



## Palermo-East Nicolaus Transmission Line Reconstruction Project Site Preparation Assumptions

Tower	Construction duration (days)	Pad <sup>a</sup> (feet)	Pad total volume (yds³) <sup>b</sup>	Road (feet) <sup>a</sup>	Road total volume (yds³) <sup>b, c</sup>	Total volume (yds³)	Total truck trips <sup>d</sup>	Total truck VMT	Special equipment	Typical constrution emissions	Typical constrution emissions (mitigated)	Dozer emissions (lbs/day)	Dozer emissions (lbs/day) (mitigated)	Truck Emissions <sup>e</sup> (lbs/day)	Daily Emissions (lbs/day)	Daily Emissions (lbs/day) (mitigated)		
306 H	1	25 x 100	31	n/a		31	3	77		16.47	9.88			2.2	18.63	12.04	2/2011, 1-2	
305	1	25 x 100	31	225	33	64	6	160		16.47	9.88			4.5	20.97	14.38	7/2011, 1; 11/2011, 4	
283	2	49,126	606	0	0	606	61	1,516		16.47	9.88			42.5	58.97	52.38	6/2011, 3-4;	İ
		25 x 100	31	0	0	31	3	77		16.47	9.88			2.2	18.63	12.04	11/2011, 4	
		25 x 100	51	0	0	31				10.47	5.00			2.2				
276	1	25 x 100	31	100	15	46	5	114	Dozer	16.47	9.88	11.06	6.64	3.2	30.73	19.72		
		100 x 100	123	0	0	123	12	309		16.47	9.88			8.7	25.12	18.53	3/2011, 2;	
247	1	25 x 100	31	100	15	46	5	114		16.47	9.88			3.2	19.67	13.08	6/2011, 2-3,	
224	2	25 x 100	31 31	50 50	7 7	38 38	4	96		16.47	9.88 9.88			2.7	19.15	12.56	11/2011, 3-4	
224		25x100 100 x 100	31 123	0	0	38 123	0 12	0 309		16.47 16.47	9.88 9.88			0.0 8.7	16.47 25.12	9.88 18.53		
212	1	25 x 100	31	100	0	31	3	77		16.47	9.88			2.2	18.63	12.04	10/2011, 3-4	$\cap$
189	1	25 x 50	15	280	41	57	6	142		16.47	9.88			4.0	20.46	13.87		FRAQMD
188	1	25 x 50	15	656	97	113	11	282		16.47	9.88			7.9	24.36	17.77		
187	1	25 x 50	15	0	0	15	2	39		16.47	9.88			1.1	17.55	10.96		$\downarrow$
186 185	1 2	25 x 50 25 x 100	15 31	0 600	0 89	15 120	2 12	39 299		16.47 16.47	9.88 9.88			1.1 8.4	17.55 24.86	10.96 18.27		>>
100	2	25 x 50	15	0	0	15	2	39		16.47	9.88			1.1	17.55	10.96		正
182	1	25 x 50	15	50	7	23	2	57		16.47	9.88			1.6	18.07	11.48		
181	1	25 x 50	15	125	19	34	3	85		16.47	9.88			2.4	18.85	12.26	9/2011,3-4; 2/2012, 4	
180	1	25 x 50	15	200	30	45	5	113		16.47	9.88			3.2	19.63	13.04	2/2012, 4	
178	1	25 x 50	15	127	19	34	3	86		16.47	9.88			2.4	18.87	12.28		
177	1	25 x 50	15	0	0	15	2	39	_	16.47	9.88			1.1	17.55	10.96		
173 171	2	25 x 50 25 x 50	15 15	500 400	74 59	90 75	9 7	224 187	Dozer	16.47 16.47	9.88 9.88	11.06	6.64	6.3 5.2	33.80 21.70	22.79 15.12		
170	1	25 x 50	15	75	11	27	3	66		16.47	9.88			1.9	18.33	11.74		
169	2	25 x 50	15	700	104	119	12	298		16.47	9.88			8.3	24.82	18.23		
164	1	25 x 200	62	0	0	62	6	154		16.47	9.88			4.3	20.80	14.21		
141	1	100 x 100	123	0	0	123	12	309		16.47	9.88			8.7	25.12	18.53	8/2011, 1-4,	
140	1	100 x 125	154	0	0	154	15	386		16.47	9.88			10.8	27.28	20.70	1/2012, 3	
87	1	25 x 100	31 123	50 0	7	38	4 12	96 309		16.47	9.88 9.88			2.7 8.7	19.15	12.56	5/2011,1-3;	
72	1	100 x 100 25 x 100	123 31	0	0	123 31	12 3	309 77		16.47 16.47	9.88 9.88			8.7 2.2	25.12 18.63	18.53 12.04	3/2011,1-3;	
/2	1	100 x 100	123	0	0	123	12	309		16.47	9.88			8.7	25.12	18.53	3/2012, 4	
39 - 10	4	n/a				0	0	0		16.47	9.88			0.0	16.47	9.88		İ
39 & 34	4 days for 39-34	25 x 50	15	607	90	105	11	263		16.47	9.88			7.4	23.85	17.26		
38	4 days for 39-34	25 x 50	15	607	90	105	11	263		16.47	9.88			7.4	23.85	17.26		
37 36	4 days for 39-34	25 x 50	15 15	607 607	90	105 105	11 11	263 263		16.47 16.47	9.88 9.88			7.4 7.4	23.85 23.85	17.26 17.26		
35	4 days for 39-34 4 days for 39-34	25 x 50 25 x 50	15	607	90 90	105	11	263		16.47	9.88			7.4	23.85	17.26		
34	4 days for 39-34	25 x 50	15	607	90	105	11	263		16.47	9.88			7.4	23.85	17.26		BCAQMD
33 & 32	1	25 x 50	15	700	104	119	12	298		16.47	9.88			8.3	24.82	18.23	4/2011, 3-4;	7
30	1	25 x 50	15	0	0	15	2	39		16.47	9.88			1.1	17.55	10.96	3/2012, 4	>
29	1	25 x 50	15	225	33	49	5	122		16.47	9.88			3.4	19.89	13.30	3,2012, 4	Ü
31 28	1	25 x 50 25 x 50	15 15	50 75	7 11	23 27	2	57 66		16.47 16.47	9.88 9.88			1.6	18.07 18.33	11.48 11.74		B
28	1	25 x 50 25 x 50	15	75 150	22	38	3 4	94		16.47	9.88			1.9 2.6	18.33	12.52		
22	1	0	0	0	0	0	0		Dozer	16.47	9.88	11.06	6.64	0.0	27.53	16.52		
21	2	0	0	497	74	74	7	184	Dozer	16.47	9.88	11.06	6.64	5.2	32.69	21.68		
20	2	0	0	501	74	74	7	186	Dozer	16.47	9.88	11.06	6.64	5.2	32.73	21.72		
19	1	25 x 50	15	50	7	23	2	57	Dozer	16.47	9.88	11.06	6.64	1.6	29.13	18.12		1
10	3	25 x 100	31	627	93	124	12	309		16.47	9.88			8.7	25.14	18.55	4/2011, 1-2	
1	2	25 x 100 25 x 100	31 31	400	59	31 90	3	77 225		16.47 16.47	9.88 9.88			2.2 6.3	18.63 22.79	12.04 16.20	4/2011, 1-2	
	-	23 × 100	31	400	33	50		223		10.47	5.00			0.5	22.73	10.20	1	<del> </del>

<sup>&</sup>lt;sup>a</sup> Pad and road assumes skid steer loader to move gravel

11.06

<sup>&</sup>lt;sup>b</sup> Pad and road gravel depth assumption (inches)

c Road width assumption (feet) 12

d Truck capacity assumption (yds<sup>3</sup>) 10

d Truck haul distance assumption (miles) 25

e Truck emission factor (lbs/mile) 0.028029 Typcial construction emissions (lbs/day)
Dozer construction emissions (lbs/day) 16.47

#### Palermo-East Nicolaus Transmission Line Reconstruction Project

#### Daily Construction NOx Emission

0 1 11 11	Hamilton and Dath (the Idea)	Million And Delley (Hearthan)
Construction Phase	Unmitigated Daily (lbs/day)	Mitigated Daily (lbs/day)
Tower Work Activities		
Ground Equipment	108.36	68.74
Helicopters	16.32	16.32
Total	124.68	85.06
Line Stringing Activities		
Helicopters	55.96	55.96
Ground Equipment when helicopters are not used in ozone season		13.68

6 days/week	
Original Mitigated (8-2009)	Revised Mitigated (9-2009)
75.34	58.83
91.66	75.16
Original Mitigated (8-2009) 14.94	Revised Mitigated (9-2009) 11.68

#### Construction Schedule within Feather River AQMD

Site Prep Activities   Site Prep Activities	Construction Schedule with	nin Fea	tner i	River I	AQIVID																																				
Non-Ozone Season			2011			2	011			20	11			20	)11			201	11		ĺ	20	)11				201	1			201	11			20	11			20	11	
Construction Phase    Site Prep Activities		J	anuai	y		Feb	oruary			Mai	ch			Ap	oril			Ma	ıy			Ju	ıne				Jul	у			Aug	ust			Septe	ember			Octo	ber	
Veekly Operation   1   1   1   1   1   1   1   1   1								Nor	n-Ozon	e Seasor																		Oz	one Se	ason											
Site Prep Activities	Construction Phase	st Week	nd Week	rd Week th Week	st Week	We	rd Week	We		st Week	rd Mook	th Week	st Week	nd Week	rd Week	th Week	st Week	nd Week	rd Week	th Week	st Week	nd Week		rd Week	th Week	st Week	nd Week	rd Week	th Week	st Week	nd Week	rd Week	th Week	st Week	nd Week	rd Week	th Week	st Week	nd Week	rd Week	th Week
Weekly Operation			7	<u>ω 4</u>	<u> </u>	2	ω.	4			1 0	0 4		7	~	4		2	က	4	<del></del>		11	<u>س ا</u>	4	<del></del>	7	3	4	<u> </u>	7	က	4		2	က	4		7	8	4
Neekly Emissions (unmitigated)			Т	Т	1	1	Т			1	Т	T	1	П								1	2	T	1	1	Т			1	1	1	1			2	2			1 1	1
Weekly Emissions (milligated)					19	19				31												31	90		59 :	21				27	27	27	27			34	34			19	19
Weekly Operation					12	12				20												20	72		52	14				21	21	21	21			23	23			12	12
Line Stringing Activities	Tower Work Activities																																								
Weekly Operation	Weekly Operation					1	1				1	1													2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Unmitigated NOx Emission    Non-Ozone Season   String Lines and Construct Towers	Line Stringing Activities																																								
Construction Alternative 1 with Helicopters to String Lines and Construct Towers  Daily Emission (lbs)  19 143 125 56 56 87 125 125 125 125 125 125 125 125 125 125	Weekly Operation							1	1	1																															
Daily Emission (ths)  19 143 125 56 56 87 125 125 125 125 125 125 125 125 125 125	Unmitigated NOx Emission							Nor	n-Ozon	e Seasor																		Oz	one Se	ason											
Construction Alternative 2 with Ground Equipment to String Lines in Ozone Season  Daily Emission (lbs)  19 143 125 21 21 125 125 125 125 125 125 125 1	Construction Alternative 1 wit	th Helico	opters	to Str	ing Lin	ies ar	nd Con	struct	Towers	ì																															
Daily Emission (lbs)   19   143   125   21   21   152   125   12	Daily Emission (lbs)				19	9 143	3 125	56		56 8	7 12	5 125										31	1	90	308	146	125	125	125	152	152	152	152	125	125	192	192	125	125	143	143
Mitigated Nox Emission   Non-Ozone Season   Ozone S		th Grour	nd Eq	uipmei		_			e Seas	on																															
Construction Alternative 1 with Helicopters to String Lines and Construct Towers           Daily Emission (lbs)         12 97 85 56 56 76 85 85         85 85 85 85 85 85 106 106 106 106 85 85 131 131 85 85 97           Construction Alternative 2 with Ground Equipment to String Lines in Ozone Season	Daily Emission (lbs)				19	143	125	21	21	52	125	125										31	90	3	08 1	146 1	25	125	125	152	152	152	152	125	125	192	192	125	125	143	143
Daily Emission (lbs) 12 97 85 56 56 76 85 85 85 85 20 72 223 99 85 85 85 106 106 106 106 85 85 131 131 85 85 97 Construction Alternative 2 with Ground Equipment to String Lines in Ozone Season	Mitigated NOx Emission							Nor	n-Ozon	e Seasor																		Oz	one Se	ason											
Construction Alternative 2 with Ground Equipment to String Lines in Ozone Season	Construction Alternative 1 wit	th Helico	opters	to Str	ing Lin	ies ar	nd Con	struct	Towers																																
	Daily Emission (lbs)				12	97	85	56	56	76	85	85										20	72	2	23	99	85	85	85	106	106	106	106	85	85	131	131	85	85	97	97
Daily Emission (lbs) 12 97 85 14 14 33 85 85 20 72 223 99 85 85 85 106 106 106 106 85 85 131 131 85 85 97		th Grour	nd Eq	uipmei		_						-		-																								-			
	Daily Emission (lbs)				12	2 97	7 85	14		14 3	3 8	5 85										20	0	72	223	99	85	85	85	106	106	106	106	85	85	131	131	85	85	97	97

		201	11			20	11			20	12			201	12			2012	2		20	12		20	112			2012			201	2		20	)12		20	12
		Nover	mber			Decei	mber			Janu	ıary			Febru	uary			Marc	h		Ap	oril		М	ay			June			July	y		Auç	gust		Septe	mber
										Ν	on-Ozon	e Seaso	n																	Oz	one S	eason						
	1st Week	i Week	3rd Week	4th Week	1st Week	1 Week	3rd Week	4th Week	st Week	2nd Week	3rd Week	4th Week	1st Week	1 Week	3rd Week	4th Week	st Week	2nd Week	3rd Week	4th Week	Ist week 2nd Week	3rd Week	4th Week	2nd Week	3rd Week	4th Week	st Week	2nd Week 3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	Ist week 2nd Week	3rd Week	4th Week	2nd Week	3rd Week 4th Week
Construction Phase	1st	2nd	3rd	tt th	1st	2nd	3rd	4th	1st	Zuc	3rd	₽ t	1st	2nd	3rd	4th	1st	Zuc	3rd	#	ısı 2nc	3rd	1ct	2nc	3rd	#	1st	2nc	4th	1st	2nc	3rd	<b>⊕</b>	2nc	3rd	# th	2nc	3rd #
Site Prep Activities																																						
Weekly Operation			1	3							2					2																						
Weekly Emissions (unmitigated)			31	111							27					34																						
Weekly Emissions (mitigated)			20	87							21					23																						
Tower Work Activities																																						
Weekly Operation	1	1																																				
Line Stringing Activities																																						
Weekly Operation			1	1	2	2	3	1	1	1		2	2	3	1	1	1	1	2	1																		
Unmitigated NOx Emission											on-Ozon	o Cooo																		0-	one C	00000						
•	1-114	4-	C4-d		10	4 4	T			IV.	011-UZ011	e Seasc	Ш																	UZ	one S	eason						
Construction Alternative 1 with I												440	440	4/0		404			440	F.																		
Daily Emission (lbs)		125			112			56	56	56	55	112	112	168	56	124	56	56	112	56																		
Construction Alternative 2 with 0				_																																		
Daily Emission (lbs)	125	125	52	132	42	42	64	21	21	21	55	42	42	64	21	89	21	21	42 2	21																		
Mitigated NOx Emission										Ν	on-Ozon	e Seaso	n																	Oz	one S	eason						
Construction Alternative 1 with F	Helicopt	ers to	String I	Lines a	nd Cor	struct	Towers																															
Daily Emission (lbs)	85	85	76	142	112	112	168	56	56	56	41	112	112	168	56	102	56	56 1	112 5	56																		
Construction Alternative 2 with 0	Ground .	Equipr	ment to	String	Lines	in Ozor	ne Seas	on																														
Daily Emission (lbs)	85	85	33	100	27	27	41	14	14	14	41	27	27	41	14	59	14	14	27	14																		

## Palermo-East Nicolaus Transmission Line Reconstruction Project

#### Daily Construction NOx Emission

Daily Construction Nox Em	1331011	
Construction Phase	Unmitigated Daily (lbs/day)	Mitigated Daily (lbs/day)
Tower Work Activities		
Ground Equipment	108.36	68.74
Helicopters	16.32	16.32
Total	124.68	85.06
Line Stringing Activities		
Helicopters	55.96	55.96
Ground Equipment when helicopters are not used in ozone season	21.19	13.68

6 days/week	
Original Mitigated (8-2009)	Revised Mitigated (9-2009)
75.34	58.83
91.66	75.16
Original Mitigated (8-2009) 14.94	Revised Mitigated (9-2009) 11.68

#### Construction Schedule within Butte County AQMD

Construction Schedule with	IIN BU	ille C	ounty	AQI	NID																																		
		201	1			20	)11			2011				2	011			20	11			201	1			20	111			201	1			2011	1		2	011	
		Janu	ary			Febr	ruary			March	h			Α	pril			М	ay			Jun	е			Jı	ıly			Augu	ust		S	eptem	ber		Oct	tober	
								Non-C	zone Se	ason																Oz	one Sea	ison											
Construction Phase	1st Week	2nd Week	3rd Week	4th Week	Ist Week	2nd Week	3rd Week	4th Week	1st Week	ind Week	3rd Week	4th Week	st Week	2nd Week	3rd Week	4th Week	st Week	nd Week	3rd Week	th Week	st Week	2nd Week	3rd Week	4th Week	st Week	and Week	rd Week	4th Week	st Week	2nd Week	3rd Week	4th Week	st Week	2nd Week	3rd Week	4th Week	1st Week 2nd Week	3rd Week	4th Week
Site Prep Activities	<u> </u>	7	3	4	Ť	2	3	4	<u>~</u>	7	3	4	÷	2	<u>~</u>	4	<u>~</u>	2	3	14	<u>~</u>	2	3	4	<del>č</del>	2	<u> </u>	4	÷	2	ਲੋ	4	<del>č</del>	2	ਲ	4	<u>= 1 2</u>	3	4
Weekly Operation							Т						1	1	1	1	1	1	1			Г	1						Т								$\overline{}$		
Weekly Emissions (unmitigated)	_		_										25	25	33	33	25	25	25													-					+		$\dashv$
Weekly Emissions (mitigated)			_										19	19	22	22	19	19	19													-					+		$\dashv$
Tower Work Activities													17	17	22		17	17	17			1	1											_			_		
Weekly Operation			Т	_	_	П	Т					Т	П	Т		1	1	1	1	1	1	2	1		_				П		_		Т		T		一	Т	
Line Stringing Activities		_	_													<u> </u>		<u> </u>	<u> </u>	<u> </u>			<u> </u>							_				_			$\perp$		
Weekly Operation			Т		Т	П	T					T	П	Т	1	1		1	1				1						П	Т	Т	$\overline{}$			T	Т	$\overline{}$	T	
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Unmitigated NOx Emission								Non-C	zone Se	ason																Oz	one Sea	ison											
Construction Alternative 1 with	h Heli	icopte	rs to S	String	g Line	es ano	l Const	truct T	owers																														
Daily Emission (lbs)													25	25	89	213	150	150	150	125	125	249	125																
Construction Alternative 2 with	h Gro	ound E	quipn	nent t	to Str	ing Li	ines in	Ozone	Season																														
Daily Emission (lbs)													25	25	54	179	150	150	150	125	125	249	125																
Mitigated NOv Emission								Non C	)zana Ca																	0-	one Coe					_					_		
Mitigated NOx Emission				o	<u>,,                                    </u>				zone Se	ason																ÜZ	one Sea	ison											
Construction Alternative 1 with	h Heli	icopte	rs to S	String	g Line	es and	l Const	truct T	owers								101	101	10/			486																	
Daily Emission (lbs)													19	19	78	163	104	104	104	85	85	170	85																
Construction Alternative 2 with	h Gro	ound E	quipn	nent t	to Str	ing Li	ines in	Ozone	Season																														
Daily Emission (lbs)													19	19	35	120	104	104	104	85	85	170	85																

		201	1			2011			20	)12			20	12			201	12			201	2			201	2			2012			20	12			201	2		2	012	
	1	Vovem	ber		De	ecembe	er		Jan	uary			Febr	uary			Mar	ch			Apr	il			Ma	у			June			Jı	ıly			Augu	ıst		Sep	tembe	r
										Nor	-Ozor	e Seas	son																		0:	zone	Seaso	n							
	1st Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week	4th Week	Ist Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	Ist Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	st Week	zna week 3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	1st week 2nd Week	3rd Week	4th Week
Construction Phase	1st	2nd	3rd	4th	1st	2nd 3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	Zno 3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	₩.	1SI 2nd	3rd	4th
Site Prep Activities																																									
Weekly Operation																			2																						
Weekly Emissions (unmitigated)																			58																						
Weekly Emissions (mitigated)																			40																						
Tower Work Activities																																									
Weekly Operation																																									
Line Stringing Activities																																									
Weekly Operation																				2	2	1	1																		
Unmitigated NOx Emission										Nor	-Ozor	e Seas	son																		0:	zone	Seaso	n							
Construction Alternative 1 with I	lelico	nters	to Str	rina I i	ines a	and Col	nstruci	Tower	rs	1101	O LOI	000																			0.	20110	oodoc								_
Daily Emission (lbs)	remoo	picis	10 011	mg Li	1103 0	ina ooi	1511 401	101101											58	112	112	56	56																—		-
Construction Alternative 2 with 0	Groun	d Eau	ipmei	nt to S	Strina	Lines	in Ozo	ne Sea	son			1																													-
Daily Emission (lbs)					9							1							58	42	42	21	21																		
																																							_		
Mitigated NOx Emission										Nor	-Ozor	e Seas	son																		0:	zone	Seaso	n							
Construction Alternative 1 with I	lelico	pters i	to Str	ring Li	ines a	and Col	nstruci	Tower	S																																
Daily Emission (lbs)																			40	112	112	56	56																		
Construction Alternative 2 with 0	Groun	d Equ	ipmei	nt to S	String	Lines	in Ozo	ne Sea	son																																
Daily Emission (lbs)																			40	27	27	14	14																		

# Palermo-East Nicolaus Transmission Line Reconstruction Project Daily Construction Emissions

## **Tower Work Activities**

	Un	mitigated Co	nstruction E	Emissions (p	ounds per c	lay)	M	itigated Con	struction Er	nissions (po	ounds per da	ıy)
Construction Source	ROG	NOx	СО	SO2	PM10 Fugitive Dust	DPM Exhaust	ROG	Nox	СО	SO2	PM10 Fugitive Dust	DPM Exhaust
Off-Road Diesel	11.13	99.05	43.42	0	0	4.35	11.13	59.43	43.42	0	0	2.39
On-Road Diesel	0.5	8.41	2.58	0.01	0.04	0.3	0.5	8.41	2.58	0.01	0.04	0.3
Worker Trips	0.57	0.9	15	0.01	0.05	0.03	0.57	0.9	15	0.01	0.05	0.03
Helicopter Operation	0.36	16.32	7.76	1.10	0.00	1.07	0.36	16.32	7.76	1.10	0.00	1.07
Total Daily Emissions	12.56	124.68	68.76	1.12	0.09	5.75	12.56	85.06	68.76	1.12	0.09	3.79
Total Daily Ground Equipment Emissions	12.20	108.36	61.00	0.02	0.09	4.68	12.20	68.74	61.00	0.02	0.09	2.72

## **Line Stringing Activities with Helicopters**

	Un	mitigated Co	nstruction E	Emissions (p	ounds per d	lay)
Construction Source	ROG	NOx	СО	SO2	PM10 Fugitive Dust	DPM Exhaust
Helicopter Operation	1.23	55.96	26.62	3.76	0	3.66

## Line Stringing Activities with Ground Equipment to Replace Helicopter Operation in Ozone Season

	Un	mitigated Co	onstruction I	Emissions (p	oounds per o	lay)	M	itigated Con	struction Er	nissions (po	ounds per da	ay)
Construction Source	ROG	NOx	СО	SO2	PM10 Fugitive Dust	DPM Exhaust	ROG	NOx	СО	SO2	PM10 Fugitive Dust	DPM Exhaust
Off-Road Diesel	1.93	18.77	6.18	0	0	0.68	1.93	11.26	6.18	0	0	0.37
On-Road Diesel	0.13	2.24	0.69	0	0.01	0.08	0.13	2.24	0.69	0	0.01	0.08
Worker Trips	0.11	0.18	3	0	0.01	0.01	0.11	0.18	3	0	0.01	0.01
Total Daily Ground Equipment Emissions	2.17	21.19	9.87	0.00	0.02	0.77	2.17	13.68	9.87	0.00	0.02	0.46

## **FAQMD Required Construction Mitigations**

As required by FRAQMD, off-road construction equipment must achieve a project wide fleet-average 20% NOx reduction and 45% DPM reduction compared to the most recent CARB fleet average at the time of construction.

## Palermo-East Nicolaus Transmission Line Reconstruction Project Assumptions for Ground Construction Equipment Operation

#### **Tower Work Activities**

On-Site Construction Equipment	Assumed Equipment Horsepower	Number of Equipment	Equipment Operation Hours/Day per Piece	Equipment Operation Days/Week
Bulldozer	357	1	12	6
Grader	174	1	12	6
Scraper	313	1	12	6
Backhoe	108	1	12	6
Crane	399	1	12	6
Line truck	189	1	12	6
Water truck	189	1	12	6
On-site Dump truck	189	1	12	6
Other Equipment	0	32	12	6

Average Daily On-road Trucks

15

Table 3-2, 3-3, and 3-4 of PEA

[(3000 cy / 20 cy-per-truck) + (500 trucks + 1500 trucks)] / 18 weeks / 6 days-per-week

Emissions from worker commute trips are calculated for 50 workers per day, based on Table 3-7 of PEA.

In Urbemis, the number of workers is estimated as 125% of the total number of construction equipment (vehicles and machines) selected.

In order to account for commute trips from 50 workers, a total of 40 pieces of equipment should be selected in Urbemis.

Therefore, the other 32 pieces of equipment are assigned, but with 0 horsepower, so they will not contribute any on-site emissions.

## Line Stringing Activities to Replace Helicopter Operation in Ozone Season

On-Site Construction Equipment	Assumed Equipment Horsepower	Number of Equipment	Equipment Operation Hours/Day per Piece	Equipment Operation Days/Week
Crane	399	1	12	6
Line truck	189	1	12	6
Other Equipment	0	6	12	6

Average Daily On-road Trucks

4

Table 3-4 of PEA

500 trucks / 21 weeks / 6 days-per-week

Emissions from worker commute trips are calculated for 12 workers per day.

In Urbemis, the number of workers is estimated as 125% of the total number of construction equipment (vehicles and machines) selected.

In order to account for commute trips from 10 workers, a total of 8 pieces of equipment should be selected in Urbemis.

Therefore, the other 6 pieces of equipment are assigned, but with 0 horsepower, so they will not contribute any on-site emissions.

# Palermo-East Nicolaus Transmission Line Reconstruction Project Daily Helicopter Emission Calculation

Helicopter Type and Usage

Туре	Engine	Power (hp)	Fuel Consumption (gallon/hr)
Bell 214ST (Heavy Duty)	GECT7-2A	3250	133
MD 500D/E (Light Duty)	Alison 250- C20B	420	28

Source: Fuel Consumption is obtained from the U.S. Department of Interior National Business Center (2006).

#### **Helicopter Emission Factor**

Туре	HC (lbs/hr)	NOx (lbs/hr)	CO (lbs/hr)	SOx (lbs/hr)	PM10 (lbs/hr)	CO2 (lbs/gallon)
Bell 214ST (Heavy Duty)	0.13	10.49	2.02	0.65	0.72	18.355
MD 500D/E (Light Duty)	0.08	1.75	2.07	0.14	0.1	18.355

Source: Emission factors for HC, NOx, CO, and SOx were obtained from the California Public Utilities Commission (2007); PM10 emission factors were obtained from the CPUC (2006); and CO2 emission factor for aviation gasoline was obtained from the U.S. Department of Energy (2008).

Note: Emission factors for Bell 214STwere derived from the emission factors for H-53 Super Stallion (T64-GE-416 Turboshaft 4,380 hp engine). Emission factors for take-off and climb-out modes were used.

Emission factors for MD 500D/E were derived from the emission factors for Bell 206 Jet Ranger (Alison 250-C20 Turboshaft 420 hp engine). Emission factors for take-off mode were used.

### Helicopter Usage

	Project-wide	Tower Work (20%)			Line Stringing (80%)		
Туре	Total Operation Hours	Schedule (weeks)	Total Operation Hours	Daily Operation Hours	Schedule (weeks)	Total Operation Hours	Daily Operation Hours
Bell 214ST (Heavy Duty)	600	18	120	1.11	21	480	3.81
MD 500D/E (Light Duty)	1440	18	288	2.67	21	1152	9.14

Note: Total project-wide operation hours are base on Table 3-11 in PEA.

#### **Helicopter Emissions**

T	HC (lbs/day)	NOx (lbs/day)	CO (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	CO2 (total tons)	
Туре	(ID3/Udy)	(IDS/day)	(ibs/day)	(ibs/day)	(ID3/day)	(total toris)	
Tower Work Activities							
Bell 214ST (Heavy Duty)	0.14	11.66	2.24	0.72	0.80	146.47	
MD 500D/E (Light Duty)	0.21	4.67	5.52	0.37	0.27	74.01	
Total Emissions	0.36	16.32	7.76	1.10	1.07	220.48	
Line Stringing Activities	Line Stringing Activities						
Bell 214ST (Heavy Duty)	0.50	39.96	7.70	2.48	2.74	585.89	
MD 500D/E (Light Duty)	0.73	16.00	18.93	1.28	0.91	296.03	
Total Emissions	1.23	55.96	26.62	3.76	3.66	881.92	

#### References

California Public Utilities Commission (CPUC). 2006. Southern California Edison. Antelope-Pardee 500-kV Transmission Line Project. Environmental Impact Report. http://www.cpuc.ca.gov/Environment/info/aspen/antelopepardee/antelopepardee.htm. Accessed September 2008.

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U.S. Department of Interior National Business Center. 2006. Aviation Management Directorate. Aircraft Rental Agreement. http://amd.nbc.gov/akro/akflight/pdf/ex2.pdf. Accessed September 2008.

## **Palermo-East Nicolaus Transmission Line Reconstruction Project**

**CO2 Construction Emissions** 

		CO2 Emissions with	CO2 Reduction Factor	CO2 Emissions with
	CO2 Emissions	Mitigation APM AIR-1	w/ Mitigation APM	APM AIR-1 and APM AIR-3
Construction Phase	(total tons per phase)	(total tons per phase)	AIR-3	(total tons per phase)
1 Staging area preparation	419	351		315
Off-Road Diesel <sup>1,3</sup>	406	338	10%	304
On-Road Diesel	2	2		2
Worker Trips <sup>4</sup>	11	11	20%	9
2 Existing tower removal	835	686		659
Off-Road Diesel <sup>1,2,3</sup>	396	247	10%	222
On-Road Diesel	20	20		20
Worker Trips	11	11	20%	9
Helicopter Operation	408	408		408
3 New pole construction	1411	1264		1186
Off-Road Diesel <sup>1,3</sup>	879	732	10%	659
On-Road Diesel	55	55		55
Worker Trips⁴	27	27	20%	22
(Helicopter Operation)	450	450		450
4 Transmission line installation	313	265		239
Off-Road Diesel <sup>1,3</sup>	285	237	10%	213
On-Road Diesel	20	20		20
Worker Trips <sup>4</sup>	8	8	20%	6
5 Staging area recovery	337	282		253
Off-Road Diesel <sup>1,3</sup>	327	272	10%	245
On-Road Diesel	1	1		1
Worker Trips⁴	9	9	20%	7
Total CO2 (tons for project)	3315	2848		2652

## Mitigation APM AIR-1

<sup>&</sup>lt;sup>1</sup>Operation of off-road construction equipment is assumed to reduce to 10 hours per day by minimizing idling time to 5 minutes.

<sup>&</sup>lt;sup>2</sup> Operation of off-road construction equipment is limited to five 5 hours per day when helicopters are used on the same day. Mitigation APM AIR-3

<sup>&</sup>lt;sup>3</sup>Construction contractors are assumed to use B10 biodiesel (10% biodiesel and 90% diesel) for all off-road construction equipment.

<sup>&</sup>lt;sup>4</sup>20% of workers are assumed to carpool.