

Appendix E

Air Quality

Construction Emissions Summary - Uncontrolled (By Activity)

Activity	ROG	CO	Emissions (lbs)		PM10	PM2.5
			NOx	SOx		
<i>Survey</i>						
Exhaust Emissions	1.0	30.3	4.1	0.0	0.4	0.4
Fugitive Dust Emissions	-	-	-	-	564.5	119.5
<i>Material Staging Yard</i>						
Exhaust Emissions	203.8	803.4	2050.0	2.9	70.8	65.1
Fugitive Dust Emissions	-	-	-	-	6237.5	1320.2
<i>ROW Clearing</i>						
Exhaust Emissions	34.0	131.6	319.5	0.5	11.9	10.9
Fugitive Dust Emissions	-	-	-	-	1411.6	295.7
<i>Roads and Landing Work</i>						
Exhaust Emissions	53.7	200.1	516.3	0.7	18.9	17.4
Fugitive Dust Emissions	-	-	-	-	2401.7	502.2
<i>Guard Structure Installation</i>						
Exhaust Emissions	35.1	135.1	324.6	0.5	12.7	11.7
Fugitive Dust Emissions	-	-	-	-	511.4	107.9
<i>Remove Existing Conductor and OHGW</i>						
Exhaust Emissions	37.2	151.7	404.0	0.6	13.4	12.3
Fugitive Dust Emissions	-	-	-	-	709.8	150.2
<i>Remove Existing Towers</i>						
Exhaust Emissions	58.2	225.5	454.6	0.5	26.3	24.2
Fugitive Dust Emissions	-	-	-	-	1167.3	245.3
<i>Remove Existing Foundations</i>						
Exhaust Emissions	32.3	115.4	302.8	0.5	10.5	9.7
Fugitive Dust Emissions	-	-	-	-	1135.0	238.4
<i>Install Tower Foundations</i>						
Exhaust Emissions	41.9	182.3	438.8	0.8	15.4	14.1
Fugitive Dust Emissions	-	-	-	-	1651.2	348.6
<i>Tower Steel Haul</i>						
Exhaust Emissions	8.9	35.4	96.7	0.1	3.1	2.9
Fugitive Dust Emissions	-	-	-	-	748.0	157.4
<i>Tower Steel Assembly</i>						
Exhaust Emissions	171.5	714.2	1229.3	1.5	83.2	76.6
Fugitive Dust Emissions	-	-	-	-	3768.2	794.9
<i>Tower Erection</i>						
Exhaust Emissions	31.2	130.7	229.8	0.3	14.9	13.7
Fugitive Dust Emissions	-	-	-	-	917.4	193.3
<i>Install Tubular Pole Foundations</i>						
Exhaust Emissions	148.6	650.9	1657.4	3.1	59.1	54.4
Fugitive Dust Emissions	-	-	-	-	8827.9	1860.6
<i>Tubular Pole Haul</i>						
Exhaust Emissions	30.3	126.8	308.1	0.4	10.8	10.0
Fugitive Dust Emissions	-	-	-	-	2604.1	547.2
<i>Tubular Pole Assembly</i>						
Exhaust Emissions	81.5	367.4	678.9	0.9	34.3	31.6
Fugitive Dust Emissions	-	-	-	-	7368.2	1543.7

<i>Tubular Pole Erection</i>						
Exhaust Emissions	81.5	367.4	678.9	0.9	34.3	31.6
Fugitive Dust Emissions	-	-	-	-	7368.2	1543.7
<i>Install Conductor and OPGW</i>						
Exhaust Emissions	961.7	3967.5	10151.8	15.0	344.1	316.7
Fugitive Dust Emissions	-	-	-	-	36417.9	7677.9
<i>Guard Structure Removal</i>						
Exhaust Emissions	17.6	76.2	159.0	0.2	7.9	7.3
Fugitive Dust Emissions	-	-	-	-	723.0	152.7
<i>Rector Substation Modifications</i>						
Exhaust Emissions	305.1	1286.1	3337.0	5.0	115.8	106.5
Fugitive Dust Emissions	-	-	-	-	12461.6	2631.0
<i>Big Creek 3 Substation Modifications</i>						
Exhaust Emissions	6.3	28.2	64.7	0.1	2.4	2.2
Fugitive Dust Emissions	-	-	-	-	462.0	97.4
<i>Springville Substation Modifications</i>						
Exhaust Emissions	4.9	23.4	51.1	0.1	1.9	1.7
Fugitive Dust Emissions	-	-	-	-	404.1	85.2
<i>Vestal Substation Modifications</i>						
Exhaust Emissions	4.9	23.4	51.1	0.1	1.9	1.7
Fugitive Dust Emissions	-	-	-	-	404.1	85.2
<i>Restoration</i>						
Exhaust Emissions	96.7	350.9	921.0	1.3	33.5	30.9
Fugitive Dust Emissions	-	-	-	-	2945.5	616.1
Total Project Emissions (tons)						
	1.2	5.1	12.2	0.02	51.1	11.1

Fugitive Dust Emissions From Earth Disturbance During Construction ¹

Activity	Acres Disturbed Per Day	Work Days Per Activity	Pounds of PM10 Per Activity	Pounds of PM2.5 Per Activity
ROW Clearing	3.03	14	848	176
Roads and Landing Work	5.21	16	1668	347
Guard Structure Installation	0.44	10	88	18
Remove Existing Towers	1.50	16	480	100
Remove Existing Foundations	2.50	10	500	104
Install Tower Foundations	0.75	16	240	50
Tower Steel Haul	1.00	12	240	50
Tower Steel Assembly	1.00	36	720	150
Tower Erection	1.00	12	240	50
Install Tubular Pole Foundations	2.00	54	2160	449
Tubular Pole Haul	2.00	27	1080	225
Tubular Pole Assembly	4.00	54	4320	899
Tubular Pole Erection	4.00	54	4320	899
Install Conductor and Optical Ground Wire	3.60	115	8280	1,722
Guard Structure Removal	0.44	10	88	18
Rector Substation	1.00	90	1800	374
Big Creek 3 Substation Modifications	1.00	5	100	21
Springvile Substation Modifications	1.00	5	100	21
Vestal Substation Modifications	1.00	5	100	21
Restoration	5.00	20	2000	416
Total Uncontrolled (pounds)			29372	6,109
Total Controlled (pounds)²			14686	3055

Notes:

1) PM10 emissions were estimated based on an emission factor of 20 pounds of PM10 per acre per day (see below for reference). Number of acres disturbed per day and workdays per activity were derived from *Chapter 2, Project Description*. PM2.5 emissions were estimating using a SCAQMD PM2.5 fraction (0.208) of PM10 for construction fugitive dust (see reference)

2) Controlled emissions assume a 50 percent control from watering.

References:

CARB, 2002. *Area-Wide Source Methodologies, Chapter 7.7 Building Construction Dust*, Revised September, 2002.

SCAQMD, 2006. Final Methodology to Calculate PM2.5 and PM2.5 Significance Thresholds. Appendix A, Updated CEIDARS Table with PM2.5 Fraction.

Fugitive Dust Emissions From Road Travel During Construction

Equipment	Quantity	Days	Miles	Unpaved (lbs of PM10)	Unpaved (lbs of PM2.5)	Paved (lbs of PM10)	Paved (lbs of PM2.5)	Total (lbs of PM10)	Total (lbs of PM2.5)
Survey									
1/2 Ton Pick-up Truck, 4X4	2	20	50	280	59	2.2	0.4	282.2	59.7
Commute	4	20	25	280	59	2.2	0.4	282.2	59.7
<i>Subtotal</i>				<i>560</i>	<i>119</i>	<i>4.5</i>	<i>0.8</i>	<i>564.5</i>	<i>119.5</i>
Material Staging Yard									
1 Ton Crew Cab 4X4	1	260	50	1820	386	14.6	2.5	1834.6	388.3
Truck, Semi, Tractor	1	260	20	728	154	5.8	1.0	733.8	155.3
Commute	4	260	25	3640	772	29.1	4.9	3669.1	776.6
<i>Subtotal</i>				<i>6188</i>	<i>1312</i>	<i>49.5</i>	<i>8.4</i>	<i>6237.5</i>	<i>1320.2</i>
ROW Clearing									
1 Ton Crew Cab 4X4	1	9	50	63	13	0.5	0.1	63.5	13.4
Water Truck	2	9	50	126	27	1.0	0.2	127.0	26.9
Lowboy Truck/Trailer	1	9	10	13	3	0.1	0.0	12.7	2.7
10-cu. yd. Dump Truck	2	4	100	112	24	0.9	0.2	112.9	23.9
Commute	5	14	25	245	52	2.0	0.3	247.0	52.3
<i>Subtotal</i>				<i>559</i>	<i>118</i>	<i>4.5</i>	<i>0.8</i>	<i>563.1</i>	<i>119.2</i>
Roads and Landing Work									
1 Ton Crew Cab 4X4	2	16	50	224	47	1.8	0.3	225.8	47.8
Water Truck	2	16	50	224	47	1.8	0.3	225.8	47.8
Commute	5	16	25	280	59	2.2	0.4	282.2	59.7
<i>Subtotal</i>				<i>728</i>	<i>154</i>	<i>5.8</i>	<i>1.0</i>	<i>733.8</i>	<i>155.3</i>
Guard Structure Installation									
3/4 Ton Pick-up Truck, 4X4	2	10	50	140	30	1.1	0.2	141.1	29.9
1 Ton Crew Cab Flat Bed, 4X4	1	10	50	70	15	0.6	0.1	70.6	14.9
Commute	6	10	25	210	45	1.7	0.3	211.7	44.8
<i>Subtotal</i>				<i>420</i>	<i>89</i>	<i>3.4</i>	<i>0.6</i>	<i>423.4</i>	<i>89.6</i>
Remove Existing Conductor and OHGW									
1 Ton Crew Cab 4X4	4	9	50	252	53	2.0	0.3	254.0	53.8
Truck, Semi, Tractor	1	8	10	11	2	0.1	0.0	11.3	2.4
Commute	14	9	25	441	93	3.5	0.6	444.5	94.1
<i>Subtotal</i>				<i>704</i>	<i>149</i>	<i>5.6</i>	<i>1.0</i>	<i>709.8</i>	<i>150.2</i>
Remove Existing Towers									
1 Ton Crew Cab, 4X4	3	16	50	336	71	2.7	0.5	338.7	71.7
Flat Bed Truck & Trailer	1	7	10	10	2	0.1	0.0	9.9	2.1
Commute	6	16	25	336	71	2.7	0.5	338.7	71.7
<i>Subtotal</i>				<i>682</i>	<i>145</i>	<i>5.5</i>	<i>0.9</i>	<i>687.3</i>	<i>145.5</i>
Remove Existing Foundations									
10-cu. yd. Dump Truck	2	10	100	280	59	2.2	0.4	282.2	59.7
1 Ton Crew Cab Flat Bed, 4X4	1	10	50	70	15	0.6	0.1	70.6	14.9
Commute	8	10	25	280	59	2.2	0.4	282.2	59.7
<i>Subtotal</i>				<i>630</i>	<i>134</i>	<i>5.0</i>	<i>0.9</i>	<i>635.0</i>	<i>134.4</i>
Install Tower Foundations									
1 Ton Crew Cab Flat Bed, 4X4	2	16	50	224	47	1.8	0.3	225.8	47.8
10 cubic yard Dump Truck	2	16	50	224	47	1.8	0.3	225.8	47.8
4000 gallon Water Truck	1	16	50	112	24	0.9	0.2	112.9	23.9
10 cu. yd. Concrete Mixer Truck	3	16	50	336	71	2.7	0.5	338.7	71.7
Commute	9	16	25	504	107	4.0	0.7	508.0	107.5
<i>Subtotal</i>				<i>1400</i>	<i>297</i>	<i>11.2</i>	<i>1.9</i>	<i>1411.2</i>	<i>298.7</i>

Tower Steel Haul

1 Ton Crew Cab Flat Bed, 4X4	2	12	50	168	36	1.3	0.2	169.3	35.8
40' Flat Bed Truck & Trailer	2	12	50	168	36	1.3	0.2	169.3	35.8
Commute	4	12	25	168	36	1.3	0.2	169.3	35.8
<i>Subtotal</i>				<i>504</i>	<i>107</i>	<i>4.0</i>	<i>0.7</i>	<i>508.0</i>	<i>107.5</i>

Tower Steel Assembly

3/4 Ton Pick-up Truck, 4X4	3	36	50	756	160	6.0	1.0	762.0	161.3
1 Ton Crew Cab Flat Bed, 4X4	2	36	50	504	107	4.0	0.7	508.0	107.5
Commute	14	36	25	1764	374	14.1	2.4	1778.1	376.4
<i>Subtotal</i>				<i>3024</i>	<i>641</i>	<i>24.2</i>	<i>4.1</i>	<i>3048.2</i>	<i>645.2</i>

Tower Erection

3/4 Ton Pick-up Truck, 4X4	2	12	50	168	36	1.3	0.2	169.3	35.8
1 Ton Crew Cab Flat Bed, 4X4	2	12	50	168	36	1.3	0.2	169.3	35.8
Commute	8	12	25	336	71	2.7	0.5	338.7	71.7
<i>Subtotal</i>				<i>672</i>	<i>142</i>	<i>5.4</i>	<i>0.9</i>	<i>677.4</i>	<i>143.4</i>

Install Tubular Pole Foundations

1 Ton Crew Cab Flat Bed, 4X4	3	54	50	1134	240	9.1	1.5	1143.1	241.9
10-cu. yd. Dump Truck	2	54	100	1512	321	12.1	2.0	1524.1	322.6
4000 gallon Water Truck	1	54	50	378	80	3.0	0.5	381.0	80.6
10 cu. yd. Concrete Mixer Truck	3	54	100	2268	481	18.1	3.1	2286.1	483.9
Commute	7	54	25	1323	280	10.6	1.8	1333.6	282.3
<i>Subtotal</i>				<i>6615</i>	<i>1402</i>	<i>52.9</i>	<i>8.9</i>	<i>6667.9</i>	<i>1411.3</i>

Tubular Pole Haul

3/4 Ton Pick-up Truck, 4X4	2	27	50	378	80	3.0	0.5	381.0	80.6
40' Flat Bed Truck & Trailer	2	27	100	756	160	6.0	1.0	762.0	161.3
Commute	4	27	25	378	80	3.0	0.5	381.0	80.6
<i>Subtotal</i>				<i>1512</i>	<i>321</i>	<i>12.1</i>	<i>2.0</i>	<i>1524.1</i>	<i>322.6</i>

Tubular Pole Assembly

3/4 Ton Pick-up Truck, 4X4	2	54	50	756	160	6.0	1.0	762.0	161.3
1 Ton Crew Cab Flat Bed, 4X4	2	54	50	756	160	6.0	1.0	762.0	161.3
Commute	8	54	25	1512	321	12.1	2.0	1524.1	322.6
<i>Subtotal</i>				<i>3024</i>	<i>641</i>	<i>24.2</i>	<i>4.1</i>	<i>3048.2</i>	<i>645.2</i>

Tubular Pole Erection

3/4 Ton Pick-up Truck, 4X4	2	54	50	756	160	6.0	1.0	762.0	161.3
1 Ton Crew Cab Flat Bed, 4X4	2	54	50	756	160	6.0	1.0	762.0	161.3
Commute	8	54	25	1512	321	12.1	2.0	1524.1	322.6
<i>Subtotal</i>				<i>3024</i>	<i>641</i>	<i>24.2</i>	<i>4.1</i>	<i>3048.2</i>	<i>645.2</i>

Install Conductor and OPGW

1 Ton Crew Cab Flat Bed, 4X4	5	115	50	4025	853	32.2	5.4	4057.2	858.7
Wire Truck & Trailer	6	115	50	4830	1024	38.6	6.5	4868.6	1030.5
Dump Truck (Trash)	1	115	50	805	171	6.4	1.1	811.4	171.7
3/4 Ton Pick-up Truck, 4X4	6	115	50	4830	1024	38.6	6.5	4868.6	1030.5
Pole Truck & Trailer	1	36	40	202	43	1.6	0.3	203.2	43.0
Fuel, Helicopter Support Truck	1	26	50	182	39	1.5	0.2	183.5	38.8
Low Boy Truck & Trailer	1	115	10	161	34	1.3	0.2	162.3	34.3
Commute	32	115	25	12880	2731	103.0	17.4	12983.0	2748.0
<i>Subtotal</i>				<i>27915</i>	<i>5918</i>	<i>223.3</i>	<i>37.7</i>	<i>28137.9</i>	<i>5955.6</i>

Guard Structure Removal

3/4 Ton Pick-up Truck, 4X4	2	10	50	140	30	1.1	0.2	141.1	29.9
1 Ton Crew Cab Flat Bed, 4X4	2	10	50	140	30	1.1	0.2	141.1	29.9
Extendable Flat Bed Pole Truck	2	10	50	140	30	1.1	0.2	141.1	29.9
Commute	6	10	25	210	45	1.7	0.3	211.7	44.8
<i>Subtotal</i>				<i>630</i>	<i>134</i>	<i>5.0</i>	<i>0.9</i>	<i>635.0</i>	<i>134.4</i>

Rector Substation Modifications

Crew Truck	2	40	50	560	119	4.5	0.8	564.5	119.5
Dump Truck	2	40	50	560	119	4.5	0.8	564.5	119.5
5 Ton Stake Bed Truck	1	40	50	280	59	2.2	0.4	282.2	59.7
8 Ton Stake Truck	1	90	50	630	134	5.0	0.9	635.0	134.4
Crew Cab Truck	2	90	50	1260	267	10.1	1.7	1270.1	268.8
Carryall Vehicle	2	90	50	1260	267	10.1	1.7	1270.1	268.8
Lift gate Truck	1	90	50	630	134	5.0	0.9	635.0	134.4
Pickup	2	90	50	1260	267	10.1	1.7	1270.1	268.8
Support Truck	2	90	50	1260	267	10.1	1.7	1270.1	268.8
Support Truck	1	15	50	105	22	0.8	0.1	105.8	22.4
Wire Truck	2	60	10	168	36	1.3	0.2	169.3	35.8
Test Truck	1	60	10	84	18	0.7	0.1	84.7	17.9
Commute	8	90	25	2520	534	20.2	3.4	2540.2	537.6
<i>Subtotal</i>				<i>10577</i>	<i>2242</i>	<i>84.6</i>	<i>14.3</i>	<i>10661.6</i>	<i>2256.6</i>

Big Creek 3 Substation Modifications

8 Ton Stake Truck	1	4	50	28	6	0.2	0.0	28.2	6.0
Crew Cab Truck	2	4	50	56	12	0.4	0.1	56.4	11.9
Lift gate Truck	1	4	50	28	6	0.2	0.0	28.2	6.0
Pickup	2	4	50	56	12	0.4	0.1	56.4	11.9
Support Truck	2	4	50	56	12	0.4	0.1	56.4	11.9
Test Truck	1	5	10	7	1	0.1	0.0	7.1	1.5
Wire Truck	1	4	10	6	1	0.0	0.0	5.6	1.2
Commute	7	5	25	123	26	1.0	0.2	123.5	26.1
<i>Subtotal</i>				<i>359</i>	<i>76</i>	<i>2.9</i>	<i>0.5</i>	<i>362.0</i>	<i>76.6</i>

Springville Substation Modifications

8 Ton Stake Truck	1	3	50	21	4	0.2	0.0	21.2	4.5
Crew Cab Trucks	2	3	50	42	9	0.3	0.1	42.3	9.0
Lift gate Truck	1	3	50	21	4	0.2	0.0	21.2	4.5
Pickup	2	3	50	42	9	0.3	0.1	42.3	9.0
Support Truck	2	3	50	42	9	0.3	0.1	42.3	9.0
Test Truck	1	5	10	7	1	0.1	0.0	7.1	1.5
Wire Truck	1	3	10	4	1	0.0	0.0	4.2	0.9
Commute	7	5	25	123	26	1.0	0.2	123.5	26.1
<i>Subtotal</i>				<i>302</i>	<i>64</i>	<i>2.4</i>	<i>0.4</i>	<i>304.1</i>	<i>64.4</i>

Vestal Substation Modifications

8 Ton Stake Truck	1	3	50	21	4	0.2	0.0	21.2	4.5
Crew Cab Trucks	2	3	50	42	9	0.3	0.1	42.3	9.0
Lift gate Truck	1	3	50	21	4	0.2	0.0	21.2	4.5
Pickup	2	3	50	42	9	0.3	0.1	42.3	9.0
Support Truck	2	3	50	42	9	0.3	0.1	42.3	9.0
Test Truck	1	5	10	7	1	0.1	0.0	7.1	1.5
Wire Truck	1	3	10	4	1	0.0	0.0	4.2	0.9
Commute	7	5	25	123	26	1.0	0.2	123.5	26.1
<i>Subtotal</i>				<i>302</i>	<i>64</i>	<i>2.4</i>	<i>0.4</i>	<i>304.1</i>	<i>64.4</i>

Restoration

1 Ton Crew Cab 4X4	2	20	50	280	59	2.2	0.4	282.2	59.7
Water Truck	1	20	50	140	30	1.1	0.2	141.1	29.9
Lowboy Truck/Trailer	1	20	10	28	6	0.2	0.0	28.2	6.0
Commute	7	20	25	490	104	3.9	0.7	493.9	104.5
<i>Subtotal</i>				<i>938</i>	<i>199</i>	<i>7.5</i>	<i>1.3</i>	<i>945.5</i>	<i>200.1</i>

Total Construction Emissions From Paved and Unpaved Road Travel

Unmitigated Emissions From Travel on Unpaved Roads (tons)	35.6	7.6
Unmitigated Emissions From Travel on Paved Roads (tons)	0.3	0.0
Total Unmitigated Emissions from Travel on Paved and Unpaved Roads (tons)	35.9	7.6
Mitigated Emissions From Travel on Unpaved Roads (tons)	11.5	2.4
Total Mitigated Emissions From Travel on Paved and Unpaved Roads (tons)	11.8	2.5

Assumptions:

*20 percent of roads are unpaved and 80 percent are paved.

*PM10 Emission factors derived from URBEMIS2007 default assumptions (see reference below)

*PM2.5 Emissions are derived from PM2.5 fractions of PM10 (0.169 for paved roads and 0.212 for unpaved roads) obtained from the South Coast Air Quality Management District (see reference below)

* Mitigated unpaved road emissions assume a 28 percent control by limiting speed limits to 15 mph and a 55 percent control from watering unpaved roads.

References:

Jones and Stokes Associates, 2007. *Software User's Guide: URBEMIS2007 for Windows, Appendix C, Pages C-2 through C-3*, prepared by Jones and Stokes Associates for South Coast Air Quality Management District, November 2007.

South Coast Air Quality Management District (SCAQMD), 2006. *Final Methodology to Calculate PM2.5 and PM2.5 Significance Thresholds, Appendix A, Updated CEIDARS Table with PM2.5 Fraction*.

Construction Equipment Exhaust Emissions

Equipment	HP	Fuel	Qty	Days	Hours	Miles	ROG EF	ROG (lbs)	CO EF	CO (lbs)	NOx EF	NOX (lbs)	SOX EF	SOX (lbs)	PM10 EF	PM10 (lbs)	PM2.5 Fraction	PM2.5 (lbs)	CO2 EF	CO2 (lbs)	CH4 EF	CH4 (lbs)
Survey																						
1/2 Ton Pick-up Truck, 4X4	200	Gas	2	20	8	50	0.0002	0.43	0.008	15.44	0.001	2.32	0.00001	0.02	0.00011	0.23	0.93	0.21	1.067	2134.00	0.00008	0.15
Commute			4	20		25	0.0003	0.56	0.007	14.82	0.001	1.80	0.00001	0.02	0.00009	0.18	0.93	0.17	1.016	2032.86	0.00007	0.14
<i>Subtotal Survey (pounds/activity)</i>								0.99		30.26		4.12		0.04		0.41		0.38		4166.86		0.29
Material Staging Yard																						
1 Ton Crew Cab 4X4	300	Diesel	1	260		50	0.0002	2.41	0.001	17.97	0.003	37.31	0.00001	0.09	0.00017	2.21	0.92	2.03	0.766	9958.00	0.00001	0.11
30 Ton Crane Truck	300	Diesel	1	260	2		0.0980	50.96	0.341	177.37	0.919	477.78	0.00110	0.57	0.03420	17.78	0.92	16.36	107.964	56141.12	0.00800	4.16
10,000 lb Rough Terrain Fork Lift	200	Diesel	1	260	5		0.1082	140.66	0.311	404.82	1.126	1463.54	0.00150	1.95	0.03660	47.58	0.92	43.77	136.515	177468.98	0.00980	12.74
Truck, Semi, Tractor	350	Diesel	1	260		20	0.0005	2.53	0.002	10.57	0.009	48.00	0.00001	0.06	0.00017	0.87	0.92	0.80	1.164	6052.80	0.00002	0.11
Commute			4	260		25	0.0003	7.28	0.007	192.66	0.001	23.40	0.00001	0.26	0.00009	2.34	0.93	2.17	1.016	26427.18	0.00007	1.82
<i>Subtotal Materials Staging Yard (pounds/activity)</i>								203.84		803.39		2050.03		2.93		70.78		65.14		276048.08		18.95
ROW Clearing																						
1 Ton Crew Cab 4X4	300	Diesel	1	9		50	0.0002	0.08	0.001	0.62	0.003	1.29	0.00001	0.00	0.00017	0.08	0.92	0.07	0.766	344.70	0.00001	0.00
Road Grader	350	Diesel	1	9	6		0.1362	7.35	0.464	25.07	1.273	68.72	0.00160	0.09	0.04690	2.53	0.92	2.33	160.495	8666.71	0.01230	0.66
Track Type Dozer	350	Diesel	1	9	6		0.1860	10.04	0.714	38.57	1.673	90.32	0.00180	0.10	0.06590	3.56	0.92	3.27	181.298	9790.08	0.01680	0.91
Water Truck	350	Diesel	2	9		50	0.0005	0.44	0.002	1.83	0.009	8.31	0.00001	0.01	0.00017	0.15	0.92	0.14	1.164	1047.60	0.00002	0.02
Lowboy Truck/Trailer	500	Diesel	1	9		10	0.0020	0.18	0.009	0.83	0.028	2.48	0.00004	0.00	0.00110	0.10	0.92	0.09	4.503	405.27	0.00009	0.01
Backhoe/Front Loader	350	Diesel	1	14	6		0.1669	14.02	0.540	45.32	1.582	132.91	0.00270	0.23	0.05490	4.61	0.92	4.24	241.181	20259.18	0.01510	1.27
Small Loader	50	Diesel	1	4	8		0.0317	1.01	0.148	4.74	0.205	6.54	0.00030	0.01	0.01800	0.58	0.92	0.53	21.534	689.09	0.00290	0.09
10-cu. yd. Dump Truck	350	Diesel	2	4		100	0.0005	0.39	0.002	1.63	0.009	7.38	0.00001	0.01	0.00017	0.13	0.92	0.12	1.164	931.20	0.00002	0.02
Commute			5	14		25	0.0003	0.49	0.007	12.97	0.001	1.58	0.00001	0.02	0.00009	0.16	0.93	0.15	1.016	1778.75	0.00007	0.12
<i>Subtotal ROW Clearing (pounds/activity)</i>								34.02		131.57		319.52		0.46		11.90		10.95		43912.58		3.11
Roads and Landing Work																						
1 Ton Crew Cab 4X4	300	Diesel	2	16		50	0.0002	0.30	0.001	2.21	0.003	4.59	0.00001	0.01	0.00017	0.27	0.92	0.25	0.766	1225.60	0.00001	0.01
Road Grader	350	Diesel	1	16	4		0.1362	8.72	0.464	29.71	1.273	81.44	0.00160	0.10	0.04690	3.00	0.92	2.76	160.495	10271.66	0.01230	0.79
Track Type Dozer	350	Diesel	1	16	6		0.1860	17.86	0.714	68.57	1.673	160.56	0.00180	0.17	0.06590	6.33	0.92	5.82	181.298	17404.58	0.01680	1.61
Drum Type Compactor	250	Diesel	1	16	4		0.1346	8.61	0.408	26.11	1.409	90.20	0.00170	0.11	0.04980	3.19	0.92	2.93	152.953	9788.96	0.01210	0.77
Water Truck	350	Diesel	2	16		50	0.0005	0.78	0.002	3.25	0.009	14.77	0.00001	0.02	0.00017	0.27	0.92	0.25	1.164	1862.40	0.00002	0.04
Lowboy Truck/Trailer	500	Diesel	1	8		50	0.0020	0.81	0.009	3.67	0.028	11.00	0.00004	0.02	0.00110	0.44	0.92	0.40	4.503	1801.20	0.00009	0.04
Backhoe/Front Loader	350	Diesel	1	16	6		0.1669	16.02	0.540	51.79	1.582	151.90	0.00270	0.26	0.05490	5.27	0.92	4.85	241.181	23153.35	0.01510	1.45
Commute			5	16		25	0.0003	0.56	0.007	14.82	0.001	1.80	0.00001	0.02	0.00009	0.18	0.93	0.17	1.016	2032.86	0.00007	0.14
<i>Subtotal Roads and Landing Work (pounds/activity)</i>								53.66		200.14		516.26		0.71		18.94		17.43		67540.61		4.85
Guard Structure Installation																						
3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	10		50	0.0002	0.19	0.001	1.38	0.003	2.87	0.00001	0.01	0.00017	0.17	0.92	0.16	0.766	766.00	0.00001	0.01
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	1	10		50	0.0002	0.09	0.001	0.69	0.003	1.44	0.00001	0.00	0.00017	0.08	0.92	0.08	0.766	383.00	0.00001	0.00
Compressor	120	Diesel	1	10	4		0.0872	3.49	0.327	13.08	0.526	21.04	0.00060	0.02	0.04830	1.93	0.92	1.78	46.908	1876.32	0.00790	0.32
Auger Truck	500	Diesel	1	10	6		0.1352	8.11	0.552	33.13	1.314	78.83	0.00310	0.19	0.04360	2.62	0.92	2.41	311.029	18661.75	0.01220	0.73
Extendable Flat Bed Pole Truck	350	Diesel	1	10	6		0.1583	9.50	0.466	27.95	1.361	81.68	0.00190	0.11	0.04930	2.96	0.92	2.72	190.463	11427.76	0.01430	0.86
80ft. Hydraulic Man-lift	350	Diesel	1	10	4		0.0872	3.49	0.341	13.62	1.137	45.46	0.00150	0.06	0.03380	1.35	0.92	1.24	148.865	5954.62	0.00790	0.32
30 Ton Crane Truck	500	Diesel	1	10	6		0.1633	9.80	0.569	34.11	1.531	91.88	0.00180	0.11	0.05700	3.42	0.92	3.15	179.940	10796.37	0.01470	0.88
Commute			6	10		25	0.0003	0.42	0.007	11.12	0.001	1.35	0.00001	0.02	0.00009	0.14	0.93	0.13	1.016	1524.65	0.00007	0.11
<i>Subtotal Guard Structure Installation (pounds/activity)</i>								35.08		135.07		324.56		0.52		12.67		11.66		51390.46		3.22

Remove Existing Conductor and OHGW																					
1 Ton Crew Cab 4X4	300	Diesel	4	9	50	0.0002	0.33	0.001	2.49	0.003	5.17	0.00001	0.01	0.00017	0.31	0.92	0.28	0.766	1378.80	0.00001	0.02
80ft. Hydraulic Man-lift	350	Diesel	3	9	8	0.0872	18.84	0.341	73.55	1.137	245.51	0.00150	0.32	0.03380	7.30	0.92	6.72	148.865	32154.93	0.00790	1.71
Sleeving Truck	300	Diesel	1	9	4	0.1357	4.89	0.399	14.37	1.167	42.01	0.00160	0.06	0.04230	1.52	0.92	1.40	163.254	5877.13	0.01220	0.44
30 Ton Crane Truck	300	Diesel	1	9	4	0.0980	3.53	0.341	12.28	0.919	33.08	0.00110	0.04	0.03420	1.23	0.92	1.13	107.964	3886.69	0.00800	0.29
Truck, Semi, Tractor	350	Diesel	1	8	10	0.0005	0.04	0.002	0.16	0.009	0.74	0.00001	0.00	0.00017	0.01	0.92	0.01	1.164	93.12	0.00002	0.00
Bull Wheel Puller	500	Diesel	1	6	4	0.2261	5.43	0.665	15.97	1.945	46.68	0.00270	0.06	0.07050	1.69	0.92	1.56	272.089	6530.15	0.02040	0.49
Hydraulic Rewind Puller	300	Diesel	1	6	4	0.1357	3.26	0.399	9.58	1.167	28.01	0.00160	0.04	0.04230	1.02	0.92	0.93	163.254	3918.09	0.01220	0.29
Commute			14	9	25	0.0003	0.88	0.007	23.34	0.001	2.84	0.00001	0.03	0.00009	0.28	0.93	0.26	1.016	3201.75	0.00007	0.22
Subtotal Remove Existing Conductor and OHGW (pounds/activity)						37.19			151.75		404.01		0.57		13.36		12.30		57040.66		3.45
Remove Existing Towers																					
1 Ton Crew Cab, 4X4	300	Diesel	3	16	50	0.0002	0.44	0.001	3.32	0.003	6.89	0.00001	0.02	0.00017	0.41	0.92	0.37	0.766	1838.40	0.00001	0.02
80 Ton Rough Terrain Crane	350	Diesel	1	8	8	0.1143	7.32	0.398	25.47	1.072	68.61	0.00120	0.08	0.03990	2.55	0.92	2.35	125.958	8061.29	0.01030	0.66
30 Ton Crane Truck	300	Diesel	2	16	6	0.0980	18.82	0.341	65.49	0.919	176.41	0.00110	0.21	0.03420	6.57	0.92	6.04	107.964	20729.03	0.00800	1.54
Compressor Truck	300	Diesel	2	8	8	0.2180	27.90	0.817	104.58	1.315	168.32	0.00100	0.13	0.12100	15.49	0.92	14.25	117.270	15010.56	0.02000	2.56
Flat Bed Truck & Trailer	350	Diesel	1	7	10	0.0005	0.03	0.002	0.14	0.009	0.65	0.00001	0.00	0.00017	0.01	0.92	0.01	1.164	81.48	0.00002	0.00
Rough Terrain Forklift	200	Diesel	1	7	4	0.1082	3.03	0.311	8.72	1.126	31.52	0.00150	0.04	0.03660	1.02	0.92	0.94	136.515	3822.41	0.00980	0.27
Commute			6	16	25	0.0003	0.67	0.007	17.78	0.001	2.16	0.00001	0.02	0.00009	0.22	0.93	0.20	1.016	2439.43	0.00007	0.17
Subtotal Remove Existing Tower (pounds/activity)						58.22			225.50		454.55		0.50		26.27		24.17		51982.60		5.22
Remove Existing Foundations																					
10-cu. yd. Dump Truck	350	Diesel	2	10	100	0.0005	0.97	0.002	4.07	0.009	18.46	0.00001	0.02	0.00017	0.34	0.92	0.31	1.164	2328.00	0.00002	0.04
Backhoe/Front Loader	350	Diesel	1	10	8	0.1669	13.35	0.540	43.16	1.582	126.58	0.00270	0.22	0.05490	4.39	0.92	4.04	241.181	19294.46	0.01510	1.21
Excavator	300	Diesel	2	10	8	0.1082	17.31	0.329	52.69	0.966	154.56	0.00140	0.22	0.03440	5.50	0.92	5.06	140.115	22418.45	0.00980	1.57
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	1	10	50	0.0002	0.09	0.001	0.69	0.003	1.44	0.00001	0.00	0.00017	0.08	0.92	0.08	0.766	383.00	0.00001	0.00
Commute			8	10	25	0.0003	0.56	0.007	14.82	0.001	1.80	0.00001	0.02	0.00009	0.18	0.93	0.17	1.016	2032.86	0.00007	0.14
Subtotal Remove Foundations (pounds/activity)						32.29			115.43		302.84		0.49		10.50		9.66		46456.76		2.96
Install Tower Foundations																					
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	16	50	0.0002	0.30	0.001	2.21	0.003	4.59	0.00001	0.01	0.00017	0.27	0.92	0.25	0.766	1225.60	0.00001	0.01
30 Ton Crane Truck	300	Diesel	1	16	5	0.0980	7.84	0.341	27.29	0.919	73.50	0.00110	0.09	0.03420	2.74	0.92	2.52	107.964	8637.10	0.00800	0.64
Backhoe/Front Loader	200	Diesel	1	16	8	0.1011	12.94	0.300	38.41	1.024	131.12	0.00150	0.19	0.03320	4.25	0.92	3.91	137.266	17570.09	0.00910	1.16
Auger Truck	500	Diesel	1	16	8	0.1352	17.31	0.552	70.67	1.314	168.17	0.00310	0.40	0.04360	5.58	0.92	5.13	311.029	39811.72	0.01220	1.56
10 cubic yard Dump Truck	350	Diesel	2	16	50	0.0005	0.78	0.002	3.25	0.009	14.77	0.00001	0.02	0.00017	0.27	0.92	0.25	1.164	1862.40	0.00002	0.04
4000 gallon Water Truck	350	Diesel	1	16	50	0.0005	0.39	0.002	1.63	0.009	7.38	0.00001	0.01	0.00017	0.13	0.92	0.12	1.164	931.20	0.00002	0.02
10 cu. yd. Concrete Mixer Truck	425	Diesel	3	16	50	0.0006	1.38	0.005	12.14	0.015	35.98	0.00003	0.07	0.00075	1.80	0.92	1.66	3.318	7963.20	0.00003	0.06
Commute			9	16	25	0.0003	1.01	0.007	26.68	0.001	3.24	0.00001	0.04	0.00009	0.32	0.93	0.30	1.016	3659.15	0.00007	0.25
Subtotal Install Tower Foundations (pounds/activity)						41.94			182.28		438.76		0.82		15.37		14.14		81660.46		3.75
Tower Steel Haul																					
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	12	50	0.0002	0.22	0.001	1.66	0.003	3.44	0.00001	0.01	0.00017	0.20	0.92	0.19	0.766	919.20	0.00001	0.01
40' Flat Bed Truck & Trailer	350	Diesel	2	12	50	0.0005	0.58	0.002	2.44	0.009	11.08	0.00001	0.01	0.00017	0.20	0.92	0.19	1.164	1396.80	0.00002	0.03
10,000 lb Rough Terrain Fork Lift	200	Diesel	1	12	6	0.1082	7.79	0.311	22.42	1.126	81.06	0.00150	0.11	0.03660	2.64	0.92	2.42	136.515	9829.05	0.00980	0.71
Commute			4	12	25	0.0003	0.34	0.007	8.89	0.001	1.08	0.00001	0.01	0.00009	0.11	0.93	0.10	1.016	1219.72	0.00007	0.08
Subtotal Tower Steel Haul (pounds/activity)						8.93			35.41		96.66		0.14		3.15		2.90		13364.77		0.83
Tower Steel Assembly																					
30 Ton Crane Truck	300	Diesel	2	36	8	0.0980	56.45	0.341	196.47	0.919	529.23	0.00110	0.63	0.03420	19.70	0.92	18.12	107.964	62187.09	0.00800	4.61
3/4 Ton Pick-up Truck, 4X4	300	Diesel	3	36	50	0.0002	1.00	0.001	7.46	0.003	15.50	0.00001	0.04	0.00017	0.92	0.92	0.84	0.766	4136.40	0.00001	0.05
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	36	50	0.0002	0.67	0.001	4.98	0.003	10.33	0.00001	0.02	0.00017	0.61	0.92	0.56	0.766	2757.60	0.00001	0.03
Compressor Trailer	350	Diesel	2	36	6	0.2543	109.86	0.954	411.91	1.535	662.90	0.00160	0.69	0.14090	60.87	0.92	56.00	136.815	59104.17	0.02290	9.89
Commute			14	36	25	0.0003	3.53	0.007	93.37	0.001	11.34	0.00001	0.13	0.00009	1.13	0.93	1.05	1.016	12807.02	0.00007	0.88
Subtotal Tower Steel Assembly (pounds/activity)						171.50			714.19		1229.30		1.51		83.23		76.58		140992.28		15.46

Tower Erection																					
3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	12	50	0.0002	0.22	0.001	1.66	0.003	3.44	0.00001	0.01	0.00017	0.20	0.92	0.19	0.766	919.20	0.00001	0.01
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	12	50	0.0002	0.22	0.001	1.66	0.003	3.44	0.00001	0.01	0.00017	0.20	0.92	0.19	0.766	919.20	0.00001	0.01
Compressor Trailer	350	Diesel	1	12	6	0.2543	18.31	0.954	68.65	1.535	110.48	0.00160	0.12	0.14090	10.14	0.92	9.33	136.815	9850.69	0.02290	1.65
180 Ton Rough Terrain Crane	500	Diesel	1	12	6	0.1633	11.76	0.569	40.93	1.531	110.26	0.00180	0.13	0.05700	4.10	0.92	3.78	179.940	12955.64	0.01470	1.06
Commute			8	12	25	0.0003	0.67	0.007	17.78	0.001	2.16	0.00001	0.02	0.00009	0.22	0.93	0.20	1.016	2439.43	0.00007	0.17
<i>Subtotal Tower Erection (pounds/activity)</i>							31.18		130.68		229.79		0.28		14.87		13.68		27084.17		2.90
Install Tubular Pole Foundations																					
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	3	54	50	0.0002	1.50	0.001	11.19	0.003	23.25	0.00001	0.05	0.00017	1.38	0.92	1.27	0.766	6204.60	0.00001	0.07
30 Ton Crane Truck	300	Diesel	1	54	5	0.0980	26.46	0.341	92.10	0.919	248.08	0.00110	0.30	0.03420	9.23	0.92	8.50	107.964	29150.20	0.00800	2.16
Backhoe/Front Loader	200	Diesel	1	54	8	0.1011	43.68	0.300	129.64	1.024	442.54	0.00150	0.65	0.03320	14.34	0.92	13.20	137.266	59299.04	0.00910	3.93
Auger Truck	500	Diesel	1	54	8	0.1352	58.41	0.552	238.51	1.314	567.56	0.00310	1.34	0.04360	18.84	0.92	17.33	311.029	134364.57	0.01220	5.27
10-cu. yd. Dump Truck	350	Diesel	2	54	100	0.0005	5.26	0.002	21.96	0.009	99.69	0.00001	0.12	0.00017	1.81	0.92	1.67	1.164	12571.20	0.00002	0.24
4000 gallon Water Truck	350	Diesel	1	54	50	0.0005	1.32	0.002	5.49	0.009	24.92	0.00001	0.03	0.00017	0.45	0.92	0.42	1.164	3142.80	0.00002	0.06
10 cu. yd. Concrete Mixer Truck	425	Diesel	3	54	100	0.0006	9.32	0.005	81.97	0.015	242.84	0.00003	0.50	0.00075	12.18	0.92	11.20	3.318	53751.60	0.00003	0.43
Commute			7	54	25	0.0003	2.65	0.007	70.02	0.001	8.51	0.00001	0.09	0.00009	0.85	0.93	0.79	1.016	9605.26	0.00007	0.66
<i>Subtotal Tubular Pole Foundation (pounds/activity)</i>							148.59		650.88		1657.39		3.08		59.08		54.36		308089.28		12.82
Tubular Pole Haul																					
3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	27	50	0.0002	0.50	0.001	3.73	0.003	7.75	0.00001	0.02	0.00017	0.46	0.92	0.42	0.766	2068.20	0.00001	0.02
40' Flat Bed Truck & Trailer	350	Diesel	2	27	100	0.0005	2.63	0.002	10.98	0.009	49.85	0.00001	0.06	0.00017	0.91	0.92	0.83	1.164	6285.60	0.00002	0.12
180 Ton Rough Terrain Crane	500	Diesel	1	27	6	0.1633	26.45	0.569	92.10	1.531	248.09	0.00180	0.29	0.05700	9.23	0.92	8.50	179.940	29150.20	0.01470	2.38
Commute			4	27	25	0.0003	0.76	0.007	20.01	0.001	2.43	0.00001	0.03	0.00009	0.24	0.93	0.23	1.016	2744.36	0.00007	0.19
<i>Subtotal Tubular Pole Haul (pounds/activity)</i>							30.34		126.81		308.11		0.40		10.84		9.98		40248.36		2.71
Tubular Pole Assembly																					
3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	54	50	0.0002	1.00	0.001	7.46	0.003	15.50	0.00001	0.04	0.00017	0.92	0.92	0.84	0.766	4136.40	0.00001	0.05
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	54	50	0.0002	1.00	0.001	7.46	0.003	15.50	0.00001	0.04	0.00017	0.92	0.92	0.84	0.766	4136.40	0.00001	0.05
Compressor Trailer	120	Diesel	1	54	5	0.0872	23.54	0.327	88.26	0.526	142.05	0.00060	0.16	0.04830	13.04	0.92	12.00	46.908	12665.19	0.00790	2.13
180 Ton Rough Terrain Crane	500	Diesel	1	54	6	0.1633	52.91	0.569	184.19	1.531	496.17	0.00180	0.58	0.05700	18.47	0.92	16.99	179.940	58300.40	0.01470	4.76
Commute			8	54	25	0.0003	3.02	0.007	80.03	0.001	9.72	0.00001	0.11	0.00009	0.97	0.93	0.90	1.016	10977.44	0.00007	0.76
<i>Subtotal Tubular Pole Assembly (pounds/activity)</i>							81.48		367.41		678.94		0.93		34.31		31.58		90215.83		7.75
Tubular Pole Erection																					
3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	54	50	0.0002	1.00	0.001	7.46	0.003	15.50	0.00001	0.04	0.00017	0.92	0.92	0.84	0.766	4136.40	0.00001	0.05
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	54	50	0.0002	1.00	0.001	7.46	0.003	15.50	0.00001	0.04	0.00017	0.92	0.92	0.84	0.766	4136.40	0.00001	0.05
Compressor Trailer	120	Diesel	1	54	5	0.0872	23.54	0.327	88.26	0.526	142.05	0.00060	0.16	0.04830	13.04	0.92	12.00	46.908	12665.19	0.00790	2.13
180 Ton Rough Terrain Crane	500	Diesel	1	54	6	0.1633	52.91	0.569	184.19	1.531	496.17	0.00180	0.58	0.05700	18.47	0.92	16.99	179.940	58300.40	0.01470	4.76
Commute			8	54	25	0.0003	3.02	0.007	80.03	0.001	9.72	0.00001	0.11	0.00009	0.97	0.93	0.90	1.016	10977.44	0.00007	0.76
<i>Subtotal Tubular Pole Erection (pounds/activity)</i>							81.48		367.41		678.94		0.93		34.31		31.58		90215.83		7.75

Install Conductor and OPGW

1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	5	115	50	0.0002	5.32	0.001	39.73	0.003	82.51	0.00001	0.19	0.00017	4.88	0.92	4.49	0.766	22022.50	0.00001	0.25
Wire Truck & Trailer	350	Diesel	6	115	50	0.0005	16.81	0.002	70.14	0.009	318.47	0.00001	0.38	0.00017	5.78	0.92	5.32	1.164	40158.00	0.00002	0.76
Dump Truck (Trash)	350	Diesel	1	115	50	0.0005	2.80	0.002	11.69	0.009	53.08	0.00001	0.06	0.00017	0.96	0.92	0.89	1.164	6693.00	0.00002	0.13
3/4 Ton Pick-up Truck, 4X4	300	Diesel	6	115	50	0.0002	6.39	0.001	47.68	0.003	99.02	0.00001	0.23	0.00017	5.86	0.92	5.39	0.766	26427.00	0.00001	0.30
30 Ton Manitex	350	Diesel	4	115	6	0.0872	240.67	0.341	939.78	1.137	3137.02	0.00150	4.14	0.03380	93.29	0.92	85.82	148.865	410868.50	0.00790	21.80
22 Ton Manitex	350	Diesel	1	115	8	0.0872	80.22	0.341	313.26	1.137	1045.67	0.00150	1.38	0.03380	31.10	0.92	28.61	148.865	136956.17	0.00790	7.27
Splicing Rig	350	Diesel	2	115	2	0.1583	72.82	0.466	214.27	1.361	626.24	0.00190	0.87	0.04930	22.68	0.92	20.86	190.463	87612.80	0.01430	6.58
Splicing Lab	300	Diesel	2	26	2	0.1583	16.46	0.466	48.44	1.361	141.59	0.00190	0.20	0.04930	5.13	0.92	4.72	190.463	19808.11	0.01430	1.49
Pole Truck & Trailer	500	Diesel	1	36	40	0.0020	2.93	0.009	13.22	0.028	39.60	0.00004	0.06	0.00110	1.58	0.92	1.45	4.503	6484.32	0.00009	0.14
20,000 lb. Rough Terrain Fork Lift	350	Diesel	1	115	2	0.1325	30.48	0.419	96.26	1.299	298.84	0.00180	0.41	0.04490	10.33	0.92	9.50	179.438	41270.83	0.01200	2.76
580 Case Backhoe	120	Diesel	1	115	2	0.0760	17.48	0.355	81.74	0.491	112.86	0.00060	0.14	0.04320	9.94	0.92	9.14	51.682	11886.77	0.00690	1.59
Spacing Cart	10	Diesel	3	29	8	0.0118	8.21	0.062	42.94	0.074	51.30	0.00020	0.14	0.00300	2.09	0.92	1.92	10.100	7029.60	0.00110	0.77
Static Truck	350	Diesel	1	115	2	0.1583	36.41	0.466	107.13	1.361	313.12	0.00190	0.44	0.04930	11.34	0.92	10.43	190.463	43806.40	0.01430	3.29
3 Drum Straw line Puller	300	Diesel	2	115	4	0.1357	124.84	0.399	367.36	1.167	1073.55	0.00160	1.47	0.04230	38.92	0.92	35.80	163.254	150193.31	0.01220	11.22
60k Puller	525	Diesel	1	115	3	0.2374	81.90	0.699	241.05	2.042	704.52	0.00280	0.97	0.07400	25.53	0.92	23.49	285.694	98564.29	0.02140	7.38
Sag Cat w2 winch	350	Diesel	2	115	2	0.1669	76.77	0.540	248.17	1.582	727.86	0.00270	1.24	0.05490	25.25	0.92	23.23	241.181	110943.12	0.01510	6.95
D8 Cat	300	Diesel	4	115	1	0.1431	65.83	0.462	212.70	1.356	623.90	0.00230	1.06	0.04700	21.62	0.92	19.89	206.726	95094.10	0.01290	5.93
Hughes 500 E Helicopter		Jet A	1	26	6	0.3010	46.96	1.140	177.84	3.747	584.53	0.00400	0.62	0.11600	18.10	0.92	16.65	384.000	59904.00		0.00
Fuel, Helicopter Support Truck	300	Diesel	1	26	50	0.0002	0.24	0.001	1.80	0.003	3.73	0.00001	0.01	0.00017	0.22	0.92	0.20	0.766	995.80	0.00001	0.01
Low Boy Truck & Trailer	500	Diesel	1	115	10	0.0020	2.34	0.009	10.56	0.028	31.63	0.00004	0.05	0.00110	1.26	0.92	1.16	4.503	5178.45	0.00009	0.11
Commute			32	115	25	0.0003	25.76	0.007	681.72	0.001	82.80	0.00001	0.92	0.00009	8.28	0.93	7.68	1.016	93511.56	0.00007	6.44
<i>Subtotal Install Conductor and OPGW (pounds/activity)</i>							961.65		3967.48		10151.83		14.99		344.12		316.66		1475408.63		85.17

Guard Structure Removal

3/4 Ton Pick-up Truck, 4X4	300	Diesel	2	10	50	0.0002	0.19	0.001	1.38	0.003	2.87	0.00001	0.01	0.00017	0.17	0.92	0.16	0.766	766.00	0.00001	0.01
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	10	50	0.0002	0.19	0.001	1.38	0.003	2.87	0.00001	0.01	0.00017	0.17	0.92	0.16	0.766	766.00	0.00001	0.01
Compressor Trailer	120	Diesel	2	10	4	0.0872	6.98	0.327	26.15	0.526	42.09	0.00060	0.05	0.04830	3.86	0.92	3.55	46.908	3752.65	0.00790	0.63
Extendable Flat Bed Pole Truck	350	Diesel	2	10	50	0.0005	0.49	0.002	2.03	0.009	9.23	0.00001	0.01	0.00017	0.17	0.92	0.15	1.164	1164.00	0.00002	0.02
80ft. Hydraulic Man-lift	350	Diesel	1	10	4	0.0872	3.49	0.341	13.62	1.137	45.46	0.00150	0.06	0.03380	1.35	0.92	1.24	148.865	5954.62	0.00790	0.32
30 Ton Crane Truck	500	Diesel	1	10	6	0.0980	5.88	0.341	20.47	0.919	55.13	0.00110	0.07	0.03420	2.05	0.92	1.89	107.964	6477.82	0.00800	0.48
Commute			6	10	25	0.0003	0.42	0.007	11.12	0.001	1.35	0.00001	0.02	0.00009	0.14	0.93	0.13	1.016	1524.65	0.00007	0.11
<i>Subtotal Guard Structure Removal (pounds/activity)</i>							17.62		76.15		159.00		0.21		7.91		7.28		20405.73		1.57

Rector Substation Modifications

Crew Truck	300	Diesel	2	40	50	0.0002	0.74	0.001	5.53	0.003	11.48	0.00001	0.03	0.00017	0.68	0.92	0.62	0.766	3064.00	0.00001	0.04		
Dump Truck	350	Diesel	2	40	50	0.0005	1.95	0.002	8.13	0.009	36.92	0.00001	0.04	0.00017	0.67	0.92	0.62	1.164	4656.00	0.00002	0.09		
5 Ton Stake Bed Truck	235	Diesel	1	40	50	0.0002	0.37	0.001	2.76	0.003	5.74	0.00001	0.01	0.00017	0.34	0.92	0.31	0.766	1532.00	0.00001	0.02		
Trencher	85	Diesel	1	10	8	0.0958	7.66	0.335	26.79	0.584	46.75	0.00050	0.04	0.05020	4.02	0.92	3.69	45.926	3674.09	0.00860	0.69		
Drill Rig	500	Diesel	1	10	8	0.1352	10.82	0.552	44.17	1.314	105.10	0.00310	0.25	0.04360	3.49	0.92	3.21	311.029	24882.33	0.01220	0.98		
Tractor	350	Diesel	1	40	7	0.1669	46.73	0.540	151.06	1.582	443.04	0.00270	0.76	0.05490	15.37	0.92	14.14	241.181	67530.60	0.01510	4.23		
Forklift	200	Diesel	1	40	4	0.0473	7.57	0.131	20.88	0.466	74.54	0.00070	0.11	0.01490	2.38	0.92	2.19	61.642	9862.72	0.00430	0.69		
Mobile crane	300	Diesel	1	5	8	0.0980	3.92	0.341	13.64	0.919	36.75	0.00110	0.04	0.03420	1.37	0.92	1.26	107.964	4318.55	0.00880	0.35		
8 Ton Stake Truck	200	Diesel	1	90	50	0.0003	1.55	0.002	7.74	0.003	12.59	0.00001	0.03	0.00030	1.36	0.92	1.25	0.784	3528.00	0.00002	0.07		
Crew Cab Truck	300	Diesel	2	90	50	0.0002	1.67	0.001	12.44	0.003	25.83	0.00001	0.06	0.00017	1.53	0.92	1.41	0.766	6894.00	0.00001	0.08		
Carryall Vehicle	300	Gas	2	90	50	0.0002	2.06	0.007	66.35	0.001	11.59	0.00001	0.12	0.00011	0.99	0.92	0.91	1.459	13131.00	0.00009	0.79		
50 ton Crane	350	Diesel	1	45	8	0.1143	41.15	0.398	143.24	1.072	385.92	0.00120	0.43	0.03990	14.36	0.92	13.21	125.958	45344.77	0.01030	3.71		
Lift gate Truck	300	Diesel	1	90	50	0.0002	0.83	0.001	6.22	0.003	12.92	0.00001	0.03	0.00017	0.76	0.92	0.70	0.766	3447.00	0.00001	0.04		
Pickup	200	Diesel	2	90	50	0.0003	3.10	0.002	15.48	0.003	25.18	0.00001	0.06	0.00030	2.72	0.92	2.50	0.784	7056.00	0.00002	0.14		
Forklift	200	Diesel	1	90	8	0.0473	34.06	0.131	93.96	0.466	335.45	0.00070	0.50	0.01490	10.73	0.92	9.87	61.642	44382.24	0.00430	3.10		
Manlift	350	Diesel	2	90	8	0.0872	125.57	0.341	490.32	1.137	1636.70	0.00150	2.16	0.03380	48.67	0.92	44.78	148.865	214366.18	0.00790	11.38		
Support Truck	300	Diesel	2	90	50	0.0002	1.67	0.001	12.44	0.003	25.83	0.00001	0.06	0.00017	1.53	0.92	1.41	0.766	6894.00	0.00001	0.08		
Carry deck crane	300	Diesel	1	10	8	0.0980	7.84	0.341	27.29	0.919	73.50	0.00110	0.09	0.03420	2.74	0.92	2.52	107.964	8637.10	0.00880	0.70		
Support Truck	300	Diesel	1	15	50	0.0002	0.14	0.001	1.04	0.003	2.15	0.00001	0.00	0.00017	0.13	0.92	0.12	0.766	574.50	0.00001	0.01		
Wire Truck	350	Diesel	2	60	10	0.0005	0.58	0.002	2.44	0.009	11.08	0.00001	0.01	0.00017	0.20	0.92	0.19	1.164	1396.80	0.00002	0.03		
Test Truck	300	Diesel	1	60	10	0.0002	0.11	0.001	0.83	0.003	1.72	0.00001	0.00	0.00017	0.10	0.92	0.09	0.766	459.60	0.00001	0.01		
Commute			8	90	25	0.0003	5.04	0.007	133.38	0.001	16.20	0.00001	0.18	0.00009	1.62	0.93	1.50	1.016	18295.74	0.00007	1.26		
<i>Subtotal Rector Substation Modification (pounds/activity)</i>							<i>305.12</i>		<i>1286.13</i>		<i>3337.01</i>		<i>5.03</i>		<i>115.76</i>		<i>106.51</i>				<i>493927.20</i>		<i>28.46</i>

Big Creek 3 Substation Modifications

8 Ton Stake Truck	200	Diesel	1	4	50	0.0003	0.07	0.002	0.34	0.003	0.56	0.00001	0.00	0.00030	0.06	0.92	0.06	0.784	156.80	0.00002	0.00		
Crew Cab Truck	300	Diesel	2	4	50	0.0002	0.07	0.001	0.55	0.003	1.15	0.00001	0.00	0.00017	0.07	0.92	0.06	0.766	306.40	0.00001	0.00		
50 ton Crane	350	Diesel	1	3	8	0.1143	2.74	0.398	9.55	1.072	25.73	0.00120	0.03	0.03990	0.96	0.92	0.88	125.958	3022.98	0.01030	0.25		
Lift gate Truck	300	Diesel	1	4	50	0.0002	0.04	0.001	0.28	0.003	0.57	0.00001	0.00	0.00017	0.03	0.92	0.03	0.766	153.20	0.00001	0.00		
Pickup	200	Diesel	2	4	50	0.0003	0.14	0.002	0.69	0.003	1.12	0.00001	0.00	0.00030	0.12	0.92	0.11	0.784	313.60	0.00002	0.01		
Forklift	200	Diesel	1	4	8	0.0473	1.51	0.131	4.18	0.466	14.91	0.00070	0.02	0.01490	0.48	0.92	0.44	61.642	1972.54	0.00430	0.14		
Manlift	350	Diesel	1	2	8	0.0872	1.40	0.341	5.45	1.137	18.19	0.00150	0.02	0.03380	0.54	0.92	0.50	148.865	2381.85	0.00790	0.13		
Support Truck	300	Diesel	2	4	50	0.0002	0.07	0.001	0.55	0.003	1.15	0.00001	0.00	0.00017	0.07	0.92	0.06	0.766	306.40	0.00001	0.00		
Test Truck	300	Diesel	1	5	10	0.0002	0.01	0.001	0.07	0.003	0.14	0.00001	0.00	0.00017	0.01	0.92	0.01	0.766	38.30	0.00001	0.00		
Wire Truck	350	Diesel	1	4	10	0.0005	0.02	0.002	0.08	0.009	0.37	0.00001	0.00	0.00017	0.01	0.92	0.01	1.164	46.56	0.00002	0.00		
Commute			7	5	25	0.0003	0.25	0.007	6.48	0.001	0.79	0.00001	0.01	0.00009	0.08	0.93	0.07	1.016	889.38	0.00007	0.06		
<i>Subtotal Big Creek 3 Substation Modification (pounds/activity)</i>							<i>6.32</i>		<i>28.22</i>		<i>64.67</i>		<i>0.10</i>		<i>2.42</i>		<i>2.23</i>				<i>9588.01</i>		<i>0.59</i>

Springville Substation Modifications

8 Ton Stake Truck	200	Diesel	1	3	50	0.0003	0.05	0.002	0.26	0.003	0.42	0.00001	0.00	0.00030	0.05	0.92	0.04	0.784	117.60	0.00002	0.00		
Crew Cab Trucks	300	Diesel	2	3	50	0.0002	0.06	0.001	0.41	0.003	0.86	0.00001	0.00	0.00017	0.05	0.92	0.05	0.766	229.80	0.00001	0.00		
50 ton Crane	350	Diesel	1	2	8	0.1143	1.83	0.398	6.37	1.072	17.15	0.00120	0.02	0.03990	0.64	0.92	0.59	125.958	2015.32	0.01030	0.16		
Lift gate Truck	300	Diesel	1	3	50	0.0002	0.03	0.001	0.21	0.003	0.43	0.00001	0.00	0.00017	0.03	0.92	0.02	0.766	114.90	0.00001	0.00		
Pickup	200	Diesel	2	3	50	0.0003	0.10	0.002	0.52	0.003	0.84	0.00001	0.00	0.00030	0.09	0.92	0.08	0.784	235.20	0.00002	0.00		
Forklift	200	Diesel	1	3	8	0.0473	1.14	0.131	3.13	0.466	11.18	0.00070	0.02	0.01490	0.36	0.92	0.33	61.642	1479.41	0.00430	0.10		
Manlifts	350	Diesel	1	2	8	0.0872	1.40	0.341	5.45	1.137	18.19	0.00150	0.02	0.03380	0.54	0.92	0.50	148.865	2381.85	0.00790	0.13		
Support Truck	300	Diesel	2	3	50	0.0002	0.06	0.001	0.41	0.003	0.86	0.00001	0.00	0.00017	0.05	0.92	0.05	0.766	229.80	0.00001	0.00		
Test Truck	300	Diesel	1	5	10	0.0002	0.01	0.001	0.07	0.003	0.14	0.00001	0.00	0.00017	0.01	0.92	0.01	0.766	38.30	0.00001	0.00		
Wire Truck	350	Diesel	1	3	10	0.0005	0.01	0.002	0.06	0.009	0.28	0.00001	0.00	0.00017	0.01	0.92	0.00	1.164	34.92	0.00002	0.00		
Commute			7	5	25	0.0003	0.25	0.007	6.48	0.001	0.79	0.00001	0.01	0.00009	0.08	0.93	0.07	1.016	889.38	0.00007	0.06		
<i>Subtotal Springville Substation Modification (pounds/activity)</i>							<i>4.92</i>		<i>23.37</i>		<i>51.14</i>		<i>0.08</i>		<i>1.89</i>		<i>1.74</i>				<i>7766.47</i>		<i>0.47</i>

Vestal Substation Modifications																					
8 Ton Stake Truck	200	Diesel	1	3	50	0.0003	0.05	0.002	0.26	0.003	0.42	0.00001	0.00	0.00030	0.05	0.92	0.04	0.784	117.60	0.00002	0.00
Crew Cab Trucks	300	Diesel	2	3	50	0.0002	0.06	0.001	0.41	0.003	0.86	0.00001	0.00	0.00017	0.05	0.92	0.05	0.766	229.80	0.00001	0.00
50 ton Crane	350	Diesel	1	2	8	0.1143	1.83	0.398	6.37	1.072	17.15	0.00120	0.02	0.03990	0.64	0.92	0.59	125.958	2015.32	0.01030	0.16
Lift gate Truck	300	Diesel	1	3	50	0.0002	0.03	0.001	0.21	0.003	0.43	0.00001	0.00	0.00017	0.03	0.92	0.02	0.766	114.90	0.00001	0.00
Pickup	200	Diesel	2	3	50	0.0003	0.10	0.002	0.52	0.003	0.84	0.00001	0.00	0.00030	0.09	0.92	0.08	0.784	235.20	0.00002	0.00
Forklift	200	Diesel	1	3	8	0.0473	1.14	0.131	3.13	0.466	11.18	0.00070	0.02	0.01490	0.36	0.92	0.33	61.642	1479.41	0.00430	0.10
Manlift	350	Diesel	1	2	8	0.0872	1.40	0.341	5.45	1.137	18.19	0.00150	0.02	0.03380	0.54	0.92	0.50	148.865	2381.85	0.00790	0.13
Support Truck	300	Diesel	2	3	50	0.0002	0.06	0.001	0.41	0.003	0.86	0.00001	0.00	0.00017	0.05	0.92	0.05	0.766	229.80	0.00001	0.00
Test Truck	300	Diesel	1	5	10	0.0002	0.01	0.001	0.07	0.003	0.14	0.00001	0.00	0.00017	0.01	0.92	0.01	0.766	38.30	0.00001	0.00
Wire Truck	350	Diesel	1	3	10	0.0005	0.01	0.002	0.06	0.009	0.28	0.00001	0.00	0.00017	0.01	0.92	0.00	1.164	34.92	0.00002	0.00
Commute			7	5	25	0.0003	0.25	0.007	6.48	0.001	0.79	0.00001	0.01	0.00009	0.08	0.93	0.07	1.016	889.38	0.00007	0.06
<i>Subtotal Vestal Substation Modification (pounds/activity)</i>						4.92			23.37		51.14		0.08		1.89		1.74		7766.47		0.47

Restoration																					
1 Ton Crew Cab 4X4	300	Diesel	2	20	50	0.0002	0.37	0.001	2.76	0.003	5.74	0.00001	0.01	0.00017	0.34	0.92	0.31	0.766	1532.00	0.00001	0.02
Road Grader	350	Diesel	1	20	6	0.1362	16.34	0.464	55.70	1.273	152.70	0.00160	0.19	0.04690	5.63	0.92	5.18	160.495	19259.36	0.01230	1.48
Backhoe	350	Diesel	1	20	6	0.1669	20.03	0.540	64.74	1.582	189.88	0.00270	0.32	0.05490	6.59	0.92	6.06	241.181	28941.68	0.01510	1.81
Front End Loader	350	Diesel	1	20	6	0.1669	20.03	0.540	64.74	1.582	189.88	0.00270	0.32	0.05490	6.59	0.92	6.06	241.181	28941.68	0.01510	1.81
Track Type Dozer	350	Diesel	1	20	6	0.1860	22.32	0.714	85.72	1.673	200.70	0.00180	0.22	0.06590	7.91	0.92	7.28	181.298	21755.72	0.01680	2.02
Drum Type Compactor	250	Diesel	1	20	6	0.1346	16.15	0.408	48.95	1.409	169.12	0.00170	0.20	0.04980	5.98	0.92	5.50	152.953	18354.30	0.01210	1.45
Water Truck	350	Diesel	1	20	50	0.0005	0.49	0.002	2.03	0.009	9.23	0.00001	0.01	0.00017	0.17	0.92	0.15	1.164	1164.00	0.00002	0.02
Lowboy Truck/Trailer	300	Diesel	1	20	10	0.0002	0.04	0.001	0.28	0.003	0.57	0.00001	0.00	0.00017	0.03	0.92	0.03	0.766	153.20	0.00001	0.00
Commute			7	20	25	0.0003	0.98	0.007	25.94	0.001	3.15	0.00001	0.04	0.00009	0.32	0.93	0.29	1.016	3557.51	0.00007	0.25
<i>Subtotal Vestal Substation Modification (pounds/activity)</i>						96.75			350.86		920.96		1.32		33.54		30.86		123659.46		8.85

Total Emissions From Construction of the Proposed Project	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Total (pounds)	2448.02	10123.75	24429.52	36.10	927.53	853.49	3528931.56	221.61
Total (tons)	1.22	5.06	12.21	0.02	0.46	0.43	1764.47	0.11

N2O
221.61
0.11

Construction Greenhouse Gas Emissions

Pollutant	Metric Tons	GWP	Metric Tons CO2e
CO2	1600.7	1	1600.70
CH4	0.1	25	2.51
N2O	0.1	298	29.95
Total Metric Tons of CO2e			1633

Notes:

- * Equipment mix and activity duration were based on information provided in *Chapter 2, Project Description*.
- * Emission factors for all off-road equipment derived from CARBs OFFROAD2007 model. The 2012 Tulare County fleet was assumed.
- * Emission factors for commute and on-road trips were derived from CARB's EMFAC2007 model. Trip distances were provided by SCE.
- * PM2.5 fractions of PM10 were obtained from SCAQMD, 2006.
- * GWP = Global Warming Potential

Source:

SCAQMD, 2006. Final Methodology to Calculate PM2.5 and PM2.5 Significance Thresholds. Appendix A, Updated CEIDARS Table with PM2.5 Fraction.

Operational Emissions

Substation (SF6)

2 old circuit breakers will be removed
4 new circuit breakers will be added

	Existing (6.0% leak rate)	Existing (2.5% leak rate)	Proposed Project	
SF6 Contained (lbs)	270	270	242	
SF6 Leakage Rate (per year)	0.06	0.025	0.01	
Average Emissions (lbs/yr)	16.2	6.75	2.42	
Number Installed/Removed	2	2	4	
Total estimated emissions (lbs SF6/yr)	32.4	13.5	9.68	235.0
CO2 eq (metric tons)	335.1	139.6	100.1	39.5

6% leakage rate: Emission reduction of approximately 235 metric tons CO2 eq per year from operation of Proposed Project
2.5% leakage rate: Emission reduction of approximately 39.5 metric tons CO2 eq per year from operation of Proposed Project

Transmission

Activity	Equipment	HP	Fuel	Quantity	Days per year	Hours	Miles	ROG	CO	NOX	SOX	PM	CO2	CH4
Transmission Line Inspection (Aerial)	Hughes 500 E Helicopter		Jet A	1	1.5	2		0.90	3.42	11.24	0.01	0.35	2484.72	0.000
Transmission Line Inspection (Ground)	Crew Truck	300	Diesel	1	7.5		50	0.07	0.52	1.08	0.00	0.06	287.25	0.003
Access Road and Spur Road Maintenance	1 Ton Truck	300	Diesel	1	3		50	0.03	0.21	0.43	0.00	0.03	114.90	0.001
	Road Grader	350	Diesel	1	3	6		2.45	8.36	22.91	0.03	0.84	2888.90	0.22
Totals (lbs)								3.45	12.50	35.65	0.04	1.28	5775.77	0.23

Totals (tons)	ROG	CO	NOX	SOX	PM	CO2	CH4	N2O
	0.00	0.01	0.02	0.00	0.00	2.89	0.0001	0.0001

GHG Totals (expressed in metric tons of CO2e)	CO2	CH4	N2O
	2.62	0.0026	0.0306
Estimated Annual Operational GHG Emissions (metric tons of CO2e)	2.65		

HELICOPTER EMISSION FACTOR DERIVATION

Helicopter (Hughes 500)

	fuel flow	fuel flow	fuel flow	lb CO2/	lb CO2/	lb CO2/
	kg/s	lb/s	lb/hr	gal Jet-A	lb Jet-A	hour
CO2	0.0334	0.0736	265.0838	21.0900	3.1244	828.2397

Note: Used EDMS, version 4.4, to obtain the Allison 250-C20 420 hp engine from the Bell 206 Jet Ranger. Takeoff mode was used for fuel flow.
CO2 emission factor obtained from Department of Energy fuel emission factors (<http://www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls>)
Density of Jet-A fuel is between 6.5 and 7.0 pounds/gallon.

