Appendix B
Air Quality Data

List of Attachments

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Attachment A
Quarterly Wind Roses for Imperial County Airport

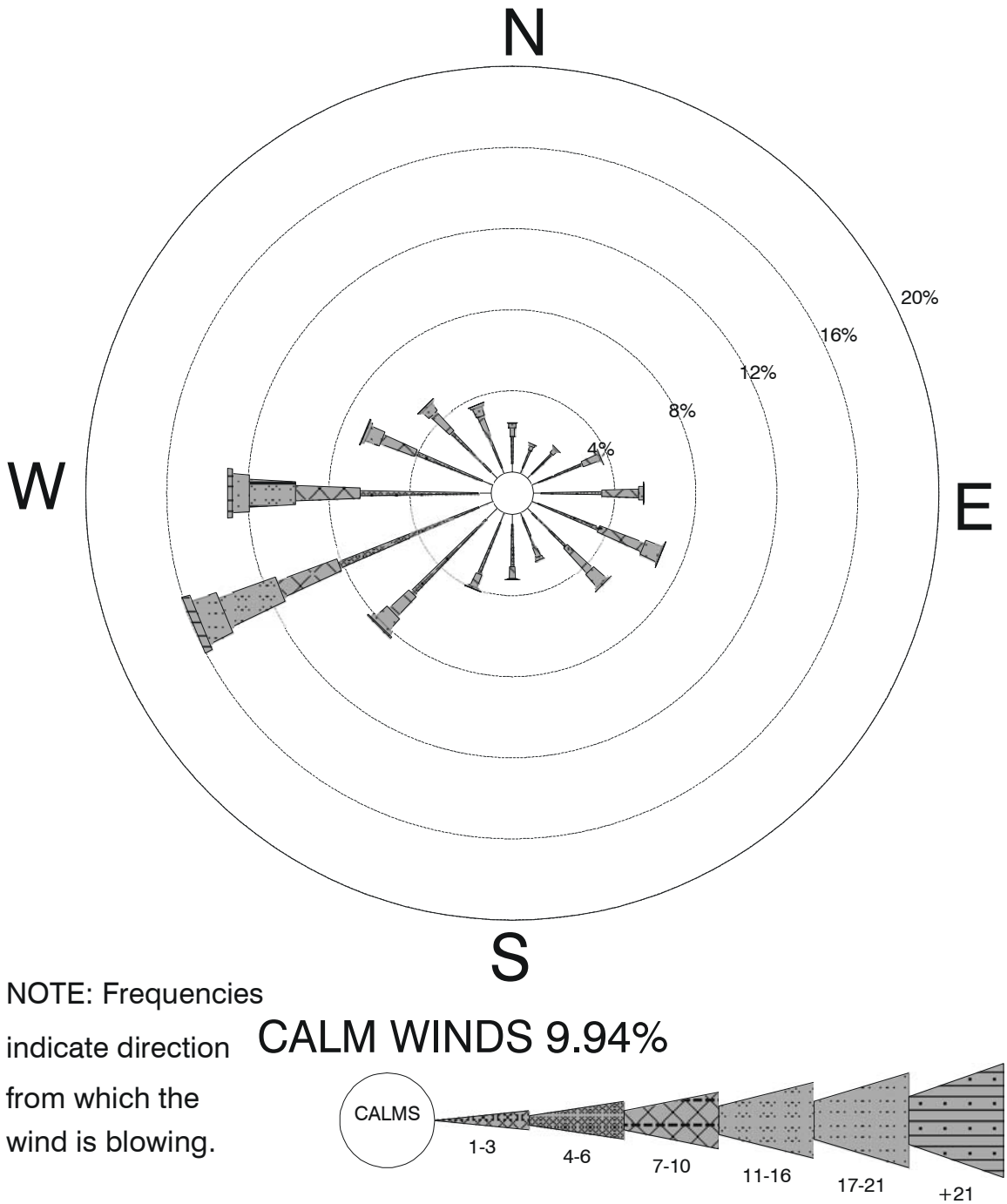

Figure A-1. Windrose for All Months 1991-95 Imperial County Airport

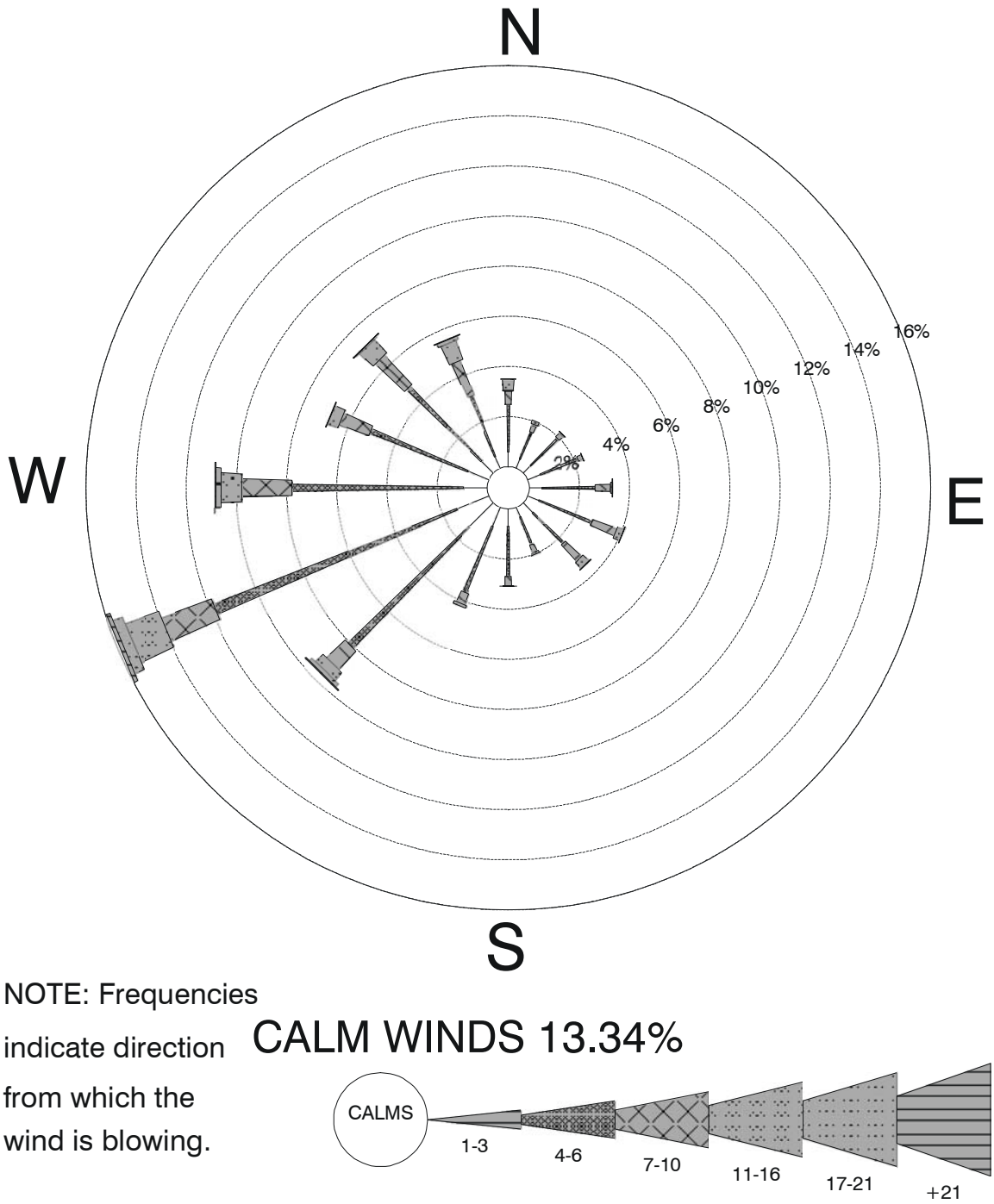

Figure A-2. Windrose for Winter Months (Dec – Feb) 1991-95 Imperial County Airport

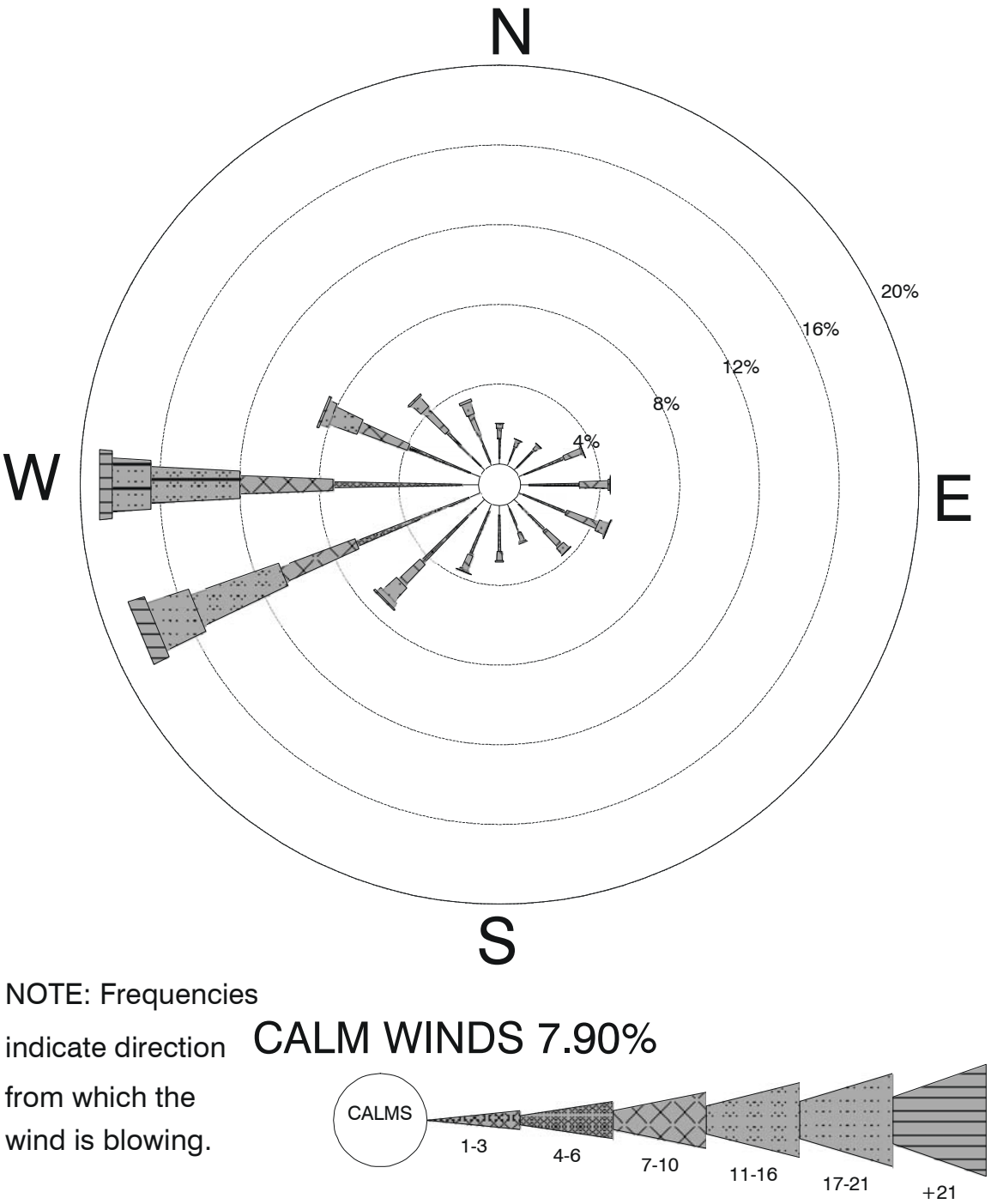

Figure A-3. Windrose for Spring Months (Mar – May) 1991-95 Imperial County Airport

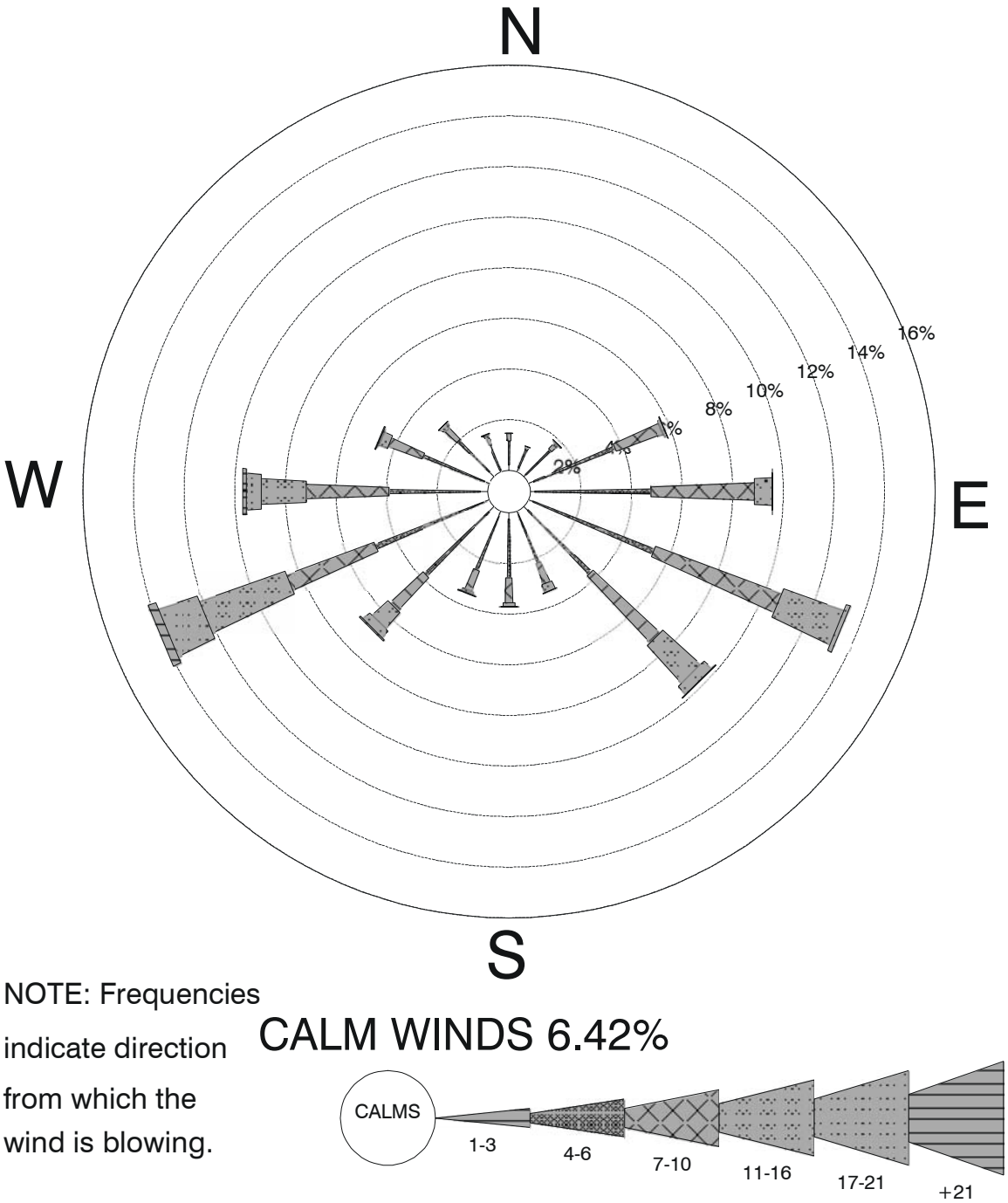

Figure A-4. Windrose for Summer Months (Jun – Aug) 1991-95 Imperial County Airport

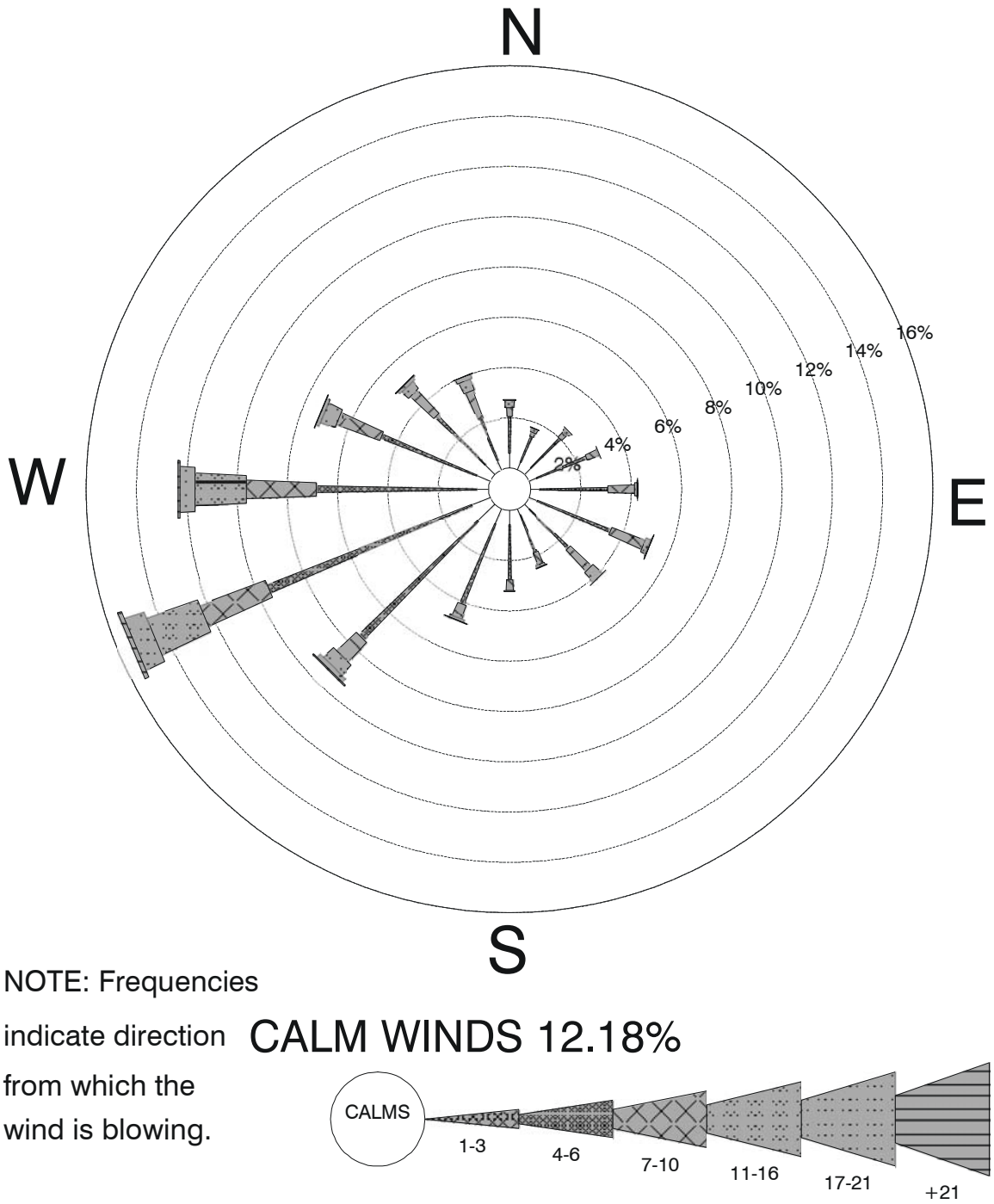

Figure A-5. Windrose for Autumn Months (Sep – Nov) 1991-95 Imperial County Airport

Attachment B
Supporting Information for Estimation of Project Construction Emissions

Table B-1 Modeled PM10 24-HR Maximum Concentrations

Model Year	CA Standard 24-HR (ug/m3)	Modeled H1H 24-HR Concetration (ug/m3)		
		ALL	Combustion	Fugitive Dust
1991	<= 50	40.7	11.6	31.3
1992		32.5	9.3	32.5
1993		35.3	10.2	31.1
1994		28.8	8.1	24.9
1995		44.3	13.2	33.0

Table B-2 Modeled PM10 Annual Concentrations

Model Year	CA Standard Annual (ug/m3)	Modeled H1H Annual Concetration (ug/m3)		
	<= 20	ALL	Combustion	Fugitive Dust
1991		7.1	0.4	7.0
1992		7.1	0.3	7.0
1993		6.5	0.3	6.4
1994		6.1	0.3	6.0
1995		6.9	0.3	6.8

Modeled ER for CO, SO2 and Sulfate (g/s or g/s-m2) 0.001

Table B-3 Modeled Maximum Concentrations (ug/m3) at Emission Rate of 0.001 g/s.

Modeled Year	Annual	1-HR	3-HR	8-HR	24-HR
1991	3677.13	7.1454	5.00	3.99	2.03
1992	3210.79	6.8131	3.79	2.59	1.63
1993	3345.19	5.7156	3.75	2.70	1.78
1994	3310.34	6.1895	3.60	2.48	1.42
1995	3593.57	7.2178	5.80	3.83	2.31

Table B-4 Modeled Maximum NO2 Concentrations (ug/m3)

Averaging Time	1-HR [1]			Annual [2]	Standard (ug/m3)		
Emission Rate (g/s)				1.4767E-06	1-HR	Annual	
Scaling Ratio				1.48E-03	470 (CA)	100 (Fed)	
Max. Background NO2 (2000 - 2004) (ug/m3)	181			36	**Cumulative Impact**		
Modeled Year	Unadjusted NOx	O3 Conc. (ug/m3)	OLM Adjusted NO2		1 HR	Annual	Date
1991	2,334	20	**252**	5.4	433	41	91032404
1992	2,225	39	**260**	4.7	441	41	92111920
1993	1,867	39	**224**	4.9	405	41	93102418
1994	2,021	39	**240**	4.9	421	41	94120205
1995	2,357	20	**255**	5.3	436	41	95012206

1. The ozone limiting method was used to convert NOx to NO2. Hourly O3 concentrations for El Centro were downloaded from the ARB website: http://www.arb.ca.gov/aqd/aqdcd/aqdcddld.htm, accessed 01/2006.
2. NOx was converted to NO2 at 100%.

Table B-5 Modeled Maximum CO Concentrations (ug/m3)

Averaging Time	1-HR	8-HR	**Standard (ug/m3)**	
Emission Rate (g/s)	0.2222	0.2222	1-HR	8-HR
Scaling Ratio	222	222	23,000 (CA)	10,000 (CA)
5-yr Max. BGD Conc.	18324	8131	**Cumulative Impact**	
Modeled Year			1-HR	8-HR
1991	1,588	886	19,912	9,017
1992	1,514	576	19,838	8,707
1993	1,270	600	19,594	8,731
1994	1,375	551	19,699	8,682
1995	1,604	852	19,928	8,983

Table B-6 Modeled Maximum SO2 Concentrations (ug/m3)

Averaging Time	1-HR	3-HR	24-HR	Annual	**Standard**	
Emission Rate (g/s)	4.953E-04	4.953E-04	1.603E-04	2.057E-09	1-HR	24-HR
Scaling Ratio	0.50	0.50	0.16	2.06E-06	655 (CA)	105 (CA)
Background SO2 (ug/m3)	68		24		**Cumulative Impact**	
Modeled Year					1-HR	24-HR
1991	4	2	0.33	0.0076	72	24
1992	3	2	0.26	0.0066	71	24
1993	3	2	0.28	0.0069	71	24
1994	3	2	0.23	0.0068	71	24
1995	4	3	0.37	0.0074	72	24

Table B-7 Modeled Maximum Sulfate Concentrations (ug/m3)

Averaging Time	24-HR
Emission Rate (g/s)	0.00024047
Scaling Ratio	0.240470024
Standard (ug/m3)	25 (CA)
Modeled Year	Max. Conc. (ug/m3)
1991	0
1992	0
1993	0
1994	0
1995	1

EMISSION CALCULATIONS FOR CONSTRUCTION EQUIPMENT COMBUSTION

TABLE B-8 EMISSION FACTOR FOR DIESEL CONSTRUCTION EQUIPMENT COMBUSTION [1]

			Horsepower		BSFC	EFss (Zero Hour Steady State Emission Factor) - Tire 2 (g/hp-hr) (Table A-2)				TAF (Table A-3)					"A" Factor (For Deterioration Factor) - Tier 2 (Table A-4)				DF (= 1 + A x Fraction of Useful Life)				Adjusted EF (g/hp-hr) [2]						Adjusted EF (lbs/gal) [6]				
Equipment Type	Fuel Type	Unit Count	Range	Average	(lb/hp-hr) (Table A-2)	HC	CO	NOx	PM	HC (Base-T3)	CO (Base-T3)	NOx (Base-T2)	PM (Base-T2)	BSFC (Base-T2)	HC	CO	NOx	PM	HC	CO	NOx	PM	HC	CO	NOx	PM Adj. Factor [3]	Adjusted PM EF (g/hp-hr) [4]	Adjusted SO2 EF (g/hp-hr) [5]	HC	CO	NOx	PM	SO2
Air Compressor 185 CFM	D	1	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3263	1.6097	4.7492	0.0578	0.3613	0.0054	0.0125	0.0618	0.1822	0.0139	0.0002
Air Compressor 750 CFM	D	1	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3263	1.6097	4.7492	0.0578	0.3613	0.0054	0.0125	0.0618	0.1822	0.0139	0.0002
Bulldozer D10R	D	1	500	500	0.367	0.1669	0.8425	4.3351	0.1316	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.2050	1.3541	4.1369	0.0525	0.1477	0.0049	0.0087	0.0572	0.1747	0.0062	0.0002
Concrete Trowel Machine	D	1	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3426	2.4628	4.5117	0.0584	0.4571	0.0055	0.0130	0.0935	0.1714	0.0174	0.0002
Concrete Vibrators	D	1	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3426	2.4628	4.5117	0.0584	0.4571	0.0055	0.0130	0.0935	0.1714	0.0174	0.0002
Crane - Mobile 65 ton	D	1	175-300	240	0.367	0.3085	0.7475	4	0.1316	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3609	0.7852	4.0180	0.0520	0.1107	0.0049	0.0154	0.0335	0.1714	0.0047	0.0002
Cranes - Mobile 35 ton	D	1	100-175	140	0.367	0.3384	0.8667	4.1	0.18	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3959	0.9105	4.1185	0.0520	0.1706	0.0049	0.0169	0.0388	0.1757	0.0073	0.0002
Cranes - Mobile 45 ton	D	1	100-175	140	0.367	0.3384	0.8667	4.1	0.18	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3959	0.9105	4.1185	0.0520	0.1706	0.0049	0.0169	0.0388	0.1757	0.0073	0.0002
Diesel Powered Welder	D	5	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	2.29	2.57	1.1	1.97	1.18	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.7473	4.1369	5.2241	0.0682	0.7573	0.0064	0.0243	0.1345	0.1698	0.0246	0.0002
Excavator - Backhoe/loader	D	2	50-100	75	0.408	0.3672	2.3655	4.7	0.24	2.29	2.57	1.1	1.97	1.18	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.9838	6.3863	5.1933	0.0682	0.5164	0.0064	0.0320	0.2076	0.1688	0.0168	0.0002
Excavator - Earth Scraper 623	D	2	175-300	240	0.367	0.3085	0.7475	4	0.1316	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3790	1.2014	3.8171	0.0525	0.1477	0.0049	0.0160	0.0507	0.1612	0.0062	0.0002
Excavator - loader	D	1	50-100	75	0.408	0.3672	2.3655	4.7	0.24	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.4511	3.8020	4.4851	0.0584	0.3067	0.0055	0.0171	0.1444	0.1704	0.0116	0.0002
Excavator - Motor Grader (CAT140H)	D	1	100-175	140	0.367	0.3384	0.8667	4.1	0.18	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.4157	1.3930	3.9125	0.0525	0.2213	0.0049	0.0176	0.0588	0.1652	0.0093	0.0002
Excavator - Trencher (CAT320)	D	1	50-100	75	0.408	0.3672	2.3655	4.7	0.24	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.4511	3.8020	4.4851	0.0584	0.3067	0.0055	0.0171	0.1444	0.1704	0.0116	0.0002
Forklift	D	3	50-100	75	0.408	0.3672	2.3655	4.7	0.24	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.4511	3.8020	4.4851	0.0584	0.3067	0.0055	0.0171	0.1444	0.1704	0.0116	0.0002
Pile Driver	D	1	375	375	0.367	0.1669	0.8425	4.3351	0.1316	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.2050	1.3541	4.1369	0.0525	0.1477	0.0049	0.0087	0.0572	0.1747	0.0062	0.0002
Portable Compaction - Vibratory Ram	D	1	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3263	1.6097	4.7492	0.0578	0.3613	0.0054	0.0125	0.0618	0.1822	0.0139	0.0002
Portable Compaction Roller	D	1	175-300	240	0.367	0.3085	0.7475	4	0.1316	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3790	1.2014	3.8171	0.0525	0.1477	0.0049	0.0160	0.0507	0.1612	0.0062	0.0002
Portable Power Generators	D	3	25-50	40	0.408	0.2789	1.5323	4.7279	0.3389	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3263	1.6097	4.7492	0.0578	0.3613	0.0054	0.0125	0.0618	0.1822	0.0139	0.0002
Truck Crane - Greater than 200 ton	D	1	175-300	240	0.367	0.3085	0.7475	4	0.1316	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3609	0.7852	4.0180	0.0520	0.1107	0.0049	0.0154	0.0335	0.1714	0.0047	0.0002
Truck Crane - Greater than 300 ton	D	1	175-300	240	0.367	0.3085	0.7475	4	0.1316	1	1	1	1	1	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.3609	0.7852	4.0180	0.0520	0.1107	0.0049	0.0154	0.0335	0.1714	0.0047	0.0002
Vibratory Roller Ingersol-Rand 20 ton	D	1	100-175	140	0.367	0.3384	0.8667	4.1	0.18	1.05	1.53	0.95	1.23	1.01	0.34	0.101	0.009	0.473	1.17	1.05	1.00	1.24	0.4157	1.3930	3.9125	0.0525	0.2213	0.0049	0.0176	0.0588	0.1652	0.0093	0.0002

D - diesel

1. Emission factors are estimated following the methodology described in the U.S. EPA NONROAD model technical document NR-009c, "Exhaust and Crandcase Emission Factors for Nonroad Engine Modeling -- Compression - Ignition", EPA420-P-04-009, April 2004.
The following assumptions are used in the calculation:

Fraction of useful life expended	0.5	
Default Diesel Sulfur Content (wt%)	0.2	Tier 2 default (NR-009c)
Actual Diesel Sulfur Content (wt%)	0.0015	15 ppm
Diesel Density (lbs/gal)	7.1	

2. Adjusted emission factor was calculated using the following equation: EF (HC, CO, NOx) = EFss x TAF x DF (NR-009c, Equation 1)
3. SPM (PM sulfur adjusting factor) = BSCF x 453.6 x 7.0 x soxcov x 0.01 x (soxbas - soxdsl); (NR-009c, Equation 5)
Where: soncov = grams PM sulfur/grams fuel sulfur consumed, 0.02247 for Tier 2.
soxbas = default certification fuel sulfur weight percent, 0.2% for for Tier 2 fuel.
soxdsl = episodic fuel sulfur weight percent, 0.01% for this project.
4. Adjusted PM emission factor = EFss x TAF x DF - SPM (NR-009c, Equation 2)
5. Adjusted SO2 emission factor = BSFC x 453.6 x (1 - soxcov) - HC) x 0.01 x soxdsl x 2 (NR-009c, Equation 7)
Where: soncov = grams PM sulfur/grams fuel sulfur consumed, 0.02247 for Tier 2..
HC = the in-use adjusted emission factor for hydrocarbons
soxdsl = episodic fuel sulfur weight percent, 0.01 % for this project.
6. Adjusted EF (lbs/gal) = Adjusted EF (g/hp-hr) / Adjusted BSFC (lbs-fuel/hp-hr) x 7.1 (lbs/gal-fuel) / 453.6 (g/lb)

EMISSION CALCULATIONS FOR CONSTRUCTION EQUIPMENT COMBUSTION

TABLE B-9 EMISSION RATES FOR CONSTRUCTION EQUIPMENT COMBUSTION - SHORT TERM [1]

Equipment	NR-009c Load Factor [2]	SCAQMD CEQA Typical Load Factor [3]	Fuel Type	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Daily Fuel Usage (gal)	LF Adjusted EF (lbs/gal fuel)[4]					Emission Rate for 1-HR Standards (lbs/hr)[5]					Daily Emissions (lbs)[6]					Emission Rate for 24-HR Standards (lbs/hr)[7]					Modeled Emission Rates for 1-HR Standards (g/s)					Modeled Emission Rates for 24-HR Standards (g/s)				
								HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
Air Compressor 185 CFM	none		D	1	8	0.00	0.00	0.0125	0.0618	0.1822	0.0139	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Air Compressor 750 CFM	none		D	2	6	0.00	0.00	0.0125	0.0618	0.1822	0.0139	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bulldozer D10R	High	0.59	D	1	8	22.25	178.00	0.0051	0.0337	0.1031	0.0037	0.0001	0.11	0.75	2.29	0.08	0.00	0.91	6.01	**18.35**	0.65	0.02	0.038	0.250	0.764	0.027	0.001	0.0143	0.0946	0.2890	0.0103	0.0003	0.0048	0.0315	0.0963	0.0034	0.0001
Concrete Trowel Machine	High		D	1	8	1.27	10.16	0.0130	0.0935	0.1714	0.0174	0.0002	0.02	0.12	0.22	0.02	0.00	0.13	0.95	1.74	0.18	0.00	0.006	0.040	0.073	0.007	0.000	0.0021	0.0150	0.0274	0.0028	0.0000	0.0007	0.0050	0.0091	0.0009	0.0000
Concrete Vibrators	High		D	1	8	0.25	2.00	0.0130	0.0935	0.1714	0.0174	0.0002	0.00	0.02	0.04	0.00	0.00	0.03	0.19	0.34	0.03	0.00	0.001	0.008	0.014	0.001	0.000	0.0004	0.0029	0.0054	0.0005	0.0000	0.0001	0.0010	0.0018	0.0002	0.0000
Crane - Mobile 65 ton	none		D	1	4	0.00	0.00	0.0154	0.0335	0.1714	0.0047	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cranes - Mobile 35 ton	none		D	1	4	0.00	0.00	0.0169	0.0388	0.1757	0.0073	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cranes - Mobile 45 ton	none		D	1	6	0.00	0.00	0.0169	0.0388	0.1757	0.0073	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Diesel Powered Welder	Low		D	5	4	0.00	0.00	0.0243	0.1345	0.1698	0.0246	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Excavator - Backhoe/loader	Low		D	2	8	2.50	40.00	0.0320	0.2076	0.1688	0.0168	0.0002	0.16	1.04	0.84	0.08	0.00	1.28	8.31	6.75	0.67	0.01	0.053	0.346	0.281	0.028	0.000	0.0202	0.1308	0.1064	0.0106	0.0001	0.0067	0.0436	0.0355	0.0035	0.0000
Excavator - Earth Scraper 623	High	0.66	D	2	8	9.00	144.00	0.0106	0.0335	0.1064	0.0041	0.0001	0.19	0.60	1.91	0.07	0.00	1.52	4.82	**15.32**	0.59	0.02	0.063	0.201	0.638	0.025	0.001	0.0240	0.0759	0.2413	0.0093	0.0003	0.0080	0.0253	0.0804	0.0031	0.0001
Excavator - loader	High	0.575	D	1	8	5.00	40.00	0.0099	0.0830	0.0980	0.0067	0.0001	0.05	0.42	0.49	0.03	0.00	0.39	3.32	3.92	0.27	0.00	0.016	0.138	0.163	0.011	0.000	0.0062	0.0523	0.0617	0.0042	0.0001	0.0021	0.0174	0.0206	0.0014	0.0000
Excavator - Motor Grader (CAT140H)	High	0.575	D	1	8	6.00	48.00	0.0101	0.0338	0.0950	0.0054	0.0001	0.06	0.20	0.57	0.03	0.00	0.48	1.62	4.56	0.26	0.01	0.020	0.068	0.190	0.011	0.000	0.0076	0.0256	0.0718	0.0041	0.0001	0.0025	0.0085	0.0239	0.0014	0.0000
Excavator - Trencher (CAT320)	High	0.575	D	1	6	6.60	39.60	0.0099	0.0830	0.0980	0.0067	0.0001	0.07	0.55	0.65	0.04	0.00	0.39	3.29	3.88	0.27	0.00	0.016	0.137	0.162	0.011	0.000	0.0082	0.0691	0.0815	0.0056	0.0001	0.0020	0.0173	0.0204	0.0014	0.0000
Forklift	High		D	3	6	0.00	0.00	0.0171	0.1444	0.1704	0.0116	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pile Driver	High		D	1	8	3.00	24.00	0.0087	0.0572	0.1747	0.0062	0.0002	0.03	0.17	0.52	0.02	0.00	0.21	1.37	4.19	0.15	0.00	0.009	0.057	0.175	0.006	0.000	0.0033	0.0216	0.0660	0.0024	0.0001	0.0011	0.0072	0.0220	0.0008	0.0000
Portable Compaction - Vibratory Ram	none		D	1	8	0.00	0.00	0.0125	0.0618	0.1822	0.0139	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Portable Compaction Roller	none		D	1	6	0.00	0.00	0.0160	0.0507	0.1612	0.0062	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Portable Power Generators	none		D	3	8	1.27	30.48	0.0125	0.0618	0.1822	0.0139	0.0002	0.05	0.24	0.69	0.05	0.00	0.38	1.88	5.55	0.42	0.01	0.016	0.078	0.231	0.018	0.000	0.0060	0.0296	0.0875	0.0067	0.0001	0.0020	0.0099	0.0292	0.0022	0.0000
Truck Crane - Greater than 200 ton	none		D	1	4	0.00	0.00	0.0154	0.0335	0.1714	0.0047	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Truck Crane - Greater than 300 ton	none		D	1	6	0.00	0.00	0.0154	0.0335	0.1714	0.0047	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vibratory Roller Ingersol-Rand 20 ton	none		D	1	8	10.00	80.00	0.0176	0.0588	0.1652	0.0093	0.0002	0.18	0.59	1.65	0.09	0.00	1.40	4.71	13.22	0.75	0.02	0.059	0.196	0.551	0.031	0.001	0.0221	0.0741	0.2082	0.0118	0.0003	0.0074	0.0247	0.0694	0.0039	0.0001
Total																		**7.13**	**36.46**	**77.82**	**4.24**	**0.10**						**0.1144**	**0.5916**	**1.2461**	**0.0682**	**0.0015**	**0.0374**	**0.1914**	**0.4086**	**0.0223**	**0.0005**

D - Diesel

1. Hourly emission rate used for short-term impact analysis were developed based on the projected highest activity level during the second month grading period.
2. Table A-3 of NR-009c document ""Exhaust and Crandcase Emission Factors for Nonroad Engine Modeling -- Compression - Ignition", EPA420-P-04-009, April 2004. A "high" load factor is taken to be 100%.
3 Table A-9-8-D of the SCAQMD CEQA Handbook. These load factors are assumed to be representative for the Niland site.
4. The emission rate for diesel nonroad equipment as determined using methods in NR-009c were for certain load factor conditions. Emission rate is adjusted based on representative load condition at the Niland site .
5. Hourly emission rate (lb/hr) = hourly fuel usage (gals) x EF (lbs/gal).
6. Daily emission (lbs) = daily fuel usage (gals) x EF (lbs/gal)
7. 24-HR Emission Rate = Daily Emissions / 24

EMISSION CALCULATIONS FOR CONSTRUCTION EQUIPMENT COMBUSTION

TABLE B-10 EMISSION RATES FOR CONSTRUCTION EQUIPMENT COMBUSTION - ANNUAL

Equipment	Usage (gal)	LF Adjusted EF (lbs/gal fuel) [1]					Project Emissions (lbs) [2]					Emission Rate - Annual (lbs/hr) [3]					Modeled Annual Emission Rate (g/s)				
		HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
Air Compressor 185 CFM	782	0.0125	0.0618	0.1822	0.0139	0.0002	9.7936	48.3114	142.5371	10.8427	0.1626	0.0011	0.0055	0.0163	0.0012	0.0000	0.0001	0.0007	0.0021	0.0002	0.0000
Air Compressor 750 CFM	0	0.0125	0.0618	0.1822	0.0139	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bulldozer D10R	5,340	0.0051	0.0337	0.1031	0.0037	0.0001	27.2786	180.1559	550.3815	19.6443	0.6552	0.0031	0.0206	0.0628	0.0022	0.0001	0.0004	0.0026	0.0079	0.0003	0.0000
Concrete Trowel Machine	132	0.0130	0.0935	0.1714	0.0174	0.0002	1.7190	12.3558	22.6351	2.2931	0.0274	0.0002	0.0014	0.0026	0.0003	0.0000	0.0000	0.0002	0.0003	0.0000	0.0000
Concrete Vibrators	26	0.0130	0.0935	0.1714	0.0174	0.0002	0.3384	2.4323	4.4557	0.4514	0.0054	0.0000	0.0003	0.0005	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
Crane - Mobile 65 ton	720	0.0154	0.0335	0.1714	0.0047	0.0002	11.0839	24.1134	123.3848	3.4008	0.1496	0.0013	0.0028	0.0141	0.0004	0.0000	0.0002	0.0003	0.0018	0.0000	0.0000
Cranes - Mobile 35 ton	480	0.0169	0.0388	0.1757	0.0073	0.0002	8.1054	18.6391	84.3129	3.4924	0.0997	0.0009	0.0021	0.0096	0.0004	0.0000	0.0001	0.0003	0.0012	0.0001	0.0000
Cranes - Mobile 45 ton	360	0.0169	0.0388	0.1757	0.0073	0.0002	6.0791	13.9793	63.2347	2.6193	0.0748	0.0007	0.0016	0.0072	0.0003	0.0000	0.0001	0.0002	0.0009	0.0000	0.0000
Diesel Powered Welder	2,235	0.0243	0.1345	0.1698	0.0246	0.0002	54.3037	300.6301	379.6387	55.0368	0.4638	0.0062	0.0343	0.0433	0.0063	0.0001	0.0008	0.0043	0.0055	0.0008	0.0000
Excavator - Backhoe/loader	2,680	0.0320	0.2076	0.1688	0.0168	0.0002	85.7239	556.4550	452.4998	44.9980	0.5554	0.0098	0.0635	0.0517	0.0051	0.0001	0.0012	0.0080	0.0065	0.0006	0.0000
Excavator - Earth Scraper 623	4,320	0.0106	0.0335	0.1064	0.0041	0.0001	45.6306	144.6519	459.5778	17.7775	0.5923	0.0052	0.0165	0.0525	0.0020	0.0001	0.0007	0.0021	0.0066	0.0003	0.0000
Excavator - loader	1,000	0.0099	0.0830	0.0980	0.0067	0.0001	9.8526	83.0390	97.9587	6.6976	0.1194	0.0011	0.0095	0.0112	0.0008	0.0000	0.0001	0.0012	0.0014	0.0001	0.0000
Excavator - Motor Grader (CAT140H)	2,304	0.0101	0.0338	0.0950	0.0054	0.0001	23.2570	77.9300	218.8798	12.3783	0.2751	0.0027	0.0089	0.0250	0.0014	0.0000	0.0003	0.0011	0.0031	0.0002	0.0000
Excavator - Trencher (CAT320)	1,386	0.0099	0.0830	0.0980	0.0067	0.0001	13.6557	115.0920	135.7708	9.2829	0.1655	0.0016	0.0131	0.0155	0.0011	0.0000	0.0002	0.0017	0.0020	0.0001	0.0000
Forklift	5,850	0.0171	0.1444	0.1704	0.0116	0.0002	100.2392	844.8314	996.6233	68.1411	1.2150	0.0114	0.0964	0.1138	0.0078	0.0001	0.0014	0.0122	0.0143	0.0010	0.0000
Pile Driver	360	0.0087	0.0572	0.1747	0.0062	0.0002	3.1170	20.5853	62.8888	2.2446	0.0749	0.0004	0.0023	0.0072	0.0003	0.0000	0.0000	0.0003	0.0009	0.0000	0.0000
Portable Compaction - Vibratory Ram	40	0.0125	0.0618	0.1822	0.0139	0.0002	0.5007	2.4702	7.2879	0.5544	0.0083	0.0001	0.0003	0.0008	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
Portable Compaction Roller	1,320	0.0160	0.0507	0.1612	0.0062	0.0002	21.1253	66.9685	212.7675	8.2303	0.2742	0.0024	0.0076	0.0243	0.0009	0.0000	0.0003	0.0010	0.0031	0.0001	0.0000
Portable Power Generators	3,048	0.0125	0.0618	0.1822	0.0139	0.0002	38.1570	188.2262	555.3392	42.2444	0.6335	0.0044	0.0215	0.0634	0.0048	0.0001	0.0005	0.0027	0.0080	0.0006	0.0000
Truck Crane - Greater than 200 ton	300	0.0154	0.0335	0.1714	0.0047	0.0002	4.6183	10.0473	51.4103	1.4170	0.0623	0.0005	0.0011	0.0059	0.0002	0.0000	0.0001	0.0001	0.0007	0.0000	0.0000
Truck Crane - Greater than 300 ton	1,125	0.0154	0.0335	0.1714	0.0047	0.0002	17.3186	37.6772	192.7888	5.3138	0.2337	0.0020	0.0043	0.0220	0.0006	0.0000	0.0002	0.0005	0.0028	0.0001	0.0000
Vibratory Roller Ingersol-Rand 20 ton	3,600	0.0176	0.0588	0.1652	0.0093	0.0002	63.1984	211.7662	594.7819	33.6368	0.7477	0.0072	0.0242	0.0679	0.0038	0.0001	0.0009	0.0030	0.0086	0.0005	0.0000
Total							**545.1**	**2960.4**	**5409.2**	**350.7**	**6.6**						**0.0078**	**0.0426**	**0.0778**	**0.0050**	**0.0001**

1. The emission rate for diesel nonroad equipment as determined using methods in NR-009c were for certain load factor conditions.
   Emission rate is adjusted based on representative load condition at the Niland site .
2. Project Total Emissions (lbs) = Project Total Fuel Usage (gals) x EF (lbs/gal).
3. Emission Rate for annual impact (lbs/hr) = Project Total Emissions (lbs) / 8760 (hrs/yr)

EMISSION CALCULATIONS FOR CONSTRUCTION EQUIPMENT COMBUSTION

TABLE B-11 EMISSION RATES FOR GASOLINE POWERED CONSTRUCTION EQUIPMENT [1]

				Actual Fuel Input			EF (lb/MMBtu)					ER For 1-HR Standards (lbs/hr)					ER For 24-HR Standards (lbs/hr) [4]				
Equipment	Fuel	Count	Daily Op. Hours	gal/hr/ Unit	lbs/hr/ Unit [2]	MMBtu /hr/ Unit [3]	TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2
Portable Compaction - Vibratory Plate	G	1	8	0.25	1.78	0.0360	3.03	62.7	1.63	0.1	0.084	0.109	2.259	0.059	0.004	0.003	0.036	0.753	0.020	0.001	0.001
Total																					

Equipment					ER For 24-HR Standards (g/s)						ER For Annual Standards (g/s) [5]				
	TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2
Portable Compaction - Vibratory Plate	0.0138	0.2847	0.0074	0.0005	0.0004	0.0046	0.0949	0.0025	0.0002	0.0001	0.0005	0.0104	0.0003	0.0000	0.0000
Total	**0.0138**	**0.2847**	**0.0074**	**0.0005**	**0.0004**	**0.0046**	**0.0949**	**0.0025**	**0.0002**	**0.0001**	**0.0005**	**0.0104**	**0.0003**	**0.0000**	**0.0000**

1. Hourly emission rate is determined using AP-42 emission factors in Table 3.3-1 and the heat input of the vibratory plate.
2. Based on the gasoline density of 7.1 lbs/gal.
3. Back calculated from fuel usage and gasoline heat value of 20,300 Btu/lb, AP-42, Table 3.3-1, footnote "c".
4. 24-HR emission rate = Daily emissions (lbs) / 24 (hrs/day)
5. Hourly emission rate for annual impact = project total emissions (lbs) / 8760 (hrs/yr).

TABLE B-12 EMISSION CALCULATION FOR GASOLINE POWERED CONSTRUCTION EQUIPMENT

			Daily Emissions (lbs) [1]					Project Emissions (lbs) [2]				
Equipment	Daily Op. Hours	Total Op. Hours / Project	TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2
Portable Compaction - Vibratory Plate	8	320	0.9	18.1	0.5	0.0	0.0	34.9	723.0	18.8	1.2	1.0
Total			**0.9**	**18.1**	**0.5**	**0.0**	**0.0**	**34.9**	**723.0**	**18.8**	**1.2**	**1.0**

1. Daily emissions = ER (lbs/hr) x No. of Units x Daily Op. Hours/unit
2. Project emission = ER (lbs/hr) x Total Op. Hours of all units

EMISSION CALCULATIONS FOR CONSTRUCTION SITE FUGITIVE DUST (PM10)

Constants:

Material silt content (s) (%)	8.5	AP-42, Table 13.2.2-1 for construction site, used for emission calculation of material handling.
Material moisture content (M) (%)	5	This value is between the moisture content for moist and dry condition listed in SCAQMD CEQA Table A9-9-F2. The moisture content during the fall-winter season is expected to be higher than during the dry seasons due to higher precipitation.
Mean Vehicle Speed (S) (mph)	5	
PM10 Scaling Factor	0.75	For bulldozing and grading only. AP-42, Table 11.9-1.
Mean Wind Speed (mph)	7.4	2005 Annual average wind speed measured at the Imperial County Airport, California Climate Data Archive, http://www.calclim.dri.edu/ccda/stationlist.html, accessed 1/18/2006.
Water Suppression Control Efficiency	90%	Daily multiple watering

TABLE B-13 EMISSIONS FROM BULLDOZING AND DIRT PUSHING OPERATION

Equipment	Controlled PM10 EF (lbs/hr) [1]	No. Of Unit	Hrs/Day/ Unit	Total Op. Hours	Daily Emissions (lbs)	Project Emission (lbs)	PM10 Emission Rate 24-HR (lbs/hr)	24-HR (g/s)	Annual (g/s)
Excavator - Trencher	0.0879	1	6	210	0.53	18.45	0.0220	0.0028	0.0003
Excavator - Backhoe/Loader	0.0879	2	8	1072	1.41	94.20	0.0586	0.0074	0.0014
Excavator - Loader	0.0879	1	8	200	0.70	17.57	0.0293	0.0037	0.0003
Bulldozer (D10R)	0.0879	1	8	240	0.70	21.09	0.0293	0.0037	0.0003
Excavator - Earth Scraper 623	0.0879	2	8	480	1.41	42.18	0.0586	0.0074	0.0006
Excavator - Motor Grader	0.0879	1	8	384	0.70	33.74	0.0293	0.0037	0.0005
Total					**5.45**	**227.23**		**0.0286**	**0.0033**

1. Using bulldozer equation in AP-42, Table 11.9-1 for all equipment with the 90% control efficiency of water suppression .

TABLE B-14 EMISSIONS FROM AGGREGATE HANDLING AND STORAGE

Daily Dirt Handled (tons)	Uncontrolled EF (lbs/ton) [1]	Controlled EF (lbs/ton) [2]	Daily PM10 EM (lbs)	PM10 Emission/ Project (lbs)	ER for 24-HR Standard (lbs/hr)	No. Of Days during project	ER for Annual Standard (lbs/hr)	ER for 24-Hr Standard (g/s)	ER for Annual Standard (g/s)
60	0.0005	5.16943E-05	0.003101655	0.140	1.29E-04	45	1.59332E-05	1.63E-05	2.008E-06

1. Calculated using AP-42 Section 13.2.4, Equation. 1
2. Based on the control efficiency of 90% for daily water suppression.

TABLE B-15 EMISSIONS FROM VEHICLE TRAFFIC ON UNPAVED ROAD AND PARKING LOT

Vehicle Type	Mean Vehicle Weight (tons)	Uncontr. PM10 EF (lbs/VMT) [1]	Adj. PM10 EF (lbs/VMT) - For Annul Impact [2]	No. Of Unit	Round Trips Or Hours/Day/ Unit	Round Trip Distance (mile)	Daily VMT (all units)	Water Suppressio n Efficiency	Controlled ER for 24-HR Standard (lbs/hr)	Daily Emissions (lbs)	Total No. of Days Operated	VMT/ Project	Project ER (lbs)	Controlled ER for Annual Standard (lbs/hr)	Controlled ER for 24-HR Standard (g/s)	Controlled ER for Annual Standard (g/s)
Dump trucks	22.7	2.73	2.64	2	6	0.4	4.8	0.9	0.055	1.312	64	307.2	81.23	0.0093	0.0069	0.0012
Service trucks	4	1.25	1.21	2	4	0.4	3.2	0.9	0.017	0.401	86	275.2	33.32	0.0038	0.0021	0.0005
Trucks - Pickup 3/4 ton	4	1.25	1.21	3	2	0.4	2.4	0.9	0.013	0.300	76	182.4	22.08	0.0025	0.0016	0.0003
Water Truck	29	3.05	2.95	1	8	0.26	2.10	0.9	0.027	0.641	142	298.2	88.04	0.0100	0.0034	0.0013
Total Unpave Road															**0.0139**	**0.0032**
Passenger Cars in Parking lot	2	0.92	0.89	60	2	0.16	19.19	0.9	0.073	1.758	270	5180.5656	459.12	0.0524	0.0092	0.0066
										4.413			**683.78**			

1. AP-42, Section 13.2.2, Equation 1a.
2. AP-42, Section 13.2.2, Equation 2. Estimated 12 days with precipitation > 0.01 inch, according to historical precipitation data collected at Niland, CA, Western Regional Climate Center, http://www.wrcc.dri.edu/summary/climsmsca.html, accessed 1/17/06..

TABLE B-16 PM10 EMISSIONS FROM PARKING LOT [1]

Daily Vehicle Counts (veh/day)	EF [2] (lbs/veh)	Project Days	Daily Emission (lbs/day)	Project Emission (lbs)	Emission Rate (g/s) 24-HR	Annual
60	0.4445	270	26.7	7201.0	0.1400	0.1036

1. Emission was calculated using equation in SCAQMD CEQA Handbook, Table A-9-9 for passenger vehicle on unpaved parking lots.
EM (lbs/day) = Vehicles per day x 5.56 x A
2. SCAQMD CEQA Handbook Table A9-9
EF (lbs/veh)= 5.56 x (Parking Lot Length in feet + Parking Lot Width in feet) x 0.000189
= 5.56 * (302 + 121) x 0.000189 = 0.4445

EMISSION CALCULATIONS FOR CONSTRUCTION RELATED ONROAD VEHICLES

TABLE B-17 EMISSION FACTOR FOR ONROAD VEHICLES

Onroad Vehicle	Fuel Type	Vehicle Count	Weight (lbs)	Vehicle Type	EF (lbs/VMT) [1]				
					TOC	CO	NOx	PM10	SO2
On-Site Vehicles									
Truck - Water	D	1	58000	HHD	2.22E-03	8.89E-03	3.74E-02	8.89E-04	4.94E-05
Dump Truck	D	2	46000	HHD	2.22E-03	8.89E-03	3.74E-02	8.89E-04	4.94E-05
Service Truck - 1 ton	D	2	8000	LHD	2.22E-03	8.89E-03	3.74E-02	8.89E-04	4.94E-05
Trucks - Pickup 3/4 ton	G	3	8000	LHD	2.22E-03	8.89E-03	3.74E-02	8.89E-04	4.94E-05
Highway Vehicles									
Passenger Vehicles [2]	G/D	60	4000	LDA/LDT	2.53E-03	2.12E-02	2.36E-03	8.40E-05	4.05E-06
Heavy Duty Delivery Truck	D	1	28000	MDH	2.22E-03	8.89E-03	3.74E-02	8.89E-04	4.94E-05

1. To obtain the emission factors, EMFAC2002 was run in the "planning inventory" mode for the modeling year of 2007. The Imperial County average fleet information was chosen, and the inventory was run for winter.
The emission factor for a given vehicle category was back calculated using the daily emissions and daily VMT for that vehicle category.
2. The emission factors for passenger vehicles is a weighted average, assuming 50% passenger cars and 50% light duty trucks.

TABLE B-18 EMISSION CALCULATION FOR ONROAD VEHICLES

Onroad Vehicles	Total Op. Hours / Project	Trips or Hours / Day / Unit	Round Trip Distance (mile)	Daily Total VMT	Daily Emissions (lbs) [1]					Project Emissions (lbs)				
					TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2
On-Site Vehicles														
Truck - Water	1,136	8	1.4	11.2	2.49E-02	9.96E-02	4.19E-01	9.96E-03	5.53E-04	4.45E-01	1.78E+00	7.50E+00	1.78E-01	9.90E-03
Dump Truck	768	6	1.4	16.8	3.73E-02	1.49E-01	6.29E-01	1.49E-02	8.30E-04	6.02E-01	2.41E+00	1.01E+01	2.41E-01	1.34E-02
Service Truck - 1 ton	688	4	1.4	11.2	2.49E-02	9.96E-02	4.19E-01	9.96E-03	5.53E-04	5.39E-01	2.16E+00	9.09E+00	2.16E-01	1.20E-02
Trucks - Pickup 3/4 ton	912	2	1.4	8.4	1.87E-02	7.47E-02	3.14E-01	7.47E-03	4.15E-04	1.07E+00	4.29E+00	1.81E+01	4.29E-01	2.38E-02
Total				**Total**	**0.11 lbs**	**0.42 lbs**	**1.78 lbs**	**0.04 lbs**	**0.00 lbs**	**2.66**	**10.64**	**44.79**	**1.06**	**0.06**
Highway Vehicles	**Total Days**													
Passenger Vehicles [2]	270	1	60	3600	9.1	76.3	8.5	0.3	1.46E-02	2,462	20,597	2,296	82	4
Heavy Duty Delivery Truck	270	12	30	360	0.8	3.2	13.5	0.3	1.78E-02	216	864	3,638	86	5
Total				**Total**	**0.80 lbs**	**3.20 lbs**	**13.48 lbs**	**0.32 lbs**	**0.02 lbs**	**2,678 lbs**	**21,461 lbs**	**5,934 lbs**	**168 lbs**	**9 lbs**
										1.3 tons	**10.7 tons**	**3.0 tons**	**0.1 tons**	**0.0 tons**

1. Based on equipment usage for grading phase on the second construction month, which is the peak activity month.

TABLE B-19 EMISSIONS FROM VEHICLE TRAFFIC ON PAVED ROAD

Vehicle Type	Mean Vehicles Speed (mph) [Vehicles Weight	Total No. Of Trips / Day	PM10 EF (lbs/VMT) [1]	Round Trip Distance (mile)	Daily VMT (all units)	Total No. of Days Operated	VMT/ Project	Daily Emissions (lbs)	Project Emissions (lbs)
Passenger Cars 1	45	60	0.0152	60	3600	180	648000	54.5589	9820.60
Heavy Duty Delivery Trucks	[18]	12	0.0709	12	144	180	25920	10.2155	1838.80
Total								**65**	**11,659**

1. EF are calculated using equations in AP-42, Section 13.2.2. Equation 1b is used for passenger cars; equation 1a is used for heavy duty delivery trucks.
EF calculations are based on the following assumptions:
Paved road silt content (%) 0.1348 SCAQMD CEQA Table A-9-C-1, 5% local, 5% collector, 90% freeway
Silt Loading 0.04 oz/yr^2 1.356 g/m^2 SCAQMD CEQA Table A9-9-C-1.

TABLE B-20 COMBUSTION EMISSION RATE FOR CONSTRUCTION EQUIPMENT

	1-HR/3-HR/8-HR				24-HR				Annual				LT Emission Rate - CONS1 (g/s-m2)	ST Emission Rate (MNCOMB1 - MNCOMB4) (g/s)	
Pollutant	Diesel Equip.	Gasoline Equip.	Trucks	Total	Diesel Equip.	Gasoline Equip.	Trucks	Total	Diesel Equip.	Gasoline Equip.	Trucks	Total	Annual	1-HR	24-HR
PM10	0.0682	0.0005	0.0013	0.0699	0.0223	0.0002	0.0002	0.0226	0.0050	1.66E-05	1.53E-05	0.00508	9.522E-08	0.0175	5.659E-03
NOx	1.2461	0.0074	0.0528	1.3063	0.4086	0.0025	0.0094	0.4204	0.0778	0.0003	0.0006	0.0787	1.477E-06	0.3266	1.051E-01
CO	0.5916	0.2847	0.0125	0.8888	0.1914	0.0949	0.0022	0.2885	0.0426	0.0104	0.0002	0.0531	9.967E-07	0.2222	7.214E-02
SO2	0.0015	0.0004	0.0001	0.0020	0.0005	1.271E-04	1.234E-05	6.413E-04	9.487E-05	1.393E-05	8.500E-07	1.097E-04	2.057E-09	0.0005	1.603E-04

TABLE B-21 FUGITIVE DUST (PM10) EMISSION RATE FOR CONSTRUCTION ACTIVITIES (g/s)

Activity	Bulldozing/ Dirt Pushing	Aggregate Handling/ Storage	Unpaved Road	Total ER w/o Parking Lot (g/s)	Parking Lot	LT ER - CONS2 (g/s-m2)	ST ER (g/s) - MNFUG1 - MNFUG4 (g/s)	PKLOT ER (g/s)
24-HR	0.0286	1.63E-05	0.0139	0.04255	0.0092		0.0106	0.0092
Annual	0.0033	2.00758E-06	0.0032	6.502E-03	0.0066	1.220E-07		0.0066

EMISSION INVENTORY

Table B-22 On-Site Daily Criteria Pollutant Construction Emissions (lbs/day)

Activities	VOC	CO	NOx	PM10	SO2
Combustion Emissions					
Construction - Diesel	7.13	36.46	77.82	4.24	0.10
Construction - Gasoline	0.87	18.07	0.47	0.03	0.02
Construction - Trucks	0.11	0.42	1.78	0.04	0.00
Construction Combustion Subtotal	*8.11*	*54.96*	*80.08*	*4.31*	*0.12*
Unpaved Road Travel/Parking Area Fugitive PM Emissions				4.41	
Grading /Bulldozing Fugitive PM Emissions				5.45	
Earth Loading/Storage Fugitive PM Emissions				0.003	
Total Max. Daily Emissions (lbs)	**8.11**	**54.96**	**80.08**	**14.18**	**0.12**

Table B-23 On-Site Project Criteria Pollutant Construction Emissions

Activities	VOC	CO	NOx	PM10	SO2
Combustion Emissions					
Construction - Diesel	545	2960	5409	351	7
Construction - Gasoline	35	723	19	1	1
Construction - Trucks	3	11	45	1	0
Construction Combustion Subtotal	*583*	*3694*	*5473*	*353*	*8*
Unpaved Road Travel / Parking Area Fugitive PM Emissions				683.8	
Grading /Bulldozing Fugitive PM Emissions				227.2	
Earth Loading/Storage Fugitive PM Emissions				0.1	
Total Project Emissions (lbs)	**582.7**	**3694.0**	**5472.7**	**1264.1**	**7.6**
Total Project Emissions (tons)	**0.291**	**1.847**	**2.736**	**0.632**	**0.004**

Table B-24 Fugitive Dust Emissions From Construction of Water Line and Gas Line

Construction	Work Area (acre)	TSP EF (tons/acre/month) [1]	Project Emission (tons)	
			TSP	PM10 [2]
Water Line	0.32	1.2	0.384	0.192
Gas Line	0.83	1.2	0.996	0.498

1. From AP-42, Chapter 13.2: EF = 1.2 tons/acre/month of activity. Assuming the construction of pipeline for each acre of disturbed area will be completed within a month.
2 Assuming 50% TSP is PM10.

Table B-25 Daily Regional On-Highway Criteria Pollutant Emissions

Activities	VOC	CO	NOx	PM10	SO2
Passenger Vehicle - Combustion Emissions	9.12	76.29	8.50	0.30	0.01
Delivery Truck - Combustion Emissions	0.80	3.20	13.48	0.32	0.02
Passenger Vehicle - Paved Road Dust				54.56	
Delivery Truck - Paved Road Dust				10.22	
Total (lbs)	9.92	79.49	21.98	65.40	0.03

Table B-26 Project Regional On-Highway Criteria Pollutant Emissions

Activities	VOC	CO	NOx	PM10	SO2
Passenger Vehicle - Combustion Emissions	2,462	20,597	2,296	82	4
Delivery Truck - Combustion Emissions	216	864	3,638	86	5
Passenger Vehicle - Paved Road Dust				9,821	
Delivery Truck - Paved Road Dust				1,839	
Total (lbs)	2,678	21,461	5,934	11,827	9
Total (tons)	1.3	10.7	3.0	5.9	0.004

```
Title    : Imperial Avg 2007 Winter Default Title
Version  : Emfac2002 V2.2 Apr 23 2003
Run Date : 01/18/06 10:10:10
Scen Year: 2007 -- Model Years: 1965 to 2007
Season   : Winter
Area     : Imperial County Average
I/M Stat : No I and M program in effect
Emissions: Tons Per Day
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                                                - - - -  H e a v y  D u t y  T r u c k
s  - - -
           - - - Light Duty Passenger Cars - - -   - - - - - Light Duty Trucks - - -
- -   - - - - - Medium Duty Trucks - - - -   ----- Gasoline Trucks ------    Diesel
Total HD     Urban    Motor-     All
           Non-cat       Cat    Diesel     Total   Non-cat       Cat    Diesel
Total   Non-cat       Cat    Diesel     Total   Non-cat       Cat     Total
Trucks    Trucks     Buses    cycles  Vehicles

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 Vehicles     1037.    63280.      207.    64524.     1387.    42873.      907.
45168.      292.     8131.      794.     9217.      690.     2549.     3239.
4548.     7787.      242.     2191.   129128.
 VMT/1000       16.     2450.        5.     2471.       40.     1609.       32.
1681.        7.      345.       44.      397.        8.       55.       63.
375.      438.       29.       16.     5031.
 Trips        4391.   396611.     1154.   402156.     5939.   268119.     5489.
279547.     2883.   115334.     8964.   127181.    12733.    32951.    45684.
48101.    93785.      968.     4381.   908018.

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Total Organic Gas Emissions
 Run Exh       0.10      0.92      0.00      1.03      0.27      0.58      0.01
0.86      0.06      0.14      0.02      0.22      0.08      0.14      0.22      0.40
     0.62      0.19      0.06      2.98
 Idle Exh      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.03
     0.03      0.00      0.00      0.04
 Start Ex      0.03      0.64      0.00      0.66      0.04      0.33      0.00
0.37      0.02      0.11      0.00      0.13      0.18      0.11      0.29      0.00
     0.29      0.01      0.01      1.47
            -------   -------   -------   -------   -------   -------   -------
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-------   -------   -------   -------   -------
 Total Ex      0.13      1.56      0.00      1.69      0.31      0.90      0.01
1.22      0.09      0.25      0.02      0.36      0.26      0.25      0.51      0.43
     0.94      0.20      0.07      4.49

 Diurnal       0.01      0.17      0.00      0.18      0.02      0.11      0.00
0.13      0.00      0.02      0.00      0.02      0.00      0.00      0.00      0.00
     0.00      0.00      0.01      0.34
 Hot Soak      0.03      0.25      0.00      0.27      0.03      0.18      0.00
0.21      0.01      0.03      0.00      0.04      0.01      0.01      0.02      0.00
     0.02      0.00      0.01      0.55
 Running       0.11      0.57      0.00      0.67      0.08      0.62      0.00
0.70      0.02      0.15      0.00      0.17      0.06      0.12      0.18      0.00
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     0.18      0.01      0.02      1.76
 Resting       0.01      0.05      0.00      0.06      0.01      0.04      0.00
0.04      0.00      0.01      0.00      0.01      0.00      0.00      0.00      0.00
     0.00      0.00      0.00      0.11
            -------   -------   -------   -------   -------   -------   -------
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 Total         0.29      2.59      0.00      2.88      0.44      1.85      0.01
2.30      0.12      0.46      0.02      0.60      0.33      0.38      0.72      0.43
     1.15      0.21      0.11      7.25

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Carbon Monoxide Emissions
 Run Exh       1.22     15.72      0.00     16.95      3.11     12.84      0.02
15.97      0.97      2.13      0.06      3.15      1.71      2.20      3.91
1.59      5.50      1.53      0.69     43.79
 Idle Exh      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.02      0.00      0.02      0.01      0.01      0.02      0.16
     0.18      0.00      0.00      0.20
 Start Ex      0.16      6.12      0.00      6.28      0.21      3.65      0.00
3.86      0.16      1.03      0.00      1.19      1.58      1.53      3.11      0.00
     3.11      0.07      0.04     14.56
            -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------
 Total Ex      1.38     21.85      0.00     23.23      3.32     16.49      0.02
19.83      1.12      3.19      0.06      4.37      3.30      3.74      7.04
1.75      8.79      1.60      0.74     58.55

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Oxides of Nitrogen Emissions
 Run Exh       0.09      2.13      0.01      2.22      0.22      1.72      0.04
1.98      0.06      0.42      0.24      0.72      0.05      0.47      0.52      6.96
     7.48      0.33      0.02     12.76
 Idle Exh      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.49
     0.49      0.00      0.00      0.50
 Start Ex      0.01      0.33      0.00      0.34      0.01      0.24      0.00
0.25      0.00      0.18      0.00      0.19      0.03      0.21      0.23      0.00
     0.23      0.00      0.00      1.02
            -------   -------   -------   -------   -------   -------   -------
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-------   -------   -------   -------   -------
 Total Ex      0.09      2.46      0.01      2.56      0.23      1.96      0.04
2.23      0.06      0.61      0.24      0.91      0.08      0.68      0.76      7.45
     8.20      0.33      0.03     14.27

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Carbon Dioxide Emissions (000)
 Run Exh       0.01      0.93      0.00      0.94      0.02      0.75      0.01
0.78      0.00      0.28      0.02      0.31      0.01      0.04      0.05      0.85
     0.90      0.04      0.00      2.97
 Idle Exh      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.03
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     0.03      0.00      0.00      0.03
 Start Ex      0.00      0.03      0.00      0.03      0.00      0.03      0.00
0.03      0.00      0.01      0.00      0.01      0.00      0.00      0.00      0.00
     0.00      0.00      0.00      0.08
            -------   -------   -------   -------   -------   -------   -------
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-------   -------   -------   -------   -------
 Total Ex      0.01      0.97      0.00      0.98      0.02      0.77      0.01
0.81      0.01      0.29      0.02      0.32      0.01      0.04      0.05      0.87
     0.93      0.04      0.00      3.07

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    PM10 Emissions
 Run Exh       0.00      0.03      0.00      0.03      0.00      0.03      0.00
0.03      0.00      0.01      0.00      0.01      0.00      0.00      0.00      0.16
     0.16      0.00      0.00      0.23
 Idle Exh      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.02
     0.02      0.00      0.00      0.02
 Start Ex      0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
     0.00      0.00      0.00      0.01
            -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------
 Total Ex      0.00      0.03      0.00      0.03      0.00      0.03      0.00
0.04      0.00      0.01      0.00      0.01      0.00      0.00      0.00      0.17
     0.17      0.00      0.00      0.26

 TireWear      0.00      0.02      0.00      0.02      0.00      0.01      0.00
0.01      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
     0.01      0.00      0.00      0.06
 BrakeWr       0.00      0.03      0.00      0.03      0.00      0.02      0.00
0.02      0.00      0.00      0.00      0.01      0.00      0.00      0.00      0.01
     0.01      0.00      0.00      0.07
            -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------   -------   -------   -------
-------   -------   -------   -------   -------
 Total         0.00      0.09      0.00      0.09      0.00      0.07      0.00
0.07      0.00      0.02      0.00      0.02      0.00      0.00      0.00      0.19
     0.19      0.00      0.00      0.38

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 Lead          0.00      0.00      0.00      0.00      0.00      0.00      0.00
0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
     0.00      0.00      0.00      0.00
 SOx           0.00      0.01      0.00      0.01      0.00      0.01      0.00
0.01      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
     0.01      0.00      0.00      0.03

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Fuel Consumption (000 gallons)
 Gasoline      1.17    102.83      0.00    104.00      2.84     82.06      0.00
84.90      0.74     30.13      0.00     30.88      1.53      5.02      6.55
0.00      6.55      1.93      0.36    228.62
```

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 Diesel         0.00       0.00       0.18       0.18       0.00       0.00       1.10
1.10       0.00       0.00       2.19       2.19       0.00       0.00       0.00      78.71
    78.71       2.53       0.00      84.72

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Title : Imperial Avg 2007 Winter Default Title
Version : Emfac2002 V2.2 Apr 23 2003
Run Date : 01/18/06 10:10:10
Scen Year: 2007 -- Model Years: 1965 to 2007
Season : Winter
Area : Imperial County Average
I/M Stat : No I and M program in effect
Emissions: Tons Per Day

	Worker Commuter			Delivery Truck			
Vehicle Class	**Passenger Car (50%)**	**Light-Duty Trucks (50%)**			**Heavy Duty Trucks - Diesel**		
Tech Group	**LDA-TOT**	**LDT1-TOT**	**LDT2-TOT**	**LHDT1-DSL**	**LHDT2-DSL**	**MHDT-DSL**	**HHDT-DSL**
Vehicle Info							
VMT/1000	2471	975	707	28	10	54	313
TOG Emissions							
Run Exh	1.03	0.48	0.38	0.01	0.01	0.03	0.37
Idle Exh	0	0	0	0	0	0	0.03
Start Ex	0.66	0.2	0.17	0	0	0	0
Diurnal	0.18	0.08	0.05	0	0	0	0
Hot Soak	0.27	0.12	0.09	0	0	0	0
Running	0.67	0.42	0.28	0	0	0	0
Resting	0.06	0.03	0.02	0	0	0	0
Total Ex (tons/day)	2.88	1.32	0.98	0.01	0.01	0.03	0.4
EF (lbs/VMT)	0.0023	0.0027					
Weighted EF (lbs/VMT)		**0.0025**			**0.0022**		
CO Emissions							
Run Exh	16.95	9.17	6.8	0.04	0.02	0.15	1.42
Idle Exh	0	0	0	0	0	0	0.16
Start Ex	6.28	2.19	1.68	0	0	0	0
Total Ex (tons/day)	23.23	11.35	8.48	0.04	0.02	0.16	1.58
EF (lbs/VMT)	0.0188	0.0236					
Weighted EF (lbs/VMT)		**0.0212**			**0.0089**		
NOx Emissions							
Run Exh	2.22	1.02	0.96	0.16	0.07	0.69	6.18
Idle Exh	0	0	0	0	0	0.01	0.48
Start Ex	0.34	0.11	0.14	0	0	0	0
Total Ex (tons/day)	2.56	1.14	1.09	0.16	0.07	0.7	6.65
EF (lbs/VMT)	0.0021	0.0027					
Weighted EF (lbs/VMT)		**0.0024**			**0.0374**		
CO2 Emissions (1000)							
Run Exh	0.94	0.45	0.33	0.02	0.01	0.09	0.75
Idle Exh	0	0	0	0	0	0	0.02
Start Ex	0.03	0.02	0.01	0	0	0	0
Total Ex (tons/day)	0.98	0.47	0.34	0.02	0.01	0.09	0.77
EF (lbs/VMT)	0.0008	0.0010					
Weighted EF (lbs/VMT)		**0.0009**			**0.0044**		

	Worker Commuter			Delivery Truck			
Vehicle Class	**Passenger Car (50%)**	**Light-Duty Trucks (50%)**			**Heavy Duty Trucks - Diesel**		
Tech Group	**LDA-TOT**	**LDT1-TOT**	**LDT2-TOT**	**LHDT1-DSL**	**LHDT2-DSL**	**MHDT-DSL**	**HHDT-DSL**
PM10 Emissions							
Run Exh	0.03	0.01	0.02	0	0	0.02	0.13
Idle Exh	0	0	0	0	0	0	0.01
Start Ex	0	0	0	0	0	0	0
SubTotal Ex	0.03	0.02	0.02	0	0	0.02	0.15
TireWear	0.02	0.01	0.01	0	0	0	0.01
BrakeWr	0.03	0.01	0.01	0	0	0	0
Total Ex (tons/day)	0.09	0.04	0.04	0	0	0.02	0.16
EF (lbs/VMT)	0.0001	0.0001					
Weighted EF (lbs/VMT)		**8.40E-05**			**0.0009**		
Lead Emission							
Lead Ex (tons/day)	0	0	0	0	0	0	0
Weighted EF (lbs/VMT)	0	0	0		0		
SOx Emissions							
SOx (tons/day)	0.01	0	0	0	0	0	0.01
EF (lbs/VMT)	0.0000	0.0000					
Weighted EF (lbs/VMT)		**4.047E-06**			**4.938E-05**		
Fuel Consumption (1000 gal)							
Gasoline	104	48.85	36.04	0	0	0	0
Diesel	0.18	0.82	0.28	1.43	0.55	8.15	69.45

NILAND SITE CONSTRUCTION EQUIPMENT USAGE PROJECTION

Equipment	Gasoline/ Diesel	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Daily Fuel Use	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Days	Gal/Month	Gal/Day	Total Fuel Usge	Total Operating Hours
						1st month			2nd month			3th month			4th month			5th month			6th month			7th month			8th month			9th month				
Air Compressor 185 CFM	D	1	8	1.27	10.16		0			0		10	102	10.16	22	224	10.16	15	152	10.16	15	152	10.16	15	152	10.16		0			0		782.32	616
Air Compressor 750 CFM	D	1	8	1.27	10.16		0			0			0			0			0			0			0			0			0		0	0
Articulating Boom Platform	D	2	6	0.25	3.00		0			0		22	66	3.00	22	66	3.00	22	66	3.00		0			0			0			0		198	792
Bulldozer D10R	D	1	8	22.25	178.00	15	2670	178.00	15	2670	178.00		0			0			0			0			0			0			0		5340	240
Bulldozer D4C	D	1	8	3.00	24.00		0			0			0			0			0			0			0			0			0		0	0
Concrete Pumper Truck	D	1	6	3.13	18.78		0		5	94	18.78	5	94	18.78	3	56	18.78		0			0			0			0			0		244.14	78
Concrete Trowel Machine	D	1	8	1.27	10.16		0		5	51	10.16	5	51	10.16	3	30	10.16		0			0			0			0			0		132.08	104
Concrete Vibrators	D	1	8	0.25	2.00		0		5	10	2.00	5	10	2.00	3	6	2.00		0			0			0			0			0		26	104
Crane - Mobile 65 ton	D	1	4	4.00	16.00		0			0			0		20	320	16.00	15	240	16.00	10	160	16.00		0			0			0		720	180
Cranes - Mobile 35 ton	D	1	4	4.00	16.00		0			0			0			0			0		20	320	16.00	10	160	16.00		0			0		480	120
Cranes - Mobile 45 ton	D	1	6	4.00	24.00		0			0			0		5	120	24.00	5	120	24.00	5	120	24.00		0			0			0		360	90
Diesel Powered Welder	D	5	4	1.27	25.40		0			0		22	559	25.40	22	559	25.40	22	559	25.40	22	559	25.40		0			0			0		2235.2	1760
Dump Truck	D	2	6	3.13	37.56	10	376	37.56	22	826	37.56	22	826	37.56	5	188	37.56	5	188	37.56		0			0			0			0		2403.84	768
Excavator - Backhoe/loader	D	2	8	2.50	40.00		0		10	400	40.00	22	880	40.00	15	600	40.00	10	400	40.00	10	400	40.00		0			0			0		2680	1072
Excavator - Earth Scraper 623	D	2	8	9.00	144.00	15	2160	144.00	15	2160	144.00		0			0			0			0			0			0			0		4320	480
Excavator - loader	D	1	8	5.00	40.00	10	400	40.00	5	200	40.00	10	400	40.00		0			0			0			0			0			0		1000	200
Excavator - Motor Grader (CAT140H)	D	1	8	6.00	48.00	10	480	48.00	20	960	48.00	8	384	48.00		0			0			0		10	480	48.00		0			0		2304	384
Excavator - Trencher (CAT320)	D	1	6	6.60	39.60		0		15	594	39.60	10	396	39.60	10	396	39.60		0			0			0			0			0		1386	210
Forklift	D	3	6	2.50	45.00		0		10	450	45.00	22	990	45.00	22	990	45.00	22	990	45.00	22	990	45.00	22	990	45.00	10	450	45.00		0		5850	2340
Fusion Welder	D	1	8	1.27	10.16		0			0			0			0			0			0			0			0			0		0	0
Light Plants	D	1	8	1.27	10.16		0			0			0			0			0			0			0			0			0		0	0
Portable Compaction - Vibratory Plate	G	1	8	0.25	2.00		0		10	20	2.00	10	20	2.00		0			0			0		10	20	2.00	10	20	2.00		0		80	320
Portable Compaction - Vibratory Ram	D	1	8	0.25	2.00		0		10	20	2.00	10	20	2.00		0			0			0			0			0			0		40	160
Portable Compaction Roller	D	1	6	10.00	60.00	5	300	60.00	12	720	60.00	5	300	60.00		0			0			0			0			0			0		1320	132
Portable Power Generators	D	3	8	1.27	30.48		0		20	610	30.48	20	610	30.48	20	610	30.48	20	610	30.48	20	610	30.48		0			0			0		3048	2400
Pumps	G	2	8	0.13	2.08		0		5	10	2.08	5	10	2.08		0			0			0			0			0			0		20.8	160
Service Truck - 1 ton	D	2	4	1.56	12.48		0		22	275	12.48	22	275	12.48	22	275	12.48	10	125	12.48	10	125	12.48		0			0			0		1073.28	688
Tractor Truck 5th Wheel	D	1	4	3.13	12.52	5	63	12.52	22	275	12.52	5	63	12.52	10	125	12.52	10	125	12.52	10	125	12.52		0			0			0		776.24	248
Truck - Fuel/Lube	D	1	2	3.13	6.26	10	63	6.26	22	138	6.26	22	138	6.26	22	138	6.26	22	138	6.26	22	138	6.26	22	138	6.26		0			0		888.92	284
Truck - Water	D	1	8	3.13	25.04	10	250	25.04	22	551	25.04	22	551	25.04	22	551	25.04	22	551	25.04	22	551	25.04	22	551	25.04		0			0		3555.68	1136
Truck Crane - Greater than 200 ton	D	1	4	5.00	20.00		0			0			0			0		15	300	20.00		0			0			0			0		300	60
Truck Crane - Greater than 300 ton	D	1	6	7.50	45.00		0			0		15	675	45.00	10	450	45.00		0			0			0			0			0		1125	150
Trucks - 3 ton	D	2	2	1.56	6.24	20	125	6.24	22	137	6.24	10	62	6.24	10	62	6.24	10	62	6.24		0			0			0			0		449.28	288
Trucks - Pickup 3/4 ton	G	3	2	0.78	4.68	10	47	4.68	22	103	4.68	22	103	4.68	22	103	4.68	22	103	4.68	22	103	4.68	22	103	4.68	10	47	4.68		0		711.36	912
Vibratory Roller Ingersol-Rand 20 ton	D	1	8	10.00	80.00	5	400	80.00	20	1600	80.00		0			0			0			0		10	800	80.00	10	800	80.00		0		3600	360
Pile Driver	D	1	8	3.00	24.00				10	240	24.00	5	120	24.00		0			0			0									0		360	120
Total =							7333	642	346	13114	871	336	7704	552	290	5868	414	247	4729	319	210	4352	268	143	3394	237	40	1317	132	0	0	0	47810	16956

Project Emissions Data Files Submitted on Separate CDs

Attachment C
Supporting Information for Estimation of Project Operations Emissions

Table C-1 Niland Gas Turbine Plant - Emissions Calculations Rev 1

Annual Emissions

Emissions Total (lbs)	Hours	NOx	CO	VOC	PM10
Startup Event	83.35	1,500	2,800	550	335
Warm-up Event	250.00	5,466	3,751	553	750
Controlled Operation	5,960.00	23,691	34,616	6,596	17,880
Uncontrolled Operation	40.00	1,590	968	133	120
Shutdown Event	66.65	1,100	1,850	300	265
	6,400	33,347	43,985	8,132	19,350
Emissions Total (tons)		**16.67**	**21.99**	**4.07**	**9.68**
ERC Estimates (tons)		19.39	18.08	4.26	10.13

Daily Emissions

Emissions Total (lbs)	Hours	NOx	CO	VOC	PM10
Startup Event	1.33	24.00	44.80	8.80	5.36
Warm-up Event	4.00	87.45	60.02	8.85	12.00
Uncontrolled Operation	8.00	318	194	27	24
Controlled Operation	33.60	133.56	195.15	37.18	100.80
Shutdown Event	1.07	17.60	29.60	4.80	4.24
	48.00	580.61	523.16	86.20	146.40

Hourly Emissions

Emissions Total (lbs)	Hours	NOx	CO	VOC	PM10
Startup Event	0.33	3.00	5.60	1.10	0.67
Warm-up Event	1.00	10.93	7.50	1.11	1.50
Controlled Operation	0.67	2.65	3.87	0.74	2.00
	2.00	16.58	16.97	2.94	4.17

Commissioning Emissions

Emissions Total (lbs)	Hours	NOx	CO	VOC	PM10
Uncontrolled Operation	400.00	15,900	9,680	1,328	1,200
	400	15,900	9,680	1,328	1,200

Reference Information

Annual Controlled Hours	5960.00
Annual Uncontrolled Hours	40.00
Annual Start/Stop Events	500.00
Daily Controlled Hours	33.60
Daily Uncontrolled Hours	8.00
Daily Start/Stop Events	8.00
Startup Time (10 min)	0.17
Warm-up Time (30 min)	0.50
Shutdown Time (8 min)	0.13

Table C-1 Niland Gas Turbine Plant - Emissions Calculations Rev 1

Base Load Emissions (lbs/hour)	NOx	CO	VOC	PM10
Controlled Operation	3.98	5.81	1.11	3.00
Uncontrolled Operation	39.75	24.20	3.32	3.00

Start/Stop Emissions (lbs/event)	NOx	CO	VOC	PM10
Startup Emissions	3.00	5.60	1.10	0.67
Warm-up Emissions	10.93	7.50	1.11	1.50
Shutdown Emissions	2.20	3.70	0.60	0.53

Notes:
1) Uncontrolled emissions are based upon the performance worksheet.
2) Controlled emissions are based upon the emissions reduction ratio.
3) Startup and shutdown emissions are based upon GE data at ISO conditions.
4) Warm-up emissions are based upon a linear emissions reduction ramp.
5) Calculations represent plant emissions, for unit values divide by 2.
6) Calculations are based upon the annual average ambient temperature 72F.
7) VOC emissions are based upon 40% of calculated HC emissions, per GE.

Table C-2 Niland Gas Turbine Facility

Emissions from Emergency Diesel Fire Water Pump

Rated horsepower	**173**	**BHP**	
Testing duration	**30**	**min/week**	
Yearly testing	**52**	**week/year**	
Expected non-emergency usage	**26**	**hr/yr**	
Diesel-fired	Emission Factor	Emission Rate per Testing	Yearly Emission Rate
	g/HP/Hr	lb/hr	lb/yr
NO_x	3.900	0.74	38.67
CO	0.400	0.08	3.97
VOC (Total Hydrocarbons)	0.100	0.02	0.99
SO_X	1.50E-01	0.03	1.49
PM_{10}	9.00E-02	0.02	0.89

Engine parameters

Flow rate (acfm)	1000	
Exhaust temp (degrees F)	950	
Stack diameter (feet)	0.33	
Stack height (feet)	12	(8-ft building + 4-ft stack)

Data from Vendor and IID
Sulfur content 0.05 percent in fuel

Emissions from Black-Start Engine Generator

Rated horsepower	**1449**	**bhp**	
Max engine power	1818	bhp	
Total efficiency	79.7	%	
Fuel consumption	**7261**	**Btu/bhp-hr**	
Testing duration	**1**	**hr/month**	
Expected non-emergency usage	**12**	**hr/yr**	
Natural gas-fired	Emission Factor	Emission Rate per Testing	Yearly Emission Rate
	g/HP/Hr	lb/hr	lb/yr
NO_X	0.500	1.60	19.17
CO	2.500	7.99	95.83
VOC (Total Hydrocarbons)	5.400	17.25	207.00
	lb/MMBtu		
SO_2	5.88E-04	0.01	0.07
PM_{10}	9.99E-03	0.11	1.26

Note: SO_2 and PM_{10} emission factors from EPA AP-42 Table 3.2-1 for natural gas 2-stroke lean-burn engines
PM_{10} emission rate includes filterable and condensable emissions.

Engine parameters

Flow rate (acfm)	11923	
Exhaust temp (degrees F)	974	
Stack diameter (feet)	1.5	
Stack height (feet)	15	(12 ft building + 3 ft stack)

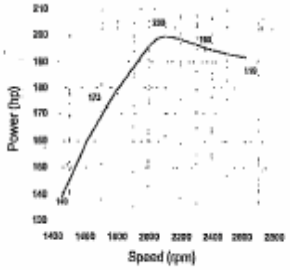
Data from Vendor and IID

NATIONAL DIESEL CORPORATION

SPECIFICATIONS

Model	NDC-BF6M2012C
Engine	Deutz 2012 Series
Number of Cylinders	6
Aspiration	Turbocharged & Aftercooled
Rotation	Counter-Clockwise
Weight - lb (kg)	1089 (495)
Compression Ratio	18.4 : 1
Total Displacement - in.³ (L)	369.7 (6.06)
Engine Type	4 Stroke Cycle - Inline
Bore & Stroke - in. (mm)	4.0 x 5.0 (101 x 126)
Installation Drawing	ID-1250
Wiring Diagram	WS-FC-A, WS-FC-B,WS-FC-C

Engine Performance Curve



ENGINE CORRECTION FACTORS

Engines are rated at standard SAE conditions of 29.61 in. (752.1 mm) Hg barometer and 77°F (25°C) inlet air temperature (approx. 300 ft. (91.4 m) above sea level by the testing laboratory (per NFPA 20 guidelines).

A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) of altitude above 300 ft. (91.4 m) (per NFPA 20 guidelines).

A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature (per NFPA 20 guidelines).

NATIONAL DIESEL CORPORATION
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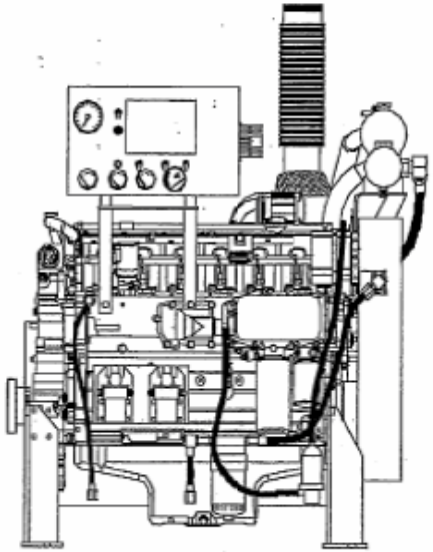
NATIONAL DIESEL CORPORATION

NDC-BF6M2012C

STANDARD FEATURES

Air Filter - Washable; for indoor service (outdoor service optional).
Alternator - With integral regulator; 14V-DC; 55 Amps, w/ belt guard.
Control Panel - Tachometer w/ integrated digital hourmeter, water temp, oil pressure, (2) voltmeters.
Engine Terminal Strip - Integral w/ control panel. Ready for on site connection to the automatic engine controller.
Exhaust - Flexible exhaust 4" NPT.
Flywheel Housing - SAE #3.
Fuel Connections - Flexible supply & return.
Fuel Injection - Bosch injection pumps.
Fuel Filters - Primary fuel filter W/ priming pump.
Governor - Constant speed, mechanical.
Heat Exchanger - NPTF connections, Tube & Shell type, max. 60 PSI.
Insulating Blankets - For exhaust manifold & turbo.
Lube Oil Filter - Full flow w/ by pass valve inside.
Manual Start/Stop Controls - (2) toggle switches located on the Control Panel.
Jacket Water Heater - 120V-AC (240V optional).
Overspeed Control - Electronic speed switch w/ reset and test button located on the Control Panel.
Power Take Off - Engine half coupling, Falk, Lovejoy or equivalent.
Raw Water Solenoid Operation - Activated from the automatic engine controller or from manual mode on the Control Panel.
Starters - (1) 12V-DC motor
Throttle Control - Tamper proof



OVERALL WIDTH
29" [737 mm]

APPROVED POWER RATINGS

	Speed (rpm)				
	~~1470~~	1760	~~2100~~	~~2550~~	~~2600~~
HP	~~140~~	173	~~200~~	~~195~~	~~192~~
kW	~~104~~	129	~~148~~	~~146~~	~~144~~

meets NFPA-20 requirements

Engine Specifications
Model: NDC-BF6M2012C

General

Engine Manufacturer	Deutz
Number of Cylinders	6
Cylinder Arrangement	In-Line
Bore/Stroke - in (mm)	4.0 (101)/ 5.0 (126)
Cylinder Displacement - in^3 (L)	61.6 (1.01)
Total Displacement - in^3 (L)	369.7 (6.06)
Compression ratio	16.4:1
Combustion system	Direct Injection
Aspiration	Turbocharged Aftercooled

Physical Data

Length - in (mm)	44.8 (1137)
Width - in (mm)	22.8 (580)
Height - in (mm)	35.7 (906)
Weight, dry - lb (kg)	1060 (480)
Max bending @ housing: lb-ft (Nm)	589.6 (800)
Max force @ flywheel:	
Axial: lb (N)	677 (3009)
Radial: lb (N)	1126 (5030)

Fuel System

Lift pump suction head, max - in (m)	59.1 (1.5)
Lift pump flow @max rpm - GPM (L/h)	2.6 (600.0)
Fuel filter type	Replaceable cartridge
Supply line size (distance from tank)	
Length 0.0-19.68 ft (0-6 m) - in (mm)	.50 (12)
Return line size - in (mm)	.375 (10)

Combustion Air System

Combustion air flow @ max rating - CFM (M^3/h)	542 (921)
Max allowable clean restriction - in H_2O (mbar)	20 (50)
Max allowable dirty restriction - in H_2O (mbar)	25 (65)

Exhaust System

Exhaust gas flow @ max rating - CFM (m^3/h)	1510 (2566)
Exhaust temperature @ max rating - °F (°C)	860 (460)
Max allowable back pressure - in H_2O (mbar)	30 (75)
Minimum exhaust pipe diameter - in (mm)	4 (102)

Cooling System

Type	Heat Exchanger
Coolant heat rejection % of gross power	51%
Max coolant temp @ engine outlet- °F (°C)	230 (110)
Normal engine operating temperature - °F (°C)	204.8 (96.0)
Coolant flow rate @ max rpm - GPM (L/min)	50.2 (190.0)
Heat exchanger max. raw H_2O inlet flow - GPM (L/min)	20 (75.7)
Heat exchanger max. raw H_2O inlet pressure - psi (kPa)	60 (414)
Max coolant operating pressure - psi (bar)	21.8 (1.5)
Coolant volume in engine - qt (L)	8.0 (7.6)
Coolant volume in heat exchanger - qt (L)	5.7 (5.3)

Lubrification System

Lubrification type	Forced feed lubrification
Oil flow at max rpm - GPM (L/min)	19.8 (74.3)
Oil pump relief valve setting - psi (bar)	87.0 (6.0)
Max oil temperature in oil sump - °F (°C)	265 (130)
Oil filter capacity - qt (L)	1.1 (1.0)
Oil pan capacity - qt (L)	14.8 (14.0)

Electrical System

Starter motor	12v, 3.1 kW
Recommended battery capacity, (CCA)	750A
Voltage drop, battery (+), max	1.0v
Jacket water heater -standard	1500w, 120v
Jacket water heater - optional	1500w, 240v
Battery cable minimum size (combined pos. and neg. cables)	
length 0 -225 in (0-304.8 cm)	No. 00
length 225-300 in (0-405.5 cm)	No. 000
length 300-350 in (0-508 cm)	No. 0000
Battery cable circuit, max resistance - ohm	0.0010
Alternator	28v, 55A

Performance Data

Low idle speed - rpm	900

Notes

UL & ULC Listed, Factory Mutual Research Approved

Certified Speed - RPM	1470	1760	2100	2350	2600
Certified Power - Hp (Kw)	140 (104)	173 (129)	200 (149)	195 (146)	192 (143)
Fuel Consumption - lb/hphr (g/kWhr)	.394 (240.3)	.384 (234.2)	.399 (243.3)	.415 (253.1)	.410 (250.0)
Heat Rejection to Coolant - BTU/min (kW)	3315 (58.4)	3924 (69.0)	3947 (69.4)	4220 (74.2)	4515 (79.4)
Heat Exchanger Minimum Flow					
80°F Raw H_2O - GPM (L/min)	12.0 (45.4)	12.0 (45.4)	13.0 (49.2)	14.0 (53.0)	14.0 (53.0)
95°F Raw H_2O - GPM (L/min)	14.0 (53.0)	14.0 (53.0)	15.0 (56.8)	16.0 (60.6)	16.0 (60.6)
Combustion Air - CFM (M^3/h)	317 (538)	385 (921)	424 (721)	482 (819)	542 (921)
Exhaust Gas - CFM (M^3/h)	712 (1211)	980 (1665)	1248 (2120)	1382 (2348)	1510 (2566)
Coolant Flow - GPM (L/min)	29.7 (112)	35.2 (133)	42.3 (160)	46.2 (175)	50.2 (190)
Noise, dB(A) - Avg. @ 1 meter	88.0	89.5	92.5	93.5	95.0

**** All data based on standard atmospheric conditions of 77° F (25° C) @ 300 feet (91m) above sea level ****

National Diesel Corporation

NDC-BF6M2012C Emission Data

				GRAMS / HP-hr					EXHAUST		
RPM	BHP	FUEL (L/h)	AIR/FUEL RATIO	HC	NO_X	CO	SO_X	PM	% O_2	TEMP °F (°C)	CFM
1470	140	28	1.40	0.10	3.80	0.50	*	0.09	6.00	950 (510)	800
1760	173	33	1.50	0.10	3.90	0.40	*	0.09	6.90	950 (510)	1000
2100	200	36	1.60	0.10	3.90	0.40	*	0.09	7.80	950 (510)	1400
2350	195	37	1.80	0.10	4.00	0.30	*	0.09	9.30	950 (510)	1400
2600	192	38	2.00	0.10	4.00	0.30	*	0.09	10.50	950 (510)	1400

* function of fuel sulfur content

Radiant / Convective Heat

RPM	BHP	Radiant heat as % of useful output power	Radiant convective heat (kW)	Radiant convective heat (BTU/hour)
1470	140	17.22	17.31	61125.20
1760	173	16.78	21.65	73894.20
2100	200	17.79	25.36	86667.03
2350	195	18.14	26.48	90381.34
2600	192	17.92	25.80	88951.40

G3516B LE

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED:	1800	FUEL:	NAT GAS
COMPRESSION RATIO:	11:1	FUEL SYSTEM:	Cat Low Pressure
AFTERCOOLER INLET (°F)	130		WITH AIR FUEL RATIO CONTROL
JACKET WATER OUTLET (°F)	198	FUEL PRESS. RANGE (PSIG)	1.5 - 5
COOLING SYSTEM:	COMBINED	MIN. METHANE NUMBER:	80
IGNITION SYSTEM:	ADEM3	RATED ALTITUDE (FT):	2237
EXHAUST MANIFOLD:	Dry	AT AMBIENT TEMP (°F):	77
COMBUSTION:	LEAN BURN	NOx EMISSION LEVEL:	0.5 g/bhp-hr

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
LHV OF FUEL			BTU/SCF	925	925	925
ENGINE POWER			BHP	1818	1364	909
ENGINE EFFICIENCY	(ISO 3046/1)	(1)	%	**36.1**	**34.4**	**32.5**
ENGINE EFFICIENCY		(2)	%	35.0	33.5	31.7
THERMAL EFFICIENCY		(7)	%	44.7	46.5	46.6
TOTAL EFFICIENCY		(8)	%	79.7	80.0	78.3

ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(1)	**BTU/bhp-hr**	**7055**	**7389**	**7843**
FUEL CONSUMPTION		(2)	BTU/bhp-hr	7261	7588	8037
AIR FLOW (77 °F, 14.7 psi)		(WET)	SCFM	4120	3171	2187
AIR FLOW		(WET)	lb/hr	18270	14064	9697
COMPRESSOR OUT PRESS.			in. HG (abs)	90.4	84.5	61
COMPRESSOR OUT TEMP.			°F	345	326	234
INLET MAN. PRESS.			in. HG (abs)	82.9	64.9	44.7
INLET MAN. TEMP.		(12)	°F	139	140	140
TIMING		(13)	°BTDC	22	22	22
NOISE - MECH @ 1m			dB(A)	100	99	98
NOISE - EXH @ 1.5m			dB(A)	111	110	109
EXHAUST STACK TEMP.			°F	974	985	1009
EXHAUST GAS FLOW (@ stack temp.)		(WET)	CFM, 14.5 psi	11923	9253	6491
EXHAUST MASS		(WET)	lb/hr	18907	14561	10049

EMISSIONS DATA					
NOx (as NO2)	(11)	g/bhp-hr	0.5	0.5	0.5
CO	(14)	g/bhp-hr	2.5	2.6	2.9
THC	(14)	g/bhp-hr	5.4	5.8	6.8
NMHC	(14)	g/bhp-hr	0.81	0.87	1.02
EXHAUST O2	(15)	%	9.2	9.1	9.0
LAMBDA			1.74	1.71	1.67

HEAT BALANCE DATA					
LHV INPUT	(2)	BTU/min	220033	172470	121784
HEAT REJ. TO JACKET	(3) (9)	BTU/min	27342	24417	19215
HEAT REJ. TO ATMOSPHERE	(5)	BTU/min	7794	6674	5483
HEAT REJ. TO LUBE OIL	(6)	BTU/min	9173	8192	6447
HEAT REJ. TO EXH. (LHV to 77°F)	(3)	BTU/min	82184	63854	47882
HEAT REJ. TO EXH. (LHV to 350°F)	(3)	BTU/min	52907	41518	29812
HEAT REJ. TO A/C - STAGE1	(4) (10)	BTU/min	8883	5993	1277
HEAT REJ. TO A/C - STAGE2	(4) (10)	BTU/min	7542	5504	2923

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1. DATA REPRESENTS CONDTIONS OF 77°F, 29.6" HG BAROMETRIC PRESSURE, 30% RELATIVE HUMIDITY, 10" H2O AIR FILTER RESTRICTION, AND 20" H20 EXHAUST STACK PRESSURE. NO OVERLOAD PERMITTED AT RATING SHOWN. DATA NOTED AS ISO 3046/1 REPRESENTS THE SAME AMBIENT CONDTIONS WITH 5" H2O AIR FILTER RESTRICTION AND 0" H20 EXHAUST STACK PRESSURE. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE. PARALLEL TO THE GRID AND SOFT LOADING ONLY. ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS.

NOTES

1) ISO 3046/1 FUEL CONSUMPTION TOLERANCE IS 0, + 5% OF FULL LOAD DATA.
2) FUEL CONSUMPTION TOLERANCE IS ± 3 % OF FULL LOAD DATA.
3) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ± 10% OF FULL LOAD DATA. (heat rate based on treated water
4) HEAT REJECTION TO AFTERCOOLER TOLERANCE IS ± 5% OF FULL LOAD DATA. (heat rate based on treated water
5) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ± 50% OF FULL LOAD DATA. (heat rate based on treated water
6) HEAT REJECTION TO LUBE OIL TOLERANCE IS ± 20% OF FULL LOAD DATA. (heat rate based on treated water
7) THERMAL EFFICIENCY: JACKET HEAT + LUBE OIL HEAT + STAGE 1 A/C HEAT + EXH. HEAT TO 350°F
8) TOTAL EFFICIENCY: ENGINE EFF. + THERMAL EFF. TOLERANCE IS ± 10% OF FULL LOAD DATA.
9) TOTAL JW HEAT: COMBINED = JACKET HEAT + OIL COOLER HEAT + (A/C STG 1 HEAT+.764 x (STG 1 + STG 2) x (ACHRF-1)) : (heat rate based on treated water
10) TOTAL A/C HEAT: COMBINED = A/C STG 2 HEAT + (STG1+ STG 2) x .236 x (ACHRF - 1) : (heat rate based on treated water
11) NOx VALUE SHOWN IS DRY. FULL LOAD NOx VALUE IS SET AT SITE. CONTROL TOLERANCE IS ± 30% OF FULL LOAD DATA.
12) MEASURED IN THE INTAKE MANIFOLD PLENUM.
13) TIMING INDICATED IS FOR USE WITH THE MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.
14) EMISSION DATA SHOWN ARE DRY AND NOT TO EXCEED.
15) EXHAUST O2 IS NOMINAL ± 0.5 % O2.

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FUEL USAGE GUIDE

DERATE FACTOR/ENGINE TIMING vs METHANE NUMBER											
<30	30	35	40	45	50	55	60	65	70	75	80 to 100
0/--	0/--	0/--	0/--	0/--	0/--	0/--	.84/22	.92/21	1.0/20	1.0/21	1.0/22

* Denotes Air Fuel Ratio Control Required for Maximum Rating Shown.

ALTITUDE DERATION FACTORS

AMBIENT (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	0.99	0.95	0.92	0.88	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.64	0.62
120	1.00	0.97	0.93	0.90	0.87	0.83	0.80	0.77	0.74	0.71	0.68	0.65	0.63
110	1.00	0.99	0.95	0.91	0.88	0.85	0.81	0.78	0.75	0.72	0.69	0.67	0.64
100	1.00	1.00	0.97	0.93	0.90	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.65
90	1.00	1.00	0.99	0.95	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69	0.66
80	1.00	1.00	1.00	0.97	0.93	0.89	0.86	0.83	0.79	0.76	0.73	0.70	0.67
70	1.00	1.00	1.00	0.98	0.95	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69
60	1.00	1.00	1.00	1.00	0.97	0.93	0.89	0.86	0.82	0.79	0.76	0.73	0.70
50	1.00	1.00	1.00	1.00	0.98	0.95	0.91	0.87	0.84	0.81	0.78	0.74	0.71

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AMBIENT (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.34	1.39	1.44	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46
120	1.27	1.32	1.37	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
110	1.20	1.25	1.30	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
100	1.13	1.18	1.23	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
90	1.07	1.11	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
80	1.00	1.04	1.09	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
70	1.00	1.00	1.02	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE (FEET ABOVE SEA LEVEL)

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel and what engine timing to use. Note that deration occurs as the methane number decreases. Methane number is a scale to measure ignition and burning characteristics of various fuels. Representative values are shown below.

Methane	100
Ethane	44
Propane	34
n-Butane	10
Hydrogen	0

Most dry pipeline natural gas has a methane number of 67 or above. The gas quality should be analyzed to determine the percentage of each constituent and then determine the methane number. Consult the dealer or factory for assistance.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various ambient temperatures and altitudes at reference inlet restriction and exhaust stack backpressure (If site inlet restriction and/or exhaust stack backpressure differ from reference conditions, refer to inlet and exhaust restriction corrections section for appropriate adjustment). Use this information to help determine actual engine power for your site.

INLET AND EXHAUST RESTRICTION CORRECTIONS FOR ALTITUDE CAPABILITY:

To determine the appropriate altitude derate factor to be applied to this engine for inlet or exhaust restrictions differering from the standard conditions on page 1, a correction to the site altitude can be made to adjust for this difference. Add 88 meters to the site altitude for each additional KPA of stack pressure greater than spec sheet conditions. Add 136 meters to the site altitude for each additional KPA of inlet restriction greater than spec sheet conditions. If site inlet restriction or exhaust stack backpressure are less than spec sheet conditions, the same trends apply to lower the site altitude.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative, i.e., they are not to be added together. The same is true for the Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration are cumulative; and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

1) (Altitude/Temperature Deration) + (Low Energy Fuel Deration)
2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant inlet air manifold temperature, as the ambient air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shut down or fail.

Niland Gas Turbine Facility
Stack Emission Calculations

Table C-3. Case Parameters

Case	1	2	3
Ambient Temperature (°F)	72	72	72
Stack Diameter (ft)	13	13	13
Exhaust Density (lb/ft^3)	0.03028	0.03028	0.03028
CTG Load Level	**100%**	**75%**	**50%**
Sprint	ON	OFF	OFF
Evap. Cooler	ON	OFF	OFF

Data from Vendor

Table C-4. Expected Operation of each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LM6000PD Sprint Turbine/Site Specific Information)			
Fuel Flow (MMBTU/hr)	396.1	313.2	244.6
Fuel Flow (Mlb/hr)	19.1	15.1	11.8
Exhaust Flow (Mlb/hr)	1066	906	673
Stack Outlet Temperature (°F)	837	871	956
Exhaust Flow @ T stack (acfm)	586814	498645	370672
Stack Exit Velocity, ft/m	4421.0	3756.8	2792.6
Stack Exit Velocity, m/s	22.5	19.1	14.2
Nitrogen, % Vol	73.71	73.72	73.66
Oxygen, % Vol	15.65	16.19	15.85
Carbon Dioxide, % Vol	4.90	4.53	4.75
Water Vapor, % Vol	4.48	4.30	4.48
Molecular Weight	28.61	28.59	28.59

Data from Vendor

Table C-5. Average Emission Rates from each Gas Turbine (lbs/hr/turbine) - Normal Operations

NO_X at 25 ppmvd pre-BACT level	39.75	31.39	24.53
NO_X at 2.5 ppmvd BACT level	3.98	3.14	2.45
CO at 25 ppmvd pre BACT level	24.20	19.11	14.93
CO at 6.0 ppmvd BACT level	5.81	4.59	3.58
VOC at 15 ppmvd pre-BACT level	3.32	2.62	2.05
VOC at 2.0 ppmvd BACT level	1.11	0.87	0.68
SO_2	0.83	0.66	0.51
PM_{10}	3.00	3.00	3.00
NH_3 at 10 ppmvd tBACT level	5.88	4.64	3.63
NH_3 at 5 ppmvd BACT level	2.94	2.32	1.81
Sulfur content in fuel basis for above:	0.75	grain total S/100 scf	

Data from Vendor

Niland Gas Turbine Facility
Stack Emission Calculations

Table C-6. Startup / Shutdown Emissions from Turbine (1CT)

Startup

Duration in minutes	10	30	20		40
	Startup	Warmup	Normal	Total Startup	Full Hour of Only Startup/Warmup
	Emissions	Emissions	Emissions	Emissions	Emissions
	lb/event	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	3.00	10.93	3.98	15.26	20.90
CO	5.60	7.5	5.81	15.04	19.65
VOC	1.10	1.11	1.11	2.58	3.32
SO_2	0.14	0.41	0.83	0.83	0.83
PM_{10}	0.67	1.5	3.00	3.17	3.26

Assumptions:

Startup emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Shutdown

Duration in minutes	8	52		8
	Shutdown	Normal	Total Shutdown	Full Hour of Only Shutdown
	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	2.20	3.98	5.65	16.50
CO	3.70	5.81	8.73	27.75
VOC	0.60	1.11	1.56	4.50
SO_2	0.11	0.83	0.83	0.83
PM_{10}	0.53	3.00	3.13	3.98

Assumptions:

Shutdown emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Niland Gas Turbine Facility
Stack Emission Calculations

Table C-7. Worst-Case 1-Hour Emissions per Turbine

Worst-Case 1-Hour Emissions are equal to the maintenance emission rates (i.e., uncontrolled emissions)

Emissions per turbine	lb/hr	g/s
NO_2	39.75	5.01
CO	24.20	3.05
VOC	3.32	0.42
SO_2	0.83	0.10
PM_{10}	3.00	0.38

Table C-8. Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard. Since the SO_2 emission rate does not change during startup, maintenance or normal operations, the worst-case 3-hour emission rate is the maximum SC_2 rate for 100% load case (72°F; with Sprint and evaporative cooler on)

Emissions per turbine	Worst-case Total				Normal Operations	Worst-case Total				Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3				3						
SO_2	0.83				0.83	2.49				2.49	0.10

Table C-9. Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.
Worst-case 8-hour scenario includes 4 hours at maintenance rate, 2 startups, 1 shutdown, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8	2	1	4	1						
CO	17.68	15.04	8.73	24.20	5.81	141.41	30.07	8.73	96.80	5.81	2.23

Niland Gas Turbine Facility
Stack Emission Calculations

Table C-10. Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-hour scenario includes 4 startups, 3 shutdowns, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	24	4	3		17						
SO_2	0.83	0.83	0.83		0.83	19.89	3.32	2.49		14.09	0.10
PM_{10}	3.04	3.17	3.13		3.00	73.07	12.68	9.39		51.00	0.38

Table C-11. Average Annual Emissions

Average operation emission rates are based on the average operation scenario (72°F; 100% load; with Sprint and evaporative cooler on) for 2,980 hours plus 250 startup/warmup events and 250 shutdown events and 20 maintenance hours. The two turbines will each have these operating conditions.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3200	166.67	33.33	20	2980						
Number per Scenario		250	250	20	2980						
Duration of Event (min)		40	8	60	60						
NO_X	1.90	20.90	16.50	39.75	3.98	16673.0	3482.5	550.0	795.0	11845.5	0.24
CO	2.51	19.65	27.75	24.20	5.81	21991.8	3275.0	925.0	484.0	17307.8	0.32
VOC	0.46	3.32	4.50	3.32	1.11	4066.8	552.5	150.0	66.4	3297.9	0.06
SO_2	0.30	0.83	0.83	0.83	0.83	2652.5	138.1	27.6	16.6	2470.1	0.04
PM_{10}	1.10	3.26	3.98	3.00	3.00	9675.0	542.5	132.5	60.0	8940.0	0.14

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

Table C-12. Case Parameters

Case	1	2	3
Ambient Temperature (°F)	72	72	72
Stack Diameter (ft)	13	13	13
Exhaust Density (lb/ft^3)	0.03028	0.03028	0.03028
CTG Load Level	**100%**	**75%**	**50%**
Sprint	ON	OFF	OFF
Evap. Cooler	ON	OFF	OFF

Table C-13. Expected Operation of each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LM6000PD Sprint Turbine/Site Specific Information)

Fuel Flow (MMBTU/hr)	396.1	313.2	244.6
Fuel Flow (Mlb/hr)	19.1	15.1	11.8
Exhaust Flow (Mlb/hr)	1066	906	673
Stack Outlet Temperature (°F)	837	871	956
Exhaust Flow @ T stack (acfm)	586814	498645	370672
Stack Exit Velocity, ft/m	4421.0	3756.8	2792.6
Stack Exit Velocity, m/s	22.5	19.1	14.2
Nitrogen, % Vol	73.71	73.72	73.66
Oxygen, % Vol	15.65	16.19	15.85
Carbon Dioxide, % Vol	4.90	4.53	4.75
Water Vapor, % Vol	4.48	4.30	4.48
Molecular Weight	28.61	28.59	28.59

Table C-14. Average Emission Rates from each Gas Turbine (lbs/hr/turbine) - Normal Operations

NO_X at 25 ppmvd pre-BACT	39.75	31.39	24.53
NO_X at 2.5 ppmvd BACT	3.98	3.14	2.45
CO at 25 ppmvd pre BACT	24.20	19.11	14.93
CO at 6.0 ppmvd BACT	5.81	4.59	3.58
VOC at 15 ppmvd pre-BACT	3.32	2.62	2.05
VOC at 2.0 ppmvd BACT	1.11	0.87	0.68
SO_2	0.83	0.66	0.51
PM_{10}	3.00	3.00	3.00
NH_3 at 10 ppmvd tBACT	5.88	4.64	3.63
NH_3 at 5 ppmvd BACT	2.94	2.32	1.81
Sulfur content in fuel basis for above:		0.75	grain total S/100 scf

Table C-15. Startup / Shutdown Emissions from Turbine (1CT)

Startup

Duration in minutes	10	30	20		40
	Startup Emissions	Warmup Emissions	Normal Emissions	Total Startup Emissions	Full Hour of Only Startup/Warmup Emissions
	lb/event	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	3.00	10.93	3.14	14.98	20.90
CO	5.60	7.5	4.59	14.63	19.65
VOC	1.10	1.11	0.87	2.50	3.32
SO_2	0.14	0.41	0.66	0.77	0.83
PM_{10}	0.67	1.5	3.00	3.17	3.26

Assumptions:

Startup emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Shutdown

Duration in minutes	8	52		8
	Shutdown Emissions	Normal Emissions	Total Shutdown Emissions	Full Hour of Only Shutdown Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	2.20	3.14	4.92	16.50
CO	3.70	4.59	7.67	27.75
VOC	0.60	0.87	1.36	4.50
SO_2	0.11	0.66	0.68	0.83
PM_{10}	0.53	3.00	3.13	3.98

Assumptions:

Shutdown emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Table C-16. Worst-Case 1-Hour Emissions per Turbine

Worst-case 1-hour emissions are equal to the maintenance emission rates (I.e., uncontrolled emissions).

Emissions per turbine	lb/hr										g/s
NO_2	31.39										3.96
CO	19.11										2.41
VOC	2.62										0.33
SO_2	0.66										0.08
PM_{10}	3.00										0.38

Table C-17. Worst-Case 3-Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard. Since the SO_2 emission rate does not change during startup, maintenance or normal operations, the worst-case 3-hour emission rate is the maximum SO_2 rate for 100% load case (72°F; with Sprint and evaporative cooler on).

Emissions per turbine	Worst-case Total				Normal Operations	Worst-case Total				Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3				3						
SO_2	0.66				0.66	1.97				1.97	0.08

Table C-18. Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.

Worst-case 8-hour scenario includes 4 hours at maintenance rate, 2 startups, 1 shutdown, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance-Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8	2	1	4	1						
CO	14.74	14.63	7.67	19.11	4.59	117.96	29.26	7.67	76.44	4.59	1.86

Table C-19. Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-hour scenario includes 4 startups, 3 shutdowns, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance- Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	24	4	3		17						
NO_X	5.33	14.98	4.92		3.14	128.03	59.91	14.76	0.00	53.36	0.67
CO	6.65	14.63	7.67		4.59	159.51	58.52	23.02	0.00	77.97	0.84
VOC	1.21	2.50	1.36		0.87	28.92	10.00	4.07	0.00	14.85	0.15
SO_2	0.68	0.77	0.68		0.66	16.26	3.08	2.04	0.00	11.14	0.09
PM_{10}	3.04	3.17	3.13		3.00	73.07	12.68	9.39	0.00	51.00	0.38

Table C-20. Average Annual Emissions

Average operation emission rates are based on the average operation scenario (72°F; 100% load; with Sprint and evaporative cooler on) for 2,980 hours plus 250 startup/warmup events and 250 shutdown events and 20 maintenance hours. The two turbines will each have these operating conditions.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance- Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3200	166.67	33.33	20	2980						
Number per Scenario		250	250	20	2980						
Duration of Event (min)		40	8	60	60						
NO_X	1.60	20.90	16.50	31.39	3.14	14014.5	3482.5	550.0	627.8	9354.2	0.20
CO	2.08	19.65	27.75	19.11	4.59	18249.7	3275.0	925.0	382.2	13667.5	0.26
VOC	0.38	3.32	4.50	2.62	0.87	3357.4	552.5	150.0	52.4	2602.5	0.05
SO_2	0.24	0.83	0.83	0.66	0.66	2132.0	138.1	27.6	13.1	1953.1	0.03
PM_{10}	1.10	3.26	3.98	3.00	3.00	9675.0	542.5	132.5	60.0	8940.0	0.14

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

Table C-21. Case Parameters

Case	1	2	3
Ambient Temperature (°F)	72	72	72
Stack Diameter (ft)	13	13	13
Exhaust Density (lb/ft^3)	0.03028	0.03028	0.03028
CTG Load Level	**100%**	**75%**	**50%**
Sprint	ON	OFF	OFF
Evap. Cooler	ON	OFF	OFF

Table C-22. Expected Operation of each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LM6000PD Sprint Turbine/Site Specific Information)

Fuel Flow (MMBTU/hr)	396.1	313.2	244.6
Fuel Flow (Mlb/hr)	19.1	15.1	11.8
Exhaust Flow (Mlb/hr)	1066	906	673
Stack Outlet Temperature (°F)	837	871	956
Exhaust Flow @ T stack (acfm)	586814	498645	370672
Stack Exit Velocity, ft/m	4421.0	3756.8	2792.6
Stack Exit Velocity, m/s	22.5	19.1	14.2
Nitrogen, % Vol	73.71	73.72	73.66
Oxygen, % Vol	15.65	16.19	15.85
Carbon Dioxide, % Vol	4.90	4.53	4.75
Water Vapor, % Vol	4.48	4.30	4.48
Molecular Weight	28.61	28.59	28.59

Table C-23. Average Emission Rates from each Gas Turbine (lbs/hr/turbine) - Normal Operations

NO_X at 25 ppmvd pre-BACT	39.75	31.39	24.53
NO_X at 2.5 ppmvd BACT	3.98	3.14	2.45
CO at 25 ppmvd pre BACT	24.20	19.11	14.93
CO at 6.0 ppmvd BACT	5.81	4.59	3.58
VOC at 15 ppmvd pre-BACT	3.32	2.62	2.05
VOC at 2.0 ppmvd BACT	1.11	0.87	0.68
SO_2	0.83	0.66	0.51
PM_{10}	3.00	3.00	3.00
NH_3 at 10 ppmvd tBACT	5.88	4.64	3.63
NH_3 at 5 ppmvd BACT	2.94	2.32	1.81
Sulfur content in fuel basis for above:		0.75	grain total S/100 scf

Table C-24. Startup / Shutdown Emissions from Turbine (1CT)

Startup

Duration in minutes	10	30	20		40
	Startup	Warmup	Normal	Total Startup	Full Hour of Only Startup/Warmup
	Emissions	Emissions	Emissions	Emissions	Emissions
	lb/event	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	3.00	10.93	2.45	14.75	20.90
CO	5.60	7.5	3.58	14.29	19.65
VOC	1.10	1.11	0.68	2.44	3.32
SO_2	0.14	0.41	0.51	0.72	0.83
PM_{10}	0.67	1.5	3.00	3.17	3.26

Assumptions:

Startup emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Shutdown

Duration in minutes	8	52		8
	Shutdown	Normal	Total Shutdown	Full Hour of Only Shutdown
	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	2.20	2.45	4.33	16.50
CO	3.70	3.58	6.81	27.75
VOC	0.60	0.68	1.19	4.50
SO_2	0.11	0.51	0.55	0.83
PM_{10}	0.53	3.00	3.13	3.98

Assumptions:

Shutdown Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and IID.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Table C-25. Worst-Case 1-Hour Emissions per Turbine

Worst-case 1-hour emissions are equal to the maintenance emission rates (i.e., uncontrolled emissions).

Emissions per turbine	lb/hr										g/s
NO_2	24.53										3.09
CO	14.93										1.88
VOC	2.05										0.26
SO_2	0.51										0.06
PM_{10}	3.00										0.38

Table C-26. Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard. Since the SO_2 emission rate does not change during startup, maintenance or normal operations, the worst-case 3-hour emission rate is the maximum SO_2 rate for 100% load case (72°F; with Sprint and evaporative cooler on).

Emissions per turbine	Worst-case Total				Normal Operations	Worst-case Total				Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3				3						
SO_2	0.51				0.51	1.54				1.54	0.06

Table C-27. Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.

Worst-case 8-hour scenario includes 4 hours at maintenance rate, 2 startups, 1 shutdown, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance- Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8	2	1	4	1						
CO	12.34	14.29	6.81	14.93	3.58	98.70	28.59	6.81	59.72	3.58	1.55

Table C-28. Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-hour scenario includes 4 startups, 3 shutdowns, and remaining time at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance- Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	24	4	3		17						
NO_X	4.74	14.75	4.33		2.45	113.67	58.99	12.98	0.00	41.70	0.60
CO	5.77	14.29	6.81		3.58	138.51	57.18	20.42	0.00	60.91	0.73
VOC	1.04	2.44	1.19		0.68	24.93	9.75	3.57	0.00	11.61	0.13
SO_2	0.55	0.72	0.55		0.51	13.26	2.89	1.66		8.70	0.07
PM_{10}	3.04	3.17	3.13		3.00	73.07	12.68	9.39		51.00	0.38

Table C-29. Average Annual Emissions

Average operation emission rates are based on the average operation scenario (72°F; 100% load; with Sprint and evaporative cooler on) for 2,980 hours plus 250 startup/warmup events and 250 shutdown events and 20 maintenance hours. The two turbines will each have these operating conditions.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Maintenance - Uncontrolled	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Maintenance- Uncontrolled	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3200	166.67	33.33	20	2980						
Number per Scenario		250	250	20	2980						
Duration of Event (min)		40	8	60	60						
NO_X	1.35	20.90	16.50	24.53	2.45	11833.0	3482.5	550.0	490.6	7309.9	0.17
CO	1.73	19.65	27.75	14.93	3.58	15176.5	3275.0	925.0	298.6	10677.9	0.22
VOC	0.32	3.32	4.50	2.05	0.68	2777.8	552.5	150.0	41.0	2034.3	0.04
SO_2	0.19	0.83	0.83	0.51	0.51	1701.4	138.1	27.6	10.2	1525.3	0.02
PM_{10}	1.10	3.26	3.98	3.00	3.00	9675.0	542.5	132.5	60.0	8940.0	0.14

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

Table C-30. 1-Hour Worst-Case Emission Scenario for Niland Plant

Only NO_2, CO and SO_2 are considered for the 1-hour Ambient Air Quality Standard.
Worst-case 1-hour scenario includes 2 turbines operating for 1 hour at maintenance rate,
and 1 hour of the black-start engine generator being tested **OR** 1/2 hour of the fire pump being tested.

Emissions per turbine	**lb/hr**	**g/s**
NO_2	39.75	5.01
CO	24.20	3.05
SO_2	0.83	0.10
Emissions from Black-Start Engine Generator	**lb/hr**	**g/s**
NO_2	1.60	0.20
CO	7.99	1.01
SO_2	0.01	0.00
Emissions from the Fire Pump	**lb/hr**	**g/s**
NO_2	0.74	0.09
CO	0.08	0.01
SO_2	0.03	0.00

Table C-31. 3 Hour Emissions Scenarios for Niland Plant

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard. Since the SO_2 emission rate does not change during startup, maintenance or normal operations, the worst-case 3-hour emission rate is the maximum SO_2 rate for 100% load case (72°F; with Sprint and evaporative cooler on).
and 1 hour of the black-start engine generator being tested **OR** 1/2 hour of the fire pump being tested.

Emissions per turbine	**lb/hr**	**g/s**
SO_2	0.83	0.10
Emissions from Black-Start Engine Generator	**lb/hr**	**g/s**
SO_2	0.0021	0.0003
Emissions from the Fire Pump	**lb/hr**	**g/s**
SO_2	0.0095	0.0012

Table C-32. 8-Hour Emissions Scenarios for Niland Plant

Only CO is considered for an average 8-hour Ambient Air Quality Standard.
Worst-case 8-hour scenario includes 4 hours at maintenance rate, 2 startups, 1 shutdown, and remaining time at normal rate.
and 1 hour of the black-start engine generator being tested **OR** 1/2 hour of the fire pump being tested.

Emissions per turbine	**lb/hr**	**g/s**
CO	17.68	2.23
Emissions from Black-Start Engine Generator	**lb/hr**	**g/s**
CO	7.73E-04	9.74E-05
Emissions from the Fire Pump	**lb/hr**	**g/s**
CO	9.54E-03	1.20E-03

Table C-33. 24-Hour Emissions Scenarios for Niland Plant

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.

Worst-case 24-hour scenario includes 4 startups, 3 shutdowns, and remaining time at normal rate.
and 1 hour of the black-start engine generator being tested **OR** 1/2 hour of the fire pump being tested.

Emissions per turbine	**lb/hr**	**g/s**
SO_2	0.83	0.10
PM_{10}	3.04	0.38
Emissions from Black-Start Engine Generator	**lb/hr**	**g/s**
SO_2	2.58E-04	3.25E-05
PM_{10}	4.38E-03	5.52E-04
Emissions from the Fire Pump	**lb/hr**	**g/s**
SO_2	1.19E-03	1.50E-04
PM_{10}	7.15E-04	9.01E-05

Table C-34. Average Annual Emissions

Average operation emission rates are based on the average operation scenario (72°F; 100% load; with Sprint and evaporative cooler on) for 2,980 hours plus 250 startup/warmup events and 250 shutdown events and 20 maintenance hours. The two turbines will each have these operating conditions.
and 12 hours of the black-start engine generator being tested **AND** 26 hours of the fire pump being tested

Emissions per turbine	**lb/hr**	**g/s**
NO_X	1.90	0.24
SO_2	0.30	0.04
PM_{10}	1.10	0.14
Emissions from Black-Start Engine Generator	**lb/hr**	**g/s**
NO_X	2.19E-03	2.76E-04
SO_2	8.47E-06	1.07E-06
PM_{10}	1.44E-04	1.81E-05
Emissions from the Fire Pump	**lb/hr**	**g/s**
NO_X	4.41E-03	5.56E-04
SO_2	1.70E-04	2.14E-05
PM_{10}	1.02E-04	1.28E-05

Estimated Average Engine Performance NOT FOR GUARANTEE

GE Energy

Performance By: **PRAJU**
Project Info: **IID Niland, Part Load Performance**

Engine: **LM6000 PD-SPRINT**
Deck Info: **GE125M - Multiple Cardpacks being used, See Cardpack Row Below**
Generator: **290ERT 60Hz, 13.8kV, 0.9PF (14839)**
Fuel: **Site Gas Fuel#900-774T, 20712 Btu/lb, LHV**

Date: **12/09/2005**
Time: **9:18:42 AM**
Version: **3.3.0**

Case #	**100**	**101**	**102**	**103**
Ambient Conditions				
Dry Bulb, °F	72.0	72.0	72.0	72.0
Wet Bulb, °F	58.7	58.7	58.7	58.7
RH, %	45.0	45.0	45.0	45.0
Altitude, ft	-105.0	-105.0	-105.0	-105.0
Ambient Pressure, psia	14.752	14.752	14.752	14.752
Engine Inlet				
Comp Inlet Temp, °F	46.4	72.0	72.0	72.0
RH, %	95.0	45.0	45.0	45.0
Conditioning	CHILL	NONE	NONE	NONE
Tons or kBtu/hr	673	0	0	0
Pressure Losses				
Inlet Loss, inH20	5.00	5.00	5.00	5.00
Volute Loss, inH20	4.00	4.00	4.00	4.00
Exhaust Loss, inH20	12.00	12.00	12.00	12.00
Partload %	**100**	**75**	**50**	**25**
kW, Gen Terms	**47625**	**35726**	**23824**	**11928**
Est. Btu/kW-hr, LHV	**8316**	**8766**	**10267**	**14725**
Fuel Flow				
MMBtu/hr, LHV	396.1	313.2	244.6	175.6
lb/hr	19122	15120	11810	8480
NOx Control	**DLE**	**DLE**	**DLE**	**DLE**
SPRINT	**LPC**	**OFF**	**OFF**	**OFF**
lb/hr	8804	0	0	0
Control Parameters				
HP Speed, RPM	10307	10273	10034	9605
LP Speed, RPM	3600	3600	3600	3600
PS3 - CDP, psia	460.2	388.9	291.3	217.4
T3CRF - CDT, °F	950	994	914	805
T48IN, °R	2025	2007	2013	1917
T48IN, °F	1565	1548	1553	1457

Estimated Average Engine Performance NOT FOR GUARANTEE

GE Energy

Exhaust Parameters				
Temperature, °F	837.3	871.0	956.1	956.9
lb/sec	296.1	251.6	187.1	144.1
lb/hr	1066124	905938	673437	518624
Energy, Btu/s- ref 0 °R	97873	84785	67463	51876
Cp, Btu/lb-R	0.2720	0.2708	0.2743	0.2736
Emissions (NOT FOR USE IN ENVIRONMENTAL PERMITS)				
NOx ppmvd Ref 15% O2	25	25	25	25
NOx as NO2, lb/hr	39.75	31.39	24.53	18
CO ppmvd Ref 15% O2	25	25	25	25
CO, lb/hr	24.20	19.11	14.93	10.71
CO2, lb/hr	52237.07	40996.29	32005.28	22997.63
HC ppmvd Ref 15% O2	15	15	15	15
HC, lb/hr	8.30	6.55	5.12	3.67
SOX as SO2, lb/hr	0.00	0.00	0.00	0.00
Exh Wght % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS)				
AR	1.2568	1.2571	1.2561	1.2576
N2	73.7053	73.7238	73.6609	73.7490
O2	15.6503	16.1910	15.8470	16.3287
CO2	4.8997	4.5253	4.7525	4.4344
H20	4.4822	4.2975	4.4781	4.2252
SO2	0.0000	0.0000	0.0000	0.0000
CO	0.0023	0.0021	0.0022	0.0021
HC	0.0008	0.0007	0.0008	0.0007
NOX	0.0026	0.0024	0.0025	0.0023
Exh Mole % Dry (NOT FOR USE IN ENVIRONMENTAL PERMITS)				
AR	0.9641	0.9617	0.9632	0.9611
N2	80.6287	80.4260	80.5507	80.3763
O2	14.9888	15.4638	15.1716	15.5803
CO2	3.4119	3.1425	3.3082	3.0764
H20	0.0000	0.0000	0.0000	0.0000
SO2	0.0000	0.0000	0.0000	0.0000
CO	0.0025	0.0023	0.0024	0.0023
HC	0.0015	0.0014	0.0015	0.0014
NOX	0.0025	0.0023	0.0024	0.0023
Exh Mole % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS)				
AR	0.8958	0.8964	0.8951	0.8969
N2	74.9165	74.9611	74.8508	75.0053
O2	13.9269	14.4130	14.0980	14.5392
CO2	3.1702	2.9289	3.0741	2.8708
H20	7.0846	6.7949	7.0761	6.6823
SO2	0.0000	0.0000	0.0000	0.0000
CO	0.0023	0.0021	0.0023	0.0021
HC	0.0014	0.0013	0.0014	0.0013
NOX	0.0023	0.0021	0.0023	0.0021

Density of flue gas: 0.03028lb/cu.ft 9778.7 cu.ft/sec

Estimated Average Engine Performance NOT FOR GUARANTEE

GE Energy

Desired Outlet Nox Emissions	2.0000	2.0000	2.0000	2.0000
Required Efficiency of SCR	0.9200	0.9200	0.9200	0.9200
Desired Outlet CO Emissions	6.0000	6.0000	6.0000	6.0000
Required Efficiency of CO Catalyst	0.7600	0.7600	0.7600	0.7600
STACK EMISSIONS				
NOx, lbs/hr	3.1800	2.5112	1.9624	1.4080
SO_2, lbs/hr	0.0000	0.0000	0.0000	0.0000
CO, lbs/hr	5.8080	4.5864	3.5832	2.5704
CO_2, lbs/hr	52266.0	41019.1	32023.1	23010.4
PM10,lb/hr	3.0000	3.0000	3.0000	3.0000

2CO+O2=2CO2
56lbs of CO will convert to 88lbs of CO2

Aero Energy Fuel Number	**0-774 (SOCAL)**	
	Volume %	**Weight %**
Hydrogen	0.0000	0.0000
Methane	96.2100	91.4747
Ethane	1.3500	2.4058
Ethylene	0.0000	0.0000
Propane	0.7600	1.9862
Propylene	0.0000	0.0000
Butane	0.1900	0.6545
Butylene	0.0000	0.0000
Butadiene	0.0000	0.0000
Pentane	0.0000	0.0000
Cyclopentane	0.0000	0.0000
Hexane	0.0000	0.0000
Heptane	0.0000	0.0000
Carbon Monoxide	0.0000	0.0000
Carbon Dioxide	1.0600	2.7649
Nitrogen	0.4300	0.7139
Water Vapor	0.0000	0.0000
Oxygen	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000
Ammonia	0.0000	0.0000
Btu/lb, LHV	20712	
Btu/scf, LHV	923	
Btu/scf, HHV	1024	
Btu/lb, HHV	22960	
Fuel Temp, °F	77.0	
NOx Scalar	1.165	
Specific Gravity	0.58	

Engine Exhaust				
Exhaust MW	28.5	28.5	28.5	28.5
Inlet Flow Wet, pps	292.2	250.3	223.8	224.5
Inlet Flow Dry, pps	290.3	248.4	222.2	222.8
Shaft HP	64994	48861	32767	16713

Estimated Average Engine Performance NOT FOR GUARANTEE

GE Energy

Generator Information				
Capacity kW	60559	60559	60559	60559
Efficiency	0.983	0.981	0.975	0.957
Inlet Temp, °F	72.0	72.0	72.0	72.0
Gear Box Loss	N/A	N/A	N/A	N/A
Burner Mode				
TRQ48, Torque Limit Cold End	118633	92410	60232	36374
Correct Control Parameters				
PS3JQA, psia	465.905	393.721	294.911	220.095
XN25R3, rpm				
8th Stage Bleed				
Flow, pps	0.0	0.0	3.7	18.3
Pressure, psia	0.000	0.000	95.406	55.241
Temperature, °R	0	0	1047	964
CDP Bleed				
Flow, pps	0.0	0.0	0.0	0.3
Pressure, psia	0.000	0.000	0.000	204.980
Est. Gas Pressure at Baseplate, ps	**579.2**	**475.7**	**365.8**	**288.4**
CardPack	**832**	**7th**	**7th**	**7th**
NSI	**304**	**0**	**0**	**1404**
NSI	**0**	**0**	**0**	**0**
NSI	**0**	**0**	**0**	**0**

Rule No. 30 Sheet 10

TRANSPORTATION OF CUSTOMER-OWNED GAS

(Continued)

I. Gas Quality (Continued)

2. All gas delivered into the Utility's system for the account of the customer for which there is no existing contract between the delivering pipeline and the Utility shall be at a pressure such that the gas can be integrated into the Utility's system at the point(s) of receipt and shall conform to the following minimum specifications:

a. Heating Value: The minimum heating value is nine hundred and seventy (970) Btu (gross) per standard cubic foot on a dry basis. The maximum heating value is one thousand one hundred fifty (1150) Btu (gross) per standard cubic foot on a dry basis.

b. Moisture Content or Water Content: For gas delivered at or below a pressure of eight hundred (800) psig, the gas shall have a water content not in excess of seven (7) pounds per million standard cubic feet. For gas delivered at a pressure exceeding of eight hundred (800) psig, the gas shall have a water dew point not exceeding 20F at delivery pressure.

c. Hydrogen Sulfide: The gas shall not contain more than twenty-five hundredths (0.25) of one (1) grain of hydrogen sulfide per one hundred (100) standard cubic feet. The gas shall not contain any entrained hydrogen sulfide treatment chemical (solvent) or its by-products in the gas stream.

d. Mercaptan Sulfur: The mercaptan sulfur is not to exceed three tenths (0.3) grains per hundred standard cubic feet.

e. Total Sulfur: The gas shall not contain more than seventy-five hundredths (0.75) of a grain of total sulfur compounds per one hundred (100) standard cubic feet. This includes COS and CS2, hydrogen sulfide, mercaptans and mono, di and poly sulfides.

f. Carbon Dioxide: The gas shall not have a total carbon dioxide content in excess of three percent (3%) by volume.

g. Oxygen: The gas shall not at any time have an oxygen content in excess of two-tenths of one percent (0.2%) by volume, and customer will make every reasonable effort to keep the gas free of oxygen.

h. Inerts: The gas shall not at any time contain in excess of four percent (4%) total inerts (the total combined carbon dioxide, nitrogen, oxygen and any other inert compound) by volume.

i. Hydrocarbons: For gas delivered at a pressure of 800 psig or less, the gas hydrocarbon dew point is not to exceed 45F at 400 psig or at the delivery pressure if the delivery pressure is below 400 psig. For gas delivered at a pressure higher than 800 psig, the gas hydrocarbon dew point is not to exceed 20F at a pressure of 400 psig.

(Continued)

Attachment D
Revised Air Quality Modeling Protocol

REVISED MODELING PROTOCOL FOR THE NILAND GAS TURBINE PLANT IMPERIAL COUNTY, CALIFORNIA

Prepared for

Imperial County Air Pollution Control District

and

California Energy Commission

URS Project No. 22238280.20001

January 23, 2006

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Figure 1-1 Aerial Site Plan – Proposed Niland Gas Turbine Plant

$\mu g/m^3$	micrograms per cubic meter
μm	micrometers
AAQS	Ambient Air Quality Standards
AB	Assembly Bill
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AFC	Application for Certification
AOI	area of impact
AQRV	air quality related values
ARB	Air Resources Board
BACM	best achievable control measures
BACT	best available control technology
bhp	brake horsepower
BPIP	building profile input program
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CEC	California Energy Commission
CO	carbon monoxide
CTG	combustion turbine generators
DOC	Determination of Compliance
g/s	gram per second
GEP	good engineering practice
H1H	high first high
H2H	high second high
H6H	highest sixth high
HARP	hotspots analysis and reporting program
HRA	health risk assessment
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
ISC	industrial source complex
km	kilometers
LORS	laws, ordinances, regulations, and standards

MEI	maximally exposed individual
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAAQS/CAAQS	National Ambient Air Quality Standards/California Ambient Air Quality Standard
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NSR	new source review
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
OLM	ozone limiting method
PAH	polycyclic aromatic hydrocarbon
PM_{10}	particulate matter less than 10 μm in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
SCR	selective catalytic reduction
SO_2	sulfur dioxide
TAC	toxic air contaminants
T-BACT	best available control technology for toxics
TPY	tons per year
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
ZOI	zone of impact

1.1 BACKGROUND

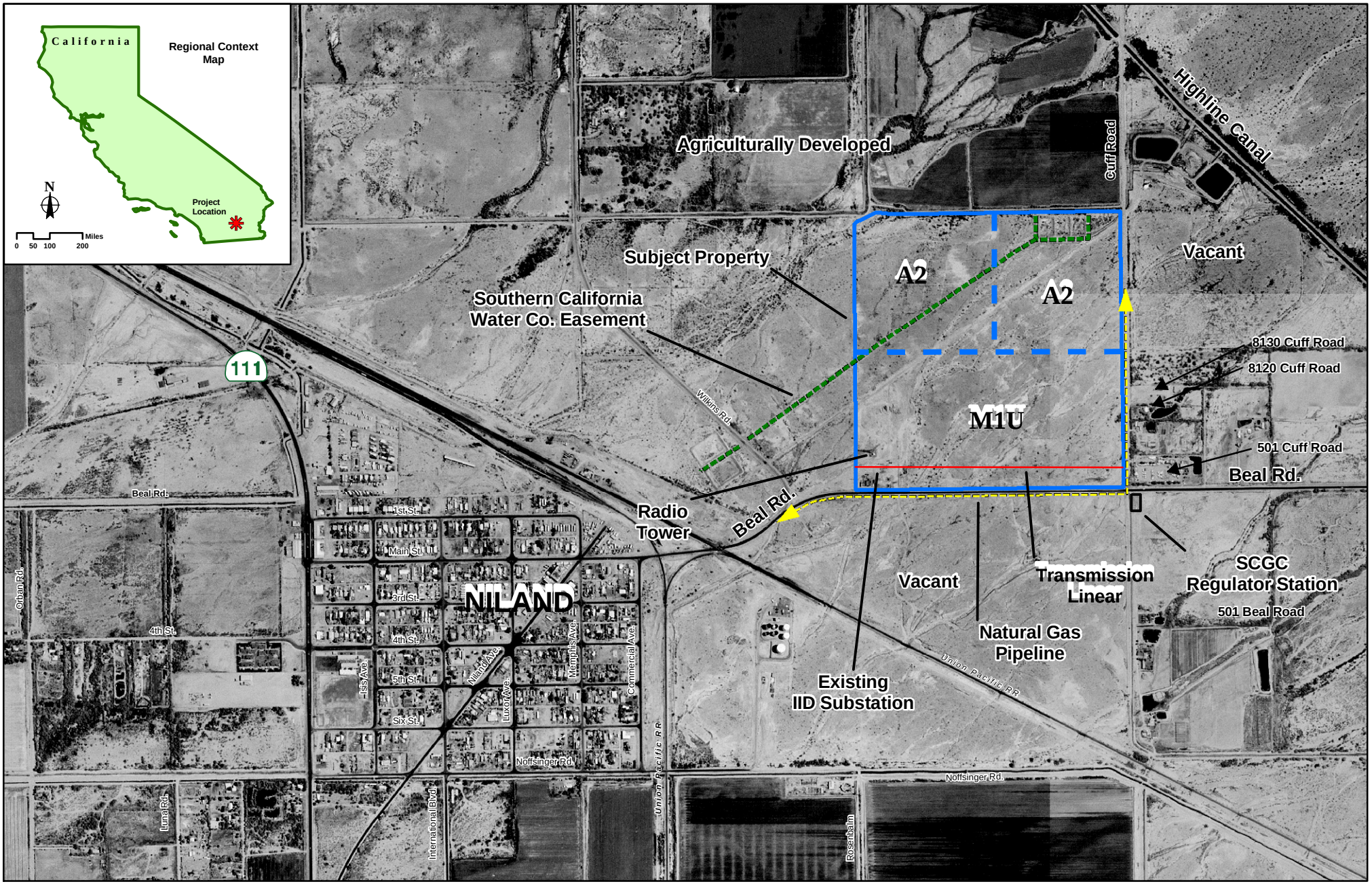
The Imperial Irrigation District (IID) is proposing to build and operate a new approximately 93-megawatt (MW) natural gas-fired simple cycle peaking plant near the town of Niland in Imperial County, California (Figure 1-1). The new Niland Gas Turbine Plant (Niland) will consist primarily of two, independent, state of the art simple cycle gas turbines. The Project is subject to the site licensing requirements of the California Energy Commission (CEC). The CEC will coordinate its independent air quality evaluations with the Imperial County Air Pollution Control District (ICAPCD) through the Determination of Compliance (DOC) process. Annual emissions of all criteria pollutants will be below the emission level thresholds specified in ICAPCD Regulations Rule 400, 403, and 405. Also, the annual emissions of all criteria pollutants will be below the emission level thresholds specified by the United States Environmental Protection Agency's (USEPA) Prevention of Significant Deterioration (PSD) review for Major Sources. Specifically, the Niland Facility will emit less than: 100 tons per year of nitrogen oxides (NO_x), volatile organic compounds (VOC), sulfur dioxide (SO_2), and particulate matter less than 10 micrometers (μm) in diameter (PM_{10}); and 0.6 tons per year of lead and 7.0 tons per year of sulfuric acid mist.

Even though federal PSD regulations will not apply to the Niland facility, the air dispersion modeling for this Project will be conducted in conformance with PSD requirements in many ways. For example, worst-case predicted impacts will be compared with the applicable monitoring exemption limits to demonstrate that the Project will be exempt from the requirements relating to pre-construction ambient air quality monitoring. The PSD regulations apply only to those pollutants for which the Project area is in attainment of the National Ambient Air Quality Standards (NAAQS). State and local nonattainment new source review (NSR) regulations potentially apply to all criteria pollutants, depending on the quantity of pollutants emitted. The area around the proposed Niland Facility is in federal attainment for NO_2, CO, and SO_2, and nonattainment for ozone (O_3) and PM_{10}. With respect to the California Ambient Air Quality Standards (CAAQS), the area around the proposed Niland Facility is in attainment for the NO_2, CO, sulfates, lead, hydrogen sulfide, and SO_2, and nonattainment for O_3 and PM_{10} and unclassified for $PM_{2.5}$. NO_x and SO_2 are regulated as PM_{10} precursors, and NO_x and VOCs as ozone precursors. Project emissions of nontattainment pollutants and their precursors will be offset to satisfy state and local nonattainment NSR regulations.

1.2 PURPOSE

The CEC requires the use of dispersion modeling to demonstrate compliance with applicable air quality standards and each of the regulating agencies (CEC and ICAPCD) require modeling to determine the potential impacts on human health from toxic air contaminants. Finally, CEC siting regulations also require that the cumulative impacts of the Project and reasonably foreseeable projects within 10 kilometers (km) of the Project site be assessed via modeling.

This document summarizes the procedures to be used for the air dispersion modeling for Project certification and permitting. Modeling of both operation and construction emissions will be performed in accordance with CEC guidance (CEC 1997). This protocol is being submitted to the CEC and ICAPCD for their review and comment prior to completion of the applicable permit applications. The proposed model selection and modeling approach is based on review of applicable regulations and agency guidance documents, and discussions with agency staff.



Imperial Irrigation District
Power Generation Division

URS Corporation

FIGURE 1-1

Aerial Site Plan
Proposed Niland Gas Turbine Plant
Niland, California

ZONING
A2 - General Agriculture
M1U - Manufacturing Light Industrial

N

0 200 400 800 Feet

SOURCES:
USGS 1:24000 Scale Quads, various dates

October 2005

2.1 PROJECT LOCATION

The Niland Facility Project site will be located on an undisturbed 160-acre parcel in Imperial County adjacent to the existing Niland Substation northeast of the town of Niland, California (see Figure 1-1). The Project site is within approximately 2 kilometers (km) of complex terrain (i.e., with elevation exceeding proposed stack heights) and is surrounded by generally vacant or agricultural land.

2.2 DESCRIPTION OF THE PROPOSED SOURCE

The Niland Facility will comprise two separate LM6000 PD Sprint model combustion turbine generators (CTG), transformers, air chiller, control and administrative buildings, and other ancillary facilities. Each gas turbine will be fired exclusively on natural gas and be equipped with dry low NO_x combustors and selective catalytic reduction (SCR) for the control of NO_x emissions and an oxidation catalyst for control of carbon monoxide (CO) emissions. The gas turbines will operate in simple cycle mode with no steam production. Each gas turbine will have its own exhaust stack with a height of approximately 60 feet. There will be no evaporative cooling tower. Aqueous ammonia will be used in the SCR system. One 173-horsepower diesel engine will act as the emergency fire water pump driver, and a 1,449 brake horsepower (bhp) natural gas-fired engine will be used as a black-start unit.

Each CTG will convert thermal energy produced by the combustion of natural gas into mechanical energy. The mechanical energy will be used to drive both the power turbine–generator and the inlet air compressor. The CTGs will be equipped with evaporative cooling for power augmentation on hot days. Each CTG will be nominally rated at about 45 megawatts (MW).

3.1 CALIFORNIA ENERGY COMMISSION REQUIREMENTS

For projects with electrical power generation capacity of greater than 50 MW, CEC requires that applicants prepare a comprehensive Application for Certification (AFC) document addressing the proposed project's environmental and engineering features. An AFC must include the following air quality information (CEC 1997):

- A description of the project, including project emissions, fuel type(s), control technologies and stack characteristics.
- The basis for all emission estimates and/or calculations.
- An analysis of Best Available Control Technology (BACT) according to ICAPCD rules.
- Existing baseline air quality data for all regulated pollutants.
- Existing meteorological data, including temperature, wind speed, and direction and mixing height.
- A listing of applicable laws, ordinances, regulations and standards (LORS) and a determination of compliance with all applicable LORS.
- An emissions offset strategy.
- An air quality impact assessment (i.e., federal and state ambient air quality standards and PSD review) and protocol for the assessment of cumulative impacts of the proposed project along with permitted and under construction projects within a 10-km radius.
- An analysis of human exposure to air toxics (i.e., health risk assessment [HRA]).

For the Niland Facility, the air quality impact assessment, the cumulative impacts assessment, and the HRA will be performed using dispersion models.

3.2 IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT REQUIREMENTS

The ICAPCD has promulgated NSR requirements under Rule 207. In general, all equipment with the potential to emit air pollutants is subject to NSR requirements. NSR has four major requirements that potentially apply to new sources:

- Installation of best available control technology (BACT).
- Ambient air quality impact modeling to demonstrate compliance with national and California Ambient Air Quality Standards.
- Emission offsets.
- Certification of statewide compliance with air quality requirements.

Assembly Bill (AB) 2588, California Air Toxics Hot Spots Program (and ICAPCD Rule 216) allows a predicted incremental cancer risk from toxic air contaminants (TAC) at any receptor up to ten in one million, prior to public notification, if best available control technology for toxics (T-BACT) is implemented. A TAC analysis should include TAC emission estimates and a modeling analysis to identify the Zone of Impact (ZOI) and the Maximally Exposed Individual (MEI). The ZOI encompasses the area within which the incremental carcinogenic risk (due to the inhalation pathway only) equals or exceeds one in one million.

3.3 U.S. ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS

The United States Environmental Protection Agency (USEPA) has promulgated PSD regulations applicable to major sources in Imperial County. The Niland Facility will not be a major source and the PSD requirements will not apply. Many of the PSD requirements are the same as the AFC and NSR requirements described above (e.g., project description, BACT, ambient air quality standards analysis); however, PSD requires the following additional analyses:

- A PSD increment (consumption) analysis.
- An analysis of Air Quality Related Values (AQRV) to ensure the protection of visibility of federal Class I wilderness areas within 100 km of the proposed project.
- An evaluation of potential impacts on soils and vegetation of commercial and recreational value.
- An evaluation of potential growth-inducing impacts.

However, for the Niland Facility, these additional PSD requirements will not apply because it will not be a major source.

This section describes the dispersion models and modeling techniques to be used in performing the air quality analysis for the Niland Facility. The objectives of the modeling are to demonstrate that air emissions from the Niland Facility will not cause or contribute to a PSD increment exceedance or an AAQS violation, and will not cause a significant health risk.

In November 2005, the USEPA officially recognized the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) as the preferred dispersion model for regulatory applications, replacing the Industrial Source Complex Short Term 3 model. EPA allowed a one-year "grace period" commencing November 9, 2005, during which the use of either model is acceptable, depending on the preference of the local air quality jurisdiction. When contacted on this point, the ICAPCD suggested that one or the other model be proposed with justification provided for the selection. Originally, the IID team selected AERMOD since this is consistent with EPA policy and the data needed to support its application are available in Imperial County. However, we have recently become aware of two problems with the model for this particular application that have caused us to question the wisdom of using it for Niland.

1. EPA has posted a notice on the SCRAM (regulatory modeling) Web site to warn that AERMOD may underpredict maximum concentrations in receptor areas with gently downward sloping terrain. This is precisely the situation on the entire southwest side of the Niland site.
2. In the initial model runs for Niland, URS found what appears to be an error in AERMAP (the terrain data processing module of AERMOD) in the terrain heights for areas that are below sea level. Roughly half the area that would be included in the Niland model receptor grid is below sea level. URS has notified Bowman (the company from whom we buy our BEEST modeling software) about this problem, and they agree that the version they are marketing provides inaccurate terrain elevations below sea level. They are checking their software to determine whether the problem in AERMAP exists in the original EPA model or has been introduced in adapting the model to the BEEST commercial software package. They believe it is inherent in the original model and, if that proves to be correct, they will contact EPA so that a remedy can be initiated as required.

Given these problems, we have decided to do the Niland modeling with the ISCST3 model until the problems with AERMOD can be resolved.

4.1 SCREENING MODELING

An initial screening analysis will be conducted to identify which operating mode for the turbines results in worst-case ambient air impacts. As explained in the previous section, the most recent version of the USEPA's ISCST3 model will be used to model worst-case conditions for each of

three operating modes across the load range (100%, 75%, or 60%). A unit emission rate of 1.0 gram per second (g/s) will be modeled for both flat and elevated terrain while considering potential building downwash. Concentrations for each pollutant, expressed in units of micrograms per cubic meter ($\mu g/m^3$), will be obtained by multiplying the unit concentration from the ISCST3 model results (expressed in $\mu g/m^3$ per g/s) by the emission rate calculated for each pollutant (expressed in g/s) for each operating mode. This is a streamlined process because it allows ISCST3 to be executed only once for all pollutants for each operating mode instead of having to execute the model iteratively for each pollutant and operating mode. The operating mode that yields the highest concentrations for each averaging time pertaining to the federal and California ambient air quality standards will be considered the worst-case operating mode for that averaging time. The worst-case operating mode will be used in all modeling analyses, screening or refined, for all short-term averaging periods throughout the modeling analysis for determining the area of impact (AOI) and impacts on any PSD increment and National Ambient Air Quality Standard/California Ambient Air Quality Standard (NAAQS/CAAQS). Refined modeling as discussed in the following section will be used to determine the worst-case annual impacts. Screening modeling will not be used to eliminate pollutants from the refined modeling analysis.

4.2 REFINED MODELING

The purpose of the refined modeling analysis is to demonstrate that air emissions from the Niland Facility will not cause or contribute to a NAAQS/CAAQS violation; and will not cause a significant health risk impact. The most recent version (04300) of USEPA's ISCST3 model will be used for the refined modeling. The regulatory default option will be selected and run in the rural mode. The short-term model version, ISCST3, will be used for modeling concentrations of pollutants having short-term (e.g., hourly or 24 hour) ambient standards. Modeling for pollutants having both short-term and annual standards (i.e., nitrogen oxide [NO_2]), will be conducted using ISCST3 with the PERIOD option to predict impacts on the annual standard. Specific modeling techniques for PSD, NAAQS/CAAQS, and HRA analyses are discussed below.

The SPPE application for the Niland Project will include an analysis of the land use adjacent to the Project. This analysis will be conducted in accordance with Section 8.2.8 of the Guideline on Air Quality Models (EPA-450/2-78-027R and Auer [1978]). The designation resulting from this analysis is expected to be rural, given the nature of the surrounding area. If this is the case, then the rural setting will be used in the ISCST3 input parameters.

The following ISCST3 settings will be used:

- Wind profile exponents of 0.7, 0.7, 0.10, 0.15, 0.35, and 0.35
- Gradual plume rise
- A 600-meter mixing height

- Stack tip downwash effects included
- Buoyancy-induced dispersion option used

4.2.1 Area of Impact Analysis

Initially, the incremental ground-level concentrations caused by the Project will be compared to ambient air quality impact significance levels defined by USEPA (Table 4-1). If maximum off-property pollutant concentrations for each pollutant are below these levels, then the Project will not cause significant air quality impacts, and no further modeling will be performed.

If the predicted ambient concentrations for the Project are above ambient air quality impact significance levels, an area of significant impact (AOI) will be defined for each pollutant and averaging period for which significance levels are exceeded. The receptor locations and time periods where the Project has a significant impact constitute *significant events*. The AOI is the area having a radius equal to the distance to the significant event located farthest from the Project. The largest radius for each pollutant, regardless of averaging period, will be used to define the AOI for the remainder of the analysis. For example, CO has both 1-hour and 8-hour averaging periods; therefore, the short-term AOI would be defined as the area having a radius equal to the distance from the Project to either the 1-hour or 8-hour significant event, whichever is longer.

4.2.2 PSD Increment Analysis

As stated earlier in this protocol, a PSD increment analysis will not be required because the Niland Facility will not be a major source. However, the monitoring exemption thresholds from the PSD regulations will be included in the analysis as justification for using agency-collected local ambient air quality monitoring data as background levels for the AAQS analysis discussed in the following section.

Table 4-1
Relevant Ambient Air Quality Standards and Significance Levels

Pollutant	Averaging Time	CAAQS (a,c)	NAAQS (b,c)	Ambient Impact Significance Levels (μg/m³)	PSD Significant Emission Rates (TPY)	PSD Increments (μg/m³)	
						Class I	Class II
CO	8-hour	9.0 ppm (10,000 μg/m³)	9.0 ppm (10,000 μg/m³)	500	100		
	1-hour	20 ppm (23,000 μg/m³)	35 ppm (40,000 μg/m³)	2,000			
NO_2[d]	Annual		0.053 ppm (100 μg/m³)	1	100	2.5	25
	1-hour	0.25 ppm (470 μg/m³)		19[e]			
SO_2	Annual		0.03 ppm (80 μg/m³)	1	100	2	20
	24-hour	0.04 ppm[f] (105 μg/m³)	0.14 ppm (365 μg/m³)	5		5	91
	3-hour			25		25	512
	1-hour	0.25 ppm (655 μg/m³)					
PM_{10}	Annual	20 μg/m³	50 μg/m³	1	100	4	17
	24-hour	50 μg/m³	150 μg/m³	5		8	30
$PM_{2.5}$	Annual	12 μg/m³	15 μg/m³				
	24-hour		65 μg/m³				
O_3	8-hour	0.07 ppm (137 μg/m³)	0.08 ppm (157 μg/m³)	See footnote[g]	100 (of VOCs)		
	1-hour	0.09 ppm (180 μg/m³)	See footnote[h]				

a. California standards for ozone (as volatile organic compounds, carbon monoxide, sulfur dioxide (1-hour), nitrogen dioxide, and PM_{10}, are values that are not to be exceeded. The visibility standard is not to be equaled or exceeded.
b. National standards, other than those for ozone and based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
c. Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parentheses and based on a reference temperature of 25° C and a reference pressure of 760 mm of mercury. All measurements of air quality area to be corrected to a reference temperature of 25° C and a reference pressure of 760 mm of mercury (1,013.2 millibar).
d. Nitrogen dioxide (NO_2) is the compound regulated as a criteria pollutant; however, emissions are usually based on the sum of all oxides of nitrogen (NO_x).
e. The ambient impact significance level for 1-hour average NO_2 is an ICAPCD level only.
f. At locations where the state standards for ozone and/or PM_{10} are violated. National standards apply elsewhere.
g. Modeling is required for any net increase of 100 tons per year or more of VOCs subject to PSD.
h. New federal 8-hour ozone and fine particulate matter ($PM_{2.5}$) standards were promulgated by USEPA on July 18, 1997. The federal 1-hour ozone standard was revoked by USEPA on June 15, 2005.

Blanks = Not applicable
CAAQS = California Ambient Air Quality Standard
mm = millimeters
NAAQS = National Ambient Air Quality Standard
ppm = parts per million by volume, or micromoles of pollutant per mole of gas
TPY = ton per year
μg/m³ = micrograms per cubic meter

4.2.3 Ambient Air Quality Standard Analysis

The purpose of the ambient air quality standard analysis is to determine whether the Niland Facility will cause or contribute to a NAAQS/CAAQS violation. The Project will not be considered to cause or contribute to a NAAQS/CAAQS violation unless impacts from the Project itself combined with the background concentration exceed the NAAQS/CAAQS, or the Project has a significant impact at the same location and time as a predicted NAAQS/CAAQS violation. The following approach is proposed for performing the NAAQS/CAAQS analysis:

1. The receptor grid and spacing described in Section 4.5 will be used for the NAAQS/CAAQS analysis.
2. Short-term and annual NAAQS/CAAQS modeling will be performed using ISCST3. Annual NAAQS/CAAQS modeling will be performed using ISCST3 with the PERIOD option. Both short-term and annual analyses will be run using sequential hourly meteorological data for five years. For short-term standards, one exceedance is allowed per year; the second is a violation. Therefore, the maximum impact (i.e., high first high [H1H]) can exceed a short-term standard; however, a high second high (H2H) concentration must be below the standard or a violation exists and further analysis is required. Maximum impact equals modeled impact plus background.

   For CO modeling, the PLOTFILE output option in ISCST3 will be invoked to save any H2H events that, when added to background, exceed the NAAQS/CAAQS. If 1-hour and 8-hour concentrations do not exceed the NAAQS/CAAQS, then compliance is demonstrated and no further modeling for CO is necessary.

   For NO_2 modeling, the PLOTFILE output option in ISCST3 will be invoked to save any H2H events that exceed the NAAQS/CAAQS (minus background). Initially, the modeling will assume full conversion of NO_x to NO_2. Should it be required, NO_2 estimates will be reduced using the USEPA's ozone limiting method (OLM) (for either hourly or annual impacts). If 1-hour and annual concentrations do not exceed the applicable NAAQS/CAAQS, then compliance is demonstrated and no further modeling is necessary for NO_2.

   For SO_2 modeling, the PLOTFILE output option in ISCST3 will be invoked to save any H2H events that, when added to background, exceed the NAAQS/CAAQS. If 3-hour and 24-hour concentrations do not exceed the NAAQS/CAAQS, then compliance is demonstrated and no further modeling for SO_2 is necessary.

   For PM_{10} modeling, the MULTYEAR processing option will not be invoked to determine the 24-hour, highest sixth high (H6H) concentration at each receptor over the five years modeled for comparison, when added to background, to the 24-hour NAAQS/CAAQS. Instead, the maximum of the five one-year average PM_{10} concentrations will be reported.

If concentrations do not exceed the NAAQS/CAAQS (minus background), then compliance is demonstrated and no further modeling for PM_{10} is necessary.

3. The events exceeding the NAAQS/CAAQS will be rerun to determine if the Project has a significant event during a predicted CAAQS or NAAQS exceedance event. The ISCST3 model will be used to analyze short-term events and annual events. If the Project does not have a significant impact during these exceedance events, then NAAQS/CAAQS compliance is demonstrated and no further modeling is necessary.
4. If the Project has a significant event during a NAAQS/CAAQS exceedance event, then the subject receptor locations will be analyzed to determine if they reside within another facility's boundary. The corresponding facility's contribution to the maximum concentration at that receptor will be determined and subtracted from the concentration modeled at that receptor. If the revised total predicted impact at the receptor is below the NAAQS/CAAQS, then compliance is demonstrated and no further analysis for PM_{10} is necessary.
5. For any remaining events, a culpability analysis using ISCST3 will be performed to determine which sources contribute the greatest impact. These sources may then be updated by contacting the facility owning the source or applicable regulatory agency and verifying the source's input parameters. For any culpable Project sources, the modeling inventory, including source locations and stack parameters used to estimate emissions, will be reviewed to ensure that they are reasonable. Adjustments will be made as appropriate.
6. An ISCST3 run will be performed using the revised inventory in (5) above to determine if the NAAQS/CAAQS exceedance still exists. If no NAAQS/CAAQS exceedance exists, then NAAQS/CAAQS compliance is demonstrated and no further modeling is necessary.

4.2.4 Health Risk Assessment Analysis

The CEC and ICAPCD require an HRA of air toxic emissions from operation of the Project. Contaminants with potential carcinogenic, chronic, and acute effects will be considered. This health risk assessment will be performed following the Office of Environmental Health Hazard Assessment (OEHHA) *Air Toxics Hot Spots Program Risk Assessment Guidelines* (OEHHA 2003). As recommended by this guideline, the California Air Resources Board (CARB) Hotspots Analysis and Reporting Program (HARP) (CARB 2005) will be used to perform a refined health risk assessment for the Project. HARP includes two modules: (1) a dispersion module, and (2) a risk module. The HARP dispersion module incorporates the EPA Industrial Source Complex Short Term Version 3 (ISCST3) air dispersion model, and the HARP risk module implements the latest Risk Assessment Guidelines developed by OEHHA.

First, ground-level impacts from the Niland Facility will be estimated using the ISC atmospheric dispersion modeling. The HARP modeling analysis will be consistent with, and use similar appropriate parameters as the modeling approach discussed above for the NAAQS/CAAQS analyses using ISCST3. Based on the impacts modeled using ISC (the dispersion model incorporated by HARP), the HARP model will be used to estimate health risk. The year(s) of meteorological data resulting in the highest 1-hour and annual impacts as determined above will be used and receptors will be placed at 25-meter spacing around the Niland facility fence line and 500-meter spacing outside of the fence out to 10 km. All receptors that HARP creates that are inside the fence will be excluded. HARP will also include the census receptors out to 10 km. Receptors will also be placed at all sensitive locations (e.g., schools, hospitals, etc.) out to 1 mile. The HRA will be performed using HARP and will follow the following steps:

1. Define the location of the MEI (i.e., the location where the highest carcinogenic risk may occur).
2. Define the locations of the maximum chronic non-carcinogenic adverse health effects and the maximum acute adverse health effects.
3. Calculate concentrations and adverse health effects at locations of maximum impact for each pollutant.

The HARP model will be performed for the inhalation pathway for diesel particulate and for all applicable uptake pathways for all other TACs. A discussion of the surrounding land use, sensitive receptors, and local meteorology will be provided in the AFC.

4.2.5 Air Quality Related Values and Visibility Analysis

A PSD analysis of air quality related values would not be required because the Niland Facility will not be a major source. However, per ICAPCD Rule 207D.6.f, an Authority to Construct permit shall address the potential to impact air quality (including visibility) of any Class 1 federal area. A screening level modeling analysis will be conducted to evaluate these impacts at the only Class I area within 100 km from the Project site; i.e., Joshua Tree National Park, the closest part of which is about 55 kilometers northwest from Niland. This analysis will be conducted using the screening version of the CALPUFF model and the same meteorological input data used for the NAAQS/CAAQS modeling analysis.

4.3 MODELING EMISSIONS INVENTORY

4.3.1 Project Sources

Operational emissions from the Project will be dominated by the two combustion turbine generators. Table 4-2 summarizes preliminary annual (combined) emission estimates for the two turbines plus the emergency diesel fire pump (assuming a maximum of 26 hours per year of emergency preparedness testing for the diesel engine driver) and the black-start unit powered by

a gas-fired IC engine (assuming 12 hours per year of testing). Conceptual plant design includes SCR for NO_x and oxidation catalysts for CO that will match recent BACT determinations for similar projects. Emissions of SO_2 and PM_{10} will be low, owing to the exclusive use of interstate pipeline quality natural gas as fuel for the gas turbines.

Table 4-2
Preliminary Estimated Emissions for Niland Facility Turbines, Emergency Diesel Fire Pump Driver, and Black-Start Unit
(tons per year)

NO_x	CO	SO_2	VOC	PM_{10}	Pb
16.7	22.0	2.6	4.5	10.0	<0.6

Combustion turbine generator emissions will vary with ambient temperature and turbine load. Modeling will be conducted for a range of ambient temperatures (low ambient temperature, high ambient temperature) and loads (60%, 75%, and 100%). All combinations will be modeled to identify worst-case operating scenarios for each averaging period (i.e., 1-hour, 3-hour, 8-hour, 24-hour, and annual). Startup and shutdown scenarios will be addressed, in addition to the normal operations, as will a small number of hours of turbine operations for maintenance activities without the SCR and CO catalyst. The modeling emission inventory for the Project will include the maximum emission rate for each source for each appropriate averaging time. The modeling analyses conducted for the AFC, DOC, and Authority to Construct permit application will be based on the refined emissions estimates. Where applicable, emissions estimates will be provided in both ppm and pounds per hour values.

Temporary construction emissions will result from heavy equipment exhaust (primarily, NO_x emissions and diesel particulate emissions) and fugitive dust (i.e., PM_{10}) from earth-moving activities and vehicle traffic on unpaved surfaces. However, construction emission impacts are expected to be small relative to the operations emissions. For the Niland Facility, the fugitive PM_{10} emissions from construction will be estimated using a spreadsheet, and taking into account the effect of implementing best achievable control measures (BACM) for controlling fugitive dust during construction. The air quality impacts of the heavy equipment exhaust and fugitive dust emissions will be modeled using screening modeling, and as necessary, a refined modeling analysis using ISCST3 may be conducted.

Air toxics, or TAC, will also be emitted from the Niland Facility Project due to combustion of natural gas and diesel fuels. These emissions have not been estimated at this time; however, because only natural gas will be used as fuel for the CTGs, only small quantities of TAC including benzene, formaldehyde, and polycyclic aromatic hydrocarbons (PAH) may potentially be emitted. Emissions estimates for TAC will be based on emission factors and/or speciation profiles (for PM_{10} and VOC) available from the California Air Resources Board (ARB) and/or

vendor data, if available. The only TAC that will be examined for the fire water pump will be diesel particulate matter since potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multipathway cancer risk from the speciated components (OEHHA 2003).

4.3.2 Contemporaneous Sources

The Niland Facility will be the only source at this site. Therefore, there are no other sources to be considered and any analysis of whether changes to those sources have been made recently is moot.

4.3.3 Cumulative Impact Analysis Using Off-Property Sources

Existing sources and known planned sources within 6 miles from the Niland Facility will be included in the AAQS and HRA modeling, if all applicable source information is provided to the applicant in a timely manner. In addition, other sources known to the ICAPCD but not yet operational will be included in the cumulative impact analysis if the associated source information is provided. Therefore, unless new additional information is identified regarding other projects within only the Project sources will be included in the cumulative analysis.

4.4 BUILDING WAKE EFFECTS

The effect of building wakes (i.e., downwash) upon the stack plumes of emission sources at the Niland plant will be evaluated in accordance with USEPA guidance (USEPA 1985). Direction-specific building data will be generated for stacks below good engineering practice (GEP) stack height using the most recent version of USEPA's Building Parameter Input Program – Prime (BPIP-Prime). Appropriate information will be provided in the AFC and other permit applications that describe the input assumptions and output results from the BPIP-Prime model. The ISCST3 model considers direction-specific downwash using both the Huber Snyder and Schulman-Scire algorithms as evaluated in the BPIP-Prime program.

4.5 RECEPTOR GRID

This section presents the receptor grids that will be used in the NAAQS/CAAQS, and HRA modeling analyses. The receptor grid to be used for determining the AOI is as follows:

- 25-meter spacing along the property line and extending from the property line out to 100 meters beyond the property line.
- 100-meter spacing within 1 km of Project sources for any locations not covered by the 25-meter grid.
- 500-meter spacing within 1 to 5 km of Project sources.

- 1,000-meter spacing within 5 to 10 km of Project sources.
- Receptors at any nearby "sensitive" locations (schools, hospitals, etc.) in the area (HRA only).

A detailed Project map and a 7 ½- minute U.S Geological Survey (USGS) map will be provided in the AFC. Actual Universal Transverse Mercator (UTM) coordinates will be used. The CAAQS and NAAQS apply to all locations off site of the applicant's facility; i.e. where public access is not under the control of the applicant. The CAAQS and NAAQS are not evaluated on the property controlled by the applicant. In other words, the air within a facility's property is not considered ambient air relative to that facility's emissions.

4.6 METEOROLOGICAL AND AIR QUALITY DATA

Meteorological data suitable for direct input to ISCST3 were obtained from the National Climatic Data Center for the Imperial County Airport meteorological station near the city of El Centro. The five years of meteorological data to be used in modeling analysis include data from 1998, 1999, 2000, 2003 and 2004. Windroses for each year used in the analysis will be provided in the AFC. Hourly ozone concentrations were obtained from the CARB Web site for the same 5 years. Therefore, if use of the ozone limiting method is invoked, the analysis will have hourly ozone data for the same 5 years represented by the meteorological data.

Available ICAPCD/ARB air quality data through 2004 will be used to determine baseline air pollutant concentrations. Data from Niland, El Centro, Calexico, and possibly the Brawley monitoring stations will be evaluated as potentially representative of the Project site conditions.

The modeled maximum incremental impacts from the Niland Facility for all pollutants emitted in significant amounts will be compared to the corresponding PSD *de minimis* monitoring exemption levels. If the modeled maximum impacts exceed the *de minimis* monitoring exemption levels for a pollutant or pollutants, then the AFC will include an analysis supporting the representativeness and use of the data from the selected air monitoring station in lieu of the need for pre-construction monitoring for that pollutant. The data collected at the air monitoring stations identified in the protocol will be used to represent the background air quality when performing the CAAQS/NAAQS analyses. The AFC will include an analysis supporting the representativeness and use of the data from the air monitoring station for CAAQS/NAAQS evaluations. The most recent three years of data will be provided. The highest reported concentration that has occurred within the past 3 years will be used for each pollutant and averaging time corresponding to the CAAQS/NAAQS.

These data will be added to the modeled maximum impacts from the facility and the total then compared to the applicable AAQS. This is a conservative approach because it assumes that the highest recorded value and the modeled maximum impact both occur at the same time and at the same location.

5.1 AREA OF IMPACT

Results of the AOI analysis will be presented in a summary table. The H1H concentration will be reported for all averaging periods for all years modeled. For years that exceed *de minimis* concentrations, a figure depicting the AOI will be generated. This figure will show the locations of all receptors that exceeded the *de minimis* concentrations. The location and value of the maximum-modeled concentration will also be presented.

5.2 NAAQS AND CAAQS ANALYSIS

The NAAQS/CAAQS analyses will be presented in a summary table and in the form of concentration contours, or isopleths. For CO, NO_2, and SO_2, the H1H short-term and highest annual concentrations will be reported. For PM_{10}, the H1H 24-hour concentration (of the individual 5 years) over the 5 years modeled will be presented. Background concentrations will be added to yield the total concentration, which will be compared with the NAAQS and CAAQS.

5.3 HEALTH RISK ASSESSMENT ANALYSIS

Maps at a scale of 1:24,000 will depict the following data:

- Elevated terrain within a 10-km radius of the Project.
- Distribution of population via census data within a 10-km radius of the Project and sensitive receptors, including schools, pre-schools, etc., within a 1-mile radius of the Project.
- Current and future residential land uses.
- Location of proposed new or modified transmission lines.
- Isopleths of any areas where predicted exposures to air toxics result in estimated chronic non-cancer impacts and acute impacts equal to or exceeding a hazard index of 1.0.
- Isopleths of any areas where exposures to air toxics led to an estimated carcinogenic risk equal to or exceeding one in one million.

Health risk assessment modeling results will be summarized to include maximum annual (chronic both carcinogenic and non-carcinogenic) and hourly (acute) adverse health effects from toxic air contaminant emissions. Health risk values will be calculated and presented in the summary table for the points of maximum impact and the sensitive receptors with the maximum risk values.

5.4 DATA SUBMITTAL

Electronic copies of the modeling input and output files will be provided to ICAPCD and the CEC.

Air Resources Board (ARB). 2003. HARP User Guide – Software for Emission Inventory Database Management, Air Dispersion Modeling Analyses, and Health Risk Assessment, Air Resources, Board, California Environmental Protection Agency.

Auer, August H. Jr., Dept. of Atmospheric Science, University of Wyoming, Laramie, WY. *American Meteorological Society Journal of Applied Meteorolog*y, Correlation of Land Use and Cover with Meteorological Anomalies. May 1978. pp. 636-643.

California Air Resources Board (CARB). 2005. HARP (Hotspots Analysis and Reporting Program), Version 1.1 (Build 23.02.21), April 2005.

California Energy Commission (CEC). 1997. "Regulations Pertaining to the Rules of Practice and Procedure and Plant Site Certification." Title 20, California Code of Regulations. Chapters 1, 2, 5.

Office of Environmental Health Hazard Assessment (OEHHA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines*, August.

United States Environmental Protection Agency (USEPA). 1985. New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft). Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC. October.

_____. 1990. New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft). Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC. October.

_____. 1995. User's Guide for the Industrial Source Complex Dispersion Models. Volume I – User's Instructions. EPA-454/B-95-003a. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. September.

_____. 1997. Addendum to ISC3 User's Guide. The Prime Plume Rise and Building Downwash Model. November.

_____. 2002. Addendum to the User's Guide for the Industrial Source Complex Dispersion Models. Volume I – User's Instructions.

Attachment E
Certificates for Banked Emission Reduction Credit to Offset Project Emissions

Emission Reduction Credit Certificate

#4483P

issued to

Imperial Irrigation District

Valid for 15.4 tons of Fugitive PM 10

CERTIFIED

Date: October 12, 2005

Date of Origin: January 7, 2005

IMPERIAL COUNTY CALIFORNIA

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#2030(P)
issued to

Imperial Irrigation District

Valid for 23 tons of NOx

CERTIFIED

IMPERIAL COUNTY CALIFORNIA

Date: February 23, 2000

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#2977P
issued to

Imperial Irrigation District

Valid for 5.53 tons of NOx

Date: July 19, 2001

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#4277P

issued to

Imperial Irrigation District

Valid for 0.23 tons of HC

CERTIFIED

Date: April 28, 2003

Date Original Certificate Issued:

September 12, 2002

IMPERIAL COUNTY CALIFORNIA 1907

Stephen L. Birdsall

Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#3055

issued to

Imperial Irrigation District

Valid for 0.8 tons/yr of ROG

CERTIFIED

IMPERIAL COUNTY CALIFORNIA

Date: July 21, 2000

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#4088P

issued to

Imperial Irrigation District

Valid for .25 tons of HC

CERTIFIED

Date: February 28, 2002

Date Original Certificate Issued:
September 7, 2001

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#4280P

issued to

Imperial Irrigation District

Valid for 0.26 tons of PM10

CERTIFIED

Date: April 28, 2003

Date Original Certificate Issued:

September 12, 2002

IMPERIAL COUNTY CALIFORNIA 1907

Stephen L. Birdsall

Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#3054

issued to

Imperial Irrigation District

Valid for 5.2 tons/yr of PM10

CERTIFIED

IMPERIAL COUNTY CALIFORNIA

Date: July 21, 2000

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#4091P

issued to

Imperial Irrigation District

Valid for 0.23 tons of PM10

CERTIFIED

Date: February 28, 2002

Date Original Certificate Issued:
September 7, 2001

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Emission Reduction Credit Certificate

#1030(P)
issued to

Imperial Irrigation District

Valid for 3.58 tons/yr of PM10

CERTIFIED

IMPERIAL COUNTY CALIFORNIA

Date: February 23, 2000

Stephen L. Birdsall
Air Pollution Control Officer

Imperial County Air Pollution Control District

Attachment F
Letter from Imperial County Air Pollution Control District Regarding Approval of Emission Reduction Package

150 SOUTH NINTH STREET
EL CENTRO, CA 92243-2850

AIR POLLUTION CONTROL DISTRICT

TELEPHONE: (760) 482-4606
FAX: (760) 353-9904

November 29, 2005

Mr. Henryk A. Olstowski, P.E.
Imperial Irrigation District
General Superintendent
Power Generation
P.O. Box 937,
Imperial, CA 92251

Dear Mr. Olstowski:

The District has conducted a review of your letter dated November 02, 2005 regarding emission offset requirements for the two generation projects that IID is currently planning, the El Centro Unit 3 Repowering and the Niland Gas Turbine Plant projects.

Based on the staff meeting conducted on November 09, 2005 between IID and ICAPCD staff and John Lague, URS Consultant, the ICAPCD has the following observations.

At this time, emission credits for the Niland Gas Turbine Plant projects are analyzed exclusively. The proposed emission credits for El Centro Unit 3 Repowering will be established and clarified on a later date.

Based on initial estimates of offsets required for the Niland project, the ICAPCD agrees with this estimates based on the following considerations:

NOX

Project Emissions:	19.39 Tons
Required Credits based on 1.2 to 1 ratio:	23.27 Tons
Proposed Offsets:	23.27 Tons

These credits are secured in the banked IID NOX ERCs.

ROC

Project Emissions:	4.26 Tons
Required Credits based on 1.2 to 1 ratio:	5.11 Tons
Proposed Offsets:	8.94 Tons (1.28 banked ROC + 7.66 Interpollutant of NOX)

These credits are secured on 1.28 tons of the banked IID ROC ERCs. The proposed credits being purchased from Border Valley Pressing are not banked and credited and there is no set date for this to happen. The ICAPCD proposes that IID secures the rest of the required credits (5.11 - 1.28 = 3.83 tons) in the form of 7.66 tons of NOX credits (3.83 tons x 2), based on an inter-pollutant ratio of 2:1.

PM10

Project Emissions:	10.13 Tons
Required Credits based on 1.2 to 1 ratio:	12.16 Tons
Proposed Offsets:	15.05 Tons (9.27 banked PM10 + 5.78 non-traditional PM10)

These credits are secured on 9.27 tons of the banked IID PM10 ERCs. The proposed credits being purchased from Border Valley Pressing (0.9 tons) are not banked and credited and there is no set date for this to happen. The ICAPCD proposes the IID secures the rest of the required credits (12.16 - 9.27 = 2.89 tons) in the form of 5.78 tons of PM10 credits (2.89 tons x 2), based on non-traditional PM10 credits at a ratio of 2:1.

The following table summarizes the emissions offset package that the ICAPCD proposes at this time in order for IID to submit the proposed package to CEC.

Proposed Offset Package for Niland Peaker Project accepted by ICAPCD

Parameter	NOX (Tons/yr)	ROC (Tons/yr)	PM10 (Tons/yr)
Project Emissions	19.39	4.26	10.13
Required Credits based on 1.2:1 ratio	23.27	5.11	12.16
Proposed/Required Offsets	23.27 / 23.27	5.11 / 8.94	12.16 / 15.05
Sources of Credits (Banked IID credits for same type of pollutant)	23.27	1.28	9.27
Sources of Credits (Proposed interpollutant trade)	NA	3.83 tons provided in the form of 7.66 tons of NOX credits based on an inter-pollutant ratio of 2:1	2.89 tons provided in the form of 5.78 tons of PM10 credits from El Toro based on non-traditional PM10 credits for combustion credits at a ratio of 2:1

These credits are available and banked at this time. The estimated credits that IID plans to purchase from Border Valley Pressing have not been credited, accounted for or banked as of this time. If these credits are to be available in the future, IID can utilize them for the El Centro Unit 3 Repowering project as approved by the ICAPCD.

I hope this letter satisfies IID's request. If you have any questions regarding this letter please contact me or Jesus A. Ramirez, APC Engineer at (760) 482-4606.

Thank you for your cooperation.

Sincerely,

Brad Poiriez
APC Senior Manager
ICAPCD

BP/jar

Attachment G
BACT Assessment

The BACT assessment conducted for the CTGs for the Project considered all NO_x and CO control technologies currently proposed or in use on natural-gas-fired combustion turbines (>50 MMBtu/hour heat input). To identify feasible emission limits, several information sources were consulted, including the following:

- U.S. EPA BACT/Lowest Achievable Emission Rate Clearinghouse (U.S. EPA 1985) and updates
- CARB BACT Clearinghouse database and CARB BACT Guidelines for Power Plants (Adopted 7/22/99)
- Recent California Energy Commission (CEC) Applications for Certification
- Research conducted by Niland Gas Turbine Plant Project design engineers

Table 1 lists selected recent NO_x BACT proposals and determinations for natural-gas-fired advanced technology combustion turbines similar in size to the Niland turbines. Nearly all recent simple cycle turbine projects in California involving turbines of similar size to those proposed for the Niland facility have had a NO_x BACT level of 2.5 ppm dry volume (ppmvd) (at 15 percent oxygen [O_2]), to be achieved by means of either low-NO_x burners or water injection coupled with the use of SCR with ammonia injection. The CTGs in this Project will achieve the BACT concentration of 2.5 ppmvd at 15 percent O_2 using dry low-NOx combustor technology (rather than steam or water injection, as a means of water conservation), and SCR.

Similarly, most recent simple cycle turbine projects have been approved with a CO emissions limit of 6 ppmvd and a ROC emissions limit of 2 ppmvd (both at 15 percent O_2), based on the use of an oxidation catalyst. The CTG in this Project will achieve the BACT concentration for ROC to achieve the same levels. Exclusive use of natural gas fuel has been determined to be BACT for SO_x and PM_{10} in all other comparable projects for several years.

U.S. EPA Region IX guidance stipulates a BACT emissions limit for NO_x of 2.5 ppmvd (at 15 percent O_2) for a 1-hour average. U.S. EPA stipulates two ppmvd (at 15 percent O_2) for a 3-hour average.

TABLE 1
SUMMARY OF RECENT NO_X BACT DETERMINATIONS FOR COMBUSTION TURBINE GENERATORS RATED AT GREATER THAN 40 MW IN PEAKING SERVICE

Name	Location	Rating	Vendor, Model	Emission Limit[1]	Control(s)	Permit Date
Kings River Conservation District Peaking Plant	CA	40+ each, 2 turbines, 97 MW total	GE LM6000 PC SPRINT	3.0 ppm	Water Injection and SCR	5/04
Modesto Electric Generation Project	CA	40+ each, 2 turbines, 95 MW total	GE LM6000 PC SPRINT	2.5 ppm	Water Injection and SCR	2/04
Riverside Energy Resource Center	CA	40+ each, 2 turbines, 96 MW total	GE LM6000 PC SPRINT NxGen	2.5 ppm	Water Injection and SCR	12/04

TABLE 1
SUMMARY OF RECENT NO_X BACT DETERMINATIONS FOR COMBUSTION TURBINE GENERATORS RATED AT GREATER THAN 40 MW IN PEAKING SERVICE

Name	Location	Rating	Vendor, Model	Emission Limit[1]	Control(s)	Permit Date
San Francisco Electric Reliability Project	CA	40+ each, 3 turbines, 145 MW total	GE LM6000 PC SPRINT	2.5 ppm	Water Injection and SCR	Tentative 4/06

[1] Based on 1-hour average.

DLE = dry low emissions combustor
MW = megawatts
ppm = parts per million by volume, dry basis, at 15 percent oxygen
SCR = selective catalytic reduction

ASSESSMENT OF NOx CONTROL TECHNOLOGIES

Based on a review of materials described above, the following NO_x control technologies were evaluated to determine whether they are able to achieve BACT NO_x levels in practice:

- DLE and Goal Line SCONOx™
- DLE and SCR with ammonia injection

SCONOx™

SCONOx™ is a new NO_x reduction system produced by Goal Line Environmental Technologies (now distributed by EmeraChem) for gas turbine applications within an exhaust temperature range significantly below the design operating parameters of the simple cycle LM6000 employed at Niland. This system uses a coated catalyst to oxidize both NO_x and CO and thereby reduce plant emissions. As demonstrated by an initial installation on several gas turbines where energy is recovered from the exhaust gas to produce steam, SCONOx™ is capable of achieving NO_x emission concentrations of 2 ppm based on a maximum inlet concentration of 25 ppm, and 90 percent CO reduction based on a maximum inlet concentration of 50 ppm. However, the SCONOx™ technology has not been sufficiently demonstrated on higher exhaust temperature simple cycle peaking gas turbines such as those proposed for the Project.

The SCONOx™ system consists of a catalyst that is installed in the flue gas at a point where the temperature is between 280°F and 650°F. The Niland CTGs operate between 837°F and 956°F; therefore, the SCONOx™ application is not appropriate for this high-temperature technology. CO emissions are reduced in SCONOx™ by the oxidation of CO to CO_2. A two-step process reduces the NO_x emissions. First, NO_x emissions are oxidized to NO_2 and then adsorbed onto the catalyst. In the second step, a proprietary regenerative gas is passed through the catalyst periodically. This gas de-desorbs the NO_2 from the catalyst and reduces it to N_2. The system does not use ammonia as a reagent; rather, it uses natural gas as the basis for a proprietary catalyst regeneration process.

Potential advantages of the SCONOx™ process include:

- **No ammonia.** The SCONOx™ process does not use ammonia. This eliminates the ammonia storage and transportation safety issues and the potential for ammonia slip or ammonia-based particulate formation.
- **Carbon monoxide reduction.** SCONOx™ will reduce CO emissions as well as NO_x emissions.

Potential disadvantages of the SCONOx™ process include:

- **Not suitable for exhaust temperatures of simple cycle gas turbine peaking applications**. SCONOx™ has been primarily installed on co-generation or combined cycle systems where the exhaust gas temperature is reduced by recovering energy to produce steam. The Niland Gas Turbine Plant will be a simple cycle peaking operation. As such, there will be no steam production, which is required to produce the SCONOx™ regeneration gas. In addition, peaking units require more rapid startup and more frequent load changes than typical co-generation systems. The main concerns are the damper systems that would be required with SCONOx™ for the units and assuring proper regeneration gas distribution. The effectiveness and longevity of these damper systems have not been demonstrated on simple cycle gas turbines, and their cost of replacement would be substantial.
- **Catalyst "washing."** A proprietary catalyst washing system must be used and an on-line catalyst washing system design has not yet been fully developed. If an on-line catalyst washing system is not used, then the facility must be shut down for cleaning.
- **High capital and operating cost.** SCONOx™ is significantly more expensive than SCR with ammonia injection primarily due to the higher cost of initial and replacement catalyst. The SCONOx™ catalyst is a precious metal catalyst, which is very expensive.

Because the low NO_x emission rates attainable on gas turbines in co-generation/combined cycle systems with SCONOx™ have not been sufficiently demonstrated as "achieved in practice" on simple cycle gas turbine applications and the other factors discussed above, SCONOx™ does not represent BACT for the Niland Gas Turbine Plant at this time.

SCR with Ammonia Injection

SCR with ammonia injection systems for reduction of NO_x emissions have been widely used in simple cycle gas turbine applications for many years and are considered a proven technology. SCR systems are commercially available from several vendors, unlike SCONOx™, which is available from a single vendor. The SCR process involves the injection of ammonia into the flue gas stream via an ammonia injection grid upstream of a catalyst. The ammonia reacts with the NO_x gases in the presence of the catalyst. The catalyst is not regenerated and requires periodic replacement. SCR vendors typically offer a 3-year guarantee on catalyst life. SCR with ammonia injection systems have been used in numerous simple cycle applications including LM6000 Class units.

Dry Low Emissions Combustors

Water injection, steam injection, and Dry Low Emissions (DLE) combustion technologies are available and used to control LM6000 exhaust gas NO_x emissions. For the Niland Gas Turbine Plant, DLE was selected to minimize the Project's use of water. DLE has been previously used on an LM6000 within California.

DLE is a system design employed by several major turbine vendors. Virtually all gas turbine manufacturers are continuing to research and improve on these advanced combustion technologies because they represent the most cost-effective NO_x reduction approach for some turbine users. Exploring NO_x control through combustor design is attractive because there is essentially only one source of NO_x formation in natural gas combustion as opposed to two sources with liquid or solid fuels. The source of NO_x emission from natural gas turbines is the thermal NO_x formation reaction, which is very dependent on combustor design. This reaction converts natural atmospheric nitrogen and oxygen to NO_x at the high temperatures of combustion. DLE combustion results in NO_x emission rates of 25 ppmvd (at 15 percent O_2) or less, the same as the more common water injected LM6000s.

The Project will use DLE and SCR and ammonia injection designed to achieve a NO_x emission limit of 2.5 ppm (at 15 percent O_2) on a 1-hour average. As noted in Table 1, this level of NO_x is at or below other recent and similar projects and is considered to be BACT for the Niland Gas Turbine Plant.

OTHER TECHNOLOGIES

Technologies that cannot achieve a NO_x emissions limit of 2.5 ppmvd (at 15 percent O_2) in practice were not considered. These technologies include SCR without DLE and DLE without SCR. As noted previously water injection was not considered to minimize the Project's use of water.

ASSESSMENT OF CO CONTROL TECHNOLOGIES

The Niland Gas Turbine Plant CTGs are guaranteed to achieve 6 ppm (at 15 percent O_2) over a 1-hour average with natural gas fuel and use of a CO oxidation catalyst (except during startup and shutdown). The ICAPCD has already confirmed that the use of a CO oxidation catalyst will result in emissions of CO that will conform to current ICAPCD BACT requirements.

The following CO control technologies are evaluated:

- Combustion design/control
- Oxidizing catalyst

Combustion Design/Control

Gas turbine combustion technology has significantly improved over recent years with respect to lowering CO emissions. IID proposes to operate LM6000 PD SPRINT turbines at the Niland Gas Turbine Plant. For other installations, these turbines have been guaranteed by the manufacturer to achieve a CO rate of 9 ppm (at 15 percent O_2) without post-combustion control technologies under a wide range of operating conditions (60 percent to 100 percent load) and ambient conditions (15°F to 115°F).

Oxidizing Catalyst

CO oxidizing catalysts have been used with natural-gas-fired turbines for over a decade when uncontrolled CO emission levels are unacceptably high. CO catalysts operate at elevated temperatures within the exhaust stream. CO oxidizing catalysts can be considered technically feasible for use in simple cycle peaking applications. Thus, installation of a CO oxidizing catalyst on the Project turbines is considered to be BACT for the Niland Gas Turbine Plant.

ASSESSMENT OF ROC CONTROL TECHNOLOGIES

The proposed BACT level of 2 ppmvd (at 15 percent O_2) for ROC control with DLE burners, SCR, and an oxidation catalyst is consistent with the most stringent level among recent BACT determinations for simple cycle gas turbines and is therefore considered to be BACT for the Niland Gas Turbine Plant.

ASSESSMENT OF SO_2 AND PM_{10} CONTROL TECHNOLOGIES

Sulfur dioxide and PM_{10} emissions will be controlled through the use of clean-burning pipeline quality natural gas. This control technology has been widely and uniformly implemented for control of SO_2 and PM_{10} emissions from combustion turbines in California and throughout the United States, and is considered to be BACT for the Niland Gas Turbine Plant.

ASSESSMENT OF AMMONIA SLIP CONTROL TECHNOLOGIES

The proposed BACT level of 5 ppmvd (at 15 percent O_2) is the most rigorous control requirement that has been imposed to date on any gas turbine power plant project in California, and is thus considered to represent an appropriate BACT level for the Niland Gas Turbine Plant.