds.

Ground-borne vibration measurements were made within the Horse Hollow Wind Farm. Measurements were made 400 feet and 1000 feet downwind from both GE 1.5 sle and Siemens 2.3 MW WTGs under full operation. In addition, background vibration measurements were made with the WTGs briefly shutdown.

7.2 Measurement Equipment

Ground level wind speed and direction were measured with a HOBO H21-002 micro weather station (Onset Computer Corporation). The data were sampled every three seconds and logged every one minute. All sound levels were measured using two Norsonic Model Nor140 precision sound analyzers, equipped with a Norsonic-1209 Type 1 Preamplifier, a Norsonic-1225 half-inch microphone and a 7-inch Aco-Pacific untreated foam windscreen Model WS7. The instrumentation meets the "Type 1 - Precision" requirements set forth in American National Standards Institute (ANSI) S1.4 for acoustical measuring devices. The microphone was tripod-mounted at a height of five feet above ground. The measurements included simultaneous collection of broadband (A-weighted) and one-third-octave band data (0.4 hertz to 20,000 hertz bands). Sound level data were primarily logged in 10-minute intervals to be consistent with the wind farm's Supervisory Control And Data Acquisition (SCADA) system which provides power output (kW) in 10-minute increments. A few sound level measurements were logged using 20-miute intervals. The meters were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the past 12 months.

The ground-borne vibration measurements were made using an Instantel Minimate Plus vibration and overpressure monitor. A triaxial geophone inserted in the ground measured the particle velocity (PPV). Each measurement was 20 seconds in duration and all data were stored in memory for later retrieval.

8.0 RESULTS AND COMPARISON TO CRITERIA

Results from the field program are organized by wind turbine type. For each wind turbine type, results are presented per location type (outdoor or indoor) with respect to applicable criteria. Results are presented for 1,000 feet from the nearest wind turbine. Data were also collected at 1,500 feet from the nearest wind turbine which showed lower sound levels. Therefore, wind turbines that met the criteria at 1,000 feet also met it at 1,500 feet. Data were collected under both high turbine output and moderate turbine output conditions, and low ground-level wind speeds (defined as sound power levels 2 or 3 dBA less than the maximum sound power levels). The sound level data under the moderate conditions were equivalent to or lower than the high turbine output scenarios, thus confirming the conclusions from the high output cases. A-weighted sound power levels presented in this section (used to describe turbine operation) were estimated from the actual measured power output (kW) of the wind turbines and the sound power levels as a function of wind speed presented in Table 6.0-1 plus an adjustment factor of 2 dBA (correction from reference values to guaranteed values).

Outdoor measurements are compared to criteria for audibility, for UK DEFRA disturbance using equivalent outdoor levels, for rattle and annoyance criteria as contained in ANSI S12.9 Part 4, and for perceptible vibration using equivalent outdoor levels from ANSI/ASA S12.2. Indoor measurements are compared to criteria for audibility, for UK DEFRA disturbance, and for suitability of bedrooms, hospitals and schools and perceptible vibration from ANSI/ASA S12.2.

8.0.1 Audibility

The threshold of audibility criteria discussed in section 4.3.4 is used to evaluate wind turbine sound levels. The audibility of wind turbines both outdoors and indoors was examined.

8.0.2 UK DEFRA Disturbance Criteria

The DEFRA one-third octave band sound pressure level L_{eq} criteria and procedures for assessing disturbance from low frequency noise (see section 4.3.2) were examined. The indoor criteria and equivalent outdoor criteria were compared to measured low frequency noise from wind turbines.

8.0.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements

The ANSI/ASA S12.2 interior perceptible vibration criteria were converted to equivalent outdoor criteria as discussed in section 4.2.3 and compared to the measured low frequency noise from wind turbines. In addition, measured data were compared to ANSI S12.9 Part 4 low frequency sound levels for minimal annoyance and for the threshold for beginning of rattles as described in section 4.2.2.

8.0.4 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements

The ANSI/ASA S12.2 interior perceptible vibration criteria and low frequency portions of the room criteria for evaluating the suitability of noises in bedrooms, hospitals and schools were compared to indoor measurements of low frequency noise from wind turbines. (See section 4.2.3.)

8.1 Siemens SWT-2.3-93

8.1.1 Outdoor Measurements - Siemens SWT-2.3-93

Several periods of high wind turbine output and relatively low ground wind speed (which minimized effects of wind noise) were measured outdoors approximately 1,000 feet from the closest Siemens WTG. This site was actually part of a string of 15 WTGS, four of which were within 2,000 feet of the monitoring location. The sound level data presented herein include contributions from all wind turbines as measured by the recording equipment. The key operational and meteorological parameters during these measurements are listed in Table 8.1-1

Table 8.1-1 Summary of Operational Parameters – Siemens SWT-2.3-93 (Outdoor)

Parameter	Sample #34	Sample #39
Distance to nearest WTG	1,000 feet	1,000 feet
Time of day	22:00-22:10	22:50-23:00
WTG power output	1,847 kW	1,608 kW
Sound power	107 dBA	106.8 dBA
Measured wind speed @ 2 m	3.3 m/s	3.4 m/s
L_{Aeq}	49.4 dBA	49.6 dBA
L_{A90}	48.4 dBA	48.6 dBA
L_{Ceq}	63.5 dBC	63.2 dBC

8.1.1.1 Outdoor Audibility

Figure 8.1-1 plots the one-third octave band sound levels (L_{eq}) for both samples of high output conditions. The results show that infrasound is inaudible to even the most sensitive people 1,000 feet from these wind turbines (more than 20 dB below the median thresholds of hearing). Low frequency sound above 40 Hz may be audible depending on background sound levels.

8.1.1.2 UK DEFRA Disturbance Criteria – Outdoor measurements

Figure 8.1-2 plots the one-third octave band sound levels (L_{eq}) for both samples of high output conditions. The low frequency sound was "steady" according to DEFRA procedures, and the results show that all outdoor equivalent DEFRA disturbance criteria are met.

8.1.1.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements

Figure 8.1-3 plots the 16, 31.5, and 63 Hz octave band sound levels (L_{eq}) for both samples of high output conditions. The results show that all outdoor equivalent ANSI/ASA S12.2 perceptible vibration criteria are met. The low frequency sound levels are below the ANSI S12.9 Part 4 thresholds for the beginning of rattles (16, 31.5, 63 Hz total less than 70 dB), and the 31.5 and 63 Hz sound levels are below the level of 65 dB identified for minimal annoyance in ANSI S12.9 Part 4, and the 16 Hz sound level is within 1.5 dB of this level, which is an insignificant increase since the levels were not rapidly fluctuating.

8.1.2 Indoor Measurements - Siemens SWT-2.3-93

Simultaneous outdoor and indoor measurements were made at two residences at different locations within the wind farm to determine indoor audibility of low frequency noise from Siemens WTGs. In each house measurements were made in a room facing the wind turbines, and were made with either window open or closed. These residences are designated Homes "A" and "D" and were approximately 1,000 feet from the closest Siemens WTG. Both homes were near a string of multiple WTGS, four of which were within 2,000 feet of the house. The sound level data presented herein include contributions from all wind turbines as measured by the recording equipment. The key operational and meteorological parameters during these measurements are listed in Table 8.1-2.

Table 8.1-2 Summary of Operational Parameters – Siemens SWT-2.3-93 (Indoor)

Parameter	Home "A" (closed / open)	Home "D" (closed / open)
Distance to nearest WTG	1,060 feet	920 feet
Time of day	7:39-7:49 / 7:51-8:01	16:16-16:26 / 16:30 -16:40
WTG power output	1,884 kW / 1564 kW	2,301 kW / 2299 kW
Sound power	107 dBA / 106.7 dBA	107 dBA / 107 dBA
Measured wind speed @ 2 m	3.2 m/s / 3.7 m/s	9.6 m/s / 8.8 m/s
L_{Aeq}	33.8 dBA /38.1 dBA	35.0 dBA / 36.7 dBA
L_{A90}	28.1 dBA / 36.8 dBA	29.6 dBA / 31.2 dBA
L_{Ceq}	54.7 dBC / 57.1 dBC	52.8 dBC / 52.5 dBC

8.1.2.1 Indoor Audibility

Figure 8.1-4a plots the indoor one-third octave band sound levels (L_{eq}) for Home "A", and Figure 8.1-4b plots the indoor one-third octave band sound levels for Home "D". The results show that infrasound is inaudible to even the most sensitive people 1,000 feet from these wind turbines with the windows open or closed (more than 20 dB below the median thresholds of hearing). Low frequency sound at or above 50 Hz may be audible depending on background sound levels.

8.1.2.2 UK DEFRA Disturbance Criteria – Indoor Measurements

Figure 8.1-5a plots the indoor one-third octave band sound levels (L_{eq}) for Home "A". The low frequency sound was "steady" according to DEFRA procedures, and the results show that all outdoor equivalent DEFRA disturbance criteria are met. Figure 8.1-5b plots the indoor one-third octave band sound levels (L_{eq}) for Home "D". According to DEFRA procedures, the low frequency sound was not "steady" and therefore the data were compared to both criteria. The results show the DEFRA disturbance criteria were met for steady low frequency sounds, the DEFRA criteria were met for unsteady low frequency sounds except for the 125 Hz band, which was within 1 dB, which is an insignificant difference.

8.1.2.3 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements

Figure 8.1-6a plots the indoor 16 Hz to 125 Hz octave band sound levels (L_{eq}) for Home "A", and Figure 8.1-6b plots the indoor 16 Hz to 125 Hz octave band sound levels (L_{eq}) for Home "D". The results show the ANSI/ASA S12.2 low frequency criteria were easily met for both windows open and closed scenarios. The ANSI/ASA S12.2 low frequency criteria for bedrooms, classrooms and hospitals were met, the spectrum was balanced, and the criteria for moderately perceptible vibrations in light-weight walls and ceilings were also met.

8.2 GE 1.5sle

8.2.1 Outdoor Measurements - GE 1.5sle

Several periods of high wind turbine output and relatively low ground wind speed (which minimized effects of wind noise) were measured outdoors approximately 1,000 feet from the closest GE 1.5 sle WTG. This site was actually part of a string of more than 30 WTGS, four of which were within 2,000 feet of the monitoring location. The sound level data presented herein include contributions from all wind turbines as measured by the recording equipment. The key operational and meteorological parameters for these measurements are listed in Table 8.2-1.

Table 8.2-1 Summary of Operational Parameters – GE 1.5sle (Outdoor)

Parameter	Sample #46	Sample #51
Distance to nearest WTG	1,000 feet	1,000 feet
Time of day	23:10-23:20	00:00-00:10
WTG power output	1,293 kW	1,109 kW
Sound power	106 dBA	106 dBA
Measured wind speed @ 2 m	4.1 m/s	3.3 m/s
L_{Aeq}	50.2 dBA	50.7 dBA
L_{A90}	49.2 dBA	49.7 dBA
L_{Ceq}	62.5 dBC	62.8 dBC

8.2.1.1 Outdoor Audibility

Figure 8.2-1 plots the one-third octave band sound levels (L_{eq}) for both samples of high output conditions. The results show that infrasound is inaudible to even the most sensitive people 1,000 feet from these wind turbines (more than 20 dB below the median thresholds of hearing). Low frequency sound at and above 31.5 - 40 Hz may be audible depending on background sound levels.

8.2.1.2 UK DEFRA Disturbance Criteria – Outdoor measurements

Figure 8.2-2 plots the one-third octave band sound levels (L_{eq}) for both samples of high output conditions. The low frequency sound was "steady" according to DEFRA procedures, and the results show the low frequency sound meet or are within 1 dB of outdoor equivalent DEFRA disturbance criteria.

8.2.1.3 Perceptible Vibration, Rattle and Annoyance – Outdoor Measurements

Figure 8.2-3 plots the 16, 31.5, and 63 Hz octave band sound levels (L_{eq}) for both samples of high output conditions. The results show that all outdoor equivalent ANSI/ASA S12.2 perceptible vibration criteria are met. The low frequency sound levels are below the ANSI S12.9 Part 4 thresholds for the beginning of rattles (16, 31.5, 63 Hz total less than 70 dB), and the 16, 31.5, 63 Hz sound levels are below the level of 65 dB identified for minimal annoyance in ANSI S12.9 Part 4.

8.2.2 Indoor Measurements - GE 1.5sle

Simultaneous outdoor and indoor measurements were made at two residences at different locations within the wind farm to determine indoor audibility of low frequency noise from GE 1.5sle WTGs. In each house, measurements were made in a room facing the wind turbines, and were made with window either open or closed. These residences are designated Homes "B" and "C" and were approximately 1,000 feet from the closest Siemens WTG. Operational conditions were maximum turbine noise and high ground

winds at Home "B", and within 1.5 dBA of maximum turbine noise and high ground level winds at Home "C". Home "B" was near a string of multiple WTGs, four of which were within 2,000 feet of the house, while Home "C" was at the end of a string of WTGs, two of which were within 2,000 feet of the house. The sound level data presented herein include contributions from all wind turbines as measured by the recording equipment. The key operational and meteorological parameters during these measurements are listed in Table 8.2-2.

Table 8.2-2 Summary of Operational Parameters – GE 1.5sle (Indoor)

Parameter	Home "B" (closed / open)	Home "C" (closed / open)
Distance to nearest WTG	950 feet	1,025 feet
Time of day	9:29-9:39 / 9:40-9:50	11:49-11:59 / 12:00-12:10
WTG power output	1,017 kW / 896 kW	651 kW / 632 kW
Sound power	106 dBA / 105.8 dBA	104.7 dBA / 104.6 dBA
Measured wind speed @ 2 m	6.2 m/s / 6.8 m/s	6.4 m/s / 5.9 m/s
L_{Aeq}	27.1 dBA / 36.0 dBA	33.6 dBA / 39.8 dBA
L_{A90}	23.5 dBA / 33.7 dBA	27.6 dBA / 34.2 dBA
L_{Ceq}	47.1 dBC / 54.4 dBC	50.6 dBC / 55.1 dBC

8.2.2.1 Indoor Audibility

Figure 8.2-4a plots the indoor one-third octave band sound levels (L_{eq}) for Home "B", and Figure 8.2-4b plots the indoor one-third octave band sound levels for Home "C". The results show that infrasound is inaudible to even the most sensitive people 1,000 feet from these wind turbines with the windows open or closed (more than 20 dB below the median thresholds of hearing). Low frequency sound at and above 63 Hz may be audible depending on background sound levels.

8.2.2.2 UK DEFRA Disturbance Criteria – Indoor Measurements

Figure 8.2-5a plots the indoor one-third octave band sound levels (L_{eq}) for Home "B", and Figure 8.2-5b plots the indoor one-third octave band sound levels (L_{eq}) for Home "C". The results show the DEFRA disturbance criteria were met for steady and non-steady low frequency sounds.

8.2.2.3 ANSI/ASA S12.2 Low Frequency Criteria – Indoor Measurements

Figure 8.2-6a plots the indoor 16 Hz to 125 Hz octave band sound levels (L_{eq}) for Home "B", and Figure 8.2-6b plots the indoor 16 Hz to 125 Hz octave band sound levels (L_{eq}) for Home "C". The results show the ANSI/ASA S12.2 low frequency criteria were met for both windows open and closed scenarios. The ANSI/ASA S12.2 low frequency criteria for

P.C. ATTACHMENT 13
P.C. April 26, 2010

bedrooms, classrooms and hospitals were met, the spectrum was balanced, and the criteria for moderately perceptible vibrations in light-weight walls and ceilings were also met.

8.3 Noise Reduction from Outdoor to Indoor

Simultaneous outdoor and indoor measurements were made at four residences within the Horse Hollow Wind Farm to determine noise reductions of the homes for comparison to that used in the determination of equivalent outdoor criteria for indoor criteria, such as ANSI/ASA S12.2 and DEFRA. Indoor measurements were made with windows open and closed. Tables 8.1-2 and 8.2-2 list the conditions of measurement for these houses.

The outdoor sound level data at Home "D" was heavily influenced by high ground winds – the measured levels were higher due to the effect of the wind on the microphone or the measurement of wind effect noise; therefore the data from Home "D" was not used in the comparison of noise reduction, since it would over estimate actual noise reduction.

Figures 8.3-1a and 8.3-1b present the measured one-third octave band noise reduction for the three homes with windows closed and open, respectively. Also presented in these same figures are the one-third octave noise reductions used in Section 4 of this report to obtain equivalent outdoor criteria for the indoor DEFRA criteria ("Table 4.3-1 Noise Reduction - Open Window"). It can be seen that for the window closed condition in Figure 8.3-1a, the measured noise reductions for all houses were greater than that used in our analysis as described in Section 4. For the open window case, the average of the three homes has a greater noise reduction than used in Section 4 and all houses at all frequencies have higher values with one minor exception. Only Home "A" at 25 Hz had a lower noise reduction (3dB), and this difference is not critical since the measured indoor sounds at 25 Hz at each of these home was significantly lower than the indoor DEFRA criteria. Furthermore, the outdoor measurements for both Siemens and GE wind turbines at 1000 feet under high output/high noise levels met the equivalent outdoor DEFRA criteria at 25 Hz.

Table 8.3-1 presents the measured octave band noise reduction for the three homes with windows closed and open, respectively. Also presented in Table 8.3-1 are the octave band noise reductions used in Table 4.2-2 of this report to obtain equivalent outdoor criteria for the indoor ANSI/ASA S12.2 criteria for perceptible vibration. It can be seen that for the window closed condition, the measured noise reductions for all houses were greater than that used in our analysis as described in Section 4. For the open window case, the average of the three homes has a greater noise reduction than used in Section 4 and all houses at all frequencies have higher values with one minor exception. Only Home "A" at 31 Hz (which contains the 25 Hz one-third octave band) had a lower noise reduction (3dB), and this difference is not critical since the measured indoor sounds at 31 Hz at each of these homes was significantly lower than the indoor ANSI/ASA S12.2 criteria. Furthermore, the outdoor measurements for both Siemens and GE wind turbines at 1000 feet under high output/high noise levels met the equivalent outdoor ANSI/ASA S12.2 criteria at 31 Hz.

Table 8.3-1 Summary of Octave Band Noise Reduction – Interior Measurements

Home	Wind Turbine	Windows	16 Hz	31.5 Hz	63 Hz
A	Siemens SWT-2-3-93	Closed	5	6	16
A	Siemens SWT-2-3-93	Open	4	3	12
B	GE 1.5 sle	Closed	20	22	22
B	GE 1.5 sle	Open	13	17	18
C	GE 1.5 sle	Closed	13	14	19
C	GE 1.5 sle	Open	8	13	17
Table 4.2-2 Noise Reduction		Open	3	6	9

8.4 Ground-Borne Vibration

Seven sets of ground-borne vibration measurements were made from Siemens 2.3 and GE 1.5sle wind turbines. The maximum ground-borne vibration RMS particle velocities were 0.071 mm/second (0.0028 inches/second) in the 8 Hz one-third octave band. This was measured 1000 feet downwind from a GE 1.5sle WTG under maximum power output and high wind at the ground. The background ground-borne vibration RMS particle velocity at the same location approximately 20 minutes beforehand was 0.085 mm/sec. Both of these measurements meet ANSI S2.71 recommendations for perceptible vibration in residences during night time hours. Soil conditions were soft earth representative of an active agricultural use. These vibration levels are nearly three orders of magnitude below the level of 0.75 inches/second set to prevent damage to residential structures. No perceptible vibration was felt from operation of the wind turbines. Measurements at the other sites and as close as 400 feet were significantly lower than the above measurements under high wind conditions.

Figure 8.1-1 Siemens SWT-2.3-93 Wind Turbine Outdoor Sound Levels at 1000 feet compared to Audibility Criteria

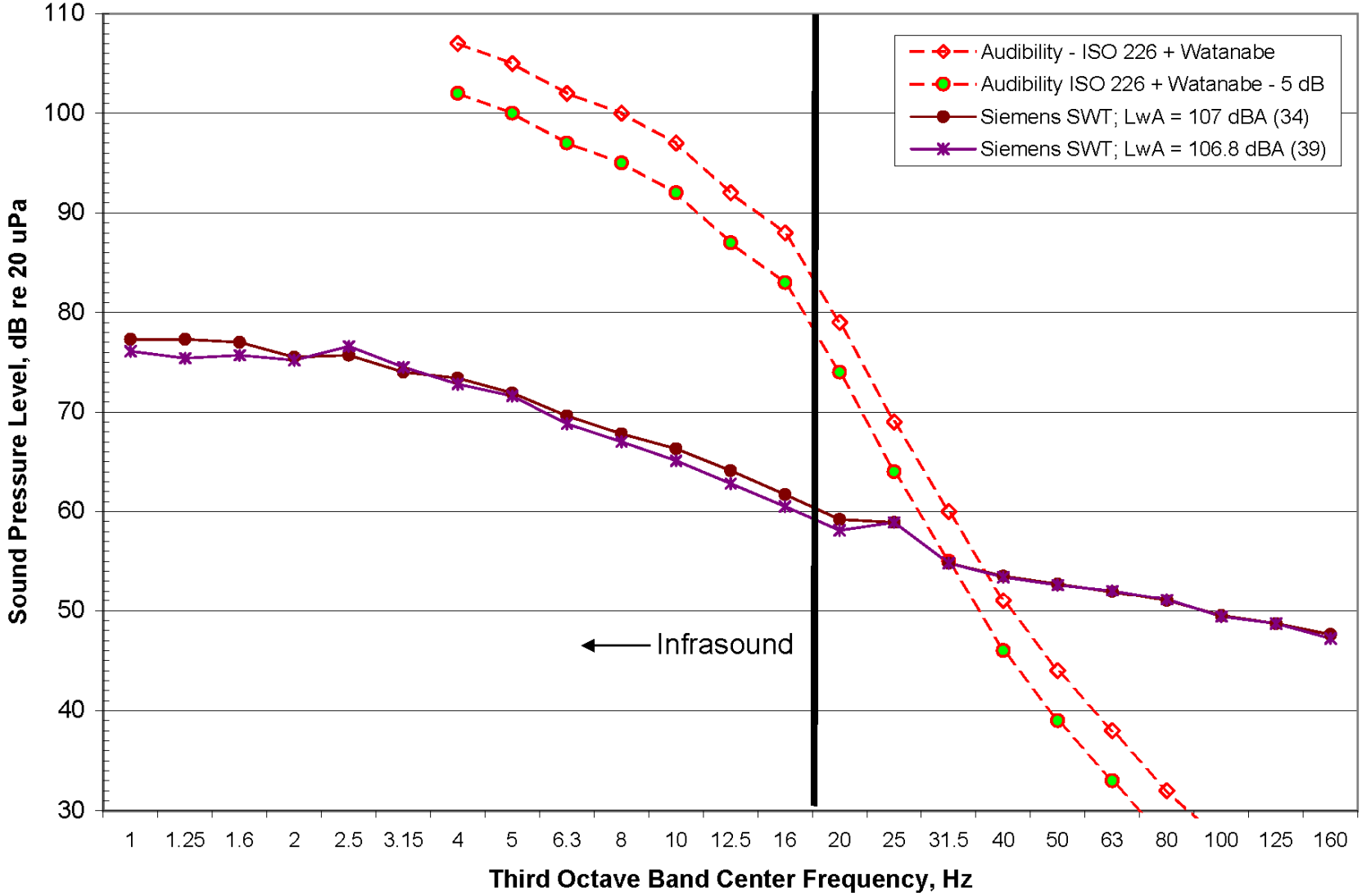
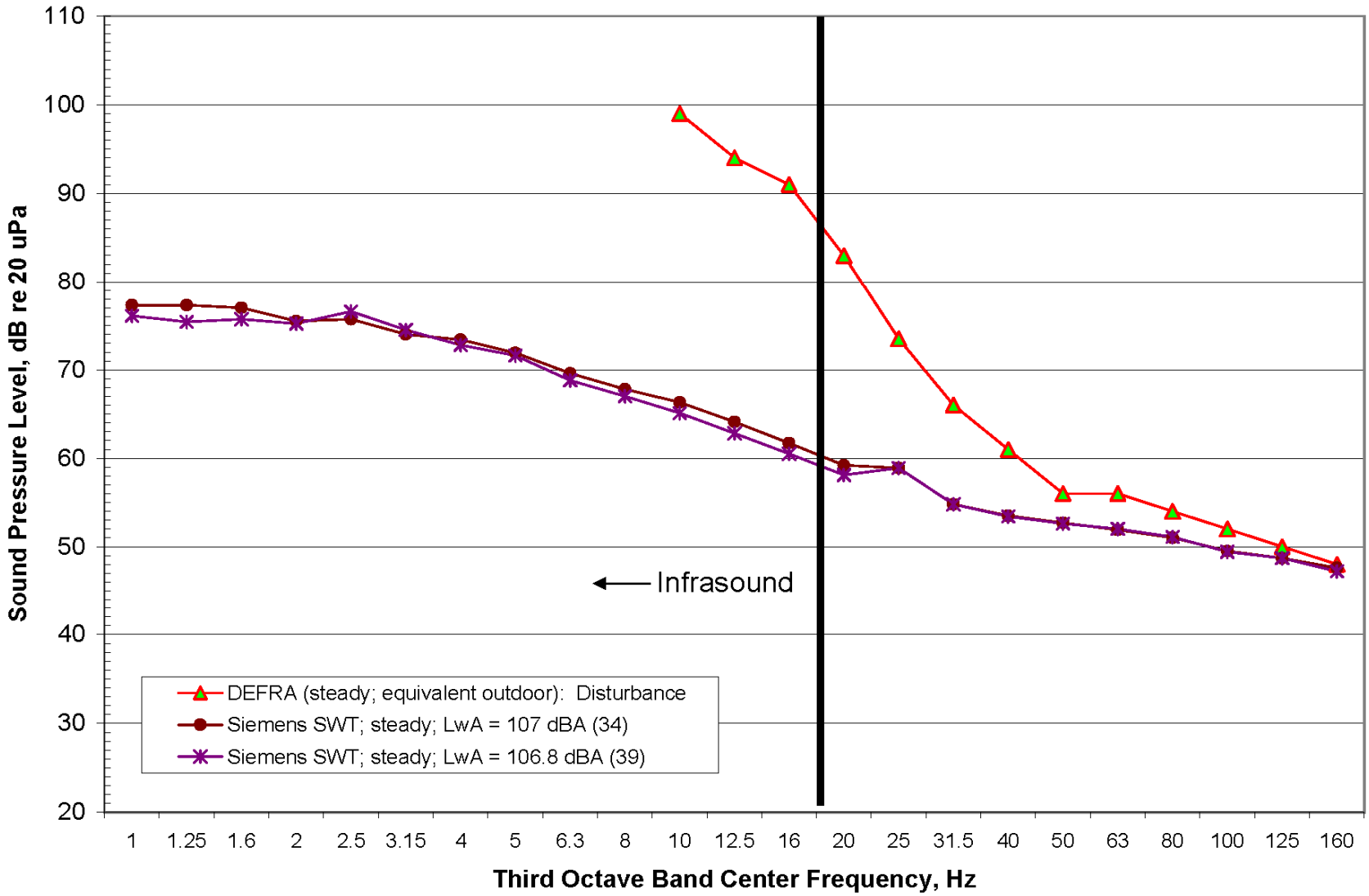


Figure 8.1-2 Siemens SWT-2.3-93 Wind Turbine Outdoor Sound Levels at 1000 feet compared to outdoor equivalent DEFRA Criteria



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.1-3 Siemens SWT-2.3-93 Wind Turbine Outdoor Sound Levels at 1000 feet compared to ANSI Criteria

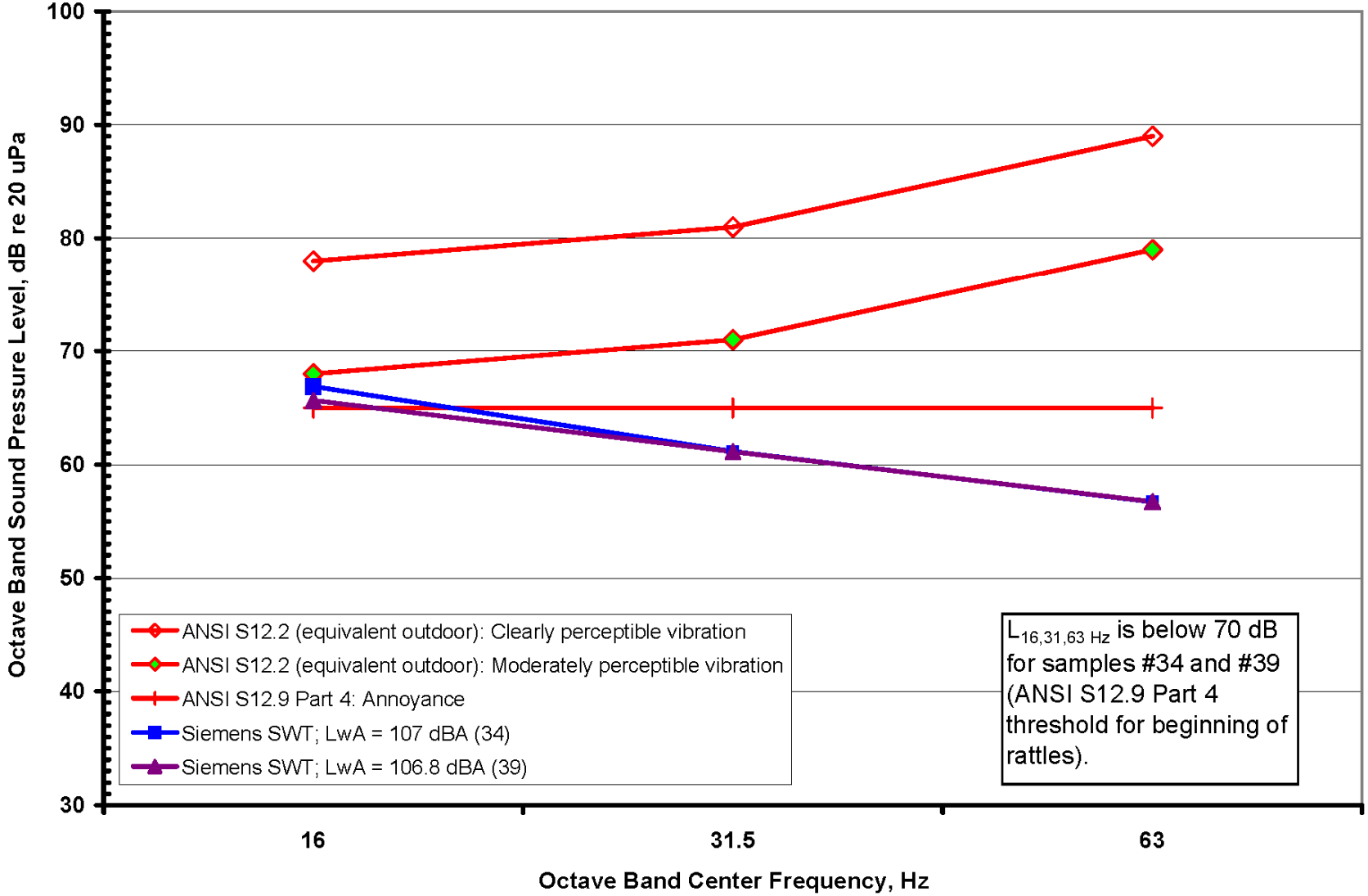


Figure 8.1-4a Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 1060 feet compared to Audibility Criteria (Home "A")

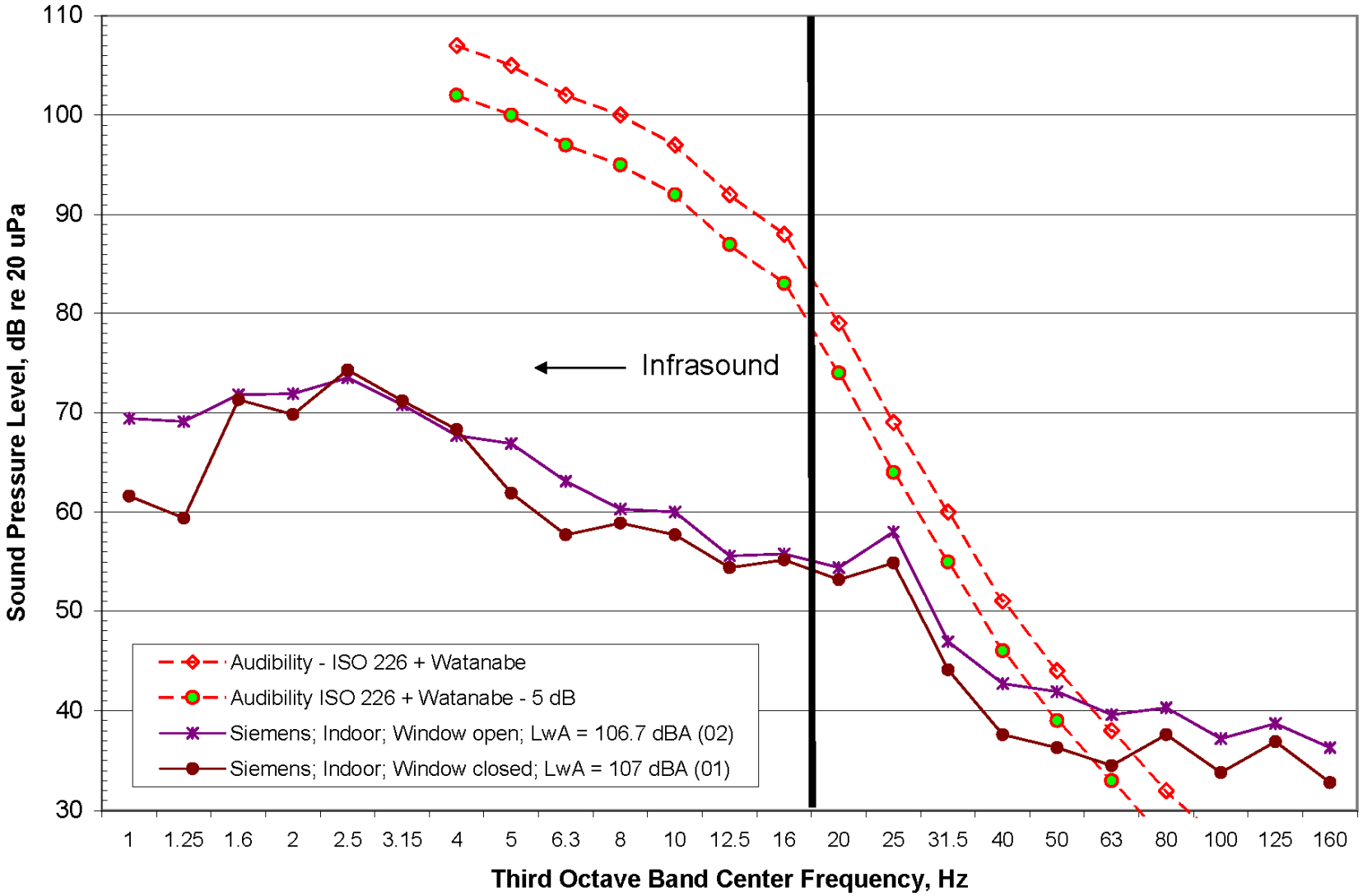
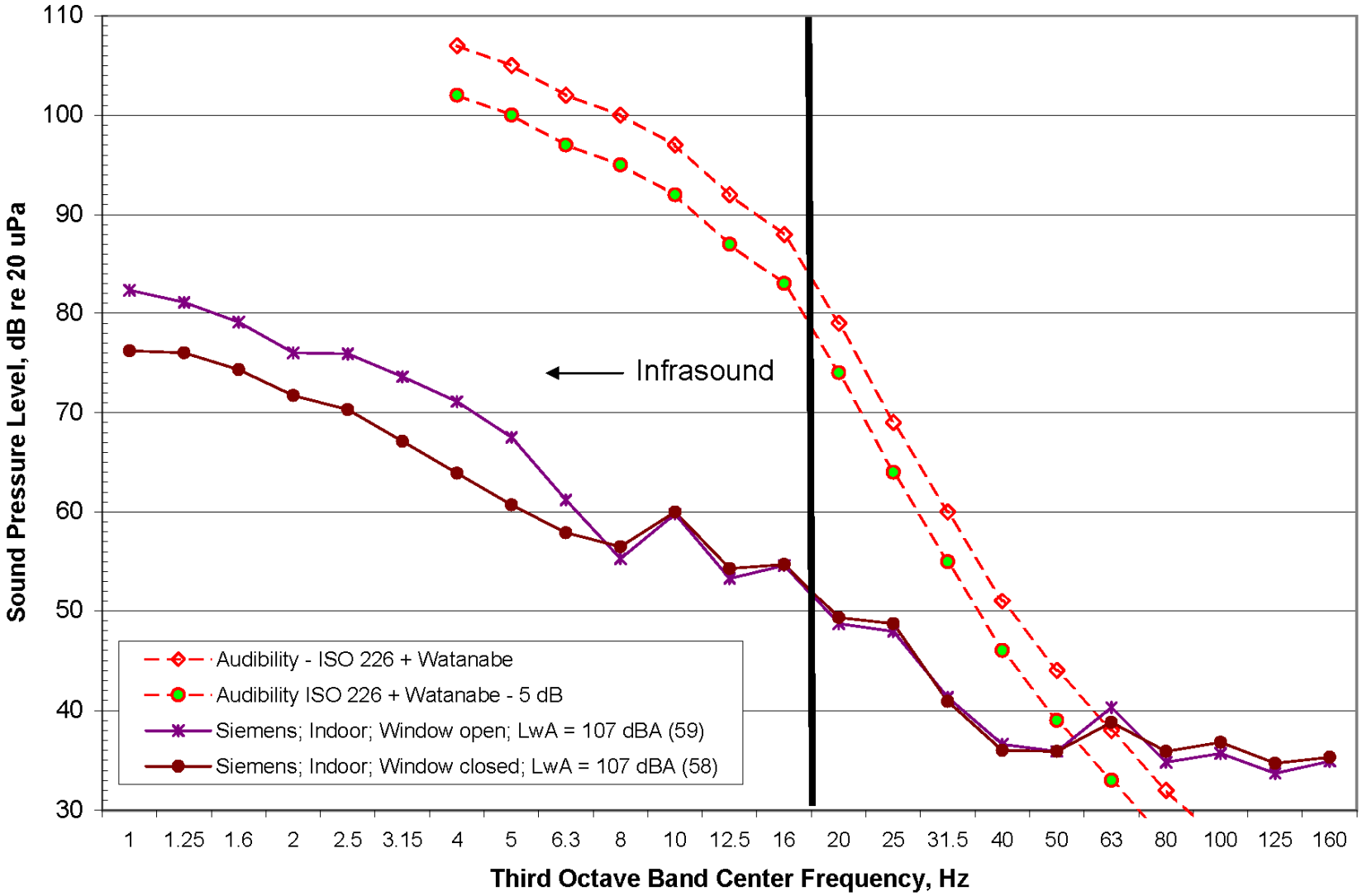
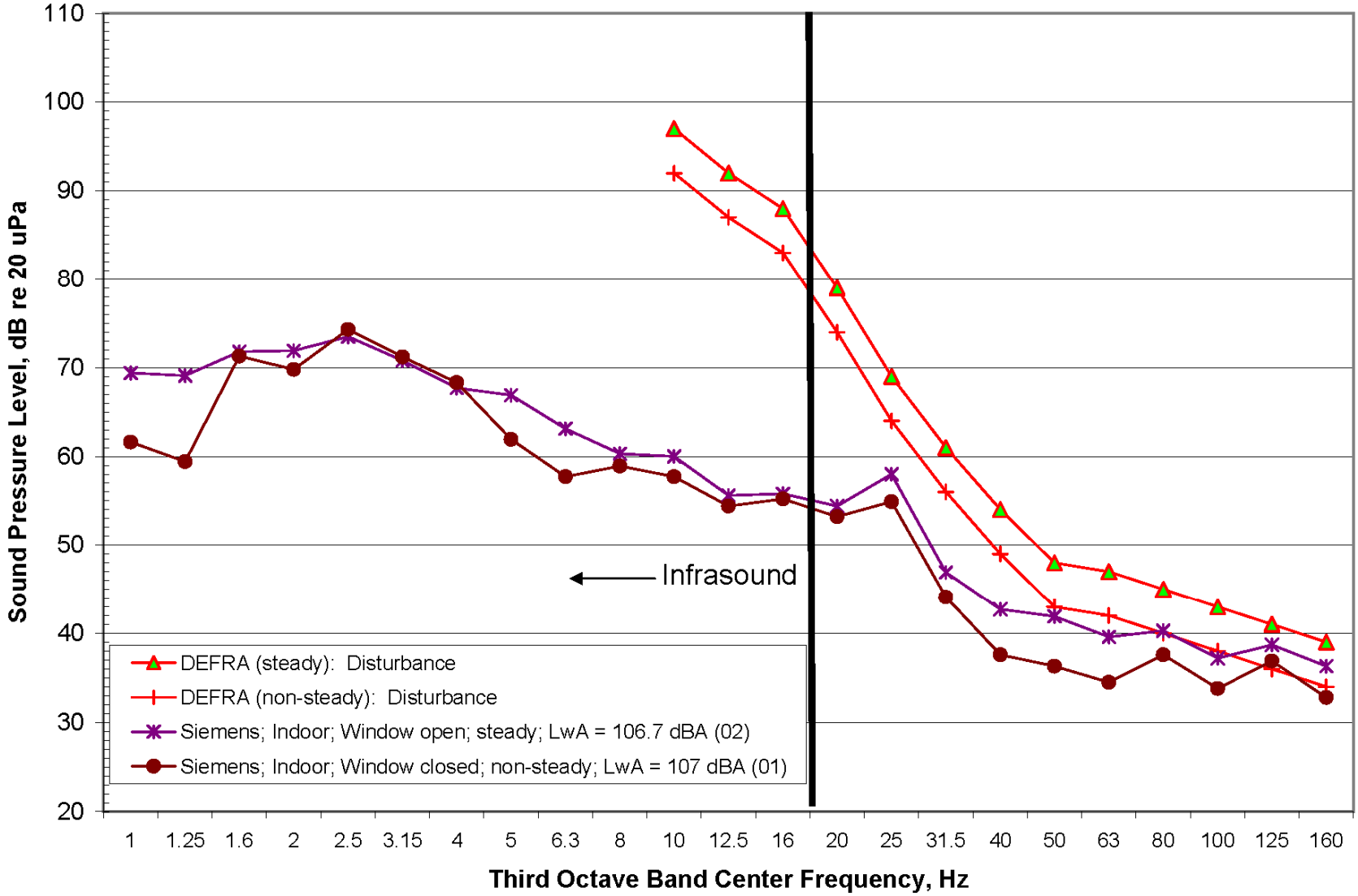


Figure 8.1-4b Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 920 feet compared to Audibility Criteria (Home "D")



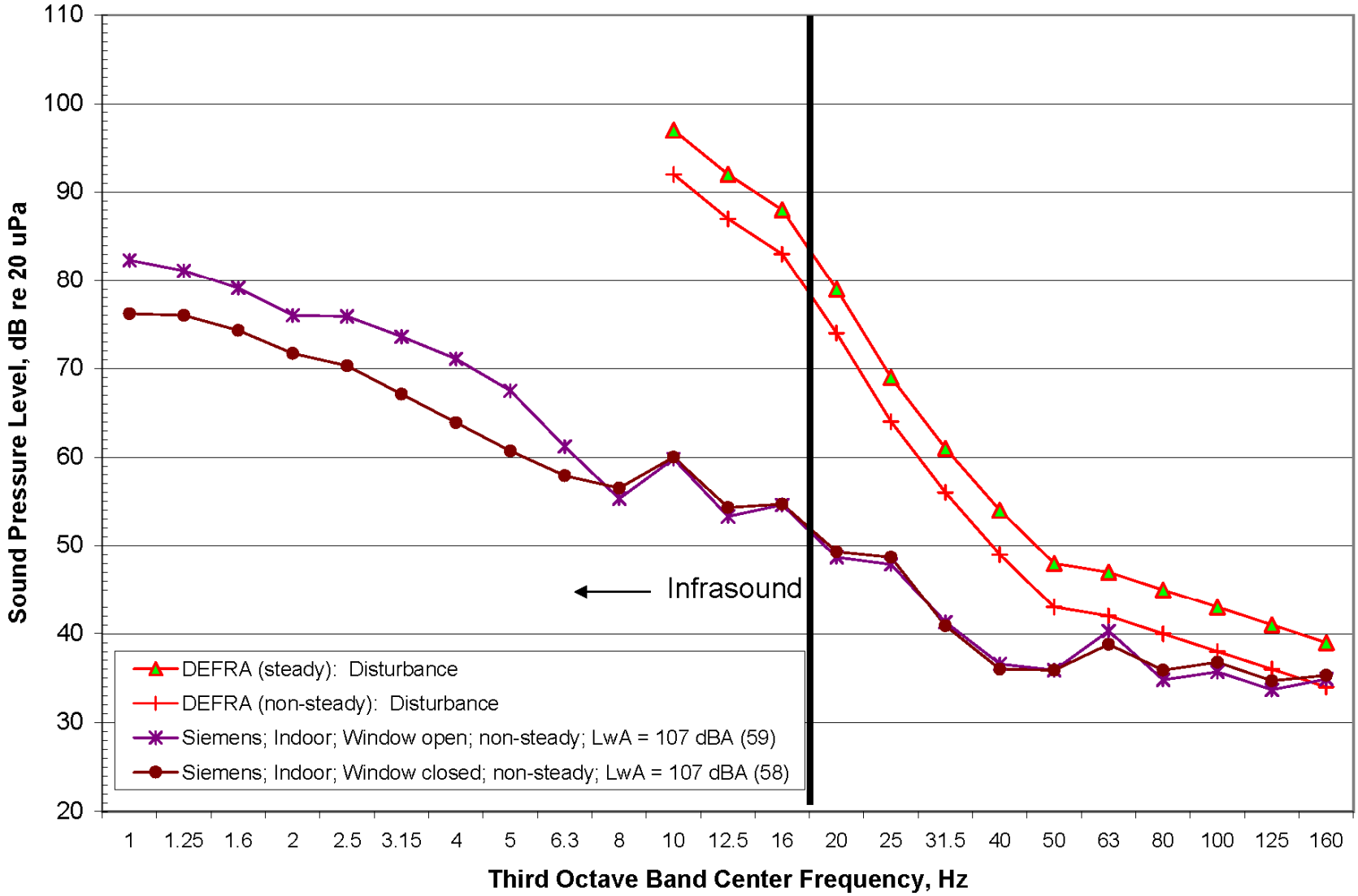
P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.1-5a Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 1060 feet compared to DEFRA Criteria (Home "A")



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.1-5b Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 920 feet compared to DEFRA Criteria (Home "D")



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.1-6a Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 1060 feet compared to ANSI 12.2 Criteria (Home "A")

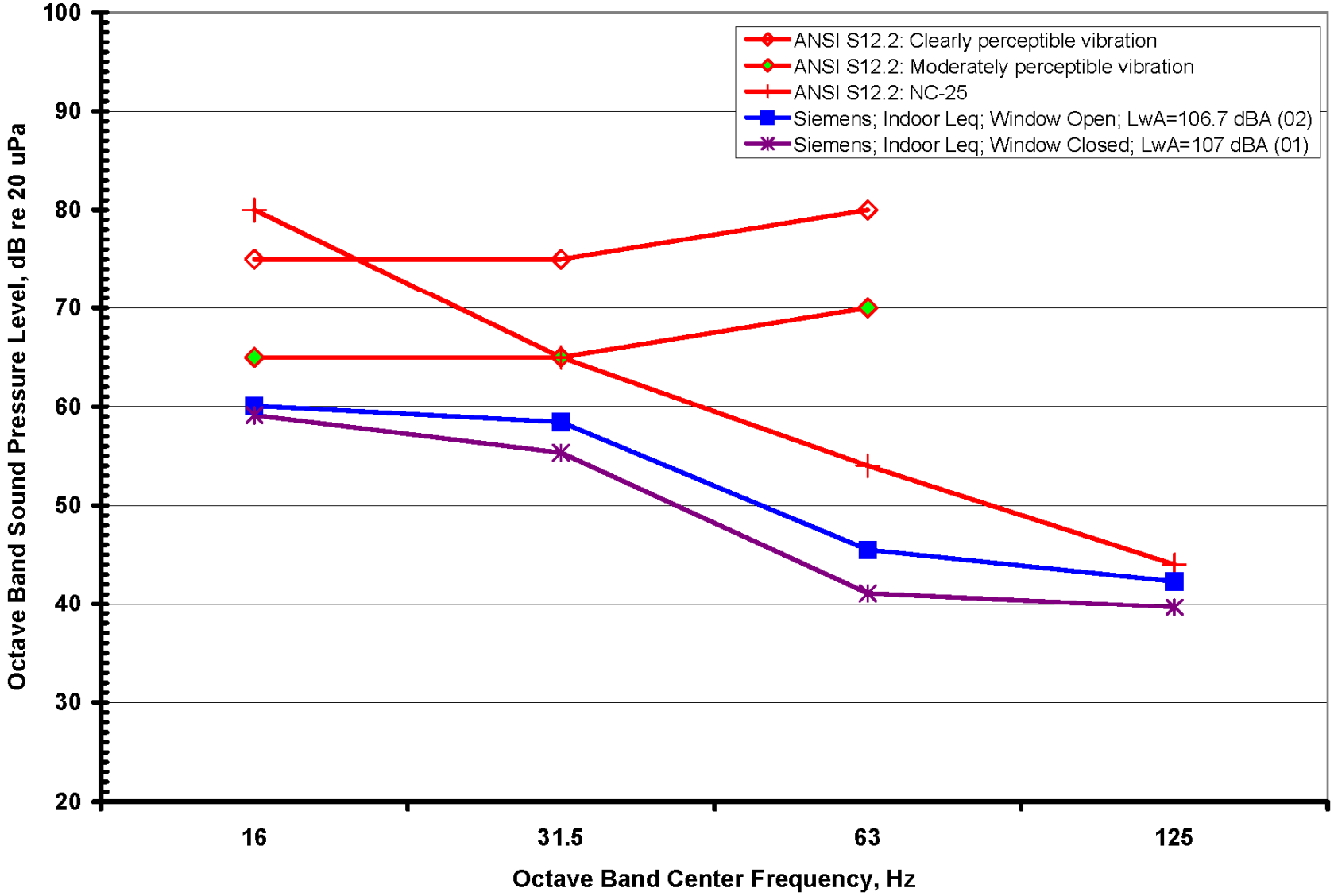
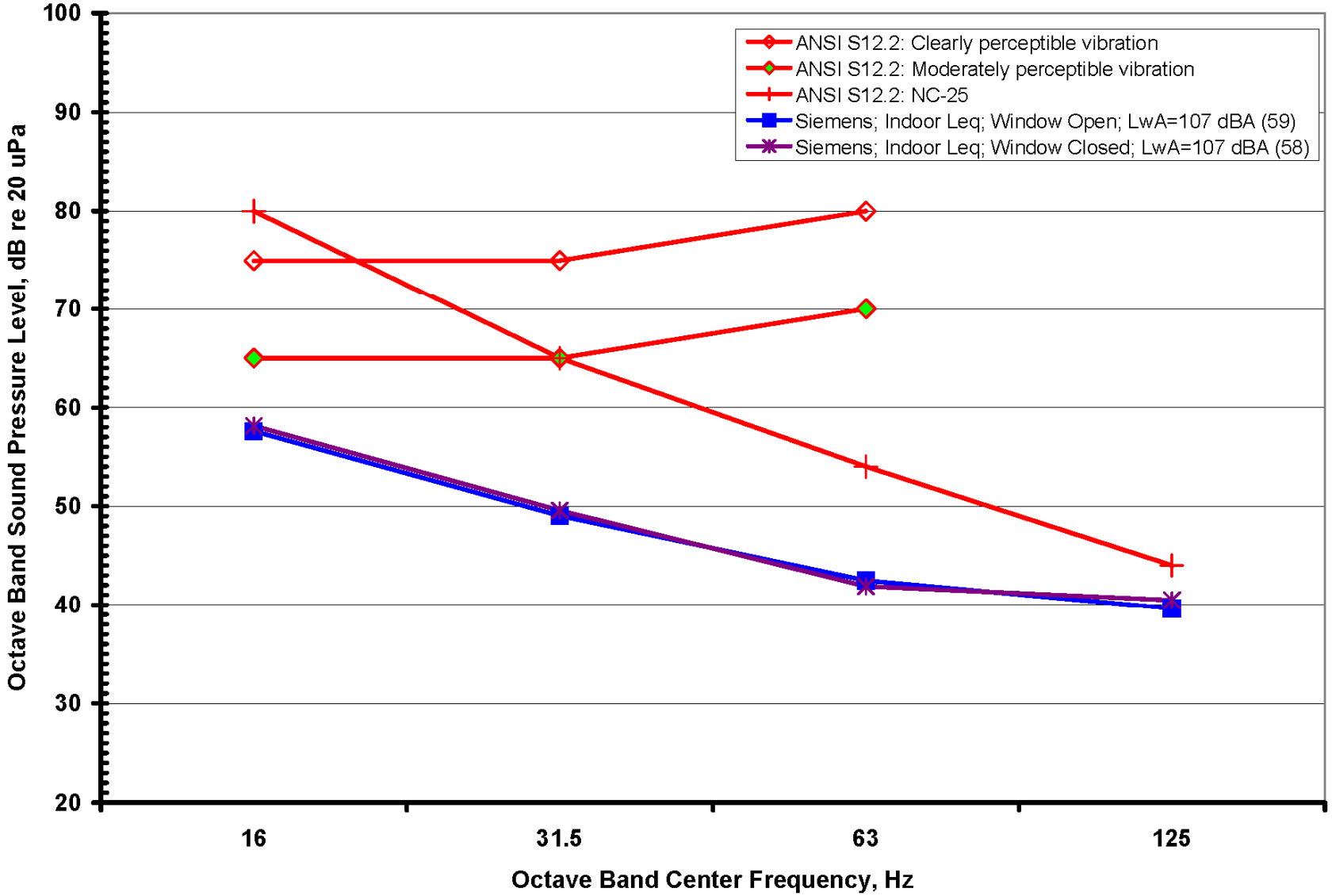
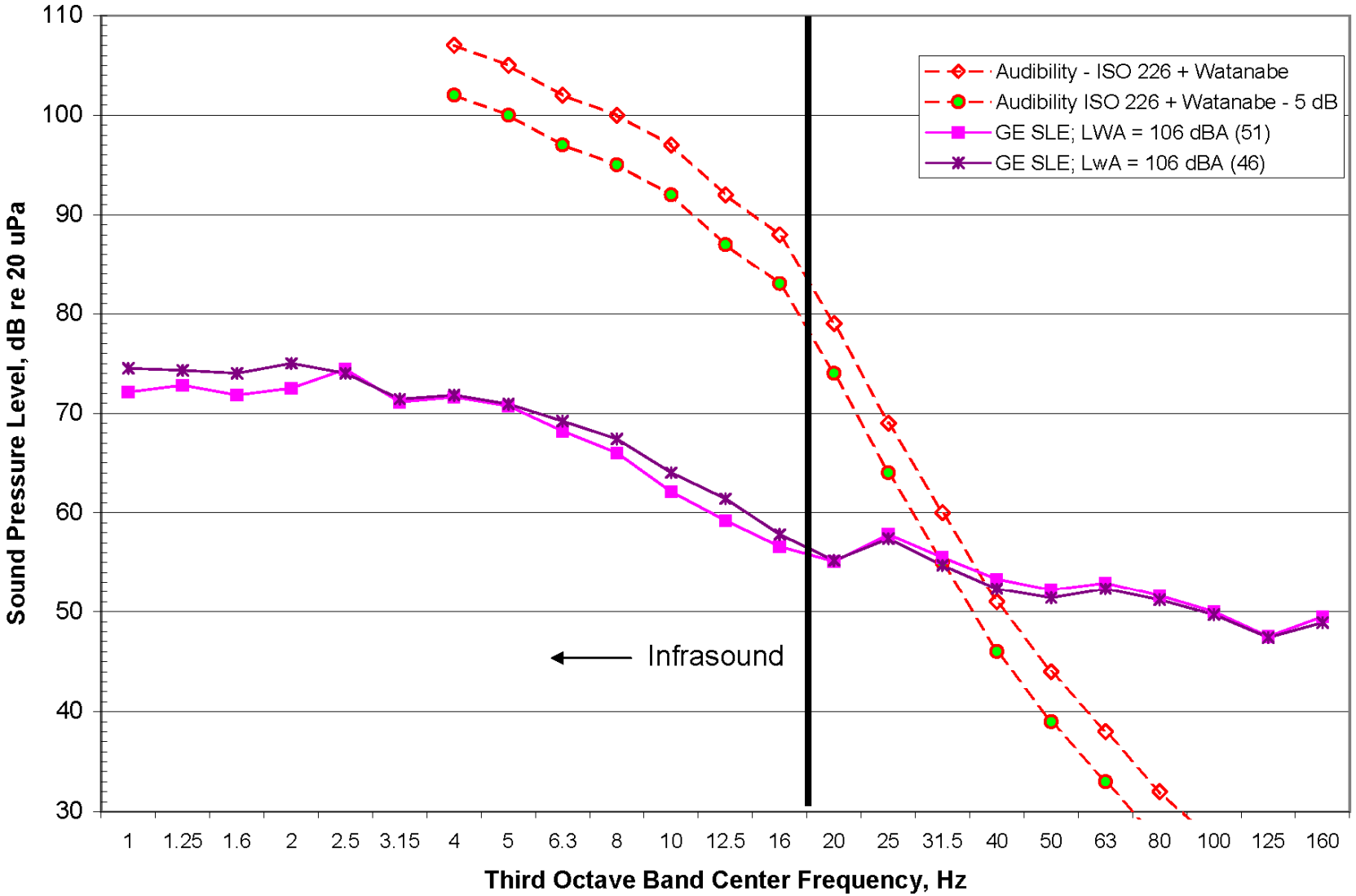


Figure 8.1-6b Siemens SWT-2.3-93 Wind Turbine Indoor Sound Levels at 920 feet compared to ANSI 12.2 Criteria (Home "D")



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.2-1 GE 1.5sle Wind Turbine Outdoor Sound Levels at 1000 feet compared to Audibility Criteria



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.2-2 GE 1.5sle Wind Turbine Outdoor Sound Levels at 1000 feet compared to outdoor equivalent DEFRA Criteria

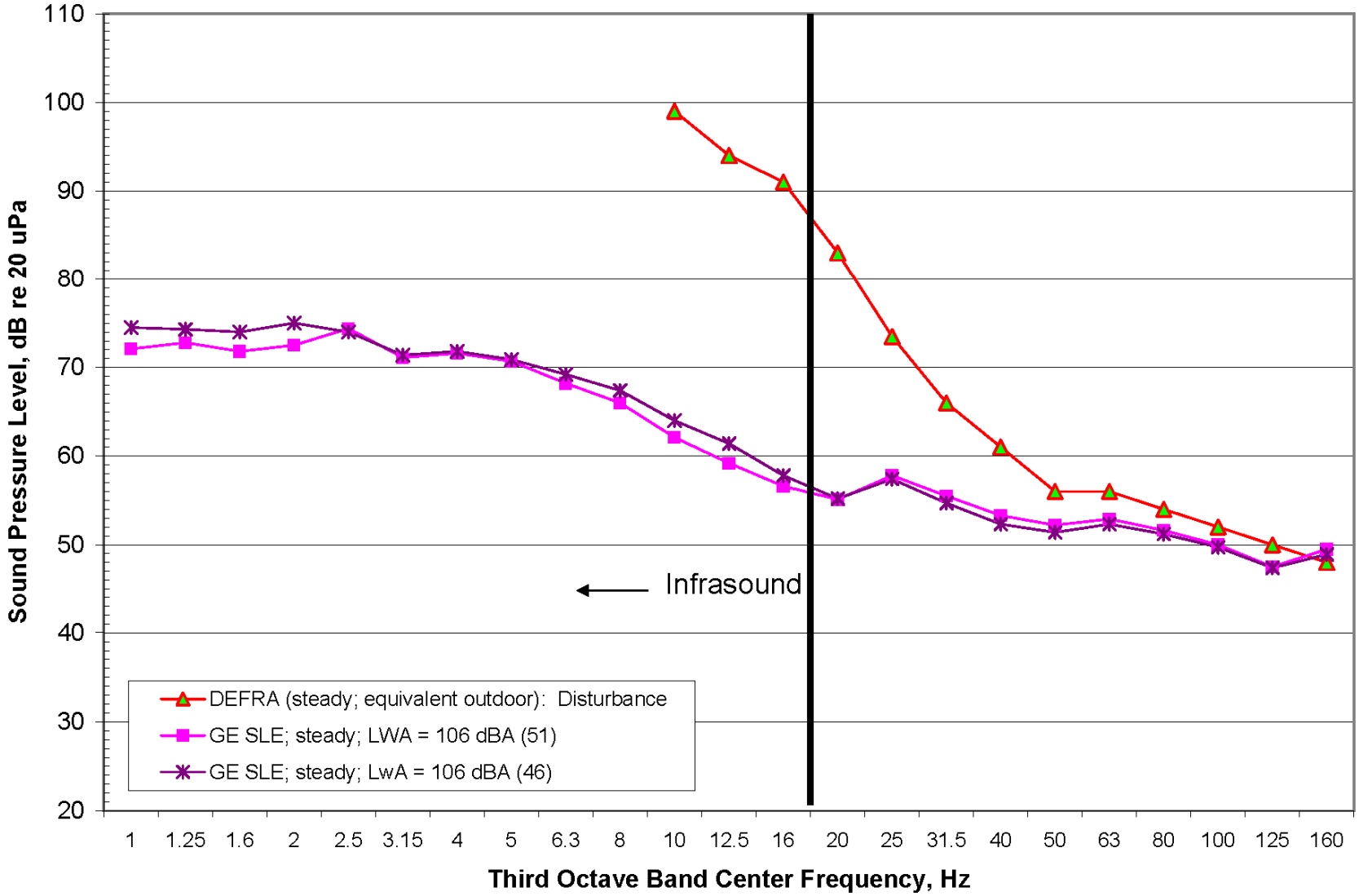


Figure 8.2-3 GE 1.5sle Wind Turbine Outdoor Sound Levels at 1000 feet compared to ANSI Criteria

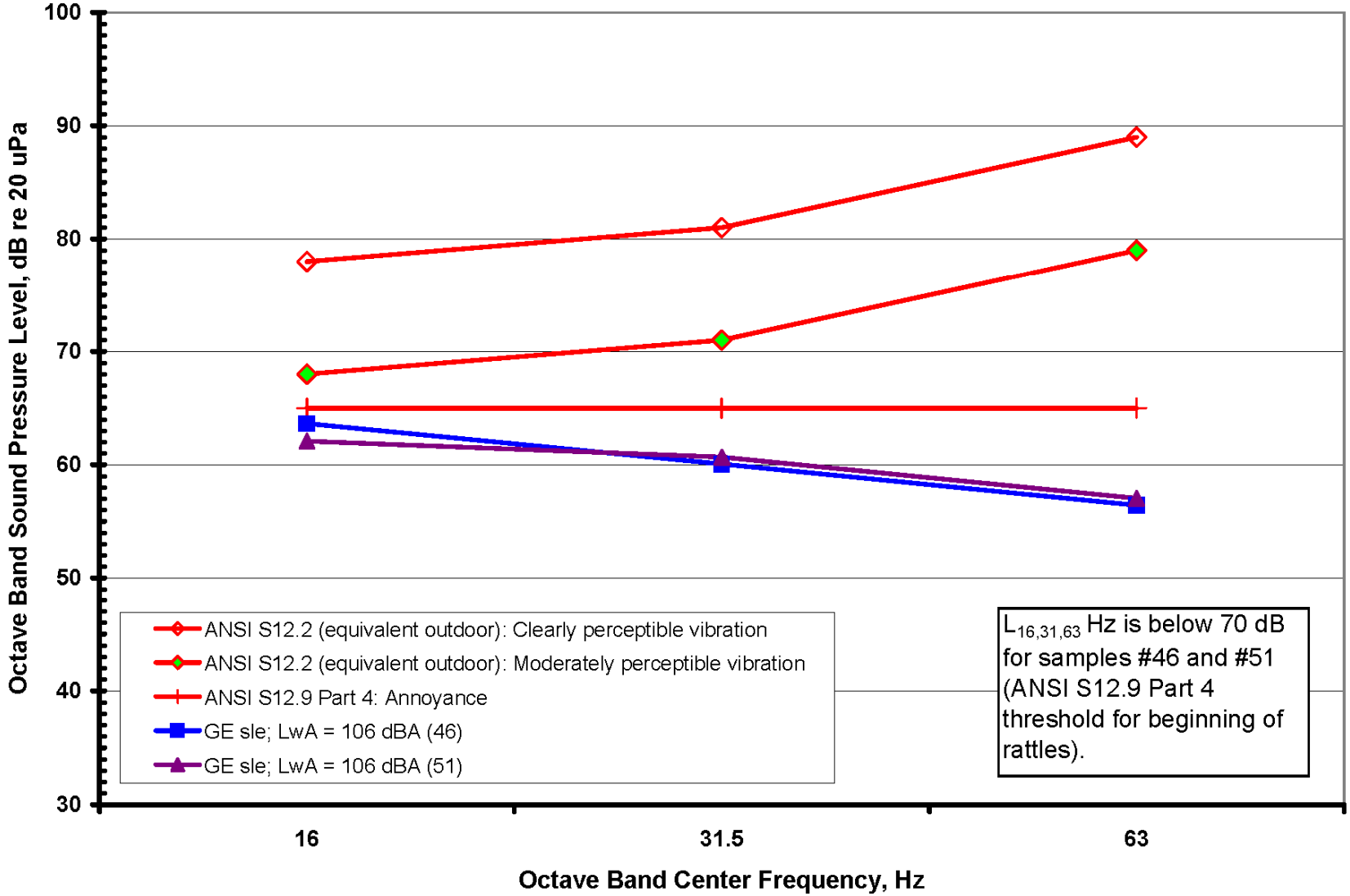
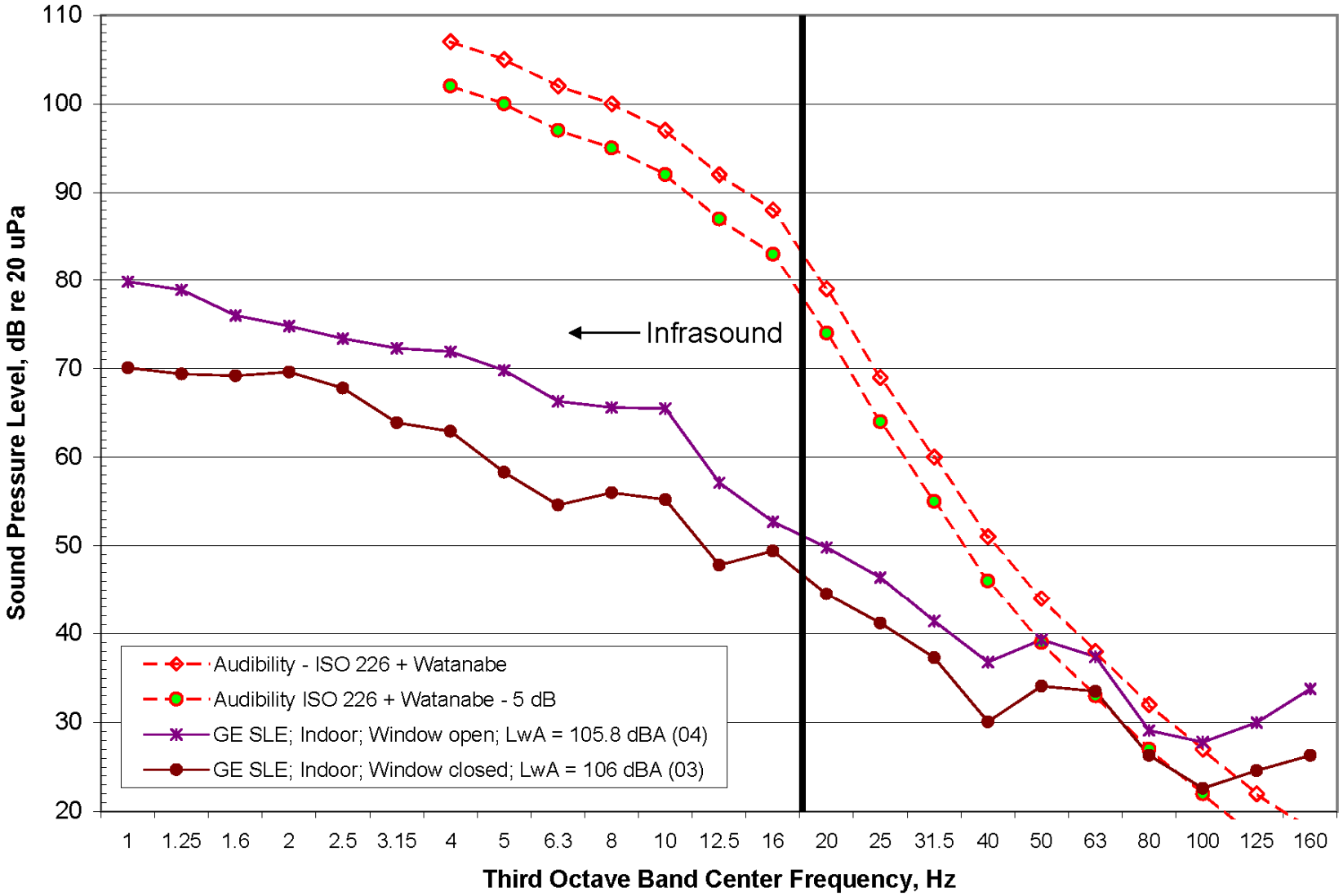


Figure 8.2-4a GE 1.5sle Wind Turbine Indoor Sound Levels at 950 feet compared to Audibility Criteria (Home "B")



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.2-4b GE 1.5sle Wind Turbine Indoor Sound Levels at 1025 feet compared to Audibility Criteria (Home "C")

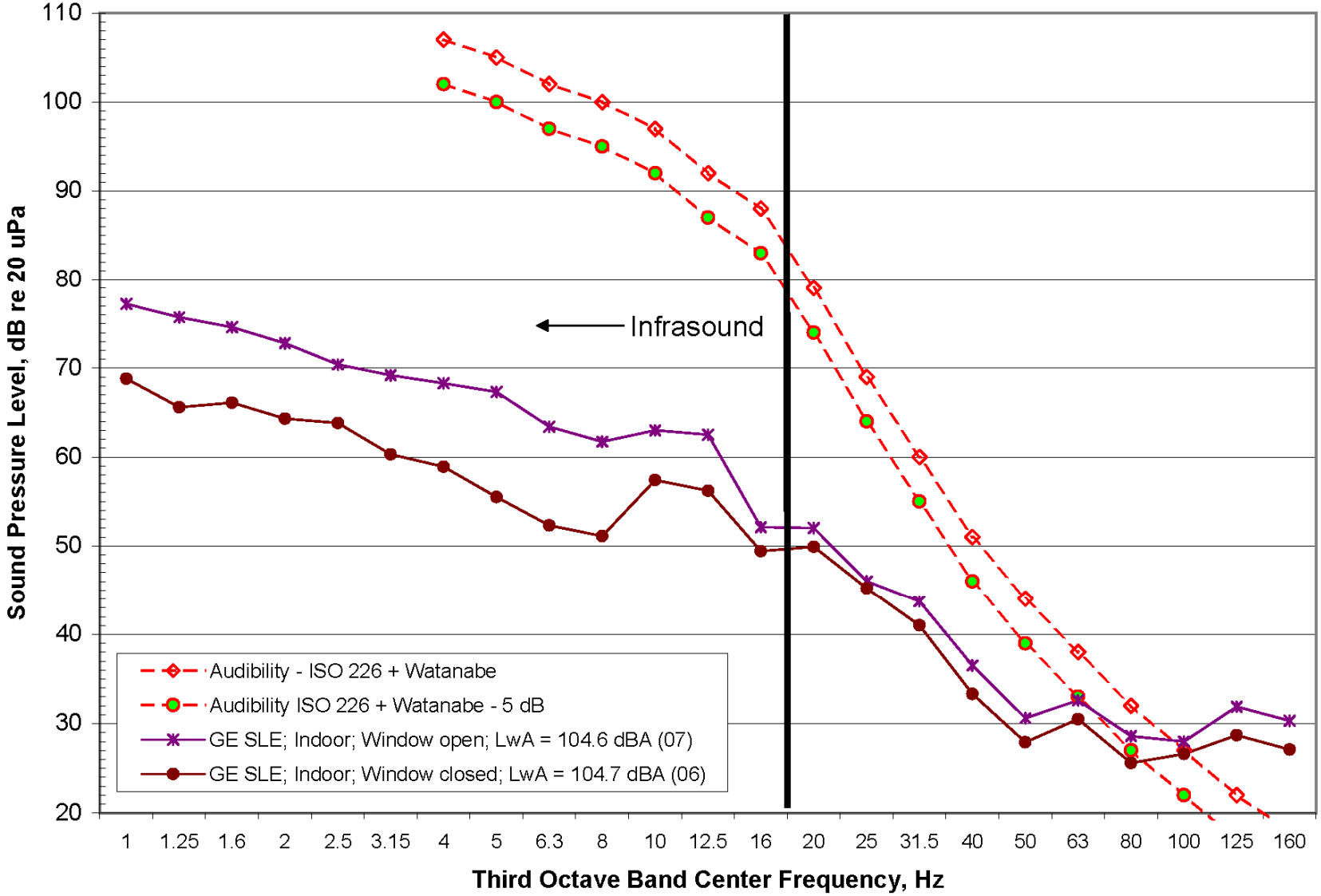


Figure 8.2-5a GE 1.5sle Wind Turbine Indoor Sound Levels at 950 feet compared to DEFRA Criteria (Home "B")

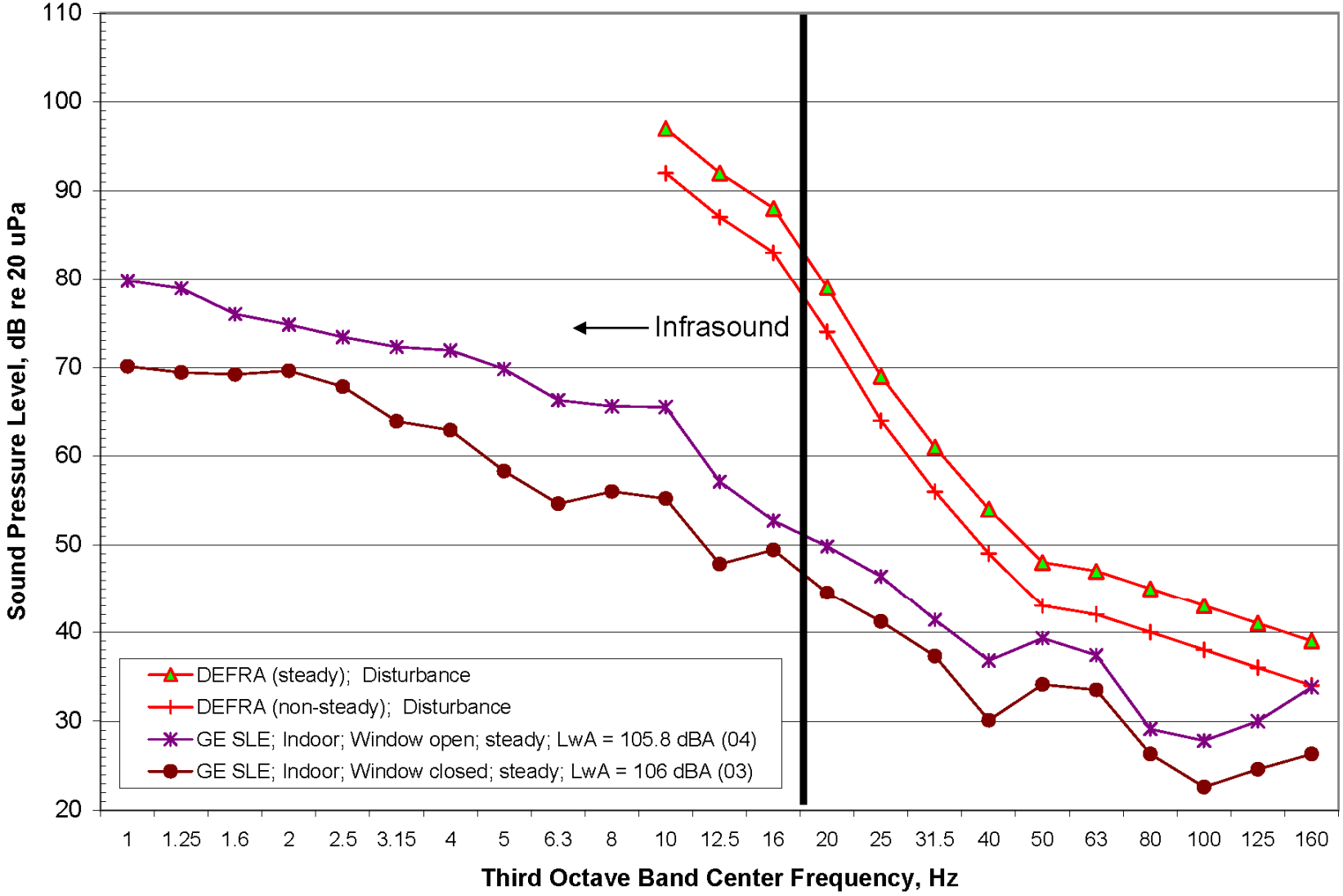
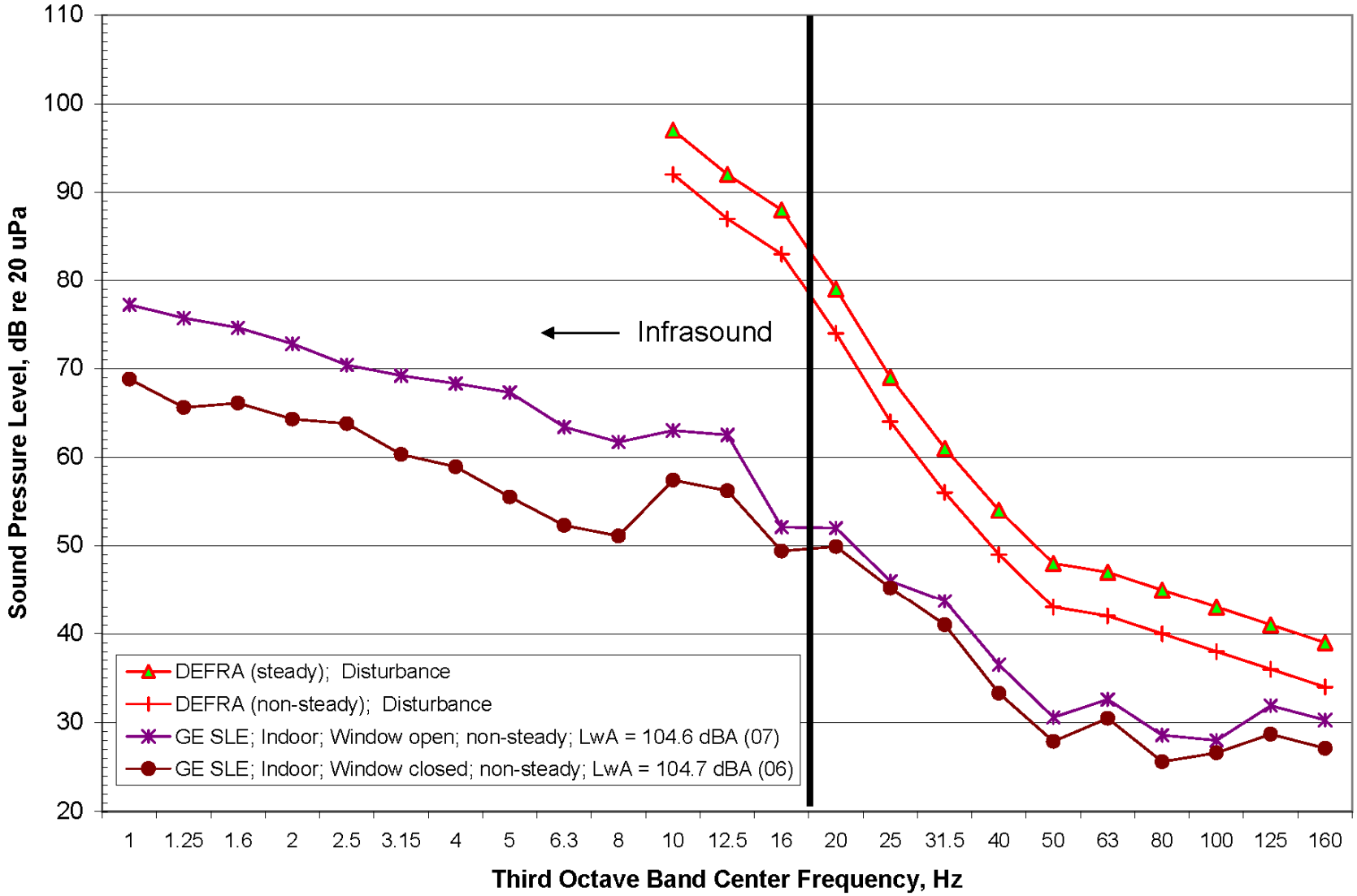
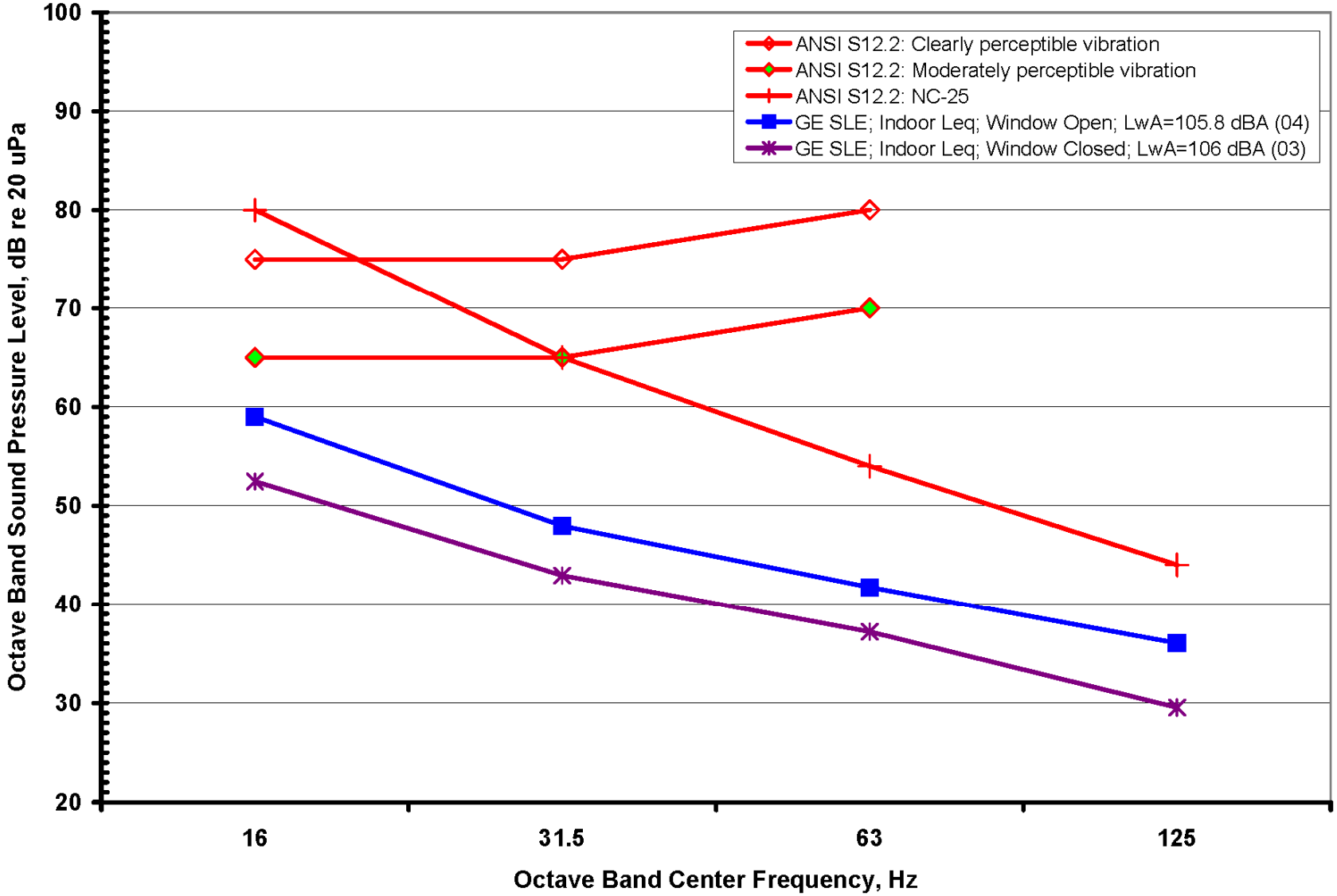


Figure 8.2-5b GE 1.5sle Wind Turbine Indoor Sound Levels at 1025 feet compared to DEFRA Criteria (Home "C")



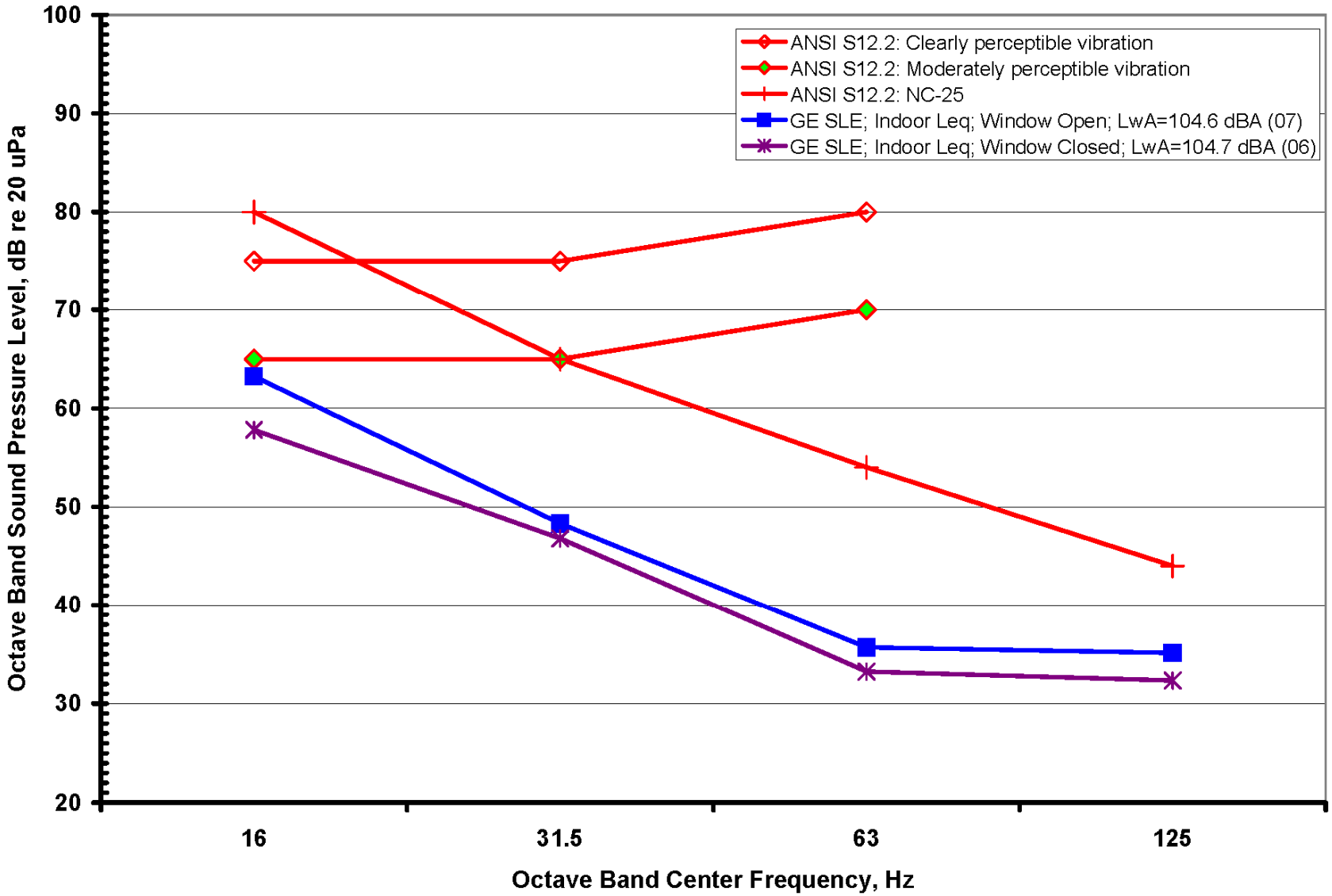
P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.2-6a GE 1.5 sle Wind Turbine Indoor Sound Levels at 950 feet compared to ANSI 12.2 Criteria (Home "B")



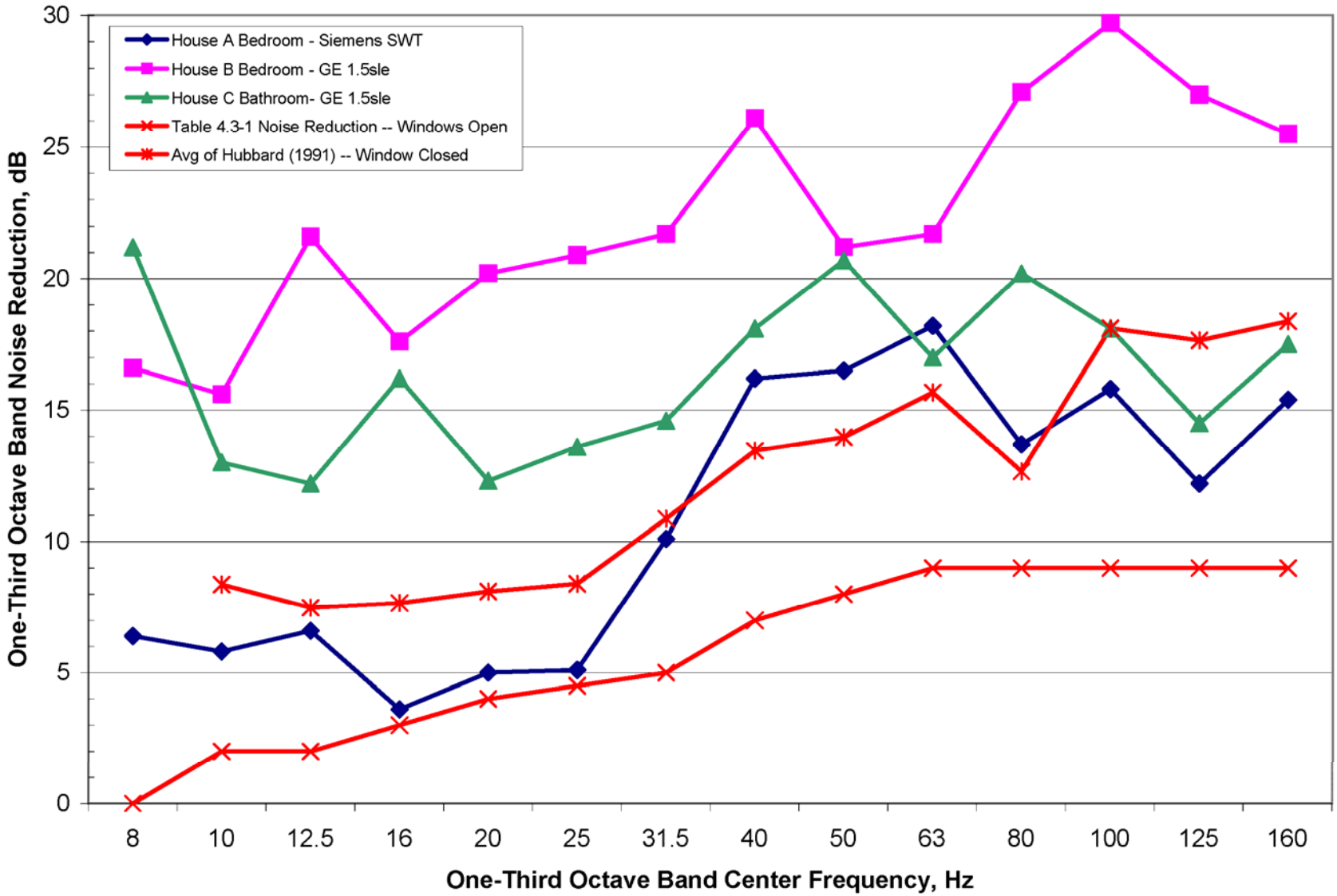
P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.2-6b GE 1.5 sle Wind Turbine Indoor Sound Levels at 1025 feet compared to ANSI 12.2 Criteria (Home "C")



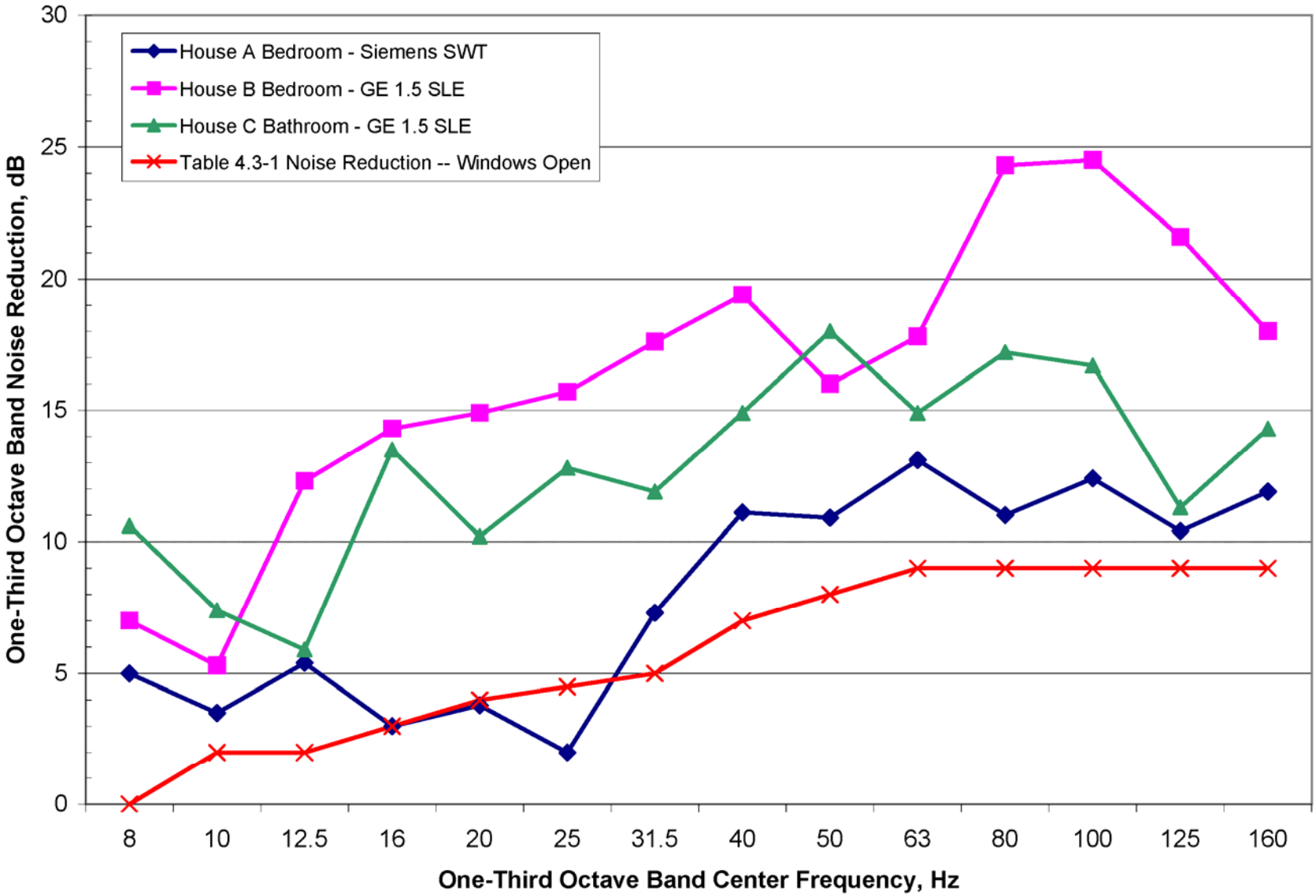
P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.3-1a One-Third Octave Band Interior Noise Reduction – Windows Closed



P.C. ATTACHMENT 13
P.C. April 26, 2010

Figure 8.3-1b One-Third Octave Band Interior Noise Reduction – Windows Open



9.0 CONCLUSION

Siemens SWT 2.93-93 and GE 1.5sle wind turbines at maximum noise at a distance more than 1000 feet from the nearest residence do not pose a low frequency noise or infrasound problem. At this distance the wind farms:

- meet ANSI/ASA S12.2 indoor levels for low frequency sound for bedrooms, classrooms and hospitals;
- meet ANSI/ASA S12.2 indoor levels for moderately perceptible vibrations in light-weight walls and ceilings;
- meet ANSI S12.9 Part 4 thresholds for annoyance and beginning of rattles;
- meet UK DEFRA disturbance based guidelines;
- have no audible infrasound to the most sensitive listeners;
- might have slightly audible low frequency noise at frequencies at 50 Hz and above depending on other sources of low frequency noises in homes, such as refrigerators or external traffic or airplanes; and
- meet ANSI S2.71 recommendations for perceptible vibration in residences during night time hours.

In accordance with the above findings, and in conjunction with our extensive literature search of scientific papers and reports, there should be no adverse public health effects from infrasound or low frequency noise at distances greater than 1000 feet from the wind turbine types measured by Epsilon: GE 1.5sle and Siemens SWT 2.3-93.

10.0 BIBLIOGRAPHY

AFSSET, French Agency for Environmental and Occupational Health Safety (AFSSET), "Impacts sanitaires du bruit généré par les éoliennes" (The health impacts of noise generated by wind turbines"), March 2008, available at http://www.afsset.fr/upload/bibliotheque/978899576914371931356311364123/bruit_eoliennes_vdef.pdf

ANSI S2.71-1983 (R2006), formerly ANSI S3.29-1983 American National Standard Guide to the Evaluation of Human Exposure to Vibration in Buildings, Acoustical Society of America, New York, 2006

ANSI/ASA S12.2-2008 American National Standard Criteria for Evaluating Room Noise, Acoustical Society of America, New York, 2008

ANSI S12.9-2005/Part 4 American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound – Part 4: Noise Assessment and Prediction of Long-term Community Response, Acoustical Society of America, 2005

ANSI/ASA S12.9-2007/Part 5 American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound – Part 5: Sound Level Descriptors for Determination of Compatible Land Use, Acoustical Society of America, 2007

Berglund, B. and Lindvall, T. "Community Noise", Center for Sensory Research, Stockholm, Sweden, 1995, prepared for the World Health Organization

BERR – UK Department for Business Enterprise and Regulatory Reform (BERR), "Government statement regarding the findings of the Salford University report into Aerodynamic Modulation of Wind Turbine Noise", 2007, http://www.berr.gov.uk/files/file40571.pdf

Branco, N. A. A. Castelo, and Alves-Pereira, M. "Vibroacoustic Disease", Noise & Health, v 6, issue 23, p 3-20, 2004

DEFRA, "Proposed criteria for the assessment of low frequency noise disturbance", University of Salford report, UK Department for Environment, Food, and Rural Affairs, DEFRA NANR45 Project Report, 2005.

DELTA, "Low Frequency Noise from Large Wind Turbines. Summary and Conclusions on Measurements and Methods", EFP-06 Project prepared for Danish Energy Authority, report AV 140/08, 2008

Eastern Research Group (ERG), "Expert Review of the Vieques Heart Study Summary Report for the Vieques Heart Study Expert Panel Review", prepared for The (U.S.) Agency for Toxic Substances and Disease Registry, Atlanta, Georgia, 2001, available at: http://www.atsdr.cdc.gov/news/viequesheartreport.html.

French National Academy of Medicine, "Le retentissement du fonctionnement des éoliennes sur la santé de l'homme" ("Repercussions of wind turbine operations on human health"), March 2006, available at http://ventdubocage.net/documentsoriginaux/sante/eoliennes.pdf.

Gastmeier, William, J., and Howe, Brian, "Recent Studies of Infrasound from Industrial Sources", Canadian Acoustics, v 36, No.3, 2008

Gueniot, Chantal, "Wind Turbines: The Academy Cautious", *Panorama du Médecin* , March 2006

Hayes McKenzie Partnership Ltd., "The Measurement of Low Frequency Noise at Three UK Wind Farms," UK Department of Trade and Industry (DTI) contract number: W/45/00656/00/00, 2006. http://www.berr.gov.uk/files/file31270.pdf

Hayes, Malcolm, "Low Frequency and Infrasound Noise Immission from Wind Farms and the potential for Vibro-Acoustic disease", presented at Wind Turbine Noise Conference, Lyon, France, 2007

Hayes, Malcolm, "Low Frequency and Infrasound Noise Immission from Wind Farms and the potential for Vibro-Acoustic disease", presented Wind Farm Noise: Armagh, 2008

Hodgdon, Kathleen K., Atchley, Anthony A., Bernhard, Robert J., "Low Frequency Noise Study", Final report, PARTNER Low Frequency Study Group, Report No. PARTNER-COE-2007-001, April 2007 (Revised August 2007), (Funded by U.S. FAA under Contract FAA 03-C-NE-PSU)

Howe, Brian, "Wind Turbines and Infrasound", prepared for the Canadian Wind Energy Association by Howe Gastmeier Chapnik Limited (HGC Engineering) (2006)

Hubbard, H.H., and Shepherd, K. P., "Aeroacoustics of large wind turbines", *Journal of the Acoustical Society of America*, 89 (6), June 1991

IEC 61400-11:2002, "Wind Turbines – Part 11: Acoustic noise measurement techniques", International Electrotechnical Commission, Geneva, Switzerland, 2002

IEC TS 61400-14:2005, "Wind Turbines – Part 14: Declaration of apparent sound power level and tonality values", International Electrotechnical Commission, Geneva, Switzerland, 2005

ISO 226:2003, "Acoustics - Normal equal-loudness-level contours", International Standards Organization, Geneva 2003

ISO 2631-2:2003, "Mechanical vibration and shock -- Evaluation of human exposure to whole-body vibration -- Part 2: Vibration in buildings (1 Hz to 80 Hz)", International Standards Organization, Geneva 2003

Leventhall, Geoff, "A Review of Published Research on Low Frequency Noise and its Effects", a report for DEFRA, May 2003.

Leventhall, Geoff, "Infrasound from Wind Turbines – Fact, Fiction or Deception", *Canadian Acoustics*, Vol 34, No. 2, 2006.

Moeller, H. and C. S. Pedersen. "Hearing at Low and Infrasonic Frequencies", *Noise & Health* 2004, v6 issue 23, 37- 57, 2004.

Snow D.J., 1997. Low frequency noise and vibrations measurements at a modern wind farm, ETSU W/13/00392/REP.

Styles, P., England, R., Stimpson, I., Toon, S., Bowers, D., Hayes, M. A Detailed Study Of The Propagation And Modelling Of The Effects Of Low Frequency Seismic Vibration And Infrasound From Wind Turbines. First International Meeting on Wind Turbine Noise: Perspectives for Control: Berlin 17-18 October 2005.

Watanabe, and Moeller, H., "Low Frequency Hearing Thresholds in Pressure Field and in Free Field", J. Low Frequency Noise and Vibration, v 9(3), p 106-115 1990

Sutherland, L. C., "Indoor Noise Environments Due to Outdoor Noise Sources", *Noise Control Engineering Journal*, v11, No. 3, p 124-137, 1978

World Health Organization (WHO), "Guidelines for Community Noise", edited by Birgitta Berglund, Thomas Lindvall, Dietrich H Schwela, Geneva, 1999

The Potential Health Impact of Wind Turbines

Chief Medical Officer of Health (CMOH) Report

May 2010

Summary of Review

This report was prepared by the Chief Medical Officer of Health (CMOH) of Ontario in response to public health concerns about wind turbines, particularly related to noise.

Assisted by a technical working group comprised of members from the Ontario Agency for Health Protection and Promotion (OAHPP), the Ministry of Health and Long-Term Care (MOHLTC) and several Medical Officers of Health in Ontario with the support of the Council of Ontario Medical Officers of Health (COMOH), this report presents a synopsis of existing scientific evidence on the potential health impact of noise generated by wind turbines.

The review concludes that while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying.

1 Introduction

In response to public health concerns about wind turbines, the CMOH conducted a review of existing scientific evidence on the potential health impact of wind turbines in collaboration and consultation with a technical working group composed of members from the OAHPP, MOHLTC and COMOH.

A literature search was conducted to identify papers and reports (from 1970 to date) on wind turbines and health from scientific bibliographic databases, grey literature, and from a structured Internet search. Databases searched include MEDLINE, PubMed, Environmental Engineering Abstracts, Environment Complete, INSPEC, Scholars Portal and Scopus. Information was also gathered through discussions with relevant government agencies, including the Ministry of the Environment and the Ministry of Energy and Infrastructure and with input provided by individuals and other organizations such as Wind Concerns Ontario.

In general, published papers in peer-reviewed scientific journals, and reviews by recognized health authorities such as the World Health Organization (WHO) carry more weight in the assessment of health risks than case studies and anecdotal reports.

The review and consultation with the Council of Ontario Medical Officers of Health focused on the following questions:

- What scientific evidence is available on the potential health impacts of wind turbines?
- What is the relationship between wind turbine noise and health?
- What is the relationship between low frequency sound, infrasound and health?
- How is exposure to wind turbine noise assessed?
- Are Ontario wind turbine setbacks protective from potential wind turbine health and safety hazards?
- What consultation process with the community is required before wind farms are constructed?
- Are there data gaps or research needs?

The following summarizes the findings of the review and consultation.

2 Wind Turbines and Health

2.1 Overview

A list of the materials reviewed is found in Appendix 1. It includes research studies, review articles, reports, presentations, and websites.

Technical terms used in this report are defined in a Glossary (Page 11).

The main research data available to date on wind turbines and health include:

- Four cross-sectional studies, published in scientific journals, which investigated the relationships between exposure to wind turbine noise and annoyance in large samples of people (351 to 1,948) living in Europe near wind turbines (see section 2.2).
- Published case studies of ten families with a total of 38 affected people living near wind turbines in several countries (Canada, UK, Ireland, Italy and USA) (Pierpont 2009). However, these cases are not found in scientific journals. A range of symptoms including dizziness, headaches, and sleep disturbance, were reported by these people. The researcher (Pierpont) suggested that the symptoms were related to wind turbine noise, particularly low frequency sounds and infrasound, but did not investigate the relationships between noise and symptoms. It should be noted that no conclusions on the health impact of wind turbines can be drawn from Pierpont's work due to methodological limitations including small sample size, lack of exposure data, lack of controls and selection bias.
- Research on the potential health and safety hazards of wind turbine shadow flicker, electromagnetic fields (EMFs), ice throw and ice shed, and structural hazards (see section 2.3).

A synthesis of the research available on the potential health impacts of exposure to noise and physical hazards from wind turbines on nearby residents is found in sections 2.2 and 2.3, including research on low frequency sound and infrasound. This is followed by information on wind turbine regulation in Ontario (section 3.0), and our conclusions (section 4.0).

2.2. Sound and Noise

Sound is characterized by its sound pressure level (loudness) and frequency (pitch), which are measured in standard units known as decibel (dB) and Hertz (Hz), respectively. The normal human ear perceives sounds at frequencies ranging from 20Hz to 20,000 Hz. Frequencies below 200 Hz are commonly referred to as "low frequency sound" and those below 20Hz as "infrasound," but the boundary between them is not rigid. There is variation between people in their ability to perceive sound. Although generally considered inaudible, infrasound at high-enough sound pressure levels can be audible to some people. Noise is defined as an unwanted sound (Rogers et al. 2006, Leventhall 2003).

Wind turbines generate sound through mechanical and aerodynamic routes. The sound level depends on various factors including design and wind speed. Current generation upwind model turbines are quieter than older downwind models. The dominant sound source from modern wind turbines is aerodynamic, produced by the rotation of the turbine blades through air. The aerodynamic noise is present at all frequencies, from infrasound to low frequency to the normal audible range, producing the characteristic "swishing" sound (Leventhall 2006, Colby et al. 2009).

Environmental sound pressure levels are most commonly measured using an A-weighted scale. This scale gives less weight to very low and very high frequency components that is similar to the way the human ear perceives sound. Sound levels around wind turbines are usually predicted by modelling, rather than assessed by actual measurements.

The impact of sound on health is directly related to its pressure level. High sound pressure levels (>75dB) could result in hearing impairment depending on the duration of exposure and sensitivity of the individual. Current requirements for wind turbine setbacks in Ontario are intended to limit noise at the nearest residence to 40 dB (see section 3). This is a sound level comparable to indoor background sound. This noise limit is consistent with the night-time noise guideline of 40 dB that the World Health Organization (WHO) Europe recommends for the protection of public health from community noise. According to the WHO, this guideline is below the level at which effects on sleep and health occurs. However, it is above the level at which complaints may occur (WHO 2009).

Available scientific data indicate that sound levels associated with wind turbines at common residential setbacks are not sufficient to damage hearing or to cause other direct adverse health effects, but some people may still find the sound annoying.

Studies in Sweden and the Netherlands (Pedersen et al. 2009, Pedersen and Waye 2008, Pedersen and Waye 2007, Pedersen and Waye 2004) have found direct relationships between modelled sound pressure level and self-reported perception of sound and annoyance. The association between sound pressure level and sound perception was stronger than that with annoyance. The sound was annoying only to a small percentage of the exposed people; approximately 4 to 10 per cent were very annoyed at sound levels between 35 and 45dBA. Annoyance was strongly correlated with individual perceptions of wind turbines. Negative attitudes, such as an aversion to the visual impact of wind turbines on the landscape, were associated with increased annoyance, while positive attitudes, such as direct economic benefit from wind turbines, were associated with decreased annoyance. Wind turbine noise was perceived as more annoying than transportation or industrial noise at comparable levels, possibly due to its swishing quality, changes throughout a 24 hour period, and lack of night-time abatement.

2.2.1 Low Frequency Sound, Infrasound and Vibration

Concerns have been raised about human exposure to “low frequency sound” and “infrasound” (see section 2.2 for definitions) from wind turbines. There is no scientific evidence, however, to indicate that low frequency sound generated from wind turbines causes adverse health effects.

Low frequency sound and infrasound are everywhere in the environment. They are emitted from natural sources (e.g., wind, rivers) and from artificial sources including road traffic, aircraft, and ventilation systems. The most common source of infrasound is vehicles. Under many conditions, low frequency sound below 40Hz from wind turbines cannot be distinguished from environmental background noise from the wind itself (Leventhall 2006, Colby et al 2009).

Low frequency sound from environmental sources can produce annoyance in sensitive people, and infrasound at high sound pressure levels, above the threshold for human hearing, can cause severe ear pain. There is no evidence of adverse health effects from infrasound below the sound pressure level of 90dB (Leventhall 2003 and 2006).

Studies conducted to assess wind turbine noise indicate that infrasound and low frequency sounds from modern wind turbines are well below the level where known health effects occur, typically at 50 to 70dB.

A small increase in sound level at low frequency can result in a large increase in perceived loudness. This may be difficult to ignore, even at relatively low sound pressures, increasing the potential for annoyance (Jakobsen 2005, Leventhall 2006).

A Portuguese research group (Alves-Pereira and Castelo Branco 2007) has proposed that excessive long-term exposure to vibration from high levels of low frequency sound and infrasound can cause whole body system pathology (vibro-acoustic disease). This finding has not been recognized by the international medical and scientific community. This research group also hypothesized that a family living near wind turbines will develop vibro-acoustic disease from exposure to low frequency sound, but has not provided evidence to support this (Alves-Pereira and Castelo Branco 2007).

2.2.2 Sound Exposure Assessment

Little information is available on actual measurements of sound levels generated from wind turbines and other environmental sources. Since there is no widely accepted protocol for the measurement of noise from wind turbines, current regulatory requirements are based on modelling (see section 3.0).

2.3 Other Potential Health Hazards of Wind Turbines

The potential health impacts of electromagnetic fields (EMFs), shadow flicker, ice throw and ice shed, and structural hazards of wind turbines have been reviewed in two reports (Chatham-Kent Public Health Unit 2008; Rideout et al 2010). The following summarizes the findings from these reviews.

- **EMFs**
  Wind turbines are not considered a significant source of EMF exposure since emissions levels around wind farms are low.

- **Shadow Flicker**
  Shadow flicker occurs when the blades of a turbine rotate in sunny conditions, casting moving shadows on the ground that result in alternating changes in light intensity appearing to flick on and off. About 3 per cent of people with epilepsy are photosensitive, generally to flicker frequencies between 5-30Hz. Most industrial turbines rotate at a speed below these flicker frequencies.

- **Ice Throw and Ice Shed**
  Depending on weather conditions, ice may form on wind turbines and may be thrown or break loose and fall to the ground. Ice throw launched far from the turbine may pose a significant hazard. Ice that sheds from stationary components presents a potential risk to service personnel near the wind farm. Sizable ice fragments have been reported to be found within 100 metres of the wind turbine. Turbines can be stopped during icy conditions to minimize the risk.

- **Structural hazards**
  The maximum reported throw distance in documented turbine blade failure is 150 metres for an entire blade, and 500 metres for a blade fragment. Risks of turbine blade failure reported in a Dutch handbook range from one in 2,400 to one in 20,000 turbines per year (Braam et al 2005). Injuries and fatalities associated with wind turbines have been reported, mostly during construction and maintenance related activities.

3 Wind Turbine Regulation in Ontario

The Ministry of the Environment regulates wind turbines in Ontario. A new regulation for renewable energy projects came into effect on September 24, 2009. The requirements include minimum setbacks and community consultations.

3.1 Setbacks

Provincial setbacks were established to protect Ontarians from potential health and safety hazards of wind turbines including noise and structural hazards.

The minimum setback for a wind turbine is 550 metres from a receptor. The setbacks rise with the number of turbines and the sound level rating of the selected turbines. For example, a wind project with five turbines, each with a sound power level of 107dB, must have its turbines setback at a minimum 950 metres from the nearest receptor.

These setbacks are based on modelling of sound produced by wind turbines and are intended to limit sound at the nearest residence to no more than 40 dB. This limit is consistent with limits used to control noise from other environmental sources. It is also consistent with the night-time noise guideline of 40 dB that the World Health Organization (WHO) Europe recommends for the protection of public health from community noise. According to the WHO, this guideline is below the level at which effects on sleep and health occurs. However, it is above the level at which complaints may occur (WHO 2009).

Ontario used the most conservative sound modelling available nationally and internationally, which is supported by experiences in the province and in other jurisdictions (MOE 2009). As yet, a measurement protocol to verify compliance with the modelled limits in the field has not been developed. The Ministry of the Environment has recently hired independent consultants to develop a procedure for measuring audible sound from wind turbines and also to review low frequency sound impacts from wind turbines, and to develop recommendations regarding low frequency sound.

Ontario setback distances for wind turbine noise control also take into account potential risk of injury from ice throw and structural failure of wind turbines. The risk of injury is minimized with setbacks of 200 to 500 metres.

3.2 Community Consultation

The Ministry of the Environment requires applicants for wind turbine projects to provide written notice to all assessed land owners within 120 metres of the project location at a preliminary stage of the project planning. Applicants must also post a notice on at least two separate days in a local newspaper. As well, applicants are required to notify local municipalities and any Aboriginal community that may have a constitutionally protected right or interest that could be impacted by the project.

Before submitting an application to the Ministry of the Environment, the applicant is also required to hold a minimum of two community consultation meetings to discuss the project and its potential local impact. To ensure informed consultation, any required studies must be made available for public review 60 days prior to the date of the final community meeting. Following these meetings the applicant is required to submit as part of their application a Consultation Report that describes the comments received and how these comments were considered in the proposal.

The applicant must also consult directly with local municipalities prior to applying for a Renewable Energy Approval on specific matters related to municipal lands, infrastructure, and services. The Ministry of the Environment has developed a template, which the applicant is required to use to document project-specific matters raised by the municipality. This must be submitted to the ministry as part of the application. The focus of this consultation is to ensure important local service and infrastructure concerns are considered in the project.

For small wind projects (under 50 kW) the public meeting requirements above are not applicable due to their limited potential impacts.

4 Conclusions

The following are the main conclusions of the review and consultation on the health impacts of wind turbines:

- While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects.
- The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct adverse health effects. However, some people might find it annoying. It has been suggested that annoyance may be a reaction to the characteristic "swishing" or fluctuating nature of wind turbine sound rather than to the intensity of sound.
- Low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects.
- Community engagement at the outset of planning for wind turbines is important and may alleviate health concerns about wind farms.
- Concerns about fairness and equity may also influence attitudes towards wind farms and allegations about effects on health. These factors deserve greater attention in future developments.

The review also identified that sound measurements at residential areas around wind turbines and comparisons with sound levels around other rural and urban areas, to assess actual ambient noise levels prevalent in Ontario, is a key data gap that could be addressed. An assessment of noise levels around wind power developments and other residential environments, including monitoring for sound level compliance, is an important prerequisite to making an informed decision on whether epidemiological studies looking at health outcomes will be useful.

Glossary

A-weighted decibels (dBA)
The sound pressure level in decibels as measured on a sound level meter using an A-weighted filter. The A-weighted filter de-emphasizes the very low and very high frequencies of the sound in a manner similar to the frequency response of the human ear.

Decibel (dB)
Unit of measurement of the loudness (intensity) of sound. Loudness of normal adult human voice is about 60-70 dB at three feet. The decibel scale is a logarithmic scale and it increases/decreases by a factor of 10 from one scale increment to the next adjacent one.

Downwind model turbines
Downwind model turbines have the blades of the rotor located behind the supporting tower structure, facing away from the wind. The supporting tower structure blocks some of the wind that blows towards the blades.

Electromagnetic fields (EMFs)
Electromagnetic fields are a combination of invisible electric and magnetic fields. They occur both naturally (light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF.

Grey literature
Information produced by all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishing, i.e., where publishing is not the primary activity of the producing body.

Hertz (Hz)
A unit of measurement of frequency; the number of cycles per second of a periodic waveform.

Infrasound
Commonly refers to sound at frequencies below 20Hz. Although generally considered inaudible, infrasound at high-enough sound pressure levels can be audible to some people.

Low frequency sound
Commonly refers to sound at frequencies between 20 and 200 Hz.

Noise
Noise is an unwanted sound.

Shadow Flicker
Shadow flicker is a result of the sun casting intermittent shadows from the rotating blades of a wind turbine onto a sensitive receptor such as a window in a building. The flicker is due to alternating light intensity between the direct beam of sunlight and the shadow from the turbine blades.

Sound
Sound is wave-like variations in air pressure that occur at frequencies that can be audible. It is characterized by its loudness (sound pressure level) and pitch (frequency), which are measured in standard units known as decibel (dB) and Hertz (Hz), respectively. The normal human ear perceives sounds at frequencies ranging from 20Hz to 20,000 Hz.

Upwind model turbines
Upwind model turbines have the blades of the rotor located in front of the supporting tower structure, similar to how a propeller is at the front of an airplane. Upwind turbines are a modern design and are quieter than the older downwind models.

Wind turbine
Wind turbines are large towers with rotating blades that use wind to generate electricity.

Appendix 1: List of Documents on Wind Turbines

Journal Articles and Books

Braam HGJ, et al. Handboek risicozonering windturbines. Netherlands: SenterNovem; 2005.

Jakobsen J. Infrasound emission from wind turbines. *J Low Freq Noise Vib Active Contr*. 2005;24(3):145-155.

Keith SE, Michaud DS, Bly SHP. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. *J Low Freq Noise Vib Active Control*. 2008;27(4):253-265.

Leventhall G. Infrasound from wind turbines: fact, fiction or deception. *Can Acoust*. 2006;34(2):29-36.

Pedersen E, Hallberg LR-M, Waye KP. Living in the vicinity of wind turbines: a grounded theory study. *Qual Res Psychol*. 2007;4(1-2):49-63.

Pedersen E, Larsman P. The impact of visual factors on noise annoyance among people living in the vicinity of wind turbines. *J Environ Psychol*. 2008;28(4):379-389.

Pedersen E, Persson Waye K. Wind turbines: low level noise sources interfering with restoration? *Environ Res Lett*. 2008;3:015002. Available from: http://www.iop.org/EJ/article/1748-9326/3/1/015002/erl8_1_015002.pdf.

Pedersen E, Persson Waye K. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. *Occup Environ Med*. 2007;64(7):480-6.

Pedersen E, van den Berg F, Bakker R, Bouma J. Response to noise from modern wind farms in The Netherlands. *J Acoust Soc Am*. 2009;126(2):634-43.

Pedersen E, Waye KP. Perception and annoyance due to wind turbine noise – a dose-response relationship. *J Acoust Soc Am*. 2004;116(6):3460-70.

van den Berg GP. Effects of the wind profile at night on wind turbine sound. *J Sound Vib*. 2004;277(4-5):955-970. Available from: http://www.nowap.co.uk/docs/windnoise.pdf.

Grey Literature

Chatham-Kent Public Health Unit. The health impact of wind turbines: a review of the current white, grey, and published literature. Chatham, ON: Chatham-Kent Municipal Council; 2008 [cited 2010 Mar 5]. Available from: http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf.

Colby WD, Dobie R, Leventhall G, Lipscomb DM, McCunney RJ, Seilo MT, et al. Wind turbine sound and health effects. An expert panel review: American Wind Energy Association & Canadian Wind Energy Association; 2009 [cited 2009 Dec 21]. Available from: http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf.

Rideout K, Copes R, Bos C. Wind turbines and health. Vancouver: National Collaborating Centre for Environmental Health; 2010 Jan [cited 2010 Mar 5]. Available from: http://www.ncceh.ca/files/Wind_Turbines_January_2010.pdf.

Wind turbines and Health: a review of evidence. Toronto: Ontario Agency for Health Protection and Promotion; 2009 [cited 2010 Mar 5]. Available from: http://www.oahpp.ca/resources/documents/presentations/2009sept10/Wind%20Turbines%20-%20Sept%2010%202009.pdf.

Environmental Protection Agency, Office of Water. Auxiliary and supplemental power fact sheet: wind turbines. Washington, DC: Environmental Protection Agency; 2007 [cited 2010 Jan 7]. Available from http://www.epa.gov/owm/mtb/wind_final.pdf.

Leventhall G, Pelmear P, Benton S. A review of published research on low frequency noise and its effects. London, England: Department for Environment, Food and Rural Affairs; 2003 [cited 2010 Mar 5]. Contract No.: EPG 1/2/50. Available from: http://www.defra.gov.uk/environment/quality/noise/research/lowfrequency/documents/lowfreqnoise.pdf.

Minnesota Department of Health, Environmental Health Division. Public health impacts of wind turbines.

Saint Paul, MN: Minnesota Department of Commerce, Office of Energy Security; 2009 [cited 2010 Mar 5]. Available from: http://energyfacilities.puc.state.mn.us/documents/Public%20Health%20Impacts%20of%20Wind%20Turbines,%205.22.09%20Revised.pdf.

National Research Council, Committee on Environmental Impacts of Wind-Energy Projects. Environmental impacts of wind-energy projects. Washington, DC: National Academies Press; 2007.

Ontario. Ministry of the Environment. Frequently asked questions: renewable energy approval. Toronto: Queen's Printer for Ontario; 2009. Available from: http://www.ene.gov.on.ca/en/business/green-energy/docs/FAQs%20-final.pdf.

Ontario. Ministry of the Environment. Noise guidelines for wind farms: interpretation for applying MOE NPC publications to wind power generation facilities. Toronto: Queen's Printer for Ontario; 2008 [cited 2010 Mar 5]. Available from: http://www.ene.gov.on.ca/publications/4709e.pdf.

Ontario. Ministry of the Environment. Development of noise setbacks for wind farms: requirements for compliance with MOE noise limits. Toronto, ON: Queen's Printer for Ontario; 2009. Available from http://www.ene.gov.on.ca/en/business/green-energy/docs/WindNoiseSetbacks.pdf.

Pedersen E. Human response to wind turbine noise: perception, annoyance and moderating factors. Göteborg, Sweden: Göteborgs Universitet, Sahlgrenska Acedemy, Department of Public Health and Community Medicine; 2007 [cited 2010 Mar 5]. Available from: http://gupea.ub.gu.se/dspace/bitstream/2077/4431/1/gupea_2077_4431_1.pdf.

Pierpont N. Wind turbine syndrome: a report on a natural experiment [pre-publication draft]. Santa Fe, NM: K-Selected Books; 2009 [cited 2010 Mar 5]. Available from: http://www.windturbinesyndrome.com/wp-content/uploads/2009/03/ms-ready-for-posting-on-wtscom-3-7-09.pdf.

Ramakrishnan R (Aiolos Engineering Corporation). Wind turbine facilities noise issues. Toronto: Queen's Printer for Ontario; 2007 [cited 2010 Mar 5]. Report No.: 4071/2180/AR155Rev3. Available from: https://ozone.scholarsportal.info/bitstream/1873/13073/1/283287.pdf.

Rogers AL, Manwell JF, Wright S. Wind turbine acoustic noise: a white paper. Amherst, MA: University of Massachusetts at Amherst, Department of Mechanical and Industrial Engineering, Renewable Energy Research Laboratory; 2006 [cited 2010 Mar 5]. Available from: http://www.ceere.org/rerl/publications/whitepapers/Wind_Turbine_Acoustic_Noise_Rev2006.pdf.

van den Berg F, Pedersen E, Bouma J, Bakker R. Project WINDFARMperception: visual and acoustic impact of wind turbine farms on residents: final report. Groningen, Netherlands: University of Groningen; 2008 [cited 2010 Mar 5]. Published jointly by the University of Groningen and the University of Gothenburg. Available from: http://www.wind-watch.org/documents/wp-content/uploads/wfp-final-1.pdf.

Whitford J. Model wind turbine by-laws and best practices for Nova Scotia municipalities: final report. Halifax, NS: Union of Nova Scotia Municipalities; 2008 [cited 2009 Apr 21]. Contract No.: 1031581. Available from: http://www.sustainability-unsm.ca/our-work.html.

World Health Organization

World Health Organization, Regional Office for Europe. Night noise guidelines for Europe. Geneva, Switzerland: World Health Organization; 2009 [cited 2010 Mar 5]. Available from: http://www.euro.who.int/document/e92845.pdf.

World Health Organization. Occupational and community noise. Fact sheet no. 258. Geneva, Switzerland: World Health Organization; 2001 [cited 2010 Mar 5]. Available from: http://www.who.int/mediacentre/factsheets/fs258/en/.

Community Concerns about Health Effects of Wind Turbines

Archives and Collections Society. Some health aspects of wind driven industrial turbines. Picton, ON: Archives and Collections Society; c2003-2004 [cited 2010 Mar 5]. Available from: http://www.aandc.org/research/wind_community_health.html.

Gillis L, Krogh C, Kouwen N. A self-reporting survey: adverse health effects with industrial wind turbines and the need for vigilance. London, ON: WindVOiCe: Wind Vigilance for Ontario Communities; 2009. Available from: http://windconcernsontario.files.wordpress.com/2009/04/windvoice__sept__24__20091.pdf.

McMurtry R. Deputation to the Ontario Standing Committee on General Government regarding Bill C-150. Scarborough, ON: Wind Concerns; 2009 Apr 22 [cited 2010 Mar 5]. Available from: http://windconcernsontario.files.wordpress.com/2009/04/deputation-to-standing-committee-mcmurtry.pdf

National Wind Watch: presenting the facts about industrial wind power. Rowe, MA: National Wind Watch; [cited 2010 Mar 5]. Available from: http://www.wind-watch.org/.

Wind Concerns Ontario: bringing sanity to wind development in Ontario. Scarborough, ON: Wind Concerns; [cited 2010 Mar 5]. Available from: http://windconcernsontario.wordpress.com/.

Conference Papers

Alves-Pereira M, Castelo Branco NAA. Infrasound and low frequency noise dose responses: contributions. In: Proceedings of the Inter-Noise Congress; 2007 Aug 28-31; Istanbul, Turkey.

Alves-Pereira M, Castelo Branco NAA. In-home wind turbine noise is conductive to vibroacoustic disease. In: Proceedings of the 2nd International Meeting on Wind Turbine Noise. 2007 Sep 20-21; Lyon, France.

Alves-Pereira M, Castelo Branco NAA. Public health and noise exposure: the importance of low frequency noise. In: Proceedings of the Inter-Noise Congress; 2007 Aug 28-31; Istanbul, Turkey.

Alves-Pereira M, Castelo Branco NAA. The scientific arguments against vibroacoustic disease. In: Proceedings of the Inter-Noise Congress. Istanbul; 2007 Aug 28-31; Istanbul, Turkey.

van den Berg GP. Do wind turbines produce significant low frequency sound levels? In: Proceedings of the 11th International Meeting on Low Frequency Noise and Vibration and its Control. 2004 Aug 30-Sep 1; Maastricht, Netherlands.

Catalogue No. 014894 ISBN: 978-1-4435-3288-4 500 May 2010 © 2010 Queen's Printer for Ontario

PSC REF#:121871

Public Service Commission of Wisconsin
RECEIVED: 10/20/09, 11:48:25 AM

BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application for a Certificate of Public Convenience and Necessity to Construct And Place in Service a Wind Turbine Electric Generation Facility Known as Glacier Hills Wind Park in Columbia County, Wisconsin	)))))	Docket No. 6630-CE-302

REBUTTAL TESTIMONY OF DR. MARK ROBERTS
ON BEHALF OF WISCONSIN ELECTRIC POWER COMPANY

Q. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is Dr. Mark Roberts. and I am employed by Exponent, Inc. located at 185 Hansen Court, Suite 100, Wood Dale, Illinois.

Q. WHAT ARE YOUR CREDENTIALS AND TRAINING?

A. I am a Principal Scientist and Director of the Center for Occupational and Environmental Health in the Chicago office of Exponent, a scientific research and consulting company headquartered in Menlo Park, California. I have worked at Exponent since November, 2003. Prior to working at Exponent, I held a series of positions with advancing responsibility in the areas of public health, occupational medicine, and academia. I was employed at the Oklahoma State Department of Health from 1972 to 1990 and held a series of positions culminating in my appointment as the State Epidemiologist, a post that I held from 1979 to 1982 followed by the position of Consulting Medical/Environmental Epidemiologist from 1983 to 1990. In both of these capacities, I directed epidemiologic investigations of a broad range of health concerns, from food-borne outbreaks to cancer clusters. I was a faculty member of the Department of Preventive Medicine at the Medical College of Wisconsin from 1990 to 1997, and I completed my tenure as Associate Professor and Acting Chairman of the Department. I have also served as Corporate Medical Director for several global companies. While on faculty at the Medical College of Wisconsin in Milwaukee, Wisconsin, I was part-time Medical

Director for Wisconsin Centrifugal, a foundry in Waukesha, Wisconsin. In this role, I supervised the health monitoring programs, both company-mandated and OSHA-required, in addition to the day-to-day clinical aspects of the employee health service. My responsibilities included biological surveillance of employee population as well as worksite reviews and inspections.

I earned a Master's degree in Education in 1972, an M.P.H. in Epidemiology and Biostatistics in 1974, and a Ph.D. in Epidemiology and Biostatistics in 1979. I completed medical school in 1986, an internship in Family Medicine in 1987, and a residency/fellowship in Occupational and Environmental Medicine in 1990. I am a Fellow of the American College of Occupational and Environmental Medicine. I have unrestricted licenses to practice medicine in Oklahoma, Wisconsin, and Illinois. In addition to my employment experience, I am a past member (2000–2007) and current member (2008–2011) of the Board of Directors for the American College of Occupational and Environmental Medicine in Arlington Heights, Illinois. I have been a member of the Board of Directors of Vysis, Inc. in Downers Grove, Illinois and the Board of Scientific Counselors for the Agency for Toxic Substances and Disease Registry in Atlanta, Georgia. In addition, I have served as an active participant on numerous state and national professional committees. My Curriculum Vitae is submitted as Exhibit 26.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony responds to that submitted by Richard James on behalf of CWESt. Mr. James relies heavily on assertions of negative health effects due to wind turbines advocated by Dr. Nina Pierpont and others. The focus of my testimony is fourfold: (i) to give an overview of public health and epidemiology principles implicated by an inquiry into the health effects of wind turbines; (ii) to review the health claims that Dr. Pierpont attributes to wind turbines, and to evaluate the methodology and scientific process that she utilizes in her analysis; (iii) to address the scientific process and compare and contrast what Dr. Pierpont has described as her process of coming to the conclusions that she is proposing; and (iv) to assess other health claims that have been made in light of what the peer-reviewed, published literature tells us about exposure to sound.

Q. WHAT ARE THE OPINIONS THAT YOU WILL BE GIVING IN THIS CASE?

A. My opinions can be summarized as follows:

1. "Wind Turbine Syndrome" is not a medical diagnosis supported by peer reviewed, published, scientific literature;

2. The materials presented to support "Wind Turbine Syndrome" are not of sufficient scientific quality nor have they received the rigorous scientific review and vetting that is customarily part of the peer review and publishing process;

3. The tried and true scientific method of developing a hypothesis, testing that hypothesis, publishing the results and having others attempt to repeat the research has not been done to test the existence of a health condition called "Wind Turbine Syndrome;"

4. An accumulation of anecdotal interviews with self-selected persons living near a wind turbine does not constitute an epidemiological study and is not sufficient to determine causation;

5. The bases for claimed adverse health effects due to wind turbines cited by Mr. James either cannot withstand scientific scrutiny or have nothing to do with wind turbines; and

6. Siting a wind turbine within view of a residence and the operation of that turbine could be a source of annoyance to those living in the residence.

Q. WHAT IS THE PRACTICE OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE?

A. Occupational and Environmental Medicine is a medical subspecialty that is recognized by the American Board of Medical Specialties and is one of the population-based specialties of Preventive Medicine. Specialists in this area are physicians with advanced training in preventative medical care of populations. Occupational and Environmental Medicine focuses on workplace/health interactions, including workplace-related illnesses and injuries, and workplace effects on non-work-related conditions. Occupational and Environmental Medicine physicians are also trained to assess the possible causes of a worker's health condition. This specialty draws heavily on the key tenets of epidemiology, biostatistics, industrial hygiene, risk assessment, and toxicology. I relied extensively on my training in this field to reach my conclusions in this matter.

Q. WHAT IS EPIDEMIOLOGY?

A. Epidemiology is the study of distribution and dynamics of factors in populations. The practice of medicine, in contrast, is devoted to preventing, alleviating or treating diseases and injuries in individuals. Both play a valuable role, but each is a tool to be used in its own sphere. Concerned with disease in populations, epidemiology does not establish the cause of an individual's disease. This question, sometimes referred to as specific causation, is beyond the domain of the science of epidemiology. Epidemiology is a statistical science, used to identify associations between risk factors and illnesses of populations, rather than actual causes of illness in individuals. By its very nature, epidemiology focuses not on the symptoms, signs, diagnosis, etiology, treatment, or prognosis of individuals, but, rather, upon symptoms, incidence, prevalence, distribution, and risk factors for disease in whole groups. To examine such issues, it is necessary for the epidemiologist to achieve an understanding of the many variables that can affect the health of human communities, but it is not necessary, nor appropriate, to attempt to diagnose individuals. Epidemiology addresses whether an agent can be linked to a cluster of cases, but not whether an agent caused a specific individual's disease. So while epidemiologists cannot diagnose individuals, they can establish the defining characteristics of clusters of illnesses, such as the point in time at which a given pathogen from a specific source began to cause problems and when it stopped.

Epidemiology is considered the cornerstone methodology in all of public health research, and is highly regarded in evidence-based medicine for identifying risk factors for disease and determining optimal treatment approaches to clinical practice. Epidemiology is the scientific study of factors affecting the health and illness populations, and, in this capacity, it serves as the foundation and logic of interventions made in the interest of the public's health and preventive medicine.

Epidemiological studies are generally categorized as descriptive, analytic (aiming to examine associations, commonly hypothesized causal relationships), and experimental (a term often equated with clinical or community trials of treatments and other

interventions). Case reports and case series are not epidemiological studies because they have no comparison group.

These principles are addressed in more depth in my white paper, which is attached as Exhibit 27.

Q. WHY IS IT IMPORTANT THAT SCIENTIFIC RESEARCH BE PUBLISHED IN PEER REVIEWED SCIENTIFIC JOURNALS?

A. These are accepted methods used in the scientific world to evaluate research. The act of submitting an article for publication has in the past meant that there was a rigorous process of review and analysis to assess its scientific merit, its contribution to the scientific body of knowledge in the specific area and was pertinent to the area covered by the journal. Publication has taken on a much broader scope today with the advent of the internet. It is now possible to "publish" views, opinions and hypotheses without the rigor of critical review. The growth of research and the number of researchers has increased the competition for publication space in journals worldwide. Today, manuscripts get reviewed at the journal editor level and those that are judged worthy of consideration (25%) are sent to the peer review panel members and roughly 10% of those get accepted for inclusion in a journal. So the peer review, publication process carefully scrutinizes the major aspects of the manuscript down to checking the numbers in the tables.

Q. WHY IS THAT IMPORTANT?

A. This is a process that has evolved over time to ensure quality of scientific articles and that the journals are contributing to the professional society of the journal's readership. This review process is imperfect but it has evolved into a system that strives to safeguard science while educating its readers. There have been "journals" that have started with commercial or special interest goals and the internet has seen this route of getting opinions and hypothesis out into public view but the scientific rigorous review is not guaranteed in these publication routes.

Q. DOES DR. PIERPONT'S BOOK RISE TO THE LEVEL OF "PEER REVIEWED, PUBLISHED" LITERATURE?

A. No. I have only read a pre-release copy of her book but the publisher's website http://www.windturbinesyndrome.com/ gives some additional insight as to her research and she has given testimony, news interviews and written reports that indicate her methodology and process. My assessment is that the material describing the phenomena does not appear to have been peer reviewed in a critical, blinded fashion in the same manner as the articles published in the leading medical journals. In addition, some of the references that I have seen cited are newspaper articles, TV interviews and addresses before legislative bodies. Those are not traditional formats to present scientific data. It shortcuts the review process that is part of the scientific process of discovery.

Q. WHAT IS THE "SCIENTIFIC METHODOLOGY?"

A. For an idea or an observation to be assimilated into the science knowledge base, it must first come to someone's attention. That can be an astute observation or a series of events that catches the attention of a science minded individual (a researcher). The individual weights the observation against what they know and makes a decision to pursue the observation further. In previous times, the next step was the preparation of a case report or a report of a case series and to submit it to a peer-reviewed journal. This was a way of alerting others about the observations and checking to see if they had made the same observation or if they had additional insight. An alternative is to present the case report or case series at a professional meeting. Both methods are an attempt to do a "reality check" on the observation.

Today, case reports or case series are seldom if ever accepted for publication by the leading science journals. Instead, the next step is to do a scientifically based study, an epidemiological study that allows the researcher to make comparisons between those with and those without the condition or effect in order to determine if an association is apparent in order to determine whether those who are "exposed" are more likely to manifest the health condition than the "non-exposed" or the "expected number." A good example of this is the investigation of a foodborne outbreak where epidemiologists compare the rate of occurrence of illness in those persons who ate the suspect food item to the rate of symptoms among those who did not eat the suspect food item. The key to

this step in the scientific method is that there is a comparison group. That is not present in a case report or a series, where the researcher is making a guess or speculating but cannot make a statement about the risk. In an epidemiological study, a method of comparison is included that will allow the researcher to evaluate the strength of the association.

One epidemiological study does not prove causation. The researcher that publishes the first study is the one that alerts his or her peers and hopefully stimulates them to do more research to explore the association. Thus the scientific knowledge base is strengthened by the collective work of different researchers, using different epidemiological methods, in different study populations combining their research. This body of research around the original observation is then evaluated to see if there is sufficient scientific information to support that a cause for the condition has been identified and is scientifically justifiable. The criteria presented by Sir Bradford Hill are most often referred to as the guidance used to go from a claim of association to one of causation.

Q. WOULD YOU CONSIDER THIS HEARING PROCESS A PART OF THE "SCIENTIFIC METHODOLOGY?"

A. No, in many ways I see the legal process represented here as having the potential to hinder or shortchange science. The tradition of science is that a researcher makes an observation. Say X is often seen in association with Y. They tell his or her peers, their fellow researchers, about their hypothesis through letters to the editor of a journal, a case report, a newsletter or maybe a presentation at a scientific meeting. The original researcher usually rushes to get a more thorough evaluation of the hypothesis so that they can "claim" the hypothesis but the critical point is that the peers do independent research to evaluate the hypothesis and they too submit their research results for publication. Getting something published in a credible journal can take time and effort. The key being that the research is independently reviewed by others in the field. This is an important step and usually insures a critical evaluation of the assumptions and data that form the basis of the research.

This hearing process will determine whether, and on what terms, Wisconsin Electric will be allowed to erect wind turbines. In this process, information from a variety of sources is presented. This evaluation process does not have the rigor of the scientific methodology whereby researchers debate, evaluate and study health issues. As a judge once pointed out when I indicated it often takes decades to answer a health research question, "we don't have that much time in the hearing process." That judicial time line often forces observations into the hearing process that have not been properly vetted in the scientific community and are often not confirmed in additional research.

Q. ARE YOU SAYING THAT DR. PIERPONT'S HYPOTHESIS IS INCORRECT?

A. Dr. Pierpont's research does not meet the standard set forth above. In addition, Dr. Pierpont presents her case series information as though it was an epidemiological study with an appropriate comparison group. This is not correct. She takes her observations and attempts to justify her hypothesis by bridging to a number of clinical concepts through some rather tenuous process in order to achieve some sort of medical basis for her opinion. I have found no clear evidence that her hypothesis has been adequately tested scientifically nor has it been thoroughly researched in a critical and unbiased fashion nor published in a peer reviewed, scientific publication. I have found that several of the references that she has cited in support of her hypothesis concerning low frequency noise and infrasound have been misquoted or applied in a manner not consistent with the hypothesis of the paper she was referencing.

Q. IS THAT JUST ANOTHER WAY OF SAYING DR. PIERPONT IS WRONG?

A. I do not feel that her hypothesis has been tested and therefore it can not be accepted as true and be used to determine that "Wind Turbine Syndrome" even exists. I believe it is more accurate to classify her statements as opinions that are unsubstantiated in the peer reviewed, published, scientific literature. Everyone has opinions. The key to the evaluation of those opinions is to look behind them to the assumptions being made and the scientifically based information that forms the foundation of the opinion. In legal terms one must find general causation, that is there must be a body of scientific literature that indicates that the exposure causes the condition before one can move to the

assumption of specific causation. A treating physician may in the course of treating a patient disregard the scientific literature and base their treatment on experience, beliefs or intuition but there is a major effort to apply "evidence based medicine" in the practice of medicine which includes rendering opinions regarding diagnosis of conditions and rendering opinions regarding causation. The evidence found in the peer reviewed, published literature does not support Dr. Pierpont's hypothesis that there is a health condition called "Wind Turbine Syndrome" caused by infrasound or low frequency sound.

Q. HOW IS THE "CAUSE" OF A MEDICAL CONDITION DETERMINED?

A. Even though a doctor describes a set of reported symptoms as a "syndrome," that statement must be researched before it is accepted in the medical community. Surprisingly, the confirmation of the "cause" of a set of symptoms is not always the primary goal of a physician but rather symptom relief and the prevention of the worsening of the condition and or transmission of the condition to another person is the center point of the treating physician's effort. The best example is the recommendation by the health department to not test every person with flu-like symptoms to confirm that they are suffering from H1N1 influenza infection. Determination of the cause of a medical condition is comparable to solving a medical mystery and the "clues" of the medical mystery are lab test results and the matching of symptoms with known medical conditions.

Q. HOW ARE "EPIDEMIOLOGICAL METHODS" USED TO DETERMINE CAUSATION?

A. Epidemiology is basically the methodology used to characterize a health condition among a group of people. Epidemiological research starts with a scientific hypothesis which is then investigated and the information is critically reviewed, and circulated among interested parties (other researchers and clinicians). The totality of this research then forms the material to answer the question of "Is there an association between exposure and the health condition." Association is not the same as causation. Two things can be associated but one does not necessarily cause the other. Determination of causation is a

higher level of data assessment and requires transparent analysis of the data to determine if the association is actually causal. Not all associations turn out to be causal. If the data is not carefully reviewed, a causal relationship may be erroneously assigned to the relationship.

Q. MR. JAMES ALSO CITES OTHER HYPOTHESES IN SUPPORT OF HIS CONCLUSION THAT INFRASOUND AND LOW FREQUENCY NOISE FROM WIND TURBINES CAUSE ADVERSE HEALTH EFFECTS. ARE YOU CONVINCED?

A. No. An underlying theme in the evaluation of wind turbine health claims made in Mr. James's report, testimony and literature references center on new unproven health theories or new diseases that have not been accepted in the mainstream medical and scientific community. As discussed in an earlier response, "Wind Turbine Syndrome" is not a recognized medical condition and has not been confirmed in the customary fashion of the scientific literature. Dr. Pierpont, despite her assertion, has not submitted nor received critical, unbiased review and acceptance of her observations.

A process similar to this is observed when Mr. James's claims regarding "Vibroacoustic Disease" are explored. A review of the NCBI "PubMed" database contains 36 published references when searched for the term "vibroacoustic disease." Of these 36, 30 have common authors including Brancho, Alves-Perira and Ferreira who have been referred to as the "VAD Team" that has been the proponents of the entity they refer to as "Vibroacoustic Disease." These researchers first published their observations involving "Vibroacoustic Disease" that they classify as "non-auditory, noise-induced biological effects" in 1999 and have actively published regarding their theories of the "biological effects of infrasound (0-20Hz) and low frequency noise (20-500Hz)." By their own description, there has been "much controversy and acrimonious debate over whether or not acoustical phenomena can cause extra-auditory effects on living organisms." It is not evident from a review of the published literature that the findings of these researchers have been confirmed by others or accepted in medical or acoustical professions.

Mr. James makes similar unfounded or overbroad statements regarding potential health effects of low frequency noise and health in his statements in Exhibit 808. Mr. James attempts to make the case for health effects using unproven, unconfirmed observations about noise-related health conditions. For example, his discussion of Dr. D. Ingber is misleading in that Dr. Ingber's work on "tensegrity" and "mechanotransduction" is actually an exploration of the cellular response to mechanical forces, having nothing to do with sound. The bolded quote on page 9 of Mr. James's Exhibit 808 gives the appearance of being from Dr. Ingber but in fact if you go to http://www.newmexicocare.org/1pages/vad.html#vad the language is not a quote from Dr. Ingber.

In a similar fashion, Mr. James indicates that Drs. Todd, Roengrenm and Colebatch support the application of their research in support of the claim of adverse health effects being associated with wind turbines. A review of this work does not indicate that this is a correct statement.

Q. YOU CONDUCTED A REVIEW OF THE PEER REVIEWED LITERATURE ON HEALTH EFFECTS ATTRIBUTABLE TO SOUND. WHAT DID IT SHOW AS IT RELATES TO SOUND GENERATED BY WIND TURBINES?

A. Our search of PubMed identified 156 articles that mentioned "Infrasound and Health Effects" or "Low-Frequency Noise and Health Effects" or "Low-Frequency Sound and Health Effects" or "Wind Power and Noise," "Wind Turbines" or "Wind Turbines and Noise." Our search and review of the peer reviewed, published literature did not identify scientific works that support the health effects claims being made regarding wind turbines. Please refer to our report "Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound," submitted as Exhibit 27.

Q. BOTTOM LINE: ARE YOU OF THE OPINION THAT WIND TURBINES CAUSE A HEALTH CONDITION?

A. This is a complex question to answer in that a "health condition" does not always equate to a "disease." There are good health conditions and bad. Some things a lay person might label "health conditions" refer to a normal process where the body's defense mechanism has gotten over active and resulted in a person not feeling well, as in allergies. A review of the material that is often used in support of the claim that there are health conditions associated with wind turbines indicates that many (if not all) are rooted in the normal physiological response to an adverse situation and most have a component of "annoyance."

Q. WHAT ARE YOU REFERRING TO WHEN YOU SAY "ANNOYANCE?"

A. Annoyance is a normal reaction to some type of stimuli or thought. It is a normal set of physiological responses to a stimuli that is unique to the individual and is based on personal experience, beliefs and circumstances of occurrence. In today's environment, noise pollution constitutes a significant factor of annoyance. The meaning listeners attribute to the sound influences annoyance, so that, if listeners dislike the noise content, they are annoyed. What is music to one is noise to another. If the sound causes activity interference, noise is more likely to annoy (for example, sleep disturbance). Control of the noise is an important factor in the annoyance quality of a noise. If the annoyed person can control the annoying sound, they can modulate the annoyance factor. However, if listeners believe that the noise is subject to third-party control, including police, but control has failed, they are more annoyed. If the sound is appropriate for the activity it is in context. If one is at a race track the noise is in context and the psychological effects are absent. If one is at an outdoor picnic the race track noise will produce adverse psychological and physical effects. The term "annoyance" is broad in definition and is imprecise. There is no indication that the "annoyance" due to wind turbines is any different from the "annoyances" that we each experience on a daily basis.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. It does.

PSC REF#:121885

Public Service Commission of Wisconsin
RECEIVED: 10/20/09, 11:52:47 AM

Exhibit 27

Health Sciences

Exponent®

Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound

Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound

Prepared for

Wisconsin Public Service Commission
Docket No. 6630-CE-302

Prepared by

Mark Roberts, M.D., Ph.D.
Jennifer Roberts, Dr.PH, MPH
Exponent
185 Hansen Court
Suite 100
Wood Dale, Illinois 60191

October 20, 2009

© Exponent, Inc.

0903940.000 F0T0 0809 JR03

Contents

List of Figures **5**

List of Tables **6**

Executive Summary **7**

Overview of Epidemiology **8**

Epidemiology, Association, and Causation 10

Peer Review Process **13**

Public Health Issues **16**

Precautionary Principle **19**

Background on Infrasound and Low Frequency Sound **21**

Infrasound 23

Low Frequency Sound 24

Background on Wind Turbines and Noise **27**

Evaluation of Scientific Literature on Health Effects **29**

Applicability and Utility 30

Soundness 31

Clarity and Completeness 31

Uncertainty and Variability 32

Evaluation and Review 32

Final Included Literature 33

Health Effects of Infrasound and Low Frequency Sound **34**

Human Effects 34

Annoyance 38

Disease vs. DIS-ease 39

Limitations of Scientific Literature **40**

Conclusions **42**

References **45**

Appendix A **51**

Final Literature **51**

List of Figures

Figure 1. The Scientific Process 11

Figure 2. The Scientific Method 12

Figure 3. Peer Review Process 14

Figure 4. Normal Equal-Loudness Level Contours 23

Figure 5. Horizontal Axis Wind Turbine 28

List of Tables

Table 1.	Risk Perception Factors For the Acceptability of Risk	18
Table 2.	Human Sound Intensity Levels	22
Table 3.	Sound Frequency Spectrum	24
Table 4.	Literature Search Queries	29
Table 5.	Applicability and Utility Ranking System	30
Table 6.	Soundness	31
Table 7.	Clarity and Completeness	31
Table 8.	Uncertainty and Variability	32
Table 9.	Evaluation and Review	32

Executive Summary

This white paper presents a review of the human health effects associated with infrasound and low frequency sound, preceded by an introduction to the basic concepts of epidemiology, causation, the peer review process, the science of public health, and the precautionary principle.

The goal of this white paper was to highlight key points regarding the health concerns of those involved with the positioning of wind turbines, rather than an in-depth review of the science of sound. The research involving sound is massive in its depth and breadth and is expanding daily. Research on health effects associated with human exposure to sound has evolved from the study of physical damage to the study of psychological and other effects, from ringing in the ears to non-specific physical symptoms. Early research in low frequency noise exposures is difficult to evaluate due to the diversity of the exposure and non-specific nature of the reported health effects. As of this review, there has not been a specific health condition documented in the peer reviewed published literature to be classified as a disease caused by exposure to sound levels and frequencies generated by the operation of wind turbines. That does not mean that there cannot be an effect. Numerous scientific papers document physiological responses to low frequency sound, but the majority of these effects are consistent with human response to environmental stimuli of varied nature and at higher decibel levels than produced by wind turbines. One of the most prominent non-physiological effects noted across the gamut of scientific as well as lay press literature is the annoying qualities of sound as was so vividly pointed out in one of the discussions when it was said that "one man's music is another man's unbearable noise." Annoyance is a normal response and is not predictable based on the sound level below the painful level. It is clear that some people respond negatively to the noise qualities generated by the operation of wind turbines, but there is no peer-reviewed, scientific data to support a claim that wind turbines are causing disease or specific health conditions. Annoyance regarding the wind turbines is an elusive factor that could underlie a majority of the health complaints being attributed to wind turbine operations.

Overview of Epidemiology

Epidemiology is the study of the distribution and determinants of health events in populations (Last JM. 2001). The key elements of epidemiology are comparisons of health outcomes and exposures between populations (which allows for the calculation of relative risk estimates) and the careful evaluation of underlying determinants that may affect the outcome of comparisons of the study populations (bias and confounding). The study of health claims related to wind turbines is an excellent example of the potential influence of both bias (voluntary and involuntary exposures) and confounding (health outcome potentially related to direct and indirect exposure).

The scientific body of knowledge relative to a particular disease often starts with observations by clinicians (case reports and case series). These reports are not analytical studies because they have no comparison group or other means to test for associations. Case reports and reports of series of cases help generate scientific hypotheses; however, they cannot be used in testing for association or causation (Checkoway H. 2004). Surveys of only those persons claiming an effect give only one part of the total equation needed to assess the magnitude of risk associated with living near wind turbines. A collection of observations, no matter how well documented, are not sufficient to prove an increased risk, but instead are a first step in the scientific process. One must rely upon peer reviewed, published studies that are designed to reduce bias and confounding as much as possible.

The two most common types of analytical epidemiologic studies used to evaluate potential disease causation are cohort studies and case-control studies. In cohort studies, the researcher identifies two groups of individuals: individuals who have been exposed to a substance considered a possible cause of disease ("exposed" group) and individuals who have not been exposed ("unexposed" or "comparison" group). The researcher then follows both groups for a length of time and compares the rate of disease among the exposed individuals with the rate of disease among the unexposed individuals. The researchers determine whether there is an association between the exposure and the disease by calculating a relative risk (RR), which

divides the rate of disease among the exposed by the rate of disease among the unexposed, with a value statistically greater than 1.0 indicating a positive association. One type of cohort study is a standardized mortality (incidence) ratio study (SMR/SIR). In SMR/SIR studies of occupational groups, the number of observed cases for a particular occupational group is compared to the number one would expect for that group based on rates in the general population. These studies divide the observed number of cases by the expected number of cases, with a value statistically greater than 1.0 indicating a positive association.

In case-control studies, the researcher begins with a group of individuals who have the disease (cases) and then selects a group of individuals who do not have the disease (controls). The researcher then compares the case and control groups looking for differences in past exposures. An association is measured by dividing the odds of exposure among the diseased by the odds of exposure among the non-diseased, with a value statistically greater than 1.0 indicating a positive association.

Another type of epidemiologic study is a proportionate mortality (incidence) ratio study (PMR/PIR). PMR/PIR studies compare the proportions of selected causes of death or disease incidence in the exposed study group to the proportion in the unexposed study population, with a value statistically greater than 1.0 indicating a positive association.

No matter the study design, the researcher applying epidemiological principles and the reader of the studies must have a clear understanding of what constitutes the "disease" being studied. The description of the disease has to be sufficiently specific and described such that the comparisons are truly comparing "like to like." In the case of health complaints related to wind turbines, there is a lack of specificity as to the health complaints. A disease or group of symptoms classified as "Wind Turbine Syndrome" has not been adopted by the medical community. The underlying complaint of annoyance is in and of itself not a disease or a specific manifestation of a specific exposure but instead a universal human response to a condition or situation that is not positively appreciated by the human receptor. Annoyances are highly variable in type (noise, smell, temperature, taste, vision) and vary from person to person. One can be annoyed by the action of others, as well as their own individual actions. Thus, "annoyance" is not a disease but

a universal human response that is highly non-specific. In conclusion, it has been found that there is a lack of epidemiologic research studies showing an association between health effects and exposure to noise at low frequency in combination with low sound pressure (dBA) generated by wind turbines.

Epidemiology, Association, and Causation

Historically, there have been careful clinical observations (case reports and series) that have stimulated a number of now-classic epidemiology research efforts that have identified important associations and ultimately the determinants of causal relationships. There have also been case reports identifying associations that did not hold up under epidemiological scrutiny, for example, those associating blunt force trauma and cancer. For this reason, case studies cannot be used to determine causation. A causal association can only be established by the evaluation of well designed and executed epidemiologic studies.

A landmark discussion of the process of moving from a disease being associated with a risk factor to a point where the scientific community is comfortable attributing causation to a risk factor was put forth by Sir Austin Bradford Hill in 1965. It was during this time that a number of papers, including the Surgeon General Report issued in 1964, began to more formally delineate the scientific reasoning process that justifies a conclusion that observed associations between an exposure and a disease are the result of a causal relationship between the exposure and the disease. Key statements from scientists during that time include the following:

> "Disregarding then any such problem in semantics we have this situation. Our observations reveal *an association between two variables, perfectly clear-cut* and beyond what we would care to attribute to chance. What aspects of that association should we especially consider before deciding that the most likely interpretation of it is causation?" [italics added] (Hill AB. 1965). Hill's nine criteria for causation have been described in a number of ways. They are commonly referred to as strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, and analogy (Hill AB. 1965).
>
> *"If it be shown that an association exists*, then the question is asked, 'Does the association have a causal significance?' … To judge or evaluate the causal significance of the association between the attribute or agent and the disease, or effect on health, a number of criteria must be utilized…" [italics added] (Bayne-Jones S et al. 1964).

Finally, it should be noted that greater weight can be provided to the strength of an association when several epidemiologic studies performed by different researchers arrive at the same conclusions. And as a final step, researchers often submit their work for publication which then typically undergoes a peer review process for completeness and scientific soundness.

Figure 1. The Scientific Process

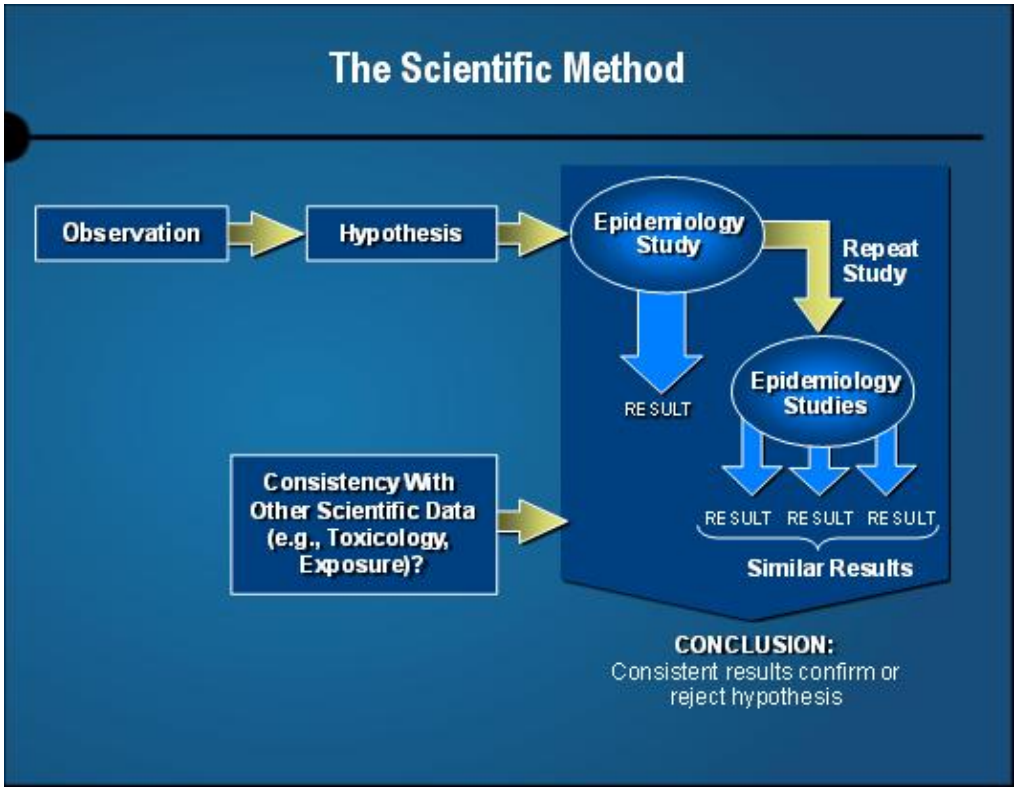


Figure 2. The Scientific Method

Peer Review Process

According to the Centers of Disease Control and Prevention (CDC), the peer review process is an "independent assessment of the scientific merit of research by panels of experts who provide written assurance that their reviews are free of real or perceived conflicts of interest. Results of the peer review process should therefore be without inherent bias and can be viewed as fair and just…" (CDC 2009).

Publication in a peer-reviewed journal remains the standard means of disseminating scientific results and has been since 1665, when the first recorded peer review process was performed at The Royal Society by the founding editor, Henry Oldenburg (UK Parliament and House of Commons 2004). Consequently, publications that have not undergone a peer review are likely to be regarded with skepticism and doubt by scholars and professionals.

Generally, the peer review process uses anonymity and employs a double-blind process whereby the authors and peer reviewers remain unknown or blinded to each other. Reviewers are often required to disclose conflicts of interest. The use of anonymity preserves the integrity of the peer review process and discourages favoritism shown by colleagues, friends, or relatives. Although not fool-proof, the peer review process can also maintain and enhance the quality of work by detecting flaws, plagiarism, fraud, unsound science, or personal views. Hence, the peer review process fosters scholarship and encourages authors to meet the accepted standards of their discipline.

The typical peer review process for scientific journals begins with the author submitting a manuscript. The editor of the journal reviews the article and determines whether or not the article is appropriate for the journal. If the article is determined to be appropriate, the editor assigns peer reviewers to read and critique the work. The reviewers then submit their comments to the editor and a decision is made with respect to the publication status of the article: (1) accept for publication; (2) accept for publication with modifications; (3) reject for publication (Figure 3). An average acceptance rate for publication in peer reviewed journals has been

reported to be between 25% and 50%, although journals such as New England Journal of Medicine and the British Medical Journal have been known to be much lower (Elsevier 2009).

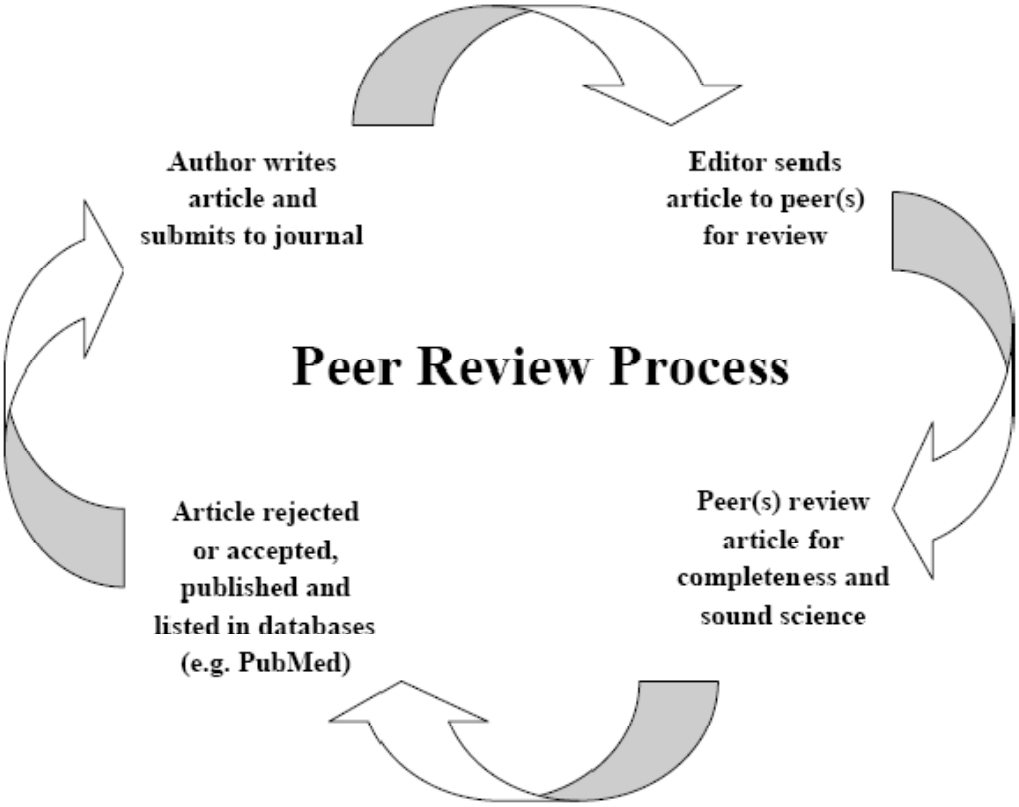


Figure 3. Peer Review Process

A thorough and complete peer review gives the reader some confidence that the article meets appropriate scientific rigor. Seldom does an article submitted for publication get accepted without addressing issues brought to light in the peer review process. At one point in time, "publication" of a scientific work in a peer-reviewed journal was a stamp of quality; however, in today's world, opinions, ideas, and hypothesis can be "published" by a number of methods (websites, blogs, and media articles), without the scientific rigor of critical peer review.

The key aspect of the peer review is a critical appraisal of the research, a continuous challenge of the scientific hypothesis and comparison with the body of scientific knowledge relevant to

that research. While the process can never be totally free of bias (we all have opinions that influence our thinking), a clear effort to seek out those who are not directly connected to the researcher(s) is an important first step. The second part of the review process and assessment of the scientific merit of the research is the publication of the research so that others interested in the topic can benefit from the knowledge, apply it in their research efforts, or learn from the mistakes of other researchers. Opinion pieces, media interviews, court testimony, and testimony before legislative bodies, while informative, do not have the weight, standing, or status of peer-reviewed published scientific work. Unfortunately, because of their high visibility, emotional nature, and understandability, these sources outside of the peer-reviewed journals are often perceived as being of high reliability without having the benefit of careful scrutiny and response from those most knowledgeable in the research field being discussed. For example, Dr. Nina Pierpont has received a considerable amount of attention regarding the upcoming publication of her book, Wind Turbine Syndrome: A Report on a Natural Experiment, which uses non-traditional references such as newspaper articles and television interviews. In addition, this book is apparently being published by a publishing company which will have only one published book (this one) and that consists of an editorial board of which Dr. Pierpont and her husband make up two of the members.

Public Health Issues

"Public Health" refers to the overall wellbeing of a group of people. The description of Public Health incorporates the science of identifying major effectors of health status of a population and taking measures to prevent disease, prolong life, and promote health through private, academic, governmental, and corporate efforts. A physician treats a patient and considers the family, whereas a public health professional "examines" populations and takes broader actions to improve the health of the individuals that make up the population. Public health efforts primarily focus on prevention rather than treatment of disease. The United Nations' World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." This is a lofty goal to strive for, but if public health history is any indication of things to come, as we conquer the leading causes of disease, new diseases become more prominent.

There have been major successes in Public Health (e.g., smallpox eradication, control of malaria, nationwide immunization programs to prevent vaccine-preventable diseases, chlorination of municipal water supplies). However, for every public health accomplishment, there have been new health challenges related to lifestyle issues and changing health expectations. According to the U.S. Census Bureau, the final data for 2003 indicated that life expectancy at birth for the total population in America has reached an all-time high level of 77.5 years. This is up from 49.2 years at the turn of the 20th century. Record-high life expectancies were found for white females (80.5 years) and black females (76.1 years), as well as for white males (75.3 years) and black males (69.0 years). With this increase in life expectancy, there has also been an expectation of a life as free of health concerns as possible. Unfortunately, this public health progress has brought the realization of the health effects of the very activities that helped extend our lives (e.g. chlorination of drinking water, mercury-based preservatives in some vaccines).

Along with these advances has come the development of a very expansive information system called the internet, a growing environmental awareness, and a growing expectation of a long and

healthy life. The advances that have been made to support a growing and aging population have brought risks with them such as automobiles, massive highway systems, and large-city problems such as crime and pollution. These more familiar risks have been generally been accepted or forgotten, but new risks are less tolerated. Herein lays the difficulty of public health today. Population growth and societal demands have pressured public health professionals to provide guidance in the assessment of risks of new technological advancements and to reduce or eliminate risk.

While assessing a level of risk may be done in a sterile, scientific fashion, assessing the acceptability of that risk level risk becomes a preference choice. A community may choose to accept a level of risk that an individual finds unacceptable. That discrepancy between community and individual acceptability moves the decision from a public health issue to a political and social decision. Public health can bring science to the discussion, but in the end, a decision that weighs all the factors must be made for the larger group as a matter of policy.

In addition to the debate over what levels of risk are acceptable or tolerable, there is also the pressure of clearly delineating between actual risks and perceived risks. Once the analysis of the risk assessment is completed, the responsibility of the risk manager is to explain to the public and all involved stakeholders. A common perception among risk assessors and managers is that individuals who have a lack of information or information that is distorted about a risk are often subjected to unreasonable fears (Vertinsky I. And Wehrung D. 1989). These fears typically are not calmed even when accurate information is provided and unfortunately many expect a level of certainty from science that is almost always impossible to achieve. Several identified risk perception factors have been found to dictate the acceptability of risk regardless of the presentation of science which quantifies and qualifies the actual risk (Table 1).

Table 1. Risk Perception Factors For the Acceptability of Risk

"Acceptable" Risk	**"Unacceptable" Risk**
Controllable	Uncontrollable
Voluntary	Involuntary
Not Dread	Dread
Natural	Man-made
Beneficial	Of Little or No Benefit
Immediate Effects	Delayed Effects
Not Global Catastrophic	Global Catastrophic
Consequences Not Fatal	Fatal Consequences
Equitable	Inequitable
Affects Adults	Affects Children
Low Risk to Future Generations	High Risk to Future Generations
Easily Reduced	Not Easily Reduced
Risk Decreasing	Risk Increasing
Doesn't Affect Me	Affects Me

Reference: (Slovic P. et al. 1982)

There are many examples in public health where the assessed risk of an event or environmental conditions is perceived differently than an interested segment of the population. In these situations, the public health officials must make the best decision they can using the scientific method. There comes a point where a decision must be made for the good of the largest segment of the population. The ramifications and effectiveness of these decisions are not always seen as positive from a historical perspective. Take for example the "Swine Flu" immunization program of 1976 under the Ford Administration. That program resulted in a segment of the immunized population developing Guillain-Barre Syndrome. The same sort of decision process is being carried out now as public health officials embark on a campaign to protect the population for an H1N1 Pandemic. Part of the analysis included an estimation of how many persons can be expected to develop Guillain-Barre Syndrome from the new vaccine.

Societal decisions, like Public Health decisions, must be made with the benefit of the best, most sound information. Few historical efforts to advance health or societal development have come without concerns from many segments of the population and a few that may be affected.

Precautionary Principle

Some groups and organizations have addressed the acceptability of risk by adopting a position or philosophy that when risk may exist, but the level of risk is in doubt, actions should be taken to avoid the risk much in tune with the idea that "if in doubt, don't." Similarly, a process potentially producing risk is "guilty until proven innocent." This view is commonly referred to as the "precautionary principle." While seemingly attractive, the precautionary principle fails to acknowledge that in reality, every human activity has risk, and the balance between the potential risk and the value of that activity depends on the individual.

The precautionary principle is an attempt to set a goal for environmental planning and response to perceived health threats based less on science and more on the social basis of the issue being examined. While the principle was developed during the discussion of environmental issues, it can be applied to any function of mankind and all our activities. It is a high standard to compare activities of the earth's inhabitants based on social values and less on science. There are few arguments when a solid body of science has been amassed showing an association and meeting the criteria for "causation." The difficulty arises when new discoveries and applications are evaluated on what effect they "could have" rather than on the scientific data obtained during they development and regulatory review. The philosophy of "new is not necessarily good" and the "fear of the unknown" result in an almost instant increased level of concern in a segment of most populations. This is partially due to the easy access to information provided by media and the internet, the risk aversion that has become prevalent in our society, and the pressures of our evolving societies. The precautionary principle should be applied in the light of the science of the day and with the understanding that no scientific study of a sample of the population can "prove" there is no association between a technology and a perceived health threat.

The precautionary principle has evolved in both the legal and social context to the point of being prominent in national and international treaty and agreements. While the principle incorporates an extremely cautious approach, it embodies concepts that we have embraced in

our daily lives e.g. “an ounce of prevention is worth a pound of cure,” “look before you leap,’ and “better safe than sorry.” On an individual basis, the precautionary principle is relatively easy to apply, and the risk and benefit directly applies to the individual. Application of the precautionary principle at a community or national level involves societal decisions that may include legal, economic, and political aspects. The application of the scientific process and sharing of knowledge gained through scientific investigation can provide objective information to assist in these decisions. Science will reduce the uncertainty, but not eliminate it entirely. Society must decide what is an acceptable level of risk (e.g. allowing passengers to fly in airplanes without parachutes, allowing people to ride ferryboats without wearing lifejackets). Delineation and comparison of risk is a scientific process, but determination of acceptable risk is beyond the realm of science.

Background on Infrasound and Low Frequency Sound

Sound is an energy generated by a source (e.g., bell), transmitted through a medium (e.g., air), and received by a receiver (e.g., human ear). Sound travels from the source in the form of waves or fluctuations of pressure within the medium. As the human ear detects these vibrating waves, they are translated into electrical signals that are transmitted to the brain for decoding.

Sound is perceived and recognized by its loudness (pressure) and pitch (frequency). The indicator of loudness is the decibel (dB), which is a logarithmic ratio of sound pressure level to a reference level.[1] With a logarithmic scale, sound levels from two or more different sources cannot be arithmetically added together to determine a combined sound level. Specifically, the dB is a logarithmic unit of measurement that expresses the magnitude of a physical quantity such as power or intensity relative to a specified reference level. Human hearing of sound loudness ranges between 0 dB (threshold of sound for humans) and 140 dB (very loud and painful sound for most humans) (NMCPHC 2009; NASD 1993) (Table 2). Not all sound pressures are perceived as being equally loud by the human ear due to the fact that the human ear does not respond equally to all frequencies. The frequency range of human hearing has been found to be between 20 Hz and 20,000 Hz for young individuals with a declining upper frequency range correlating with increasing age (Berglund B. et al. 1996). The frequency of sound is expressed in Hertz (Hz)[2] which is equal to 1 cycle per second. The sound perception, "hearing," for humans is less sensitive to lower frequency (low pitch) and higher frequency (high pitch) sounds. As a result, the human ear can most easily recognize sounds in the middle of the audible spectrum, which is ideally between 1 kHz to 4 kHz (1,000 to 4,000 vibrations per second) (UNSW 2005). As a result, devices used to measure sound (sound meters[3]) are

---

[1] Reference Level - A special value of a quantity expressing the degree of modulation of a recording medium, in terms of which other degrees of modulation are expressed, usually in decibels (IEC).

[2] Hertz (Hz) - A unit of frequency defined as the number of cycles per second (1 Hz equals 1 cycle per second). Hertz can be used to measure any periodic event within a sinusoidal context, such as radio and audio frequencies (IEC).

[3] Sound Level Meter – Instrument used for the measurement of sound level with a standard frequency weighting and a standard exponential time weighting (IEC).

designed with filters that have a response to frequency similar to human. The A scale is the most commonly used sound level filter and the sound pressure level is given in units of dB(A) or dBA. With the A weighting filter, the sound level meter is less sensitive to very high and very low frequencies. Sound measurements made on the C scale, which are linear over several octaves and suitable for subjective measurements of very high frequency sound levels, are expressed as dB(C) or dBC. Another weighting filter, the B scale, is a rarely used intermediate between the A and C scales (UNSW 2005).

Table 2. Human Sound Intensity Levels

Decibel Level (dB)	Source
140	Threshold of pain: gunshot, siren at 100 feet
135	Jet take off, amplified music
120	Chain saw, jack hammer, snowmobile
100	Tractor, farm equipment, power saw
90	OSHA limit - hearing damage if excessive exposure to noise levels above 90 dB
85	Inside acoustically insulated tractor cab
75	Average radio, vacuum cleaner
60	Normal conversation
45	Rustling leaves, soft music
30	Whisper
15	Threshold of hearing
0	Acute threshold of hearing

Reference: (NASD 1993)

In the 1930s, researchers Fletcher and Munson conducted experiments on the response of the human ear and the relationship between sound frequency and pressure (Fletcher H. and Munson WA. 1933). Fletcher and Munson developed curves to approximate this relationship which were then revised by the International Organization for Standardization (ISO) and are now referred to as Normal Equal-Loudness Level Contours. Hence, an equal-loudness contour is a measure of the sound pressure (dB) level required to cause a given loudness for a listener as a function of frequency (Hz) (Figure 2).

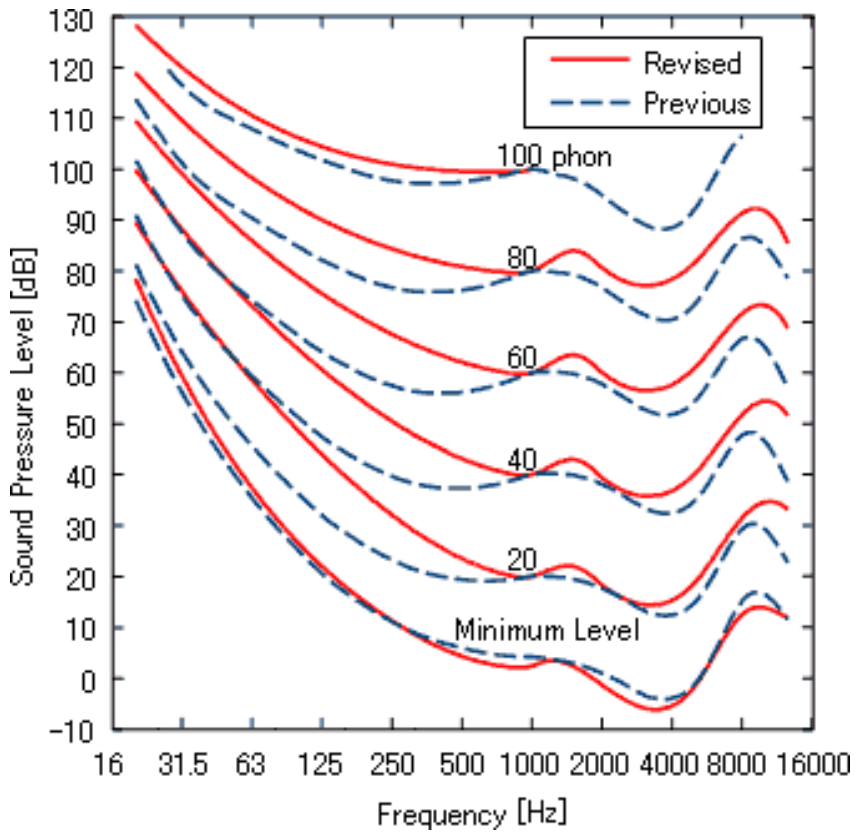


Figure 4. Normal Equal-Loudness Level Contours

Infrasound

Infrasound is generally accepted to be sound between 0 Hz and 20 Hz (Leventhall G. 2007) (Table 3). Infrasound occurs when the frequency of acoustic oscillations (Hz) is lower than the low frequency limit of audible sound, which is approximately 16 Hz according to the International Electrotechnical Commission (IEC) (Leventhall 2007). Although the human hearing threshold has been found to be as low as 4 Hz in an acoustic chamber, a level of 20 Hz, arises from the lower frequency limit of the Normal Equal-Loudness Level Contours. At 1,000 Hz, the contour ranges a span of 100 dB, but at lower frequencies the contours are grouped more closely together. Thus, the change of grouping at 20 Hz or below leads to a greater rate of growth in loudness with increasing level for frequencies in the infrasound region (Leventhall G. 2007).

Although it has been believed that infrasound is inaudible, that belief has been determined to be a misconception (Berglund B. et al. 1996; Leventhall G. 2007; Maschke C. 2004). Infrasound at frequencies lower than 20 Hz are audible at very high levels and these sounds may occur from many natural sources, such as meteors or volcanic eruptions. Anthropogenic (i.e., human-caused) sources, which often are the predominant type of source, can also generate infrasonic noise and include machinery, ventilation, or large combustion processes (Berglund B. et al. 1996; Leventhall G. 2007; Sienkiewicz Z. 2007). In addition, the human body has multiple sources of sound. For example, heart sounds are in the range of 27 to 35 dB at 20-40 Hz (Sakai A. et al. 1971) and lung sounds are reported in the range of 5-35 dB at 150-600 Hz (Fiz JA. Et al. 2008).

The threshold of human hearing has been found to be well in the range of infrasound, but it has been suggested that detection does not occur through hearing in the normal sense. Infrasound detection has been theorized to result from nonlinearities of conduction in the middle and inner ear which produces a harmonic distortion in the higher frequency range (Berglund B. et al. 1996). Also, the definition of infrasound detection has not only considered direct hearing, but also subjective reactions such as annoyance as well as detection occurring through the resonance of other body organs (Berglund B. et al. 1996).

Table 3. Sound Frequency Spectrum

Frequency (Hz)				
0	**10**	**20**	**100/250**	**20,000**
Infrasound (With Body Resonance)	Infrasound	Low Frequency Sound	Non-Low Frequency Audible Sound	Ultrasound

Low Frequency Sound[4]

The low frequency sound range is approximately between 10 or 20 Hz and 100 or 250 Hz (Berglund B. et al. 1996). The setting of a lower and upper limit of a continuum has been

[4] The word "sound" and "noise" are terms that can be used interchangeably. "Noise" often implies an unwanted sound. The use of "noise" also depends on the intensity of the sound or the complex temporal pattern. The classification of a "sound" or "noise" may also depend of cultural factors, the individual, or the time and circumstance (Berglund B. et al. 1996).

problematic due to the arbitrary nature of setting those limits. However, it has generally been accepted that low frequency sound is below 100 Hz (Takahashi Y. et al. 2005) or 200 Hz (Maschke C. 2004). Due to the long wavelengths of low frequency noise, it has been known to travel long distances and pass through walls and windows with little attenuation (Waye K. 2004).

With respect to reception, the hearing sensitivity of the human ear declines at low frequencies (Takahashi Y. et al. 2005). Occupational and residential activities have been found to be a common source of low frequency sound (Berglund B. et al. 1996). Many sources of low frequency noise are transportation vehicles such as buses, trains, and some aircraft. Other stationary sources of low frequency noise include heating, cooling, or ventilation of buildings (Waye K. 2004). Low frequency sound possesses features that are not commonly shared by higher pitch noises.

A review of the literature related to sound indicates that there are uncertainties associated with the measurement and characterization of low frequency sound. As mentioned previously, the A scale is the most commonly used sound level filter (Sienkiewicz Z. 2007; Takahashi Y. et al. 2005; Takahashi Y. et al. 2001; Takahashi Y. et al. 1999). Furthermore, it was recommended that either a scale with a more appropriate response be developed and used for characterizing low frequency sound or that the details of the acoustic environment be provided for each exposure scenario (Sienkiewicz Z. 2007).

As mentioned previously, human hearing becomes less sensitive for decreasing frequency. In addition to the sensitivity of sound, the perceived character of that sound also changes at lower frequencies. The threshold[5] for hearing is standardized by ISO for frequencies down to 20 Hz, but there has been research and some agreement among investigators regarding a possible threshold for frequencies below this level (Moller H. and Pedersen CS. 2004). Men and women have the same hearing threshold with the standard deviation between individuals being

[5] Threshold - For a specified signal and method of presentation, amount in decibels by which the threshold of hearing for a listener, for either one or two ears, exceeds a specified standard threshold of hearing (IEC).

approximately 5dB. Furthermore, low frequency sound may be inaudible to some, but that same sound may be loud to others.

Background on Wind Turbines and Noise

There are two types of noise generated from wind turbines. One is a mechanical noise originating from the gearbox, generator, and yaw motors. The other type of noise, aerodynamic noise, originates from the flow of air around the components of the wind turbine (blades and tower) produces a "whooshing" sound in the range of 500 to 1000 Hz (Hau E. 2006). This type of noise is typically the dominant component of wind turbine noise because manufacturers have been able to reduce the mechanical noise to a level that is below the aerodynamic noise (Pedersen E. and Waye KP. 2004). However, the whooshing sound is highly variable and dependent upon mechanical as well as atmospheric conditions. Hence, the sound power levels reached by wind turbines are determined by the mechanical and aerodynamic specifications.

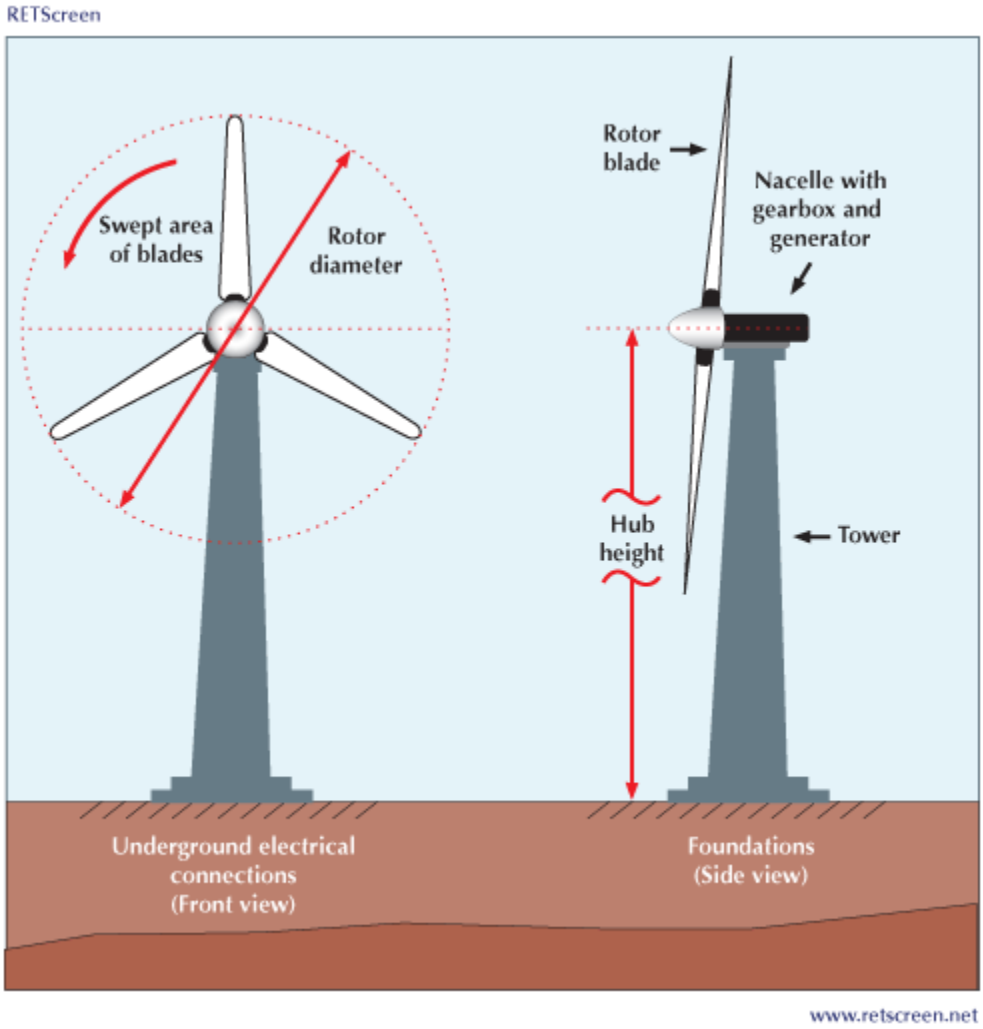


Figure 5. Horizontal Axis Wind Turbine

Evaluation of Scientific Literature on Health Effects

A thorough search was performed of the peer-reviewed scientific literature using the PubMed[6] search engine which is maintained by the United States National Library of Medicine. The purpose of the search was to identify literature that has addressed the known or unknown health effects associated with infrasound and low frequency sound. The following search criteria terms were used for each search query with some overlapping results.

Table 4. Literature Search Queries

Search Query	Number of Articles Found
Infrasound AND Health Effects	16
Low-Frequency Noise AND Health Effects	59
Low-Frequency Sound AND Health Effects	40
Wind Power AND Noise	18
Wind Turbines	20
Wind Turbines AND Noise	3
Total	**156**

In 2003, the U.S. Environmental Protection Agency (EPA) published a document entitled "A Summary of General Assessment Factors for Evaluating the Quality of Scientific and Technical Information" which outlined general assessment factors to evaluate the quality and relevance of scientific and technical information (U.S. EPA 2003). The assessment factors include (1) soundness; (2) applicability and utility; (3) clarity and completeness; (4) uncertainty and variability; and (5) evaluation and review. These factors use a weight-of-evidence approach that considers the information provided in an integrative assessment. These factors also take into account the quality and quantity as well as the strengths and weaknesses of the information. These EPA guidelines were used to evaluate the articles identified in this literature search.

[6] Pub Med is a searchable database that comprises more than 19 million citations for biomedical articles from MEDLINE and life science journals.

Applicability and Utility

The extent to which the information is relevant for the intended use, or how relevant the study is to current conditions of interest (U.S. EPA 2003).

With each identified article, the research and research subjects were ranked as a whole based on the applicability to the overall purpose of the literature search. The following ranking system was employed, and then we eliminated articles with a rank of one or two from further review (Table 6). These ratings and those used in later tables were also used in the appendix. Although it has been found in animal experiments, during the last 50 years, that high levels of low frequency noise and vibration can influence the respiratory rate, cardiac, digestive and central nervous systems, (Maschke C. 2004) animal studies were not reviewed in this white paper. At this time only human studies were reviewed and evaluated, which also eliminated articles with a rank of three. It was assumed that animal studies would not provide the necessarily applicability to effects of wind turbines on humans, thus resulting in an extrapolation layered with assumptions. Articles that were not written in the English language were also eliminated. Background research consisted of articles that reviewed infrasound and low frequency sound in general.

Table 5. Applicability and Utility Ranking System

Rank	Rank Description
1	No applicability at all
2	Limited applicability (e.g. *in vitro* studies)
3	Some applicability (e.g. animal studies)
4	Applicable (e.g. human studies)
5	Very applicable (e.g. human studies and wind turbines)
**	Background research

Soundness

The extent to which the scientific and technical procedures, measures, methods or models employed to generate the information are reasonable for, and consistent with, the intended application (U.S. EPA 2003).

The articles were evaluated based on whether or not the study purpose was reasonable and consistent with its design. If articles did not employ sound scientific theory or accepted approaches, such as the use of an adequate sample size or the validation of a survey instrument, they were graded accordingly.

Table 6. Soundness

Rank	Rank Description
1	Not sound (e.g. study instrument not validated)
2	Sound with limitations (e.g. useful research but not consistent with design)
3	Very sound (e.g. study reasonable and consistent with design)
**	Background research

Clarity and Completeness

The degree of clarity and completeness with which the data, assumptions, methods, quality assurance, sponsoring organizations and analyses employed to generate the information are documented (U.S. EPA 2003).

Articles were assessed for clarity and completeness and whether or not the results were clearly described and comparable to other study results. The description of the study design and methods was also assessed to determine if the description was clear enough for reproducibility.

Table 7. Clarity and Completeness

Rank	Rank Description
1	Several limitations
2	Complete with some limitations
3	Very complete (e.g. clear enough to be reproduced)
**	Background research

Uncertainty and Variability

The extent to which the variability and uncertainty (quantitative and qualitative) in the information or in the procedures, measures, methods or models are evaluated and characterized (U.S. EPA 2003).

The level of uncertainty and variability of the study methodology and results and how these uncertainties were handled were also evaluated. Potential sources of error and study bias were considered as well.

Table 8. Uncertainty and Variability

Rank	Rank Description
1	High uncertainty and variability
2	Medium uncertainty and variability
3	Low uncertainty and variability
**	Background research

Evaluation and Review

The extent of independent verification, validation and peer review of the information or of the procedures, measures, methods or models (U.S. EPA 2003).

Independent verification was measured by whether or not the methodology used and survey instruments were used on other similar, peer-reviewed studies. The consistency of the results with other relevant studies performed by the same or different authors was also accounted for in this analysis.

Table 9. Evaluation and Review

Rank	Rank Description
1	Low validation (e.g. no independent verification or similar results)
2	Medium validation (e.g. result consistent with same author)
3	High validation (e.g. results consistent in peer-review literature)
**	Background research

Final Included Literature

Of the original 156 articles identified, 21 were included for the literature review (Appendix A). Based on the previously outlined five assessment factors, the most relevant and scientifically appropriate articles were selected for this review. Many articles were excluded from this review due to the fact that the research focused in animal responses as opposed to human. Furthermore, with the exception of articles dealing with annoyance, articles were excluded if the sound studied was above the established range of low frequency sound.

Health Effects of Infrasound and Low Frequency Sound

Human Effects

It has been demonstrated that high levels of low frequency sound can excite body vibrations, such as a chest resonance vibration that can occur at a frequency of 50 Hz to 80 Hz (Leventhall G. 2007). These chest wall and body hair vibrations have also been shown to occur at the infrasonic range (Mohr GC. et al. 1965; Schust M. 2004). It is of interest to note that various body organs and physical activities of the human body produce low frequency, low amplitude sounds, some of which are key diagnostic tools for physicians (e.g., heart, lung, and gastrointestinal).

Vibroacoustic disease, a thickening of cardiovascular structures, such as cardiac muscle and blood vessels, was first described and documented by Castelo Branco *et al.* among airplane technicians, commercial and military pilots, mechanical engineers, restaurant workers, and disc jockeys for exposure to large pressure amplitude and low frequency (LPALF) sound (> or = 90 dB SPL, < or = 500 Hz) (Maschke C. 2004; Castelo Branco NA. and Rodriguez E. 1999). Castelo Branco *et al.* concluded that workers who were exposed to high level low frequency noise for more than 10 years exhibited extra-aural[7] symptoms such as thickening of heart valve issue (Castelo Branco NA. and Rodriguez E. 1999; Takahashi Y. et al. 2001; Maschke C. 2004). However, this association was not determined to be causally related and a dose response relationship was not established.

Takahashi *et al.* has explored the effects of acoustic excitation by measuring the resulting vibration (Takahashi Y. et al. 1999; Takahashi Y et al. 2001; Takahashi Y. et al 2005). In 1999, six male subjects were exposed to pure tones in the 20 Hz to 50 Hz frequency range, and vibration was measured on the subjects' chest and abdomen. There were 15 kinds of the low frequency noise stimuli (5 frequencies x 3 sound pressure levels) reproduced by loud speakers.

[7] Aural - Of or relating to the ear or to the sense of hearing

All of them were pure tones frequencies of 20, 25, 30.5, 40 and 50 Hz with each of the corresponding sound pressure levels of 100,105 and 110 dB (SPL).

It was found that measured noise induced vibration negatively correlated with the subject's body mass index and the researchers concluded that the health effects of low frequency noise depended on the physical constitution of the human body (Takahashi Y. et al. 1999). However, it was also concluded by the researchers that it was still unknown if or how vibrations measured on the body surface related to vibrations in the body's internal organs, and that no conclusions could be determined as to the possible chronic health effects caused by long term exposure to low frequency noise (Takahashi Y. et al. 1999). Similarly, in a later article, Takahashi *et al.* reported that low frequency noise (same frequency and sound pressure levels as previously reported) induced vibration measured on the chest was higher than the vibration measured on other parts of the body (Takahashi Y. et al. 2001). By taking this research a step further; Takahashi *et al.* examined the level of unpleasantness of human body vibration and low frequency sound (same frequency and sound pressure levels as previously reported). It was found through the use of a rough rating scale for subjective unpleasantness that there was a significant correlation between the measured body surface vibration induced by the low frequency noise and the rating of unpleasantness (Takahashi Y. et al. 2005). This finding was similar to research conducted by Inukai *et al*., who discovered that the slopes of the equal-unpleasantness level contours are very similar to those of the equal-loudness level contours. This similarity supported the fact that hearing sensation was an influential component in the perception of unpleasantness or annoyance among those exposed to low frequency noise (Inukai Y. et al. 2000; Takahashi Y. et al. 2005). This perception of unpleasantness was also determined to be independent of the audibility of the noise (Takahashi Y. et al. 2005). Inukai *et al*. also recognized the fact that the human psychological responses to low frequency noise, such as unpleasantness or annoyance, were based not only on hearing sensation, but also on three other factors: sound pressure, vibration, and loudness (Inukai Y. et al. 1986; Takahashi Y. et al. 2005).

In a general review of the effects of low frequency noise up to 100 Hz, Schust stated that the use of frequency weighting with an attenuation of low frequencies, such as G-weighting, was not appropriate for evaluating the health risk caused by low frequency noise (Schust M. 2004). Karprova *et al* (1970) ((5, 10 Hz / 100, 135 dB) for 15 minutes) and Slarve *et al*. (1975) (144 dB / 1 Hz - 20 Hz for 8 minutes) also indicated that study subjects reported aural complains after exposure to high level industrial infrasound in the range of 1 Hz to 20 Hz (Karpova NI. et al. 1970; Schust M. 2004; Slarve RN. and Johnson DL. 2009). Non-aural effects, such as a significantly increased diastolic blood pressure and decreased systolic blood pressure, were also mentioned after exposure to high levels of low frequency noise (125 dB, 16 Hz for 1 hour) (Danielsson A. and Landstroem U. 1985; Schust M. 2004). Karprova *et al* also reported complaints of fatigue, feelings of apathy, loss of concentration, somnolence, and depression following exposure to high levels of low frequency noise (5 Hz and 10 Hz (100 dB and 135 dB) for 15 minutes) (Karprova NI. et al. 1970; Schust M. 2004). Furthermore, the effects of low frequency noise among 439 employees working in offices, laboratories, and industries were also evaluated in another study. It was shown that there was a relationship between fatigue and tiredness after work and increasing low frequency noise. There were no employees that were exposed to low frequency noise with C-A differences greater than 20 dB (Schust M. 2004; Tesarz M. et al. 1997).

Ising *et al.* conducted a study that examined the effect of low frequency nighttime traffic noise by measuring saliva cortisol concentrations in children. Based on a previous study, the authors stated that the full spectrum of truck noise in the children's bedroom was at a maximum of 100 Hz (Ising H. et al. 2004; Ising H. and Kruppa B. 2004). It was found that the children under high noise exposure (8h = 54-70dB(A)) had a significantly increased morning saliva cortisol concentration compared to a control population, which indicated an activation of the hypothalamus-pituitary-adrenal (HPA) axis (Ising H. et al. 2004). This endocrine change was found to be an indication of restless sleep and a further aggravation of bronchitis in the children.

Finally, in 2000, a multidisciplinary group of clinicians and researchers called the Study Group on Neonatal Intensive Care Unit (NICU) Sound and the Expert Panel gathered and reviewed

over 50 studies on the effects of sound on the fetus, newborn, and preterm infants. Upon the completion of review, the panel recommended that women should avoid prolonged exposure to low frequency sound levels (< 250 Hz) above 65 dB(A) during pregnancy (Graven SN. 2000). This recommendation was based on research that was conducted on sheep fetuses, which determined that after sustained periods of intense low frequency sound, the fetuses experienced injury to the hair cells of cochlea (Graven SN. 2000).

There have been some studies that have looked at the effect of low frequency noise on nighttime sleep (Maschke C. 2004). Unfortunately, for many of these studies, it was difficult to determine what percentage of the nightly noise was actually low frequency noise. Case studies have reported that low frequency noise (low-frequency noise reaching levels between 72 and 85 dB(A)) affects sleep quality and results in insomnia and concentration problems (Berglund B. et al. 1996; Waye K. 2004). A cross-sectional study of 279 individuals, it was determined that there were no significant differences detected in reported sleep among those exposed to flat frequency noise (>100 Hz; 24 to 33 dBA and 41 to 49 dBC) in their homes as compared to low frequency noise (50 Hz – 200 Hz; 26 to 36 dBA and 49 to 60 dBC) from ventilation and heat pumps (Persson Waye K. and Rylander R. 2001; Waye K. 2004). However, it was determined that fatigue, difficulty falling asleep, feeling tense and irritable were reported significantly more often among those individuals who were annoyed by low frequency noise than those who were exposed to the same noise but did not report being annoyed. Additionally, a dose-response relationship was identified between reported annoyance/disturbed rest and degree of low frequency noise before and after correction for differences in A-weighted sound pressure levels (Persson Waye K. and Rylander R. 2001; Waye K. 2004). In another study, six individuals were exposed to sinusoidal tones as 10, 20, 40, and 63 Hz with sound pressure levels ranging from 75 to 105 dB for 10 Hz and 20 Hz and 50 to 100 dB for 40 Hz and 63 Hz. No significant difference was found between the exposure and control nights in sleep efficiency index, number of changes in sleep state, or changes in the proportion of each sleep stage evaluated by electroencephalogram recordings (Inaba R. and Okada A. 1988; Waye K. 2004).

Annoyance

The World Health Organization (WHO) definition of the adverse effects of noise is as follows:

> *Change in the morphology and physiology of an organism that results in impairment of functional capacity to compensate for additional stress, or increases in the susceptibility of an organism to the harmful effects of other environmental influences. Includes any temporary or long-term lowering of the physical, psychological or social functioning of humans or human organs* (WHO 2001).

An earlier definition of annoyance was "a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them" (Koelega HS.(ed.) 1987; Lindvall T. and Radford EP.(eds.) 1973; WHO 1999). The WHO considers annoyance an adverse health effect of noise in addition to sleep disturbance, performance effects, and psychological effects such as irritability (WHO 2001). Annoyance was also defined as a feeling of displeasure with varying tolerance levels. WHO also characterized annoyance as a feeling that increases with noise impulses as opposed to a steady noise (WHO 2001).

As specifically related to low frequency noise generated from wind turbines, Pedersen *et al.* noted a dose response relationship between calculated A-weighted sound pressure levels from wind turbines and noise annoyance in a cross-sectional study that was conducted in five dwelling areas in Sweden. It was determined that the study respondents were annoyed by the wind turbines at a higher level than other community noises, such as road traffic (Pedersen E. and Waye KP. 2004). It was also found the noise annoyance was related to visual or aesthetic interference, and attitude or sensitivity toward to wind turbine (Pedersen E. and Waye KP. 2004). Importantly, it should be noted that the Swedish wind turbines were all upwind devices which had a blade passage frequency of 1.4 Hz, but unlike earlier downwind turbines with contained low frequency noise, these turbines had upwind rotor blades and the noise was much more broadband (Pedersen E. and Waye KP. 2004).

In addition to annoyance, the relationship between wind turbine noise and self-reported health and well-being factors was also researched by Pedersen *et al.* It was confirmed that there was no correlation between A-weighted sound pressure levels from wind turbines and any health or

well-being factors, such as the respondent's status of chronic disease, diabetes, or cardiovascular disease (Pedersen E. and Persson, Waye K. 2007). However, among the 31 respondents who stated that they were annoyed by the wind turbine noise, out of 754 respondents, 36% reported that their sleep was disturbed and 19% reported being tired (Pedersen E. and Persson, Waye K. 2007). Both of these findings were statistically significantly higher in comparison to those respondents who were not annoyed. Recall bias is likely to occur among annoyed individuals, and it is not apparent that this bias was considered in this study. Furthermore, Pedersen *et al.* also identified that living in a rural area, as opposed to an urban area, increased the risk of perceiving wind turbine noise and being annoyed by it (Pedersen E. and Persson, Waye K. 2007).

The underlying complaint of annoyance is, in and of itself, not a disease or a specific manifestation of a specific exposure, but instead a universal human response to a condition or situation that is not positively appreciated by the human receptor. The variability of annoyance and its link to undesirable factors makes it a prime indicator for the possibility of recall bias. Annoyances are highly variable in types (noise, smell, temperature, taste, vision) and vary from person to person. One can be annoyed by the action of others as well as their own individual actions. Thus "annoyance" is not a disease but a human response that is highly non-specific.

Disease vs. DIS-ease

The state of being in which individuals are uneasy, agitated or without ("dis") freedom from labor, pain, anxiety or physical annoyance ("ease") can often be undistinguishable from the state of disease as related to morbidity. Both states of being can be assessed objectively and subjectively. However, with physical illnesses, objective measureable indicators can be obtained through instrumentation testing that is typically absent of human error or influence. Subjective responses to stimuli are much harder to prove or disprove which is why it is very important to supplement a subjective response with an objective assessment.

Limitations of Scientific Literature

The research and scientific literature on the human health effects of low frequency noise exposure are limited. Most researchers have agreed that there are some uncertainties associated with the measurement and characterization of low frequency sound. The most important limitation of the current research involves the use of the A-weight scale. The WHO and other researchers have stated that the conventional method of using an A-weighted equivalent sound level may be inadequate for low frequency noise. There are other researchers who advocate that the current research using various weighted measures is sufficiently robust to be depended upon for the evaluation of the potential for sound related health effects. As a result of these diverse opinions, biased or conflicting conclusions may have been made about the level of low frequency sound and its human health effects.

Another significant limitation of the current research is the use of a small number of subjects or those with prejudicial views of wind turbines. Although it was noted in some studies that the questionnaires used were masked, it was quite possible the participants still had negative or unfavorable attitudes about the wind turbines and the low frequency noise that was generated. The presence of wind turbines has instigated heightened levels of annoyance and NIMBY (*Not In My Back Yard)* attitudes by the nearby residents. With such levels of annoyance and discontent, it is very plausible that the associated anxiety can engender health effects or amplify already existing health conditions. It would be beneficial to examine the health effects of low frequency noise among residents that did not experience the annoyance of the presence of wind turbines. There are health effects and adverse health effects and it is important to differentiate the between the two types of effects.

A common effect that has been observed with low frequency noise is vibration. Although the effects of low frequency noise and vibration have not been well characterized, objective body vibration results only from very high levels of low frequency noise, greater than those produced by wind turbines. Sleeplessness and insomnia have also been associated with low frequency

noise, but this finding has been poorly correlated and lacking in consistency. However, the level of annoyance with low frequency noise was found to be correlated with insomnia.

Conclusions

Noise exposures outside the workplace have not been studied as extensively as those that occur in the workplace. There have been pockets of research centering on population exposures to highway traffic noise, noise exposures associated with living near commercial airports, and a scattering of other community noise sources, but there is not an extensive amount of research specifically on the health effects related to the sound exposure generated by wind turbines. However, wind turbines have been used in the U.S. since the late 1800s that has provided a baseline of knowledge and experience of their usage and presence in American lives. The first windmill for electricity production in the United States was built in Cleveland, Ohio by Charles Brush (Windpower.org 2003). In addition, wind turbines have continued to evolve (e.g. vertical to horizontal designs, downwind to upwind blade positioning and numerous sound reduction design changes with the mechanics of the turbine.) This evolution of design and the use of improved technology have resulted in quieter and more efficient wind turbines. Possibly the biggest change beyond these design changes is the trend to build more wind farms.

The implementation of wind turbines has resulted in a steadily growing population of individuals who live in their geographical and visual proximity. The literature clearly delineates a subset of this population that is annoyed by the nearby presence of wind turbines, but there has not been a specific disease or condition that has been found by the research community to be caused by the wind turbines. However, there have been illnesses, symptom complexes, and other health events attributed to wind turbines. This is to be expected given the circumstances and emotions that often surround the presence of wind turbine farms. This is a common phenomenon that is associated with activities that are perceived as a social disruption or infringement on personal rights or freedom.

The literature, both scientific and lay, clearly indicates the diversity of concerns regarding the presence of wind turbines near residences and communities. The science of sound is robust and has identified a number of health-related links to high level industrial sound in the workplace. This same science has not identified a causal link between any specific

health condition and exposure to the sound patterns generated by wind turbines of the type used today, perhaps because they generate far lower decibel levels than most vocational sources. However, the same science has determined that there is a range of sounds (some would say noise) that is clearly described by some as annoying. The process of being annoyed is a universal response that is not specific to wind turbines. The nonspecificity of annoyance leads to confusion and concern that the peer reviewed published scientific literature has not been able to adequately clarify. It appears that the scientific process of research and discussion before acceptance of new principles, or redefinition of previously accepted principles, has to some extent gotten caught up in rush of the lay media. Jumping from observations and speculation to cause and effect has been the result of this rush. This type of short cut has historically led to misdirection of resources and efforts.

The subjective nature of annoyance makes the job of epidemiological investigation difficult due to the biases that this subjectivity brings to any study. One cannot assess the level of effect of an activity by analyzing the experience and perceptions of those who are annoyed, without an appropriate comparison group and study design that reduces or delineates the biases that commonly hamper studies of emotionally-charged activities such as the positioning of wind turbines.

Believing without question can lead to positions of unnecessary vulnerability. It is often stated that the best advocate for a patient's rights, well-being and infallible medical care is the actual patient. Therefore, second medical opinions are often highly recommended despite who is giving the first opinion or what that opinion may be. Likewise, the rush to accept opinions without an adequate scientific or medical basis (e.g. objective medical tests) may actually lead to adverse health outcomes originating from the perception of health effects. From the positive perspective, there can be a healing effect or belief, as in the "placebo effect", which is often a key part of a medical encounter. Unfortunately, the reverse can also occur in the situation where a person is given "bad health news" that is unfounded or incorrect and person actually becomes physically and/or emotionally ill. It

is a delicate balance that must be maintained as health care professionals and public health officials weigh the science in making decisions.

Based on the literature review that was conducted for this white paper, there was not any scientifically peer-reviewed information found demonstrating a link between wind turbines and negative health effects.

References

Agrawal Y., Platz E.A., and Niparko J.K. (2009). Risk Factors for Hearing Loss in U.S. Adults: Data From the National Health and Nutrition Examination Survey, 1999 to 2002. *Otology & Neurotology.* 30.139 -145).

Baerwald, E. F., D'Amours, G. H., Klug, B. J., and Barclay, R. M. (8-26-2008). Barotrauma is a significant cause of bat fatalities at wind turbines. 18(16), (R695 -R696).

Bayne-Jones S., Burdette WJ., Cochran WG., Farber E., Fieser LF., Furth J., Hickam JB., LeMaistre C., Schuman LM., and Seevers MH. (1964). Smoking and Health. Report of the Advisory Committee to the Surgeon General of the Public Health Service. Report No. PublicHealth Services Publication No.1103.Washington, DC: Public Health Service.

Berglund, B., Hassmen, P., and Job, R. F. (1996). Sources and effects of low-frequency noise. *Journal of the Acoustical Society of America.* 99(5), (2985 -3002).

Bernstein, L. R., Trahiotis, C., and Hyde, E. L. (1998). Inter-individual differences in binaural detection of low-frequency or high-frequency tonal signals masked by narrow-band or broadband noise. *Journal of the Acoustical Society of America.* 103(4), (2069 -2078).

Bjor, B., Burstrom, L., Karlsson, M., Nilsson, T., Naslund, U., and Wiklund, U. (2007). Acute effects on heart rate variability when exposed to hand transmitted vibration and noise. 81(2), (193 -199).

Castelo Branco N.A.A. and Rodriguez E. (1999). The Vibroacoustic Disease - An Emerging Pathology. *Aviation Space & Environmental Medicine.* 70(3,Pt2), (A1 -A6).

CDC.Centers for Disease Control and Prevention. Peer Review Process of Research Applications. (4-13-2009), Available at http://www.cdc.gov/od/science/PHResearch/peerreview.htm.

Checkoway, H. (2004). Case-crossover designs in occupational health. *Journal of Occupational and Environmental Medicine.* 61(12), (953 -954).

Danielsson A. and Landstroem U. (1985). Blood Pressure Changes in Man During Infrasonic Exposure. *Acta Medica Scandinavica.* 217.531 -535).

Davies H.W., Teschke K., Kennedy S.M., Hodgson M.R., and Demers P.A. (2009). Occupational Noise Exposure and Hearing Protector Use in Canadian Lumber. *Journal of Occupational and Environmental Hygiene.* 6.32 -41).

Deans, J. K., Powell, A. D., and Jefferys, J. G. (9-1-2007). Sensitivity of coherent oscillations in rat hippocampus to AC electric fields. 583(Pt 2), (555 -565).

Desholm M. and Kaahlert J. (2005). Avian Collision Risk at an Offshore Wind Farm. *Biology Letters.* 1.296 -298).

Dobie, R. A. (2007). Noise-induced permanent threshold shifts in the occupational noise and hearing survey: an explanation for elevated risk estimates. 28(4), (580 -591).

DOE and EIA.U.S.Department of Energy, Energy Information Administration. Wind Energy -- Energy from Moving Air. (2008), Available at http://www.eia.doe.gov/kids/energyfacts/sources/renewable/wind.html.

Elsevier.Elsevier. The Peer Review Process. (2009), Available at http://www.elsevier.com/wps/find/intro.cws_home/review_process.

Findeis, H. and Peters, E. (2004). Disturbing effects of low frequency sound emissions and vibrations in residential buildings. 6(23), (29 -35).

Fiz, J. A., Gnitecki, J., Kraman, S. S., Wodicka, G. R., and Pasterkamp, H. (2008). Effect of body position on lung sounds in healthy young men. 133(3), (729 -736).

Fletcher H. and Munson W.A. (1933). Loudness, its definition, measurement and calculation. *Journal of the Acoustical Society of America.* 5.82 -108).

Graven S.N. (2000). The Full-Term and Premature Newborn. *Journal of Perinatology.* 20.S88 - S93).

Harding, G., Harding, P., and Wilkins, A. (2008). Wind turbines, flicker, and photosensitive epilepsy: characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them. 49(6), (1095 -1098).

Hau E., W*ind Turbines: Fundamentals,Technologies, Application,Economics*,2nd ed.(Springer, Berlin, 2006).

Hill AB. (1965). The Environment and Disease: Association or Causation? *Proc R Soc Med.* 58295 -300).

Inaba R. and Okada A. (1988). Study on the Effects of Infra- and Low Frequency Sound on the Sleep by EEG Recordings. *Journal of Low Frequency Noise, Vibration and Active Control.* 7.15 -19).

Inukai Y., Taya H., Miyano H., and Kuriyama H. (1986). A Multidimensional Evaluation Method for the Psychological Effects of Pure Tones at Low and Infrasonic Frequencies. *Journal of Low Frequency Noise, Vibration and Active Control.* 5.104 -112).

Inukai Y., Nakamura N., and Taya H. (2000). Unpleasantness and Acceptable Limits of Low Frequency Sound. *Journal of Low Frequency Noise, Vibration and Active Control.* 19.135 -140).

Ising, H., Lange-Asschenfeldt, H., Moriske, H. J., Born, J., and Eilts, M. (2004). Low frequency noise and stress: bronchitis and cortisol in children exposed chronically to traffic noise and exhaust fumes. *Noise and Health.* 6(23), (21 -28).

Ising, H. and Kruppa, B. (2004). Health effects caused by noise: evidence in the literature from the past 25 years. *Noise and Health.* 6(22), (5 -13).

Jauchem, J. R. and Cook, M. C. (2007). High-intensity acoustics for military nonlethal applications: a lack of useful systems. *Journal of Military Medicine.* 172(2), (182 -189).

Karpova N.I., Alekseev S., Erokhin V.N., Kadyskina E.N., and Reutov O.V. (1970). Early Response of the Organism to Low Frequency Acoustical Oscillations. *Noise and Vibration Bulletin.* 11(65), (100 -103).

Kim, J., Morest, D. K., and Bohne, B. A. (1997). Degeneration of axons in the brainstem of the chinchilla after auditory overstimulation. 103(1-2), (169 -191).

Koelega HS.(ed.), *Environmental Annoyance: Characterization, Measurement, and Control*,(Elsevier, Amsterdam, Netherlands, 1987).

Kondoh, Y., Arima, T., Okuma, J., and Hasegawa, Y. (1993). Response dynamics and directional properties of nonspiking local interneurons in the cockroach cercal system. 13(6), (2287 -2305).

Last JM, *A Dictionary of Epidemiology*,Fourth Edition ed.(Oxford University Press, 2001).

Leighton, T. G. (2007). What is ultrasound? 93(1-3), (3 -83).

Leventhall, G. (2007). What is infrasound? 93(1-3), (130 -137).

Leventhall, H. G. (2004). Low frequency noise and annoyance. 6(23), (59 -72).

Lindvall T. and Radford EP (eds.). (1973). Measurement of annoyance due to exposure to environmental factors. *Environmental Research.* 6.1 -36).

Maschke, C. (2004). Introduction to the special issue on low frequency noise. *Noise and Health.* 6(23), (1 -2).

McConnell, S. O., Schilt, M. P., and Dworski, J. G. (1992). Ambient noise measurements from 100 Hz to 80 kHz in an Alaskan fjord. 91(4 Pt 1), (1990 -2003).

MDHEHD.Minnesota Department of Health Environmental Health Division. Public Health Impacts of Wind Turbines. (5-22-2009), Available at http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf.

Mohr G.C., Cole J.N., Guild E., and Gierke von, H. E. (1965). Effects of Low Frequency and Infrasonic Noises on Man. 36.817 -827).

Moller, H. and Pedersen, C. S. (2004). Hearing at low and infrasonic frequencies. *Noise and Health.* 6(23), (37 -57).

Muly, S. M., Gross, J. S., Morest, D. K., and Potashner, S. J. (2002). Synaptophysin in the cochlear nucleus following acoustic trauma. *Experimental Neurology.* 177(1), (202 - 221).

Nakashima, A., Abel, S. M., Duncan, M., and Smith, D. (2007). Hearing, communication and cognition in low-frequency noise from armoured vehicles. 9(35), (35 -41).

NASD.National Agricultural Safety Database. Noise: The Invisible Hazard. (1993), Available at http://www.nasdonline.org/docs/d000801-d000900/d000882/d000882.html.

NMCPHC.NMCPHC (Navy and Marine Corps Public Health Center). Physics of Sound. (4-15-2009), Available at http://www-nmcphc.med.navy.mil/downloads/occmed/toolbox/PHYSICSOFSOUND.ppt.

NRC. (2007). Environmental Impacts of Wind-Energy Projects. *National Research Council.* Committee on Environmental Impacts of Wind-Energy Projects, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies140 -179).

Pedersen, E. and Waye, K. P. (2004). Perception and annoyance due to wind turbine noise--a dose-response relationship. *Journal of the Acoustical Society of America.* 116(6), (3460 - 3470).

Pedersen, E. and Persson, Waye K. (2007). Wind turbine noise, annoyance and self-reported health and well-being in different living environments. 64(7), (480 -486).

Pedersen, E. and Waye, K. P. (2008). Wind Turbines - Low Level Noise Sources Interfering With Restoration. *Environmental Research Letters.* 3.

Pei, Z., Sang, H., Li, R., Xiao, P., He, J., Zhuang, Z., Zhu, M., Chen, J., and Ma, H. (2007). Infrasound-induced hemodynamics, ultrastructure, and molecular changes in the rat myocardium. 22(2), (169 -175).

Persson Waye K. and Rylander R. (2001). The Extent of Annoyance and Long-Term Effects Among Persons Exposed to LFN in the Home Environment. 240.483 -497).

Sakai, A., Feigen, L. P., and Luisada, A. A. (1971). Frequency distribution of the heart sounds in normal man. *Cardiovascular Research.* 5(3), (358 -363).

Schust, M. (2004). Effects of low frequency noise up to 100 Hz. *Noise and Health.* 6(23), (73 - 85).

Shields, F. D. (2005). Low-frequency wind noise correlation in microphone arrays. *Journal of the Acoustical Society of America.* 117(6), (3489 -3496).

Sienkiewicz, Z. (2007). Rapporteur report: Roundup, discussion and recommendations. *Progress in Biophysics and Molecular Biology.* 93(1-3), (414 -420).

Silva, M. J., Dias, A., Barreta, A., Nogueira, P. J., Castelo-Branco, N. A., and Boavida, M. G. (2002). Low frequency noise and whole-body vibration cause increased levels of sister chromatid exchange in splenocytes of exposed mice. 22(3), (195 -203).

Slarve R.N. and Johnson D.L. (2009). Human Whole - Body Exposure to Infrasound. 46(4), (428 -431).

Slovic P., Fischhoff B., and Lichtenstein S. (1982). Why Study Risk Perception. *Risk Analysis.* 2(2), (83 -93).

Takahashi, Y., Yonekawa, Y., Kanada, K., and Maeda, S. (1999). A pilot study on the human body vibration induced by low frequency noise. *Industrial Health.* 37(1), (28 -35).

Takahashi, Y., Yonekawa, Y., and Kanada, K. (2001). A new approach to assess low frequency noise in the working environment. *Industrial Health.* 39(3), (281 -286).

Takahashi, Y., Kanada, K., Yonekawa, Y., and Harada, N. (2005). A study on the relationship between subjective unpleasantness and body surface vibrations induced by high-level low-frequency pure tones. *Industrial Health.* 43(3), (580 -587).

Tesarz M., Kjellberg A., Landstroem U., and Holmberg K. (1997). Subjective Response Patterns Related to Low Frequency Noise. *Journal of Low Frequency Noise, Vibration and Active Control.* 16(2), (145 -149).

U.S.EPA.U.S.Environmental Protection Agency. A Summary of General Assessment Factors for Evaluating the Quality of Scientific and Technical Information. (2003), Available at http://www.epa.gov/osa/spc/pdfs/assess2.pdf.

UK Parliament and House of Commons.House of Commons, The United Kingdom Parliament. The Origin of the Scientific Journal and the Process of Peer Review. (2004), Available at http://eprints.ecs.soton.ac.uk/13105/1/399we23.htm.

UNSW.The University of New South Wales. dB: What is a decibel? (2005), Available at http://www.phys.unsw.edu.au/jw/dB.html.

Waye K. (2004). Effects of Low-Frequency Noise on Sleep. *Noise and Health.* 6(23), (87 -91).

WHO.World Health Organization. WHO Guidelines for Community Noise - A complete, authoritative guide on the effects of noise pollution on health: 3. Adverse health effects of noise. (1999), Available at http://www.ruidos.org/Noise/Comnoise-3.pdf.

WHO.World Health Organization, Presentation at the TRB Session 391 "Setting an Agenda for Transportation Noise Management Policies in the United States" 10 January 2001,

Washington DC, USA. World Health Organization Guidelines on Community Noise. (2001), Available at http://www.adc40.org/docs/schwela.pdf.

Windpower.org.Danish Wind Industry Association. A Wind Energy Pioneer: Charles F. Brush. (7-23-2003), Available at http://www.windpower.org/en/pictures/brush.htm.

Appendix A

Final Literature

List #	Year	Author	Title	Journal	Soundness	Applicability and Utility	Clarity and Completeness	Uncertainty and Variability	Evaluation and Review	Did Not Review
Search Term: Infrasound AND Health Effects										
1	2007	Sienkiewicz Z.	Rapporteur report: Roundup, discussion and recommendations.	Prog Biophys Mol Biol.	**	**	**	**	**	
2	2007	Leventhall G.	What is infrasound?	Prog Biophys Mol Biol.	**	**	**	**	**	
3	2004	Feldmann J. et al.	Effects of low frequency noise on man--a case study.	Noise Health.		4				x
4	1999	Pawlaczyk-Luszczyńska M.	Evaluation of occupational exposure to infrasonic noise in Poland.	Int J Occup Med Environ Health.		4				x
5	1996	Pawlaczyk-Luszczyńska M.	Infrasound in the occupational and general environment: a three-element microphone measuring method for locating distant sources of infrasound.	Int J Occup Med Environ Health.		4				x

List #	Year	Author	Title	Journal	Soundness	Applicability and Utility	Clarity and Completeness	Uncertainty and Variability	Evaluation and Review	Did Not Review
Search Term: Low-Frequency Noise AND Health Effects										
6	2005	Hori K. et al.	Influence of sound and light on heart rate variability	J Hum Ergol (Tokyo).		4				x
7	2005	Takahashi Y et al.	A study on the relationship between subjective unpleasantness and body surface vibrations induced by high-level low-frequency pure tones.	Ind Health.	2	4	2	2	2	
8	2004	Schust M. et al.	Effects of low frequency noise up to 100 Hz	Noise Health.	**	**	**	**	**	
9	2004	Ising H. et al.	Low frequency noise and stress: bronchitis and cortisol in children exposed chronically to traffic noise and exhaust fumes	Noise Health.	1	4	1	1	2	

List #	Year	Author	Title	Journal	Soundness	Applicability and Utility	Clarity and Completeness	Uncertainty and Variability	Evaluation and Review	Did Not Review
10	2002	Silva MJ. et al.	Low frequency noise and whole-body vibration cause increased levels of sister chromatid exchange in splenocytes of exposed mice.	Teratog Carcinog Mutagen.	2	3	2	1	1	
11	2001	Takahashi Y et al.	A new approach to assess low frequency noise in the working environment	Ind Health.	2	4	1	2	1	
12	2000	Graven SN.	Sound and the developing infant in the NICU: conclusions and recommendations for care	J Perinatol.	**	**	**	**	**	
13	1999	Silva MJ. et al.	Sister chromatid exchange analysis in workers exposed to noise and vibration	Aviat Space Environ Med.		4				x
14	1999	Alves-Pereira M.	Noise-induced extra-aural pathology: a review and commentary	Aviat Space Environ Med.		4				x

List #	Year	Author	Title	Journal	Soundness	Applicability and Utility	Clarity and Completeness	Uncertainty and Variability	Evaluation and Review	Did Not Review
15	1999	Takahashi Y et al.	A pilot study on the human body vibration induced by low frequency noise	Ind Health.	2	4	2	2	1	
16	1996	Berglund B. et al.	Sources and effects of low-frequency noise.	J Acoust Soc Am.	**	**	**	**	**	
17	1993	Seidel H.	The problem of a "vibration disease" caused by low-frequency whole-body vibration (wbv) is critically discussed.	Am J Ind Med.	**	**	**	**	**	
Search Term: Low-Frequency Sound AND Health Effects										
18	2008	Carrubba S. et al.	The effects of low-frequency environmental-strength electromagnetic fields on brain electrical activity: a critical review of the literature	Electromagn Biol Med.		4				x

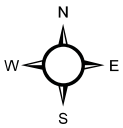
Search Term: Wind Power AND Noise										
List #	**Year**	**Author**	**Title**	**Journal**	**Soundness**	**Applicability and Utility**	**Clarity and Completeness**	**Uncertainty and Variability**	**Evaluation and Review**	**Did Not Review**
19	2005	Shields FD.	Low-frequency wind noise correlation in microphone arrays	J Acoust Soc Am.	**	**	**	**	**	
20	2004	Pedersen E. et al.	Perception and annoyance due to wind turbine noise--a dose-response relationship	J Acoust Soc Am.	3	5	5	2	3	
21	1998	Munro KJ. et al.	Are clinical measurements of uncomfortable loudness levels a valid indicator of real-world auditory discomfort?	Br J Audiol.		4				x
22	1992	McConnell SO. et al.	Ambient noise measurements from 100 Hz to 80 kHz in an Alaskan fjord.	J Acoust Soc Am.	**	**	**	**	**	
Search Term: Wind Turbines										
23	2008	Harding G. et al.	Wind turbines, flicker, and photosensitive epilepsy: characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them	Epilepsia.	**	**	**	**	**	

List #	Year	Author	Title	Journal	Soundness	Applicability and Utility	Clarity and Completeness	Uncertainty and Variability	Evaluation and Review	Did Not Review
24	2007	Pedersen E. et al.	Wind turbine noise, annoyance and self-reported health and well-being in different living environments.	Occup Environ Med.	3	5	5	2	3	
Search Term: Wind Turbines AND Noise										
ALREADY INCLUDED IN OTHER SEARCHES										
Other articles found in *Noise and Health*										
25	2004	Waye K.	Effects of low frequency noise on sleep.	Noise and Health	**	**	**	**	**	
26	2004	Moller H. et al.	Hearing at low and infrasonic frequencies	Noise and Health	**	**	**	**	**	
27	2004	Maschke C.	Introduction to the special issue on low frequency noise	Noise and Health	**	**	**	**	**	
28	2004	Leventhall H.	Low frequency noise and annoyance	Noise and Health	**	**	**	**	**	
29	2004	Findeis H. et al.	Disturbing effects of low frequency sound emissions and vibrations in residential buildings	Noise and Health	**	**	**	**	**	

I-8 at McCain Valley Road

SDG&E Sunrise Powerlink – 500 kV transmission line (Approved) and Tule Wind Project – 138 kV transmission line

SDG&E Sunrise Powerlink – 500 kV transmission line (Approved)



Attachment G.1 Revised Table G-1 (February 2011)

Table G-1
Summary of Proposed Project Adverse and Unavoidable Impacts
(Revised to reflect Impact Determination Changes)

Impact No.	General Impact Description	Project Specific Impact Description	Justification for Proposed Change
~~Tule-BIO-10~~	~~Presence of transmission lines and wind turbines may result in electrocution of, and/or collisions by, listed or sensitive bird or bat species.~~	~~With mitigation, turbines would cause adverse and under CEQA significant and unavoidable (Class I) impacts to sensitive bird species, such as golden eagles (*Aquila chrysaetos*).~~	Please consider changing Impact Tule-BIO-10 to a Class II impact and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.2, Biological Resources.
Tule-VIS-1	The project would have a substantial adverse effect on a scenic vista (County land only).	Adverse and under CEQA significant and unavoidable for County jurisdictional areas (Class I) Impacts to scenic views resulting from the project would occur where portions of the wind turbine development would be visible from the ~~Carrizo Overlook,~~ Ribbonwood Trail, and the Ribbonwood Road Pathway.	Please consider changing Impact Tule-VIS-1 to a Class III impact for BLM land and a Class I impact for the County land only, based on Tule Wind, LLC's comments to Section D.3, Visual Resources.
~~Tule-VIS-3~~	~~The project would substantially degrade the existing visual character or quality of the site and its surroundings.~~	~~With mitigation the wind turbines and associated energy transmission lines would substantially degrade the visual character of the project site and surrounding area and would be adverse and under CEQA significant and unavoidable (Class I).~~	Please consider changing Impact Tule-VIS-3 to a less than significant impact (Class III) based on Tule Wind, LLC's comments to Section D.3, Visual Resources.
~~Tule-VIS-4~~	~~The project would create a substantial new source of light or glare that would adversely affect day or nighttime views in the area.~~	~~Nighttime lighting of the project would be visible in the area and would adversely impact the nighttime views of the site. No mitigation is available to reduce this impact and under CEQA would be significant and unavoidable (Class I).~~	Please consider changing Impact Tule-VIS-4 to a Class III impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.3, Visual Resources. The O&M/Substation facility is proposed to be located on BLM jurisdictional lands and would not be subject to County requirements. Neverthless, the O&M/Substation will adhere to the County standard regarding lighting. The O&M/Substation would be classified under the Class II, Parking Lots and Security classification, Zone A (within 15 miles of Laguna or Palomar Observatory) to utilize fully shielded low pressure sodium lamp types not to exceed 4050 lumens

			output. The operation of the project would not affect the nighttime views (dark skies) in the Boulevard area. The proposed turbine configuration would require each turbine positioned at each end of the line or string of turbines to have a standard flashing red (L864) or white (L-865) light visible from 360 degrees, with placement at the beginning and end of a turbine string and no more than one-half mile spacing. The project does not propose lighting which would cause substantial lighting to affect day or nighttime views, thus impacts from lighting and glare are less than significant (Class III). Existing similar lighting exists in the local area.
~~Tule VIS-5~~	~~Construction of the project or the presence of project components would result in an inconsistency with federal, state, or local regulations, plans, and standards applicable to the protection of visual resources.~~	~~The project would not be consistent with all applicable plans, policies, and regulations relevant to the project area, including the County of San Diego Draft General Plan Conservation and Open Space Element, and the Mountain Empire Subregional Plan. Since the project would conflict with identified policies, the resulting impact would be adverse and cannot be mitigated.~~	Please consider changing Impact Tule-VIS-5 to a Class IV no impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.3, Visual Resources. The Draft County General Plan does not apply to the Tule Wind Project. The following goals and polices are considered consistent with the project; therefore, a less than significant impact is identified. Please consider changing the determination to reflect this information.
~~Tule CUL-3~~	~~Construction of the project would cause an adverse change to Traditional Cultural Properties.~~	~~With mitigation impacts would remain adverse and under CEQA significant and unavoidable (Class I) to Traditional Cultural Properties as avoiding direct and indirect impacts to TCPs such as traditional landscapes, topographic elements including sacred mountains, or use areas may not be completely feasible given the geographic expanse of some of these resources.~~	Please consider changing Impact Tule-CUL-3 to a Class III impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.7, Cultural and Paleontological Resources. With respect to impacts to potentially identified human remains and TCPs, please note that any Class I determinations are contingent upon discovery. To date, no TCPs or human remains have been found. Please change to a Class III impact. This section specifically deals with TCPs, but none has been identified or recorded. The excerpt discusses Native American cultural resources noted by the NAHC to occur in the Tule project area, and then refers to such NAHC sacred sites as TCPs. Sacred sites are not by default TCPs, and the two should not be linked in the same discussion of impacts. TCPs are formally recorded and evaluated for NRHP eligibility. According to Dave Singleton,

			NAHC director (personal communication, January 4, 2011) the NAHC records sacred sites and does not keep records consistent with the format required for submission to the NRHP for evaluation of eligibility as a TCP. The NAHC's goal is to record places of significance to Native peoples, not formally TCPs. Singleton confirmed that the Draft EIR/EIS should not confuse sacred sites and TCPs, and the consideration given to each with respect to impacts.
~~Tule-NOI-1~~	~~Construction noise would substantially disturb sensitive receptors and violate local rules, standards, and/or ordinances.~~	~~With mitigation incorporated construction noise would create adverse and under CEQA significant and unavoidable (Class I) temporary noise impacts.~~	Please consider changing Impact Tule-NOI-1 to a Class II impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.8, Noise, based on mitigated noise levels as presented in the Noise Technical Report (HDR, Feb. 2011). Mitigation of construction noise impacts has been proposed by introduction of time constraints on the construction activities, Best Management Practices (BMP's) and movable noise barriers which would bring the closest receptors in compliance with the noise ordinance.
~~Tule-NOI-2~~	~~Construction activity would temporarily cause groundborne vibration~~	~~Construction noise would create adverse and under CEQA significant and unavoidable (Class I) temporary groundborne vibration impact.~~	Please consider changing Impact Tule-NOI-2 to a Class III impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.8, Noise, based on the design considerations and mitigation measures outlined in the Noise Technical Report (HDR, Feb. 2011). Both blasting and construction noise would be mitigated to comply with San Diego County ordinances Sec. 96.1.3301.2 Explosives and Fireworks – Applicability, wherein monitoring and inspection procedures are required. No residential structures would be within 50 feet of construction activities; therefore, construction-related groundborne vibration would not result in an adverse impact, and under CEQA, impacts would be considered less than significant (Class III).
Tule-AIR-1	Construction would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants.	Short-term, construction-related ~~VOC~~, NOx, PM10, and PM2.5 air emissions will remain adverse with mitigation and under	Please consider updating the list of short-term construction-related air emissions to exclude VOCs from the list of those that remain adverse with

		CEQA significant and unavoidable (Class I).	mitigation, based on Tule Wind, LLC's comments to Section D.11, Air Quality.
~~Tule-FF-2~~	~~Presence of project facilities including overhead transmission line would increase the probability of a wildfire.~~	~~With partial mitigation, the possibility that a transmission line fault will occur and start a fire remains an adverse impact and under CEQA significant and unavoidable (Class I)~~	Please consider changing Impact Tule-FF-2 to a Class II impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.15, Fire and Fuels Management. This impact has been reduced to a less than significant level based on the project design features and mitigation measures outlined in the Fire Protection Plans approved by the San Diego Rural Fire Protection District (Nov. 2010), and San Diego County Fire Authority (Feb. 2011).
~~Tule-FF-3~~	~~Presence of the overhead transmission line/facilities would reduce the effectiveness of firefighting.~~	~~With mitigation, the presence of the overhead transmission line will reduce aerial and ground firefighter effectiveness, and the impact would remain adverse and under CEQA significant and unavoidable (Class I)~~	Please consider changing Impact Tule-FF-3 to a Class II impact, and removing it from Table G-1 based on Tule Wind, LLC's comments to Section D.15, Fire and Fuels Management. This impact has been reduced to a less than significant level based on the project design features and mitigation measures outlined in the Fire Protection Plans approved by the San Diego Rural Fire Protection District (Nov. 2010), and San Diego County Fire Authority (Feb. 2011).