DOCKETED

Docket Number:	13-AFC-01
Project Title:	Alamitos Energy Center
TN #:	201620-42
Document Title:	AEC AFC Appendix 5.1B Operational and Commissioning Emission Calculations
Description:	Previously TN# 201493-15
Filer:	Tiffani Winter
Organization:	CH2M Hill
Submitter Role:	Applicant Consultant
Submission Date:	2/3/2014 12:47:11 PM
Docketed Date:	2/3/2014

Appendix 5.1B
Operational and Commissioning Emission Calculations

APPENDIX 5.1B

Operational and Commissioning Emission Calculations (Criteria and Greenhouse Gas)

Tables presented in this Appendix are as follows:

Alamitos Energy Center
Table 5.1B.1
Summary of Commissioning Emission Estimates
December 2013

			Unabated Emission Rate			Total Unabated Emissions			Reduction %			Exhaust Emission Rate			Total lbs After Catalysts				
Activity	Duration [hr]	CTG Load [%]	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	NOx (lbs)	CO (lbs)	VOC (lbs)	SCR Reduction %	CO Cat. Reduction %	VOC Reduction %	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	NOx	CO	VOC	SOx	PM10/2.5
CTG Testing (Full Speed No Load, FSNL)	4	5	48.5	1,709.1	383.8	194.1	6,836.5	1,535.3	0%	0%	0%	48.5	1,709.1	383.8	194.1	6,836.5	1,535.3	12.4	18.0
Steam Blows[1]	27	50	109.7	3,169.4	373.1	2,961.5	85,573.6	10,074.5	0%	0%	0%	109.7	3,169.4	373.1	2,961.5	85,573.6	10,074.5	83.4	121.5
Set Unit HRSG & Steam Safety Valves	16	100	41.9	28.4	1.7	671.2	454.0	27.4	0%	0%	0%	41.9	28.4	1.7	671.2	454.0	27.4	49.4	72.0
Steam Blows - Restoration																		0.0	0.0
Restart CTGs and run HRSG in Bypass Mode. STG Bypass Valve Tuning. HRSG Blow Down and Drum Tuning	12	40	103.9	5,490.2	240.8	1,246.8	65,882.3	2,889.7	75%	75%	33%	26.0	1,372.5	161.3	311.7	16,470.6	1,936.1	37.1	54.0
Restart CTGs and run HRSG in Bypass Mode. STG Bypass Valve Tuning. HRSG Blow Down and Drum Tuning	12	75	32.8	22.2	1.7	393.0	265.9	20.5	75%	75%	33%	8.2	5.5	1.1	98.3	66.5	13.7	37.1	54.0
Restart CTGs and run HRSG in Bypass Mode Bypass Valve Tuning. HRSG Blow Down and Drum Tuning	12	100	41.9	28.4	1.7	503.4	340.5	20.5	75%	75%	33%	10.5	7.1	1.1	125.8	85.1	13.7	37.1	54.0
Verify STG on Turning Gear; Establish Vacum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	12	75	32.8	22.2	1.7	393.0	265.9	20.5	75%	75%	33%	8.2	5.5	1.1	98.3	66.5	13.7	37.1	54.0
Verify STG on Turning Gear; Establish Vacum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	12	100	41.9	28.4	1.7	503.4	340.5	20.5	75%	75%	33%	10.5	7.1	1.1	125.8	85.1	13.7	37.1	54.0
CT Base Load Testing	12	75	32.8	22.2	1.7	393.0	265.9	20.5	75%	75%	33%	8.2	5.5	1.1	98.3	66.5	13.7	37.1	54.0
Pre-STG Roll Outage and Stack Emissions Test Equipment Installation																		0.0	0.0
Load Test STG / Combine Cycle (3X1)	24	100	41.9	28.4	0.0	1,006.7	681.0	0.0	75%	75%	33%	10.5	7.1	0.0	251.7	170.2	0.0	74.2	108.0
Combine Cycle testing	24	100	41.9	28.4	1.7	1,006.7	681.0	41.0	75%	75%	33%	10.5	7.1	1.1	251.7	170.2	27.5	74.2	108.0
STG Load Test	24	75	32.8	22.2	1.7	786.0	531.7	41.0	75%	75%	33%	8.2	5.5	1.1	196.5	132.9	27.5	74.2	108.0
No Operation																		0.0	0.0
Install Temporary Emissions Test Equipment																		0.0	0.0
DLN Emissions Tuning[2]	12	100	41.9	28.4	1.7	503.4	340.5	20.5	75%	75%	33%	10.5	7.1	1.1	125.8	85.1	13.7	37.1	54.0
Emissions Tuning[2]	12	70	31.3	21.2	1.7	375.5	254.0	20.5	75%	75%	33%	7.8	5.3	1.1	93.9	63.5	13.7	37.1	54.0
Emissions Tuning[2]	12	100	41.9	28.4	1.7	503.4	340.5	20.5	75%	75%	33%	10.5	7.1	1.1	125.8	85.1	13.7	37.1	54.0
Source Testing & Drift Test Day 1-5 RATA / Pre-performance Testing/ Part 60/75 Certification and Source Testing	168	100	28.0	28.4	1.7	4,704.0	4,767.0	287.3	75%	75%	33%	7.0	7.1	1.1	1,176.0	1,191.7	192.5	519.1	756.0
Water Wash & Performance preparation	24	100	41.9	28.4	1.7	1,006.7	681.0	41.0	75%	75%	33%	10.5	7.1	1.1	251.7	170.2	27.5	74.2	108.0
Performance Testing	24	100	41.9	28.4	1.7	1,006.7	681.0	41.0	75%	75%	33%	10.5	7.1	1.1	251.7	170.2	27.5	74.2	108.0
CALISO Certification	12	100	41.9	28.4	1.7	503.4	340.5	20.5	75%	75%	33%	10.5	7.1	1.1	125.8	85.1	13.7	37.1	54.0
Total Operating Hours:	**455**												**Total lbs (per turbine):**		**7,536**	**112,029**	**14,000**	**1,406**	**2,048**
													Total tons (per turbine):		**3.8**	**56.0**	**7.0**	**0.70**	**1.0**
													Total tons (per 3x1 block):		**11.3**	**168.0**	**21.0**	**2.11**	**3.1**

Notes:
1. Steam blows of the first CTG are expected to last 40 hours at 50% load. It is expected that Steam Blows on the remaining two CTG's will last 20 hours (each) at 50% load
2. After Commissioning, tuning is expected to occurr twice a year

Alamitos Energy Center
Table 5.1B.2
MPSA 501DA Performance Data
December 2013

PEC Engineering Data - Combined Cycle

Case Number	2	3	4	5	7	8	9	10	12	13	14	15
CTG Model	501DA	501DA	501DA	501DA	501DA	501DA	501DA	501DA	501DA	501DA	501DA	501DA
CTG Fuel Type	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
CTG Load	100	90	80	70	100	90	80	70	100	90	80	70
CTG Inlet Air Cooling	Off	Off	Off	Off	On	Off	Off	Off	On	Off	Off	Off
Ambient Temperature, F	low	low	low	low	Average	Average	Average	Average	High	High	High	High
Fuel Sulfur Content (grains/100 standard cubic feet)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Ambient Conditions												
Ambient Temperature, F	28	28	28	28	65.3	65.3	65.3	65.3	107	107	107	107
Ambient Relative Humidity, %	76.33	76.33	76.33	76.33	86.8	86.8	86.8	86.8	10.73	10.73	10.73	10.73
Atmospheric Pressure, psia	14.68	14.68	14.68	14.68	14.68	14.68	14.68	14.68	14.68	14.68	14.68	14.68
Combustion Turbine Performance												
CTG Inlet Air Conditioning Effectiveness, %	0	0	0	0	85	0	0	0	85	0	0	0
CTG Compressor Inlet Dry Bulb Temperature, F	28	28	28	28	62.85	65.3	65.3	65.3	73.16	107	107	107
CTG Compr. Inlet Relative Humidity, %	85.89	85.89	85.89	85.89	92.22	57.76	57.76	57.76	71.96	7.869	7.869	7.869
Inlet Loss, in. H2O	3.859	3.513	3.187	2.879	3.934	3.58	3.268	2.974	4.308	3.742	3.485	3.232
Exhaust Loss, in. H2O	18.32	15.85	13.63	11.63	16.06	13.84	11.99	10.32	15.4	12.1	10.78	9.532
CTG Load Level (percent of Base Load)	100	90	80	70	100	90	80	70	100	90	80	70
Gross CTG Output, kW	133,403	120,835	108,029	95,026	119,873	107,710	96,364	84,817	115,304	91,825	82,158	72,341
Gross CTG Heat Rate, Btu/kWh (LHV)	9,952	10,170	10,463	10,856	10,202	10,443	10,746	11,157	10,306	10,906	11,280	11,770
Gross CTG Heat Rate, Btu/kWh (HHV)	11,047	11,289	11,614	12,050	11,324	11,592	11,928	12,384	11,440	12,106	12,521	13,065
Net CTG Output, kW	133,160	120,592	107,786	94,783	119,630	107,467	96,121	84,574	115,061	91,582	81,915	72,098
Net CTG Heat Rate, Btu/kWh (LHV)	9,970	10,191	10,487	10,884	10,223	10,467	10,773	11,189	10,328	10,935	11,314	11,810
Net CTG Heat Rate, Btu/kWh (HHV)	11,067	11,311	11,640	12,081	11,347	11,618	11,958	12,420	11,464	12,138	12,558	13,109
Gross 3x1 Combined Cycle kW's per CTG	182,594	168,248	153,517	138,263	170,127	155,663	141,987	128,008	159,676	133,327	121,678	109,743
Net 3x1 Combined Cycle kW's per CTG	176,946	162,838	148,348	133,339	164,709	150,482	137,029	123,274	154,362	128,453	116,996	105,253
CTG Heat Input, MMBtu/h (LHV)	1,339	1,214	1,088	977	1,222	1,117	1,007	910	1,078	994	905	822
CTG Heat Input, MMBtu/h (HHV)	1,509	1,368	1,226	1,101	1,377	1,258	1,134	1,025	1,214	1,120	1,020	926
CTG Exhaust Flow, 10^3 lb/h	3,380.7	3,056.0	2,734.9	2,411.9	3,128.6	2,855.4	2,578.4	2,287.7	2,864.8	2,650.6	2,423.3	2,164.3
CTG Exhaust Temperature, F	993	988	994	1,024	1014.0	1009.0	1015.0	1046.0	1,034	1,029	1,035	1,068
Fuel Sulfur Content (grains/100 standard cubic feet)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Duct Burner Fuel												
Duct Burner Heat Input, MMBtu/h (LHV)	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner Heat Input, MMBtu/h (HHV)	0	0	0	0	0	0	0	0	0	0	0	0
Total Duct Burner Fuel Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner Fuel LHV, Btu/lb	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner Fuel HHV, Btu/lb	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Sulfur Content (grains/100 standard cubic feet)	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner Emissions												
Duct Burner NOx, lb/MMBtu (HHV)	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner CO, lb/MMBtu (HHV)	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner VOC (as CH4), lb/MMBtu (HHV)	0	0	0	0	0	0	0	0	0	0	0	0
Duct Burner PM10, lb/MMBtu (HHV) (front and back half catch)	0	0	0	0	0	0	0	0	0	0	0	0
Assumed SO2 oxidation rate in Duct Burner for SO3 calculation, vol%	0	0	0	0	0	0	0	0	0	0	0	0
Total SO2, lb/h from Duct Burner Fuel only (after SO2 oxidation)	0	0	0	0	0	0	0	0	0	0	0	0

Alamitos Energy Center
Table 5.1B.2
MPSA 501DA Performance Data
December 2013

PEC Engineering Data - Combined Cycle

Case Number	2	3	4	5	7	8	9	10	12	13	14	15
Total SO3, lb/h from Duct Burner Fuel only (after SO2 oxidation)	0	0	0	0	0	0	0	0	0	0	0	0
Stack Emissions												
Catalyst Inlet Exhaust Analysis - %Mole Basis - Wet												
Ar	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.94	0.94	0.94
CO2	3.32	3.30	3.30	3.36	3.26	3.24	3.22	3.28	3.25	3.11	3.10	3.15
H2O	6.88	6.85	6.85	6.96	8.19	8.10	8.10	8.19	8.31	6.87	6.83	6.94
N2	75.17	75.18	75.18	75.13	74.10	74.15	74.15	74.12	73.99	75.02	75.04	75.00
O2	13.69	13.72	13.72	13.60	13.52	13.58	13.60	13.48	13.52	14.06	14.09	13.97
Ave Mol wt (based on %mol)	28.50	28.51	28.50	28.50	28.40	28.44	28.44	28.44	28.36	28.51	28.51	28.51
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SO2, lb/hr (after SO2 oxidation)	2.87	2.60	2.33	2.09	2.62	2.39	2.15	1.95	2.31	2.13	1.94	1.76
SO3, lb/hr (after SO2 oxidation)	0.397964595	0.36085951	0.3233378	0.29050148	0.36318663	0.3318431	0.29924701	0.27035604	0.32026359	0.29546978	0.26895955	0.24428099
Stack Exit Temperature, F	412	402.4	392.6	382.4	407.7	398	388.9	379.8	414.1	395.7	388	381
Stack Diameter, ft (estimated)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Stack Flow, 10^3 lb/h	3380.7	3056.0	2734.9	2411.9	3135.0	2855.4	2578.4	2287.7	3074.1	2650.6	2423.3	2164.3
Stack Flow, 10^3 acfm	1259.9	1126.3	996.6	868.4	1166.7	1049.4	937.4	823.0	1154.4	969.1	878.0	777.8
Stack Exit Velocity, ft/s	82.52	73.77	65.27	56.88	76.41	68.73	61.40	53.91	75.61	63.47	57.50	50.94
NOx (Catalyst inlet), ppmvd (dry, 15% O2)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
CO (Catalyst inlet), ppmvd (dry, 15% O2)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
VOC (Catalyst inlet), ppmvd (dry, 15% O2)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Stack NOx Emissions with the Effects of Selective Catalytic Reduction (SCR)												
NOx, ppmvd (dry, 15% O2)	2	2	2	2	2	2	2	2	2	2	2	2
NOx, ppmvd (dry)	2.10	2.09	2.09	2.13	2.09	2.07	2.07	2.11	2.09	1.97	1.96	2.00
NOx, ppmvw (wet)	1.96	1.95	1.95	1.98	1.92	1.91	1.90	1.93	1.91	1.83	1.82	1.86
NOx, lb/h as NO2	10.68	9.60	8.59	7.71	9.76	8.83	7.95	7.18	8.90	7.84	7.14	6.49
NOx, lb/MMBtu (LHV) as NO2	0.0080	0.0079	0.0079	0.0079	0.0080	0.0079	0.0079	0.0079	0.0083	0.0079	0.0079	0.0079
NOx, lb/MMBtu (HHV) as NO2	0.0071	0.0070	0.0070	0.0070	0.0071	0.0070	0.0070	0.0070	0.0073	0.0070	0.0070	0.0070
SCR NH3 slip, ppmvd (dry, 15% O2)	5	5	5	5	5	5	5	5	5	5	5	5
SCR NH3 slip, lb/h	9.87	8.87	7.94	7.12	9.01	8.16	7.34	6.63	8.22	7.24	6.60	6.00
Ammonia Use, lb/h	149.76	134.66	120.51	108.08	136.81	123.80	111.46	100.64	124.73	109.93	100.11	91.04
Stack CO Emissions with the Effects of Catalytic Reduction (CO Catalyst)												
CO, ppmvd (dry, 15% O2)	2	2	2	2	2	2	2	2	2	2	2	2
CO, ppmvd (dry)	2.10	2.09	2.09	2.13	2.09	2.07	2.07	2.11	2.09	1.97	1.96	2.00
CO, ppmvw (wet)	1.96	1.95	1.95	1.98	1.92	1.91	1.90	1.93	1.91	1.83	1.82	1.86
CO, lb/h	6.50	5.85	5.23	4.69	5.94	5.37	4.84	4.37	5.41	4.77	4.35	3.95
CO, lb/MMBtu (LHV)	0.0049	0.0048	0.0048	0.0048	0.0049	0.0048	0.0048	0.0048	0.0050	0.0048	0.0048	0.0048
CO, lb/MMBtu (HHV)	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0045	0.0043	0.0043	0.0043
Stack SO2 Emissions												
Assumed SO2 oxidation rate in CO Catalyst for SO3 calculation, vol%	30	30	30	30	30	30	30	30	30	30	30	30
Assumed SO2 oxidation rate in SCR for SO3 calculation, vol%	1	1	1	1	1	1	1	1	1	1	1	1
SO2, ppmvd (dry, 15% O2)	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.27	0.27	0.27
SO2, ppmvd (dry)	0.28	0.28	0.28	0.29	0.28	0.28	0.28	0.28	0.27	0.27	0.26	0.27
SO2, ppmvw (wet)	0.26	0.26	0.26	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25
SO2, lb/h	1.99	1.80	1.61	1.45	1.81	1.66	1.49	1.35	1.60	1.47	1.34	1.22

Alamitos Energy Center
Table 5.1B.2
MPSA 501DA Performance Data
December 2013

PEC Engineering Data - Combined Cycle

Case Number	2	3	4	5	7	8	9	10	12	13	14	15
SO2, lb/MMBtu (LHV)	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
SO2, lb/MMBtu (HHV)	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
Stack VOC Emissions with the Effects of Catalytic Reduction (CO Catalyst)												
VOC, ppmvd (dry, 15% O2)	1	1	1	1	1	1	1	1	1	1	1	1
VOC, ppmvd (dry)	1.05	1.05	1.05	1.06	1.05	1.04	1.03	1.05	1.04	0.98	0.98	1.00
VOC, ppmvw (wet)	0.98	0.97	0.97	0.99	0.96	0.95	0.95	0.97	0.96	0.92	0.91	0.93
VOC, lb/h as CH4 (includes VOC correction as applied to CTG)	1.86	1.67	1.49	1.34	1.70	1.54	1.38	1.25	1.55	1.36	1.24	1.13
VOC, lb/MMBtu (LHV)	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
VOC, lb/MMBtu (HHV)	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0012	0.0012
Total Effects of SO2 Oxidation												
Total SO2 to SO3 conversion rate for SO3 calculation, %vol	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7
Total Amount of SO2 converted to SO3 for SO3 calculation, lb/h	0.88	0.80	0.71	0.64	0.80	0.73	0.66	0.60	0.71	0.65	0.59	0.54
Maximum Stack Ammonium Sulfate [(NH4)2-(SO4)] (assuming 100% conversion from SO3), lb/h	2.47	2.24	2.01	1.80	2.26	2.06	1.86	1.68	1.99	1.83	1.67	1.52
Maximum Stack H2SO4 (assuming 100% conversion from SO3 to H2SO4), lb/h	1.83	1.66	1.49	1.34	1.67	1.53	1.38	1.25	1.48	1.36	1.24	1.13

Notes:

1. The emissions estimates shown in the table above are per stack. Emission estimates are expected and do not include any margin. Permitting margins should be applied by permitting engineer.
2. The dry air composition used is 0.98% Ar, 78.03% N2 and 20.99%O2
3. Standard conditions are defined as 59° F, 14.696 psia, Norm conditions are defined as 32° F, 14.696 psia.
4. The CTG performance and emissions are based on MHI data
5. The O2 reduction in the CO catalyst is negligible and not included in the analysis.
6. The H2O increase in the SCR catalyst is negligible and not included in the analysis.
7. Ammonium sulfates created downstream of the SCR are included in front half particulates and front&back half particulates. The assumption that 100% SO3 is converted to ammonium sulfates results in "worst case" particulate emissions.
8. Where manufacturer data of lb/h of pollutant emissions were available, the manufacturer's estimate was used in the summary table.
9. SCR and CO Catalyst are included for emission reduction and are designed to control NOx and CO emissions. VOC conversion across the CO catalyst is assumed to be 68%.
10. Sulfur content in fuel gas is assumed to be 0.75 grains/100 SCF.
11. CO catalyst is assumed to be located within the HP evaporator in the HRSG and hence a typical SO_2 oxidation rate of 30% in CO catalyst was used for emission estimates. Permitting engineer should apply necessary margins if the assumed SO2 oxidation rate in CO catalyst varies from 30%.
12. SO3 and subsequent PM10 and PM2.5 values are to be calculated based on the SO2 to SO3 conversion rates noted for the CTG, duct burner, SCR and CO catalyst.
13. GT Sulfur emissions are assumed to be 90% SO2 and 10% SO3
14. It is assumed that the CO catalyst converts 30% SO2 to SO3 and 30% NO to NO2
15. It is assumed that the SCR catalyst converts 1% SO2 to SO3
16. Ammonia use is calculated with 19% aqueous ammonia and factors in ammonia slip
17. Estimates for SO2 account for reduction due to oxidation to SO3
18. Data source for row CTG Compr. Inlet Relative Humidity, % through Row Net 3x1 Combined Cycle kW's per CTG is GT Pro Model
19. CTG Heat Input, MMBtu/h (LHV), CTG Exhaust Flow, 10^3 lb/h, and CTG Exhaust Temperature, F provided by MPSA.

Alamitos Energy Center
Table 5.1B.3
Summary of Start-Up and Shutdown Emission Estimates
December 2013

Engineering Estimate Version (3/8/2013)
3x1 MHI 501DA Combustion Turbine

	NOx	CO	VOC	NOx [a, b]	CO [a, b]	VOC [a, b]				Steady State [b]		
										NOx	CO	VOC
Start Up	lbs/event	lbs/event	lbs/event	lbs/hr	lbs/hr	lbs/hr	min/event	events/day	events/month	lbs/min	lbs/min	lbs/min
Cold (per turbine)	28.7	116	27.9	25.5	113.9	27.3	90	1	5	NA	NA	NA
Warm (per turbine)	16.6	46.0	21.0	21.5	49.0	21.9	32.5	2	25	0.18	0.11	0.031
Hot (per turbine)	16.6	33.6	20.4	21.5	36.6	21.3	32.5	0	60	0.18	0.11	0.031
Shutdown (per turbine)	9.0	45.3	31.0	18.0	50.8	32.6	9.5	3	90	0.18	0.11	0.031

[a] The hourly NOx, CO, and VOC emission rates for a cold start are estimated assuming the SCR and catalyst are functional within 60 minutes. Therefore, the equation is conservatively estimated as lbs/hr = lbs/event - lowest hourly emission rate * 30 minutes / 60 minutes for a 90 minute startup.
[b] The NOx, CO, and VOC emissions for the balance of the hour for a warm start, hot start, and shutdown event were based on the hourly emission rate for 100 percent load, at 28 °F.

PEC Engineering Data

AEC Cold Startup Emissions 3.8.2013

Total CO Emissions per GT During Cold Startup (0 to 90 minutes) (lbs)	115.9
Total VOC Emissions per GT During Cold Startup (0 to 90 minutes) (lbs)	27.9
Total NOx Emissions per GT During Cold Startup (0 to 90 minutes) (lbs)	28.7

1. GT Startup emissions taken from Mitsubishi Power Systems Americas (MPSA) provided Combined Cycle Startup Emissions table plus a 10% increment to account for temperature variations of startup.
2. It is assumed that no NOx emission reductions occur from 0 to 12.5 minutes. NOx reduction during the interval from 12.5 minutes to 90 minutes is estimated to be 71%.

a. The GT 100% CO and VOC emission compliance rates were applied from 9 minutes onwards.
b. Catalyst temperature is assumed to be 330 °F at the time of startup. The HRSG heat up rate is assumed to be 15 °F per minute.

AEC Warm Startup Emissions 3.8.2013

Total CO Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	46
Total VOC Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	21
Total NOx Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	16.6

1. GT Startup emissions taken from Mitsubishi Power Systems Americas (MPSA) provided Combined Cycle Startup Emissions table plus a 10% increment to account for temperature variations of startup.
2. It is assumed that no NOx emission reductions occur from 0 to 12.5 minutes. NOx reduction during the interval from 12.5 minutes to 32.5 minutes is estimated to be 68.5%.
3. CO reduction percentage during GT startup is assumed to be 76%. VOC reduction percentage during GT startup is assumed to be 28%.

a. The GT 100% CO and VOC emission compliance rates were applied from 9 minutes onwards.
b. Catalyst temperature is assumed to be 417 °F at the time of startup. The HRSG heat up rate is assumed to be 15 °F per minute.

AEC Hot Startup Emissions 3.8.2013

Total CO Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	33.6
Total VOC Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	20.4
Total NOx Emissions per GT to Emissions Compliance (0 to 32.5 minutes) (lbs)	16.6

1. GT Startup emissions taken from Mitsubishi Power Systems Americas (MPSA) provided Combined Cycle Startup Emissions table plus a 10% increment to account for temperature variations of startup.
2. It is assumed that no NOx emission reductions occur from 0 to 12.5 minutes. NOx reduction during the interval from 12.5 minutes to 32.5 minutes is estimated to be 68.5%.
3. CO reduction percentage during GT startup is assumed to be 80%. VOC reduction percentage during GT startup is assumed to be 30%.

a. The GT 100% CO and VOC emission compliance rates were applied from 9 minutes onwards.

b. Catalyst temperature is assumed to be 500 °F at the time of startup.

AEC Shutdown Emissions 3.8.2013

Total CO Emissions During GT Shutdown (lbs)	45.3
Total VOC Emissions During GT Shutdown (lbs)	31
Total NOx Emissions During GT Sshutdown (lbs)	9

1. GT Startup emissions taken from Mitsubishi Power Systems Americas (MPSA) provided Combined Cycle Startup Emissions table plus a 10% increment to account for temperature variations of startup.
2. Estimated NOx emission assume a 30% catalyst reduction during shutdown.
3. CO reduction is assumed to be 80% during the shutdown. VOC reduction is assumed to be 30% during the shutdown.

Alamitos Energy Center
Table 5.1B.4
Summary of Turbine Operation Emissions – Criteria Pollutants
December 2013

Scenario	2	3	4	5	7	8	9	10	12	13	14	15
Ambient Temperature (°F)	28	28	28	28	65.3	65.3	65.3	65.3	107	107	107	107
Relative Humidity (%)	76.33	76.33	76.33	76.33	86.8	86.8	86.8	86.8	10.73	10.73	10.73	10.73
Load (%)	100	90	80	70	100	90	80	70	100	90	80	70
Duct Burner Firing?	no	no	no	no	no	no	no	no	no	no	no	no
Fuel Input (MMBtu/hr HHV)	1,509	1,368	1,226	1,101	1,377	1,258	1,134	1,025	1,214	1,120	1,020	926
NO_X Emissions												
per turbine (lb/hr) [a]	10.68	9.60	8.59	7.71	9.76	8.83	7.95	7.18	8.90	7.84	7.14	6.49
per turbine (lb/day) [b]	313	290	269	250	293	274	255	239	275	253	238	225
per turbine (lb/month) [c]	9,587	8,858	8,176	7,577	8,962	8,335	7,740	7,218	8,380	7,666	7,192	6,755
all turbines (lb/month) [c]	115,043	106,300	98,112	90,919	107,544	100,017	92,875	86,614	100,555	91,990	86,309	81,061
per turbine (lb/year) [d]	-	-	-	-	45,306	42,226	39,304	36,743	-	-	-	-
per turbine (ton/year) [d]	-	-	-	-	22.7	21.1	19.7	18.4	-	-	-	-
all turbines (ton/year) [d]	-	-	-	-	271.8	253.4	235.8	220.5	-	-	-	-
CO Emissions												
per turbine (lb/hr) [a]	6.50	5.85	5.23	4.69	5.94	5.37	4.84	4.37	5.41	4.77	4.35	3.95
per turbine (lb/day) [b]	480	466	453	442	468	456	445	435	457	444	435	427
per turbine (lb/month) [c]	12,219	11,775	11,360	10,995	11,838	11,457	11,094	10,777	11,484	11,049	10,761	10,495
all turbines (lb/month) [c]	146,625	141,303	136,319	131,941	142,061	137,479	133,131	129,321	137,806	132,593	129,135	125,940
per turbine (lb/year) [d]	-	-	-	-	61,968	60,094	58,315	56,756	-	-	-	-
per turbine (ton/year) [d]	-	-	-	-	31.0	30.0	29.2	28.4	-	-	-	-
all turbines (ton/year) [d]	-	-	-	-	371.8	360.6	349.9	340.5	-	-	-	-
VOC Emissions												
per turbine (lb/hr) [a]	1.86	1.67	1.49	1.34	1.70	1.54	1.38	1.25	1.55	1.36	1.24	1.13
per turbine (lb/day) [b]	202	198	194	191	198	195	192	189	195	191	189	187
per turbine (lb/month) [c]	5,935	5,808	5,689	5,585	5,826	5,717	5,613	5,523	5,725	5,600	5,518	5,442
all turbines (lb/month) [c]	71,215	69,694	68,270	67,019	69,911	68,602	67,360	66,271	68,695	67,206	66,218	65,305
per turbine (lb/year) [d]	-	-	-	-	31,301	30,766	30,258	29,812	-	-	-	-
per turbine (ton/year) [d]	-	-	-	-	15.7	15.4	15.1	14.9	-	-	-	-
all turbines (ton/year) [d]	-	-	-	-	187.8	184.6	181.5	178.9	-	-	-	-
SO_2 Emissions [e, f]												
per turbine (lb/hr) [a]	3.09	2.80	2.51	2.26	2.82	2.58	2.32	2.10	2.49	2.29	2.09	1.90
per turbine (lb/day) [b]	74	67	60	54	68	62	56	50	60	55	50	46
per turbine (lb/month) [c]	2,299	2,084	1,868	1,678	2,098	1,917	1,728	1,562	1,850	1,707	1,553	1,411
all turbines (lb/month) [c]	27,584	25,012	22,411	20,135	25,173	23,001	20,741	18,739	22,198	20,479	18,642	16,931
per turbine (lb/year) [d]	-	-	-	-	3,464	3,165	2,854	2,579	-	-	-	-
per turbine (ton/year) [d]	-	-	-	-	1.73	1.58	1.43	1.29	-	-	-	-
all turbines (ton/year) [d]	-	-	-	-	20.8	19.0	17.1	15.5	-	-	-	-
PM Emissions [f]												
per turbine (lb/hr) [a]	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
per turbine (lb/day) [b]	108	108	108	108	108	108	108	108	108	108	108	108
per turbine (lb/month) [c]	3,348	3,348	3,348	3,348	3,348	3,348	3,348	3,348	3,348	3,348	3,348	3,348
all turbines (lb/month) [c]	40,176	40,176	40,176	40,176	40,176	40,176	40,176	40,176	40,176	40,176	40,176	40,176
per turbine (lb/year) [d]	-	-	-	-	16,586	16,586	16,586	16,586	-	-	-	-
per turbine (ton/year) [d]	-	-	-	-	8.3	8.3	8.3	8.3	-	-	-	-
all turbines (ton/year) [d]	-	-	-	-	99.5	99.5	99.5	99.5	-	-	-	-

Notes:

[a] The hourly emission rates are for the turbine in normal operation only (i.e., excludes startup or shutdown emissions).

[b] The daily emission rates include the number of daily starts and stops on the SU-SD Emissions tab (1 cold, 2 warm, and 3 shutdown per day).

[c] The monthly emission rates assume 31 days and include the number of monthly starts and stops on the SU-SD Emissions tab (5 cold, 25 warm, 60 hots, and 90 shutdown per month).

[d] The annual emission rate assumes 3,320 hours of operation and the balance of startup/shutdowns.

[e] Hourly, daily, and monthly SO2 emissions are based on a fuel sulfur content of 0.75 gr/100 scf. Annual SO2 emissions are based on a fuel sulfur content of 0.25 gr/100 scf.

[f] SO2 and PM emissions are based on steady state operation and do not include startup or shutdown as emissions of SO2 and PM are expected to be lower during startup and shutdown.

Alamitos Energy Center
Table 5.1B.5
Summary of Turbine Operation Emissions – Air Toxics
December 2013

Assumptions:

Maximum Heat Input Case:	Base load operation	
Total Operations (per turbine -includes startup and shutdown hours):	3,686	hr/yr
Gas Heat Content:	1,047	MMBtu/MMscf
Maximum Hourly Heat Input (per turbine):	1,509	MMBtu/Hr (HHV)
Average Annual Heat Input (per turbine):	1,377	MMBtu/Hr (HHV)
Number of Turbines:	12	

Proposed Project	Emission Factor		Emissions (per Turbine)			Emissions (Facility Total)		
Compound	**(lbs/MMcf) [a]**	**(lbs/MMBtu) [a]**	**lbs/hr**	**lbs/yr**	**tpy**	**lbs/hr**	**lbs/yr**	**tpy**
Ammonia [b]	5 ppm	-	13.3	33,224	16.6	159.5	398,684	199.3
Acetaldehyde	0.042	4.00E-05	0.060	203	0.101	0.7	2,436	1.22
Acrolein	0.0067	6.40E-06	0.010	32.5	0.016	0.1	390	0.19
Benzene	0.013	1.20E-05	0.018	60.9	0.030	0.2	731	0.37
1,3-Butadiene	0.00045	4.30E-07	0.0006	2.18	0.0011	0.0	26	0.013
Ethylbenzene	0.034	3.20E-05	0.048	162	0.081	0.6	1,949	0.97
Formaldehyde [c]	0.377	3.60E-04	0.5	1827	0.91	6.5	21,921	11.0
Hexane	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	0.0014	1.30E-06	0.0020	6.60	0.003	0.0	79	0.040
PAHs	0.0023	2.20E-06	0.0033	11.2	0.006	0.0	134	0.067
Propylene (propene)	NA	NA	NA	NA	NA	NA	NA	NA
Propylene Oxide	0.030	2.90E-05	0.044	147	0.074	0.5	1,766	0.88
Toluene	0.136	1.30E-04	0.20	660	0.330	2.4	7,916	3.96
Xylene	0.067	6.40E-05	0.097	325	0.162	1.2	3,897	1.95
TOTAL HAPs				**3,437**	**1.72**		**41,244**	**20.6**
TOTAL TACs				**1,890**	**0.94**		**22,678**	**11.34**

Notes:

[a] Obtained from AP-42, Table 3.1-3 Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines, with the exception of formaldehyde. (lb/MMCF =

[b] Based on the operating exhaust NH_3 limit of 5 ppmv @ 15% O_2 and a F-factor of 8710.

[c] Emission factor was modified to reflect SCAQMD formaldehyde emission factor of $3.6*10^{-4}$.

Alamitos Energy Center
Table 5.1B.6
Facility Wide Natural Gas Fuel Use
December 2013

Hours/Year/Turbine	3,686

Number of Units

Units per Block	3
Number of Blocks	4

Max Fuel Use	Turbine (per unit)	Total
Max Fuel Use Per Hour (MMBtu)	1,509	18,103
Max Fuel Use Per Day (MMBtu)	36,207	434,480
Annual Average Fuel Use Per Year (MMBtu)	5,074,335	60,892,017

Maximum daily fuel use is based on the maximum rated heat capacity multiplied by 24 hours/day.

Alamitos Energy Center
Table 5.1B.7
Summary of Turbine Operation Emissions – Greenhouse Gas Pollutants
December 2013

Facility Heat Input

AEC Turbine Natural Gas Use - Facility (PTE)	60,892,017	MMBtu/yr
AES Alamitos Natural Gas Use - Facility (Past Actuals)	23,294,758	MMBtu/yr

GHG Netting

	AEC PTE Emissions (metric tons/year)	AES Alamitos Past Actuals (metric tons/year)	Difference (metric tons/year)
CO2	3,230,930	1,236,020	1,994,911
CH4	55	21.0	34
N2O	170.5	21.0	149.5
CO2 Equivalent (Total)	3,284,936	1,242,959	2,041,976

GHG Emission Factors

	Combined Cycle Emission Factor (kg/MMBtu)	Boiler Emission Factor (kg/MMBtu)
CO2	53.06	53.06
CH4	0.0009	0.0009
N2O	0.0028	0.0009

CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1.
CH4 and N2O emission factors from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Global Warming Potential

CH4	21
N2O	310

Reference: Intergovernmental Panel on Climate Change, Fourth Assessment Report (IPCC, 2007)

Alamitos Energy Center
Table 5.1B.8
Oil-Water Separator Calculations
December 2013

1. Maximum volume throughput of water (an instantaneous gpm):
This value will be driven by the tank rated flow rate. At this stage we estimate that the most conservative rated flow rate will be 300 gpm.
It is estimated that there will be one 3000 gallon capacity, 300 gpm rated above ground oil/water separator tank for AEC Blocks 1 and 2.
It is estimated that there will be one 3000 gallon capacity, 300 gpm rated above ground oil/water separator tank for AEC Block 3.
It is estimated that there will be one 3000 gallon capacity, 300 gpm rated above ground oil/water separator tank for AEC Block 4.
2. Total expected annual volume (in gallons)
For AEC the estimated annual volume is: 450,000 gallons for all 4 blocks.

Area for One CCGT Block at AEC	**L** (ft)	**W** (ft)	**Count**	**Total Area** (ft^2)	
Lube Oil Skids	50	15	3	2,250	
GSU Transformers	35	22	4	3,080	
Aux Transformers	10	10	2	200	
Fin Fan Cooler	86	48	1	4,128	
Gas Conditioning Skid	71	34	1	2,414	
GT Fuel Gas Skid	20	12	3	720	
ACC Skids	20	20	1	400	
Ammonia Tank	18	38	1	684	
Sum of Area per Block				**13,876**	
One 10 Year Storm, 24 Hour Rain Event				3,963	ft^3
Total Gallons of Rain Event				29,643	gallons
Amnt. of time it will take Block 3 300 gpm system to process Event				99	minutes
Amnt. of time it will take Block 4 300 gpm system to process Event				99	minutes
Amnt. of time it will take Blocks 1&2 300 gpm system to process Event				198	minutes
Tank Capacity				3000	Gallons
Expected Annual Volume of Water Processed by Block 3 Tank				14,963	ft^3
Expected Annual Volume of Water Processed by Block 4 Tank				14,963	ft^3
Expected Annual Volume of Water Processed by Blocks 1&2 Tank				29,926	ft^3
Expected Annual Volume of Water Processed by All Tanks				59,852	ft^3
				447,692	gallons

Notes:
Source: 'AEC Oil-Water Separator Tank and Sump Estimate.pdf' provided by H. Larios/PEC on 7/9/13.

1. It is assumed that the components listed will have their own containment dikes with normally shut drains. Dike contents will be pumped to an above ground separator.
2. Mechanical components located within enclosures are not counted because the oil drains on these enclosures would normally be shut. AEC is not expected to have any enclosures.
3. Alamitos 10-year, 24 hour storm event ~ 3.43 inches
Source: Appendix B and Table 5.3.1 in *Los Angeles County Hydrology Manual* (LA County, 2006)
4. Long Beach Yearly Average Precipitation 12.94 inches (30 Year Average)
Source: National Climatic Data Center: http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html

VOC Emission Calculations

Annual				Monthly Maximum [b]		
Actual Annual Volume (gal/yr)	Rounded Annual Volume (gal/yr)	VOC Emission Factor (lb VOC/gal) [a]	Annual VOC Emissions (lbs/yr)	Max Monthly Volume (gal/month)	Monthly VOC Emissions (lbs/month)	Daily VOC Emissions (lbs/day) [c]
447,692	450,000	0.0002	90.00	112,500	22.50	0.75

Notes:
[a] Derived from Table 5.1-2 of EPA's *AP-42* (1/95). VOC Emission Factor = 0.2 lb/1000 gallons.
[b] Assumption: 25% precipitation falls in a single month.
[c] Daily emissions are based on a 30-day average month.

Alamitos Energy Center
Table 5.1B.9
SF_6 Calculations
December 2013

Project Data [a]		Calculation Factors		Annual Emissions		
AEC Electric Breakers [a]	Total SF_6 (lbs)	Annual Leak Rate [b]	SF_6 GWP [c]	Annual SF_6 Emissions (lbs/year)	Annual SF_6 Emissions (metric tons/year)	CO_2e (metric tons/year)
20	1,248	0.1%	23,900	1.248	0.0006	13.5

[a] Project data provided by H. Larios/PEC on 7/11/13. Electrical breakers include 16 Generator Circuit Breakers and four 230-kilvolt Transmission Breakers.

[b] Assumed based on *SF_6 Leak Rates from High Voltage Circuit Breakers - U.S. EPA Investigates Potential Greenhouse Gas Emission Sources* , a paper prepared by J. Blackman of the EPA, M. Averyt of ICF Consulting, and Z. Taylor of ICF Consulting.

[c] GWP = Global Warming Potential; Value from *Climate Change 2007, The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2007).

Alamitos Energy Center
Table 5.1B.10
Summary of Vehicle Emissions Associated with Project Operation – Criteria Pollutants and GHG
December 2013

Criteria Pollutant Emissions for Operation

Emission Source	Number [a, b]	Miles per Roundtrip [c]	Criteria Pollutant Emissions (lbs/year) [d, e]					
			CO	VOC	SOx	NOx	PM_{10}	$PM_{2.5}$
Operation Worker Commute	51	33.2	1,571.01	27.51	5.53	152.80	63.31	26.35
Material Deliveries	32	13.8	12.56	2.71	0.19	55.56	1.91	1.13
		Total (lbs/year)	**1,583.56**	**30.22**	**5.72**	**208.36**	**65.22**	**27.49**

Notes:

[a] Number of operational staff (daily) based on engineering estimates (presented in Table 2.4-1, Operating Employees, of the AFC Project Description Section).

[b] Number of material deliveries (monthly) based on engineering estimates from H. Larios/PEC in "RE AEC Operational Truck Deliveries.msg" on 7/18/13.

[c] Roundtrip miles/day taken as the CalEEMod defaults for the South Coast Air Basin from Table 4.2, C-W for Operation Worker Commute and C-NW for Material Deliveries, of Appendix D of the *CalEEMod User's Guide* (ENVIRON, 2013).

[d] Calculations assume that workers would be onsite: 365 days/year

[e] Calculations assume that material deliveries would occur: 12 months/year

Greenhouse Gas Emissions for Operation

Emission Source	Number [a, b]	Miles per Roundtrip [c]	GHG Emissions (metric tons/year) [d, e]			CO_2-Equivalent Emissions (metric tons/year) [f]
			CO_2	N_2O	CH_4	
Operation Worker Commute	51	33.2	264.89	0.002225	0.010692	265.81
Material Deliveries	32	13.8	9.68	0.000025	0.000027	9.69
		Total (metric tons/year)	**274.57**	**0.002250**	**0.010719**	**275.50**

Notes:

[a] Number of operational staff (daily) based on engineering estimates (presented in Table 2.4-1, Operating Employees, of the AFC Project Description Section)

[b] Number of material deliveries (monthly) based on engineering estimates from H. Larios/PEC in "RE AEC Operational Truck Deliveries.msg" on 7/18/13.

[c] Roundtrip miles/day taken as the CalEEMod defaults for the South Coast Air Basin from Table 4.2, C-W for Operation Worker Commute and C-NW for Material Deliveries, of Appendix D of the *CalEEMod User's Guide* (ENVIRON, 2013).

[d] Calculations assume that workers would be onsite: 365 days/year

[e] Calculations assume that material deliveries would occur: 12 months/year

[f] CO_2-equivalent emissions based on the following global warming potentials from the *Climate Change 2007: The Physical Science Basis - Contribution of Working Group I to the Fourth Assessment Report of the IPCC* (IPCC, 2007):

CH_4: 21
N_2O: 310

Alamitos Energy Center
Table 5.1B.11
Equations Used to Calculate Criteria Pollutant and GHG Emissions
December 2013

Emission Source	Pollutant(s)	Equation	Variables
Operation Worker Commute Vehicle Exhaust	CO, VOC, NOx, SOx, PM_{10}, and $PM_{2.5}$	E = N * VMT * D * EF / 453.6	E = Emissions (lbs/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year EF = EMFAC2011 emission factor (g/mile) 453.6 = Conversion from g to lbs
Material Deliveries Vehicle Exhaust	CO, VOC, NOx, SOx, PM_{10}, and $PM_{2.5}$	E = N * VMT * M * EF / 453.6	E = Emissions (lbs/year) N = Number of vehicles per month VMT = Vehicle miles traveled per roundtrip (miles/trip). M = Number of operational months per year EF = EMFAC2011 emission factor (g/mile) 453.6 = Conversion from g to lbs
Operation Worker Commute Vehicle Exhaust	CO_2	E = N * VMT * D / FE * EF * 0.001	E = Emissions (metric tons/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year FE = Fuel economy (mpg) EF = Emission factor (kg/gallon) 0.001 = Conversion from kg to metric tons
	CH_4 and N_2O	E = N * VMT * D * EF / 1,000 * 0.001	E = Emissions (metric tons/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year EF = Emission factor g/mile 1,000 = Conversion from g to kg 0.001 = Conversion from kg to metric tons
Material Deliveries Vehicle Exhaust	CO_2	E = N * VMT * M / FE * EF * 0.001	E = Emissions (metric tons/year) N = Number of vehicles per month VMT = Vehicle miles traveled per roundtrip (miles/trip) M = Number of operational months per year FE = Fuel economy (mpg) EF = Emission factor (kg/gallon) 0.001 = Conversion from kg to metric tons
	CH_4 and N_2O	E = N * VMT * M * EF / 1,000 * 0.001	E = Emissions (metric tons/year) N = Number of vehicles per month VMT = Vehicle miles traveled per roundtrip (miles/trip) M = Number of operational months per year EF = Emission factor g/mile 1,000 = Conversion from g to kg 0.001 = Conversion from kg to metric tons

Alamitos Energy Center
Table 5.1B.12
Vehicle Emission Factors for Operation - Criteria Pollutants
December 2013

Vehicle Emission Factors for Operation

Vehicle Type	Vehicle Class [a]	Exhaust Emission Factors (g/mile) [b, c]						Fuel Economy (mpg) 2019 [d]
		CO 2019	VOC 2019	SO_X 2019	NO_X 2019	PM_{10} 2019 [e]	$PM_{2.5}$ 2019 [e]	
Operation Worker Commute	Light-duty Auto/Truck	1.153	0.020	0.004	0.112	0.046	0.019	20.485
Material Deliveries	Heavy-duty Diesel	1.075	0.232	0.016	4.756	0.163	0.097	5.589

Notes:

[a] The vehicle classes are represented as follows:

Light-duty Auto/Truck: 50% LDA, GAS; 25% LDT1, GAS; and 25% LDT2, GAS values, per Section 4.5 of Appendix A of the *CalEEMod User's Guide* (ENVIRON, 2013

Heavy-duty Diesel: Assumed to be 100% HHDT, DSL values, as confirmed in Section 4.5 of Appendix A of the *CalEEMod User's Guide* (ENVIRON, 2013).

[b] Blocks 1 & 2 are projected to begin commercial operation in Q2 2019; Block 3 in Q3 2022; and Block 4 in Q4 2025 based on engineering estimates (presented in Table 2.2-1, AEC Project Schedule Major Milestones, of the AFC Project Description Section); therefore, 2019 emission factors were conservatively used.

[c] Exhaust emission factors from EMFAC2011-PL for the South Coast Air Basin, calendar year 2019. EMFAC2007 Vehicle Categories were used. A speed of 40 mph was assumed for offsite vehicles, which is consistent with the CalEEMod defaults.

[d] Fuel economy from EMFAC2011 Web Based Emissions Database for the South Coast Air Basin, calendar year 2019, using EMFAC2007 Vehicle Categories. An aggregated speed and model year were used for onsite and offsite vehicles. Value estimated by dividing the VMT (miles/day) by the Fuel (gal/day).

[e] Because of the small number of vehicles, it is assumed that the fugitive dust emissions from paved roads are negligible. As such, paved road emission factors are not included in these values.

Alamitos Energy Center
Table 5.1B.13
Vehicle Emission Factors for Operation - GHG
December 2013

Vehicle Emission Factors for Operation

Fuel / Category Type	Emission Factor	Emission Factor Units	Emission Factor Source
CO_2 Emission Factors			
Gasoline	8.78	kg CO_2/gallon	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.1, March 2013 as updated through April 2013.
Diesel	10.21	kg CO_2/gallon	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.1, March 2013 as updated through April 2013.
N_2O Emission Factors			
Gasoline Passenger Car Model Year 2010 [a]	0.0036	g N_2O/mile	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.5, March 2013 as updated through April 2013.
Diesel Heavy-duty Truck Model Year 1960 - 2010 [a]	0.0048	g N_2O/mile	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.5, March 2013 as updated through April 2013.
CH_4 Emission Factors			
Gasoline Passenger Car Model Year 2010 [a]	0.0173	g CH_4/mile	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.5, March 2013 as updated through April 2013.
Diesel Heavy-duty Truck Model Year 1960 - 2010 [a]	0.0051	g CH_4/mile	The Climate Registry General Reporting Protocol, Version 2.0, Table 13.5, March 2013 as updated through April 2013.

Notes:
[a] Model Year 2010 was the most recent year of emission factors available. As a result, it was assumed representative of vehicles used for this project.

Alamitos Energy Center
Table 5.1B.14a
Summary of Unit 1 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 1 VOC	Unit 1 CO	Unit 1 NOx	Unit 1 SOx	Unit 1 PM10	Unit 1 CO2	Unit 1 CH4	Unit 1 N2O	Unit 1 VOC	Unit 1 CO	Unit 1 NOx	Unit 1 SOx	Unit 1 PM10	Unit 1 CO2	Unit 1 CH4	Unit 1 N2O
2008	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	5	53,878	55,131	70.04	1,831.26	345.15	32.33	113.14	2,925.26	0.050	0.050								
2008	6	99,698	102,390	129.61	3,388.62	422.71	59.82	209.37	5,432.82	0.092	0.092								
2008	7	29,045	29,800	37.76	987.21	160.76	17.43	61.00	1,581.21	0.027	0.027								
2008	8	71,777	73,571	93.31	2,439.61	489.17	43.07	150.73	3,903.70	0.066	0.066								
2008	9	158,668	162,635	206.27	5,392.95	912.39	95.20	333.20	8,629.42	0.146	0.146								
2008	10	78,391	80,351	101.91	2,664.42	306.33	47.03	164.62	4,263.45	0.072	0.072								
2008	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	1	8,034	7,815	10.44	2,221.07	86.37	4.82	16.87	414.66	0.007	0.007								
2009	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	136,619	13,987	177.60	37,770.94	734.40	81.97	286.90	742.17	0.013	0.013								
2009	5	13,505	13,843	17.56	3,733.85	50.34	8.10	28.36	734.51	0.012	0.012								
2009	6	18,097	18,585	23.53	5,003.16	87.24	10.86	38.00	986.13	0.017	0.017								
2009	7	151,564	155,505	197.03	41,902.99	885.11	90.94	318.29	8,251.10	0.140	0.140								
2009	8	191,866	196,662	249.43	53,045.13	1,231.42	115.12	402.92	10,434.91	0.177	0.177								
2009	9	349,922	357,970	454.90	96,742.99	1,792.88	209.95	734.84	18,993.91	0.322	0.322								
2009	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	11	60,477	62,050	78.62	16,720.08	184.51	36.29	127.00	3,292.37	0.056	0.056								
2009	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.92	136.92	3.84	0.43	1.49	70,585.62	1.20	1.20
2010	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.92	136.92	3.84	0.43	1.49	70,585.62	1.20	1.20
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.92	136.92	3.84	0.43	1.49	70,585.62	1.20	1.20
2010	3	128,572	131,272	257.14	33,145.86	1,189.12	77.14	131.27	6,965.29	0.118	0.118	1.05	153.50	4.44	0.47	1.56	77,550.91	1.32	1.32
2010	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.05	153.50	4.44	0.47	1.56	77,550.91	1.32	1.32
2010	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.02	152.58	4.27	0.45	1.50	74,625.65	1.27	1.27
2010	6	0	0	0.00	0.00	1.10	0.00	0.00	0.00	0.000	0.000	0.95	150.89	4.06	0.42	1.40	69,192.83	1.17	1.17
2010	7	46,237	47,624	92.47	11,919.90	308.37	27.74	47.62	2,526.93	0.043	0.043	0.98	156.35	4.13	0.42	1.39	70,138.55	1.19	1.19
2010	8	43,541	44,716	87.08	11,224.87	355.54	26.12	44.72	2,372.63	0.040	0.040	0.98	160.74	4.06	0.42	1.34	68,607.48	1.16	1.16
2010	9	116,718	118,935	233.44	30,089.90	794.29	70.03	118.94	6,310.69	0.107	0.107	0.99	173.09	4.00	0.40	1.23	66,288.75	1.12	1.12
2010	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.94	171.76	3.85	0.38	1.15	62,025.30	1.05	1.05
2010	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.94	171.76	3.85	0.38	1.15	62,025.30	1.05	1.05
2010	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.94	171.76	3.85	0.38	1.15	62,025.30	1.05	1.05
2011	1	215,801	210,537	431.60	32,909.65	2,344.18	129.48	210.54	11,171.09	0.189	0.189	1.15	187.10	4.98	0.44	1.24	72,781.74	1.23	1.23
2011	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.15	187.10	4.98	0.44	1.24	72,781.74	1.23	1.23
2011	3	16,848	16,437	33.70	2,569.32	105.07	10.11	16.44	872.15	0.015	0.015	1.17	188.39	5.03	0.45	1.25	73,653.89	1.25	1.25
2011	4	9,457	9,226	18.91	1,442.14	88.11	5.67	9.23	489.53	0.008	0.008	1.09	170.22	4.71	0.41	1.11	73,401.25	1.25	1.25
2011	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.08	168.36	4.68	0.40	1.10	72,666.73	1.23	1.23
2011	6	27,555	26,883	55.11	4,202.08	184.55	16.53	26.88	1,426.39	0.024	0.024	1.09	167.96	4.73	0.41	1.09	73,106.99	1.24	1.24
2011	7	122,903	119,905	245.81	18,742.65	736.17	73.74	119.91	6,362.16	0.108	0.108	1.12	156.38	4.66	0.40	1.00	71,218.06	1.21	1.21
2011	8	212,360	207,181	424.72	32,384.95	1,470.22	127.42	207.18	10,993.01	0.186	0.186	1.21	146.05	4.78	0.41	0.90	71,776.16	1.22	1.22
2011	9	128,663	125,525	257.33	19,621.06	1,087.19	77.20	125.52	6,660.33	0.113	0.113	1.11	107.49	4.42	0.34	0.59	59,442.58	1.01	1.01
2011	10	59,875	61,122	119.75	9,130.89	487.93	35.92	61.12	3,243.13	0.055	0.055	1.17	112.05	4.67	0.36	0.62	62,685.72	1.06	1.06
2011	11	39,181	39,997	78.36	5,975.10	376.67	23.51	40.00	2,122.25	0.036	0.036	1.17	106.68	4.76	0.35	0.58	61,515.60	1.04	1.04
2011	12	45,159	45,706	90.32	6,886.75	312.13	27.10	45.71	2,425.16	0.041	0.041	1.21	110.12	4.92	0.36	0.60	63,940.75	1.08	1.08
2012	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.21	110.12	4.92	0.36	0.60	63,940.75	1.08	1.08
2012	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.21	110.12	4.92	0.36	0.60	63,940.75	1.08	1.08
2012	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.08	93.55	4.33	0.33	0.54	56,975.46	0.97	0.97
2012	4	251,077	246,638	502.15	41,641.20	1,387.05	150.65	258.61	13,086.61	0.222	0.222	1.34	114.37	5.02	0.40	0.67	70,062.07	1.19	1.19
2012	5	38,060	38,745	76.12	6,312.28	214.85	22.84	39.20	2,055.82	0.035	0.035	1.37	117.53	5.13	0.41	0.69	72,117.90	1.22	1.22
2012	6	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.37	117.53	5.13	0.41	0.69	72,117.90	1.22	1.22
2012	7	11,457	11,618	22.91	1,900.17	86.34	6.87	11.80	616.43	0.010	0.010	1.34	112.52	5.02	0.40	0.67	70,207.40	1.19	1.19
2012	8	164,697	168,156	329.39	27,315.06	981.15	98.82	169.64	8,922.36	0.151	0.151	1.46	120.56	5.33	0.44	0.73	76,757.12	1.30	1.30
2012	9	13,073	13,387	26.15	2,168.18	2,741.56	7.84	13.47	710.31	0.012	0.012	1.36	106.60	6.30	0.41	0.68	71,156.74	1.21	1.21
2012	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.36	106.60	6.30	0.41	0.68	71,156.74	1.21	1.21
2012	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.36	106.60	6.30	0.41	0.68	71,156.74	1.21	1.21
2012	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.36	106.60	6.30	0.41	0.68	71,156.74	1.21	1.21
										Max 24-Month Rolling		**1.46**	**188.39**	**6.30**	**0.47**	**1.56**	**77,550.91**	**1.32**	**1.32**

Notes:
Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.14b
Summary of Unit 2 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 2 VOC	Unit 2 CO	Unit 2 NOx	Unit 2 SOx	Unit 2 PM10	Unit 2 CO2	Unit 2 CH4	Unit 2 N2O	Unit 2 VOC	Unit 2 CO	Unit 2 NOx	Unit 2 SOx	Unit 2 PM10	Unit 2 CO2	Unit 2 CH4	Unit 2 N2O
2008	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	5	26,801	27,425	45.56	846.47	211.91	16.08	56.28	1,455.14	0.025	0.025								
2008	6	101,318	104,054	172.24	3,199.95	608.81	60.79	212.77	5,521.09	0.094	0.094								
2008	7	45,346	46,525	77.09	1,432.19	238.27	27.21	95.23	2,468.64	0.042	0.042								
2008	8	32,181	32,986	54.71	1,016.39	236.44	19.31	67.58	1,750.23	0.030	0.030								
2008	9	67,122	68,800	114.11	2,119.93	385.84	40.27	140.96	3,650.54	0.062	0.062								
2008	10	25,074	25,701	42.63	791.92	202.95	15.04	52.66	1,363.70	0.023	0.023								
2008	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	12	29,887	30,754	50.81	943.92	82.30	17.93	62.76	1,631.79	0.028	0.028								
2009	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	56,896	58,262	62.59	8,153.26	471.50	34.14	119.48	3,091.38	0.052	0.052								
2009	5	56,807	58,227	62.49	8,140.43	344.33	34.08	119.29	3,089.53	0.052	0.052								
2009	6	15,119	15,527	16.63	2,166.48	126.38	9.07	31.75	823.85	0.014	0.014								
2009	7	117,332	120,383	129.07	16,813.73	909.63	70.40	246.40	6,387.52	0.108	0.108								
2009	8	156,485	160,397	172.13	22,424.25	1,369.43	93.89	328.62	8,510.65	0.144	0.144								
2009	9	62,200	63,631	68.42	8,913.32	524.37	37.32	130.62	3,376.26	0.057	0.057								
2009	10	12,546	12,860	13.80	1,797.84	120.01	7.53	26.35	682.35	0.012	0.012								
2009	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	12	1,139	1,169	1.25	163.22	2.37	0.68	2.39	62.03	0.001	0.001	0.54	39.46	2.92	0.24	0.85	43,864.70	0.74	0.74
2010	1	19,012	18,824	20.91	908.77	202.25	11.41	28.24	998.80	0.017	0.017	0.55	39.92	3.02	0.25	0.86	44,863.50	0.76	0.76
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.55	39.92	3.02	0.25	0.86	44,863.50	0.76	0.76
2010	3	5,650	5,768	6.22	270.07	38.82	3.39	8.65	306.05	0.005	0.005	0.56	40.05	3.04	0.25	0.87	45,169.55	0.77	0.77
2010	4	49,422	50,558	54.36	2,362.37	913.18	29.65	75.84	2,682.61	0.046	0.046	0.58	41.23	3.49	0.26	0.90	47,852.16	0.81	0.81
2010	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.56	40.81	3.39	0.26	0.87	46,397.02	0.79	0.79
2010	6	72,467	74,351	79.71	3,463.92	612.01	43.48	111.53	3,945.06	0.067	0.067	0.51	40.94	3.39	0.25	0.82	44,820.99	0.76	0.76
2010	7	40,519	41,654	44.57	1,936.81	406.09	24.31	62.48	2,210.16	0.037	0.037	0.50	41.19	3.47	0.25	0.81	44,562.51	0.76	0.76
2010	8	36,420	37,403	40.06	1,740.88	362.13	21.85	56.10	1,984.60	0.034	0.034	0.49	41.56	3.54	0.25	0.80	44,796.89	0.76	0.76
2010	9	40,858	41,635	44.94	1,953.01	334.75	24.51	62.45	2,209.15	0.037	0.037	0.46	41.47	3.51	0.24	0.76	43,355.50	0.74	0.74
2010	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.43	41.08	3.41	0.23	0.74	41,991.80	0.71	0.71
2010	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.43	41.08	3.41	0.23	0.74	41,991.80	0.71	0.71
2010	12	0	0	0.00	0.00	148.72	0.00	0.00	0.00	0.000	0.000	0.41	40.60	3.44	0.22	0.71	40,360.01	0.68	0.68
2011	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.41	40.60	3.44	0.22	0.71	40,360.01	0.68	0.68
2011	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.41	40.60	3.44	0.22	0.71	40,360.01	0.68	0.68
2011	3	109,815	107,137	120.80	18,448.92	1,092.21	65.89	132.96	5,684.69	0.096	0.096	0.47	49.83	3.99	0.26	0.77	46,044.70	0.78	0.78
2011	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.44	45.75	3.75	0.24	0.71	42,953.32	0.73	0.73
2011	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.41	41.68	3.58	0.22	0.65	39,863.79	0.68	0.68
2011	6	69,844	68,141	76.83	11,733.86	494.34	41.91	84.56	3,615.56	0.061	0.061	0.44	46.47	3.77	0.24	0.68	42,655.50	0.72	0.72
2011	7	43,912	42,841	48.30	7,377.22	287.40	26.35	53.17	2,273.14	0.039	0.039	0.40	41.75	3.45	0.22	0.58	38,541.12	0.65	0.65
2011	8	107,768	105,139	118.54	18,104.96	604.30	64.66	130.48	5,578.68	0.095	0.095	0.37	39.59	3.07	0.20	0.48	35,609.15	0.60	0.60
2011	9	110,746	108,045	121.82	18,605.35	794.29	66.45	134.08	5,732.87	0.097	0.097	0.40	44.43	3.21	0.22	0.48	37,965.76	0.64	0.64
2011	10	280,298	286,138	308.33	47,090.13	1,669.86	168.18	355.10	15,182.46	0.258	0.258	0.54	67.08	3.98	0.30	0.65	52,465.87	0.89	0.89
2011	11	105,476	107,673	116.02	17,719.97	762.70	63.29	133.62	5,713.14	0.097	0.097	0.60	75.94	4.36	0.33	0.72	58,179.01	0.99	0.99
2011	12	182,387	184,596	200.63	30,641.02	1,120.55	109.43	229.08	9,794.66	0.166	0.166	0.70	91.18	4.92	0.38	0.83	67,911.64	1.15	1.15
2012	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.69	90.72	4.82	0.38	0.82	66,912.84	1.13	1.13
2012	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.69	90.72	4.82	0.38	0.82	66,912.84	1.13	1.13
2012	3	27,710	27,409	30.48	4,904.14	242.86	16.63	55.42	1,454.30	0.025	0.025	0.70	93.04	4.92	0.38	0.84	68,061.09	1.15	1.15
2012	4	357,663	351,339	393.43	63,299.13	2,257.48	214.60	715.33	18,642.02	0.316	0.316	0.87	123.51	5.59	0.48	1.16	84,020.51	1.43	1.43
2012	5	127,773	130,073	140.55	22,613.26	748.64	76.66	255.55	6,901.67	0.117	0.117	0.94	134.82	5.97	0.51	1.29	90,922.18	1.54	1.54
2012	6	107,766	109,814	118.54	19,072.43	939.20	64.66	215.53	5,826.71	0.099	0.099	0.96	142.62	6.13	0.52	1.34	92,803.82	1.57	1.57
2012	7	15,252	15,466	16.78	2,699.31	159.89	9.15	30.50	820.61	0.014	0.014	0.95	143.00	6.01	0.52	1.32	91,414.26	1.55	1.55
2012	8	217,398	221,963	239.14	38,475.08	1,378.29	130.44	434.80	11,777.37	0.200	0.200	1.05	161.37	6.52	0.57	1.51	101,207.03	1.72	1.72
2012	9	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.03	160.39	6.35	0.56	1.48	98,997.88	1.68	1.68
2012	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.03	160.39	6.35	0.56	1.48	98,997.88	1.68	1.68
2012	11	15,888	16,301	17.48	2,811.78	181.42	9.53	31.78	864.91	0.015	0.015	1.03	161.80	6.44	0.56	1.50	99,862.79	1.69	1.69
2012	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.03	161.80	6.37	0.56	1.50	99,862.79	1.69	1.69
										Max 24-Month Rolling		**1.05**	**161.80**	**6.52**	**0.57**	**1.51**	**101,207.03**	**1.72**	**1.72**

Notes:
Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.14c
Summary of Unit 3 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 3 VOC	Unit 3 CO	Unit 3 NOx	Unit 3 SOx	Unit 3 PM10	Unit 3 CO2	Unit 3 CH4	Unit 3 N2O	Unit 3 VOC	Unit 3 CO	Unit 3 NOx	Unit 3 SOx	Unit 3 PM10	Unit 3 CO2	Unit 3 CH4	Unit 3 N2O
2008	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	3	208,371	213,581	395.91	27,504.53	1,750.75	125.02	416.74	11,332.59	0.192	0.192								
2008	4	364,416	374,256	692.39	48,102.08	3,259.36	218.65	728.83	19,858.00	0.337	0.337								
2008	5	620,676	635,109	1,179.28	81,927.74	4,878.14	372.41	1,241.35	33,698.89	0.572	0.572								
2008	6	733,228	753,025	1,393.13	96,784.30	4,957.46	439.94	1,466.46	39,955.50	0.678	0.678								
2008	7	908,888	932,519	1,726.89	119,971.08	5,800.94	545.33	1,817.78	49,479.48	0.839	0.839								
2008	8	1,100,123	1,127,626	2,090.23	145,213.60	6,548.36	660.07	2,200.25	59,831.84	1.015	1.015								
2008	9	963,265	987,346	1,830.20	127,148.62	6,093.83	577.96	1,926.53	52,388.59	0.889	0.889								
2008	10	981,555	1,006,094	1,864.95	129,562.92	7,200.60	588.93	1,963.11	53,383.35	0.905	0.905								
2008	11	775,353	795,513	1,473.17	102,344.78	5,238.44	465.21	1,550.71	42,209.89	0.716	0.716								
2008	12	173,986	179,032	330.57	22,965.74	1,367.66	104.39	347.97	9,499.42	0.161	0.161								
2009	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	662,500	678,400	1,258.75	57,013.72	4,252.24	397.50	1,325.00	35,995.93	0.611	0.611								
2009	5	464,922	476,545	883.35	40,010.40	2,980.48	278.95	929.84	25,285.45	0.429	0.429								
2009	6	310,201	318,577	589.38	26,695.42	2,225.28	186.12	620.40	16,903.67	0.287	0.287								
2009	7	966,077	991,195	1,835.55	83,139.04	7,090.81	579.65	1,932.15	52,592.81	0.892	0.892								
2009	8	909,894	932,641	1,728.80	78,303.99	7,391.12	545.94	1,819.79	49,485.93	0.839	0.839								
2009	9	1,100,146	1,125,449	2,090.28	94,676.79	8,608.29	660.09	2,200.29	59,716.33	1.013	1.013								
2009	10	706,656	724,323	1,342.65	60,813.68	5,767.69	423.99	1,413.31	38,432.58	0.652	0.652								
2009	11	506,742	519,918	962.81	43,609.41	4,129.15	304.05	1,013.48	27,586.85	0.468	0.468								
2009	12	285,854	293,287	543.12	24,600.14	1,795.41	171.51	571.71	15,561.81	0.264	0.264	12.11	705.19	45.67	3.82	12.74	693,198.92	11.76	11.76
2010	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	12.11	705.19	45.67	3.82	12.74	693,198.92	11.76	11.76
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	12.11	705.19	45.67	3.82	12.74	693,198.92	11.76	11.76
2010	3	380,132	388,115	722.25	60,821.20	2,837.69	228.08	543.36	20,593.40	0.349	0.349	12.27	721.85	46.21	3.87	12.81	702,459.73	11.92	11.92
2010	4	305,866	312,901	581.15	48,938.59	2,829.68	183.52	438.06	16,602.53	0.282	0.282	12.21	722.27	46.00	3.86	12.66	699,204.26	11.86	11.86
2010	5	92,902	95,224	176.51	14,864.30	743.26	55.74	133.31	5,052.61	0.086	0.086	11.71	688.74	43.93	3.70	12.11	670,557.97	11.37	11.37
2010	6	489,331	502,054	929.73	78,293.01	4,051.60	293.60	702.88	26,638.98	0.452	0.452	11.48	679.49	43.48	3.63	11.72	657,241.45	11.15	11.15
2010	7	681,187	700,260	1,294.26	108,989.92	5,513.53	408.71	980.36	37,155.81	0.630	0.630	11.26	674.00	43.33	3.56	11.31	644,917.78	10.94	10.94
2010	8	349,565	359,003	664.17	55,930.42	2,711.60	209.74	502.60	19,048.72	0.323	0.323	10.55	629.36	41.41	3.33	10.46	604,134.66	10.25	10.25
2010	9	487,059	496,313	925.41	77,929.36	4,208.04	292.24	694.84	26,334.35	0.447	0.447	10.10	604.75	40.47	3.19	9.84	578,080.41	9.81	9.81
2010	10	290,107	297,360	551.20	46,417.19	2,143.10	174.06	416.30	15,777.93	0.268	0.268	9.44	563.18	37.94	2.98	9.07	540,474.99	9.17	9.17
2010	11	197,132	202,257	374.55	31,541.08	1,862.85	118.28	283.16	10,731.77	0.182	0.182	8.89	527.78	36.25	2.81	8.43	508,996.86	8.63	8.63
2010	12	10,797	10,894	20.51	1,727.49	111.73	6.48	15.25	578.03	0.010	0.010	8.74	517.16	35.63	2.76	8.27	500,075.48	8.48	8.48
2011	1	276,899	270,145	526.11	28,160.63	2,079.90	166.14	49.98	14,333.91	0.243	0.243	9.00	531.24	36.67	2.84	8.29	514,409.39	8.73	8.73
2011	2	817,900	797,951	1,554.01	83,180.39	4,662.07	490.74	147.62	42,339.27	0.718	0.718	9.78	572.83	39.00	3.09	8.37	556,748.66	9.44	9.44
2011	3	284,728	277,783	540.98	28,956.79	2,254.51	170.84	51.39	14,739.17	0.250	0.250	10.05	587.31	40.13	3.17	8.39	571,487.83	9.69	9.69
2011	4	552,997	539,509	1,050.69	56,239.77	3,635.21	331.80	99.81	28,626.35	0.486	0.486	9.94	586.92	39.82	3.14	7.78	564,118.25	9.57	9.57
2011	5	430,697	420,192	818.32	43,801.88	2,951.42	258.42	77.74	22,295.39	0.378	0.378	9.91	588.82	39.80	3.13	7.35	561,128.19	9.52	9.52
2011	6	505,035	492,717	959.57	51,362.10	3,823.37	303.02	91.15	26,143.59	0.443	0.443	10.10	601.15	40.60	3.19	7.09	570,368.11	9.67	9.67
2011	7	291,587	284,475	554.02	29,654.39	2,404.85	174.95	52.63	15,094.24	0.256	0.256	9.46	574.41	38.26	2.99	6.15	532,869.54	9.04	9.04
2011	8	374,919	365,774	712.35	38,129.25	3,419.24	224.95	67.67	19,407.99	0.329	0.329	8.95	554.32	36.27	2.83	5.27	502,791.61	8.53	8.53
2011	9	195,366	190,601	371.20	19,868.77	1,363.03	117.22	35.26	10,113.31	0.172	0.172	8.09	516.91	32.65	2.55	4.19	453,188.58	7.69	7.69
2011	10	68,826	70,260	130.77	6,999.58	530.94	41.30	13.00	3,727.97	0.063	0.063	7.48	490.01	30.03	2.36	3.49	418,483.98	7.10	7.10
2011	11	93,339	95,283	177.34	9,492.58	653.98	56.00	17.63	5,055.74	0.086	0.086	7.09	472.95	28.29	2.24	2.99	395,952.87	6.72	6.72
2011	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	6.82	460.65	27.40	2.15	2.71	380,391.06	6.45	6.45
2012	1	20,137	19,820	38.26	0.00	132.78	12.08	36.25	1,051.66	0.018	0.018	6.84	460.65	27.46	2.16	2.73	381,442.72	6.47	6.47
2012	2	149,625	147,269	284.29	0.00	1,083.37	89.78	269.33	7,814.10	0.133	0.133	6.98	460.65	28.00	2.20	2.86	389,256.82	6.60	6.60
2012	3	234,296	231,747	445.16	0.00	1,760.63	140.58	421.73	12,296.47	0.209	0.209	6.84	430.24	27.47	2.16	2.80	380,959.89	6.46	6.46
2012	4	385,057	378,249	731.61	0.00	2,365.03	231.03	693.10	20,069.88	0.340	0.340	6.92	405.77	27.23	2.18	2.93	384,427.24	6.52	6.52
2012	5	356,429	362,845	677.22	0.00	2,450.76	213.86	641.57	19,252.55	0.327	0.327	7.17	398.34	28.09	2.26	3.18	398,627.19	6.76	6.76
2012	6	391,590	399,030	744.02	0.00	2,780.96	234.95	704.86	21,172.55	0.359	0.359	7.07	359.19	27.45	2.23	3.18	393,160.75	6.67	6.67
2012	7	486,835	493,651	924.99	0.00	3,299.89	292.10	876.30	26,193.13	0.444	0.444	6.89	304.70	26.34	2.18	3.13	382,198.07	6.48	6.48
2012	8	642,523	656,016	1,220.79	0.00	4,496.29	385.51	1,156.54	34,808.19	0.590	0.590	7.17	276.73	27.24	2.26	3.46	397,957.55	6.75	6.75
2012	9	265,159	271,523	503.80	0.00	1,994.73	159.10	477.29	14,406.98	0.244	0.244	6.96	237.77	26.13	2.20	3.35	386,030.18	6.55	6.55
2012	10	707,159	724,838	1,343.60	0.00	5,054.98	424.30	1,272.89	38,459.89	0.652	0.652	7.35	214.56	27.59	2.32	3.78	408,712.15	6.93	6.93
2012	11	594,730	610,193	1,129.99	0.00	4,579.24	356.84	1,070.51	32,376.82	0.549	0.549	7.73	198.79	28.94	2.44	4.17	430,357.20	7.30	7.30
2012	12	346,877	355,896	659.07	0.00	2,803.65	208.13	624.38	18,883.85	0.320	0.320	8.05	197.92	30.29	2.54	4.47	448,663.02	7.61	7.61
											Max 24-Month Rolling	**12.27**	**722.27**	**46.21**	**3.87**	**12.81**	**702,459.73**	**11.92**	**11.92**

Notes:
Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.14d
Summary of Unit 4 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 4 VOC	Unit 4 CO	Unit 4 NOx	Unit 4 SOx	Unit 4 PM10	Unit 4 CO2	Unit 4 CH4	Unit 4 N2O	Unit 4 VOC	Unit 4 CO	Unit 4 NOx	Unit 4 SOx	Unit 4 PM10	Unit 4 CO2	Unit 4 CH4	Unit 4 N2O
2008	1	849,226	873,853	1,528.61	0.00	3,899.97	509.54	849.23	46,366.64	0.786	0.786								
2008	2	99,978	102,377	179.96	0.00	389.25	59.99	99.98	5,432.14	0.092	0.092								
2008	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	4	125,083	128,461	225.15	0.00	568.73	75.05	125.08	6,816.11	0.116	0.116								
2008	5	239,275	244,840	430.70	0.00	1,061.08	143.57	239.28	12,991.19	0.220	0.220								
2008	6	771,531	792,363	1,388.76	0.00	3,320.44	462.92	771.53	42,042.77	0.713	0.713								
2008	7	586,201	601,443	1,055.16	0.00	2,548.06	351.72	586.20	31,912.55	0.541	0.541								
2008	8	480,538	492,552	864.97	0.00	2,654.66	288.32	480.54	26,134.79	0.443	0.443								
2008	9	583,516	598,103	1,050.33	0.00	3,064.59	350.11	583.52	31,735.37	0.538	0.538								
2008	10	768,218	787,423	1,382.79	0.00	3,946.30	460.93	768.22	41,780.69	0.709	0.709								
2008	11	587,830	603,114	1,058.09	0.00	2,929.70	352.70	587.83	32,001.22	0.543	0.543								
2008	12	331,475	341,087	596.65	0.00	2,690.71	198.88	331.47	18,098.10	0.307	0.307								
2009	1	479,286	466,232	407.39	7,141.37	1,963.76	287.57	479.29	24,738.27	0.420	0.420								
2009	2	101,122	103,043	85.95	1,506.71	370.85	60.67	101.12	5,467.47	0.093	0.093								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	309,126	316,545	262.76	4,605.98	1,269.75	185.48	309.13	16,795.89	0.285	0.285								
2009	5	381,379	390,914	324.17	5,682.55	1,670.29	228.83	381.38	20,741.89	0.352	0.352								
2009	6	164,389	168,827	139.73	2,449.39	792.92	98.63	164.39	8,957.97	0.152	0.152								
2009	7	786,988	807,450	668.94	11,726.13	3,419.53	472.19	786.99	42,843.30	0.727	0.727								
2009	8	453,960	465,309	385.87	6,764.01	2,351.99	272.38	453.96	24,689.32	0.419	0.419								
2009	9	907,866	928,747	771.69	13,527.20	4,143.48	544.72	907.87	49,279.29	0.836	0.836								
2009	10	519,737	532,730	441.78	7,744.08	2,621.36	311.84	519.74	28,266.65	0.479	0.479								
2009	11	126,596	129,887	107.61	1,886.28	752.93	75.96	126.60	6,891.80	0.117	0.117								
2009	12	53,517	54,909	45.49	797.40	319.49	32.11	53.52	2,913.47	0.049	0.049	6.70	31.92	23.37	2.91	4.85	526,896.88	8.94	8.94
2010	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.94	31.92	21.42	2.66	4.43	480,530.24	8.15	8.15
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.85	31.92	21.23	2.63	4.38	475,098.10	8.06	8.06
2010	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.85	31.92	21.23	2.63	4.38	475,098.10	8.06	8.06
2010	4	147,012	150,393	124.96	15,259.87	875.67	88.21	165.43	7,979.88	0.135	0.135	5.80	39.55	21.38	2.63	4.40	476,261.86	8.08	8.08
2010	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.58	39.55	20.85	2.56	4.28	463,270.67	7.86	7.86
2010	6	19,089	19,586	16.23	1,981.47	110.28	11.45	21.54	1,039.21	0.018	0.018	4.90	40.54	19.25	2.34	3.90	422,267.12	7.16	7.16
2010	7	82,596	84,908	70.21	8,573.44	606.26	49.56	93.40	4,505.24	0.076	0.076	4.40	44.82	18.28	2.19	3.66	394,859.82	6.70	6.70
2010	8	516,834	530,788	439.31	53,647.33	3,451.43	310.10	583.87	28,163.62	0.478	0.478	4.19	71.65	18.68	2.20	3.71	396,888.64	6.73	6.73
2010	9	120,248	122,533	102.21	12,481.74	831.21	72.15	134.79	6,501.58	0.110	0.110	3.72	77.89	17.56	2.06	3.49	371,654.86	6.30	6.30
2010	10	289,954	297,203	246.46	30,097.26	1,546.58	173.97	326.92	15,769.60	0.267	0.267	3.15	92.94	16.36	1.91	3.26	345,643.78	5.86	5.86
2010	11	17,720	18,181	15.06	1,839.33	85.07	10.63	20.00	964.67	0.016	0.016	2.63	93.86	14.94	1.74	2.98	314,607.22	5.34	5.34
2010	12	81,792	82,528	69.52	8,490.01	353.21	49.08	90.78	4,378.94	0.074	0.074	2.36	98.10	13.77	1.67	2.86	300,888.06	5.10	5.10
2011	1	988,873	964,754	840.54	16,118.63	4,387.05	593.32	1,061.23	51,189.86	0.868	0.868	2.58	102.59	14.98	1.82	3.15	327,339.66	5.55	5.55
2011	2	522,592	509,846	444.20	8,518.25	1,638.86	313.56	560.83	27,052.43	0.459	0.459	2.76	106.10	15.61	1.95	3.38	348,924.62	5.92	5.92
2011	3	0	0	0.00	0.00	25.80	0.00	0.00	0.00	0.000	0.000	2.76	106.10	15.63	1.95	3.38	348,924.62	5.92	5.92
2011	4	520,819	508,116	442.70	8,489.35	2,138.17	312.49	558.93	26,960.63	0.457	0.457	2.85	108.04	16.06	2.01	3.51	359,089.37	6.09	6.09
2011	5	375,218	366,066	318.93	6,116.05	1,841.57	225.13	402.67	19,423.46	0.329	0.329	2.85	108.25	16.15	2.01	3.52	357,770.94	6.07	6.07
2011	6	294,111	286,938	249.99	4,794.02	1,319.78	176.47	315.63	15,224.93	0.258	0.258	2.90	109.43	16.41	2.05	3.59	364,037.90	6.17	6.17
2011	7	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	2.57	103.56	14.70	1.81	3.20	321,194.60	5.45	5.45
2011	8	216,848	211,559	184.32	3,534.63	1,025.04	130.11	232.72	11,225.34	0.190	0.190	2.47	101.95	14.04	1.74	3.09	307,730.62	5.22	5.22
2011	9	118,755	115,859	100.94	1,935.71	572.47	71.25	127.44	6,147.47	0.104	0.104	2.13	96.15	12.25	1.50	2.70	264,598.80	4.49	4.49
2011	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.91	92.28	10.94	1.35	2.44	236,332.15	4.01	4.01
2011	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.86	91.34	10.56	1.31	2.37	229,440.34	3.89	3.89
2011	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.83	90.94	10.40	1.29	2.35	226,526.87	3.84	3.84
2012	1	118,814	116,943	100.99	98.62	614.34	71.29	142.58	6,205.01	0.105	0.105	1.88	90.99	10.71	1.33	2.42	232,731.88	3.95	3.95
2012	2	456,357	449,171	387.90	378.78	1,686.92	273.81	547.63	23,833.00	0.404	0.404	2.08	91.18	11.55	1.47	2.69	256,564.88	4.35	4.35
2012	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	2.08	91.18	11.55	1.47	2.69	256,564.88	4.35	4.35
2012	4	332,304	326,429	282.46	275.81	1,528.98	199.38	398.77	17,320.30	0.294	0.294	2.16	83.69	11.88	1.52	2.81	265,905.30	4.51	4.51
2012	5	485,100	493,832	412.34	402.63	2,271.23	291.06	582.12	26,202.74	0.444	0.444	2.36	83.89	13.02	1.67	3.10	292,108.04	4.95	4.95
2012	6	113,933	116,098	96.84	94.56	613.00	68.36	136.72	6,160.14	0.104	0.104	2.40	82.94	13.27	1.70	3.16	297,228.97	5.04	5.04
2012	7	456,286	462,674	387.84	378.72	1,896.01	273.77	547.54	24,549.49	0.416	0.416	2.56	78.85	13.91	1.81	3.39	317,273.22	5.38	5.38
2012	8	773,015	789,248	657.06	641.60	2,947.71	463.81	927.62	41,877.51	0.710	0.710	2.67	52.34	13.66	1.88	3.56	330,987.11	5.61	5.61
2012	9	247,695	253,640	210.54	205.59	1,273.54	148.62	297.23	13,458.13	0.228	0.228	2.72	46.20	13.88	1.92	3.64	337,943.66	5.73	5.73
2012	10	279,207	286,187	237.33	231.74	963.79	167.52	335.05	15,185.10	0.258	0.258	2.72	31.27	13.59	1.92	3.64	337,359.15	5.72	5.72
2012	11	38,883	39,894	33.05	32.27	209.98	23.33	46.66	2,116.79	0.036	0.036	2.73	30.37	13.65	1.93	3.66	338,511.28	5.74	5.74
2012	12	142,788	146,501	121.37	118.51	568.64	85.67	171.35	7,773.32	0.132	0.132	2.75	26.18	13.76	1.94	3.70	341,905.66	5.80	5.80
										Max 24-Month Rolling		**6.70**	**109.43**	**23.37**	**2.91**	**4.85**	**526,896.88**	**8.94**	**8.94**

Notes:
Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.14e
Summary of Unit 5 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 5 VOC	Unit 5 CO	Unit 5 NOx	Unit 5 SOx	Unit 5 PM10	Unit 5 CO2	Unit 5 CH4	Unit 5 N2O	Unit 5 VOC	Unit 5 CO	Unit 5 NOx	Unit 5 SOx	Unit 5 PM10	Unit 5 CO2	Unit 5 CH4	Unit 5 N2O
2008	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	5	502,975	514,671	2,162.79	80,878.37	1,764.47	301.78	452.68	27,308.45	0.463	0.463								
2008	6	590,259	606,196	2,538.11	94,913.68	2,583.07	354.16	531.23	32,164.77	0.546	0.546								
2008	7	1,026,994	1,053,696	4,416.08	165,140.71	4,322.91	616.20	924.30	55,909.13	0.948	0.948								
2008	8	1,203,499	1,233,586	5,175.04	193,522.61	5,781.24	722.10	1,083.15	65,454.09	1.110	1.110								
2008	9	1,183,315	1,212,898	5,088.25	190,277.06	6,909.99	709.99	1,064.98	64,356.37	1.092	1.092								
2008	10	1,198,941	1,228,914	5,155.44	192,789.65	7,414.00	719.36	1,079.05	65,206.18	1.106	1.106								
2008	11	1,724,515	1,769,352	7,415.41	277,301.93	8,926.75	1,034.71	1,552.06	93,881.81	1.592	1.592								
2008	12	1,319,589	1,357,857	5,674.23	212,189.84	6,663.60	791.75	1,187.63	72,047.87	1.222	1.222								
2009	1	66,277	64,472	152.44	10,146.99	284.42	39.77	99.42	3,420.87	0.058	0.058								
2009	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	5	268,878	275,600	618.42	41,165.15	1,395.71	161.33	403.32	14,623.31	0.248	0.248								
2009	6	426,077	437,581	979.98	65,232.41	1,920.58	255.65	639.12	23,218.06	0.394	0.394								
2009	7	1,590,389	1,631,739	3,657.89	243,488.54	7,718.54	954.23	2,385.58	86,580.07	1.469	1.469								
2009	8	1,371,018	1,405,294	3,153.34	209,902.92	6,292.22	822.61	2,056.53	74,564.89	1.265	1.265								
2009	9	1,473,082	1,506,963	3,388.09	225,528.91	7,660.72	883.85	2,209.62	79,959.47	1.356	1.356								
2009	10	218,955	224,428	503.60	33,522.01	1,079.52	131.37	328.43	11,908.15	0.202	0.202								
2009	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	25.04	1,118.00	35.36	4.25	8.00	770,603.49	13.07	13.07
2010	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	25.04	1,118.00	35.36	4.25	8.00	770,603.49	13.07	13.07
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	25.04	1,118.00	35.36	4.25	8.00	770,603.49	13.07	13.07
2010	3	508,887	519,574	1,170.44	76,485.73	3,900.39	305.33	763.33	27,568.58	0.468	0.468	25.62	1,156.24	37.31	4.40	8.38	798,172.07	13.54	13.54
2010	4	149,896	153,344	344.76	22,529.43	810.70	89.94	224.84	8,136.43	0.138	0.138	25.80	1,167.51	37.71	4.45	8.49	806,308.50	13.68	13.68
2010	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	24.72	1,127.07	36.83	4.30	8.27	779,000.05	13.21	13.21
2010	6	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	23.45	1,079.61	35.54	4.12	8.00	746,835.28	12.67	12.67
2010	7	420,116	431,880	966.27	63,143.47	2,433.56	252.07	630.17	22,915.53	0.389	0.389	21.72	1,028.61	34.60	3.94	7.85	713,841.68	12.11	12.11
2010	8	679,670	698,021	1,563.24	102,154.45	3,397.23	407.80	1,019.51	37,037.02	0.628	0.628	19.92	982.93	33.40	3.78	7.82	685,424.61	11.63	11.63
2010	9	371,696	378,758	854.90	55,865.93	2,283.79	223.02	557.54	20,096.92	0.341	0.341	17.80	915.72	31.09	3.54	7.57	641,165.16	10.88	10.88
2010	10	465,496	477,134	1,070.64	69,964.07	2,772.77	279.30	698.24	25,316.71	0.429	0.429	15.76	854.31	28.77	3.32	7.38	601,275.68	10.20	10.20
2010	11	279,941	287,219	643.86	42,075.08	1,327.23	167.96	419.91	15,239.85	0.258	0.258	12.37	736.70	24.97	2.88	6.81	522,633.72	8.86	8.86
2010	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	9.53	630.60	21.64	2.49	6.22	450,585.84	7.64	7.64
2011	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	9.46	625.53	21.50	2.47	6.17	447,164.98	7.58	7.58
2011	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	9.46	625.53	21.50	2.47	6.17	447,164.98	7.58	7.58
2011	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	9.46	625.53	21.50	2.47	6.17	447,164.98	7.58	7.58
2011	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	9.46	625.53	21.50	2.47	6.17	447,164.98	7.58	7.58
2011	5	78,201	76,293	179.86	11,847.41	463.24	46.92	117.30	4,048.13	0.069	0.069	9.24	610.87	21.03	2.41	6.03	436,589.79	7.41	7.41
2011	6	48,730	47,542	112.08	7,382.65	323.15	29.24	73.10	2,522.57	0.043	0.043	8.80	581.95	20.23	2.30	5.74	415,894.30	7.05	7.05
2011	7	588,677	574,319	1,353.96	89,184.56	2,890.74	353.21	883.02	30,473.37	0.517	0.517	7.65	504.79	17.82	2.00	4.99	359,787.60	6.10	6.10
2011	8	683,032	666,372	1,570.97	103,479.28	3,380.90	409.82	1,024.55	35,357.71	0.600	0.600	6.86	451.58	16.36	1.79	4.47	320,580.42	5.44	5.44
2011	9	477,910	466,254	1,099.19	72,403.34	2,195.84	286.75	716.86	24,739.41	0.420	0.420	5.72	375.02	13.63	1.49	3.73	265,360.36	4.50	4.50
2011	10	0	0	0.00	0.00	46.67	0.00	0.00	0.00	0.000	0.000	5.47	358.26	13.11	1.43	3.56	253,452.21	4.30	4.30
2011	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.47	358.26	13.11	1.43	3.56	253,452.21	4.30	4.30
2011	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.47	358.26	13.11	1.43	3.56	253,452.21	4.30	4.30
2012	1	812,295	799,503	641.71	98,693.79	3,537.89	487.38	974.75	42,421.61	0.720	0.720	5.79	407.60	14.88	1.67	4.05	295,873.82	5.02	5.02
2012	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.79	407.60	14.88	1.67	4.05	295,873.82	5.02	5.02
2012	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.20	369.36	12.93	1.52	3.67	268,305.23	4.55	4.55
2012	4	221,201	217,290	174.75	26,875.93	1,173.75	132.72	265.44	11,529.40	0.196	0.196	5.12	371.53	13.11	1.54	3.69	271,698.20	4.61	4.61
2012	5	154,338	157,117	121.93	18,752.12	805.86	92.60	185.21	8,336.60	0.141	0.141	5.18	380.91	13.52	1.58	3.78	280,034.80	4.75	4.75
2012	6	88,494	90,176	69.91	10,752.03	478.52	53.10	106.19	4,784.71	0.081	0.081	5.21	386.29	13.76	1.61	3.84	284,819.52	4.83	4.83
2012	7	378,699	384,001	299.17	46,011.97	2,201.46	227.22	454.44	20,375.10	0.346	0.346	4.88	377.72	13.64	1.60	3.75	282,279.09	4.79	4.79
2012	8	1,261,599	1,288,092	996.66	153,284.25	6,514.80	756.96	1,513.92	68,346.18	1.159	1.159	4.59	403.29	15.20	1.77	4.00	313,588.26	5.32	5.32
2012	9	1,007,975	1,032,167	796.30	122,469.00	4,927.11	604.79	1,209.57	54,766.77	0.929	0.929	4.57	436.59	16.52	1.96	4.32	348,258.10	5.91	5.91
2012	10	423,438	434,024	334.52	51,447.70	2,169.15	254.06	508.13	23,029.31	0.391	0.391	4.20	427.33	16.22	1.95	4.23	345,970.70	5.87	5.87
2012	11	215,148	220,742	169.97	26,140.47	1,193.76	129.09	258.18	11,712.56	0.199	0.199	3.96	419.36	16.15	1.93	4.15	342,443.42	5.81	5.81
2012	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	3.96	419.36	16.15	1.93	4.15	342,443.42	5.81	5.81
										Max 24-Month Rolling		**25.80**	**1,167.51**	**37.71**	**4.45**	**8.49**	**806,308.50**	**13.68**	**13.68**

Notes:

Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.14f
Summary of Unit 6 Past Actual Emissions: Years 2008 - 2012
December 2013

		Monthly Fuel Usage		Monthly Criteria Pollutant Emissions (lbs)					Monthly GHG Emissions (Metric Tons)			Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	MSCF (metered)	MMBtu (metered)	Unit 6 VOC	Unit 6 CO	Unit 6 NOx	Unit 6 SOx	Unit 6 PM10	Unit 6 CO2	Unit 6 CH4	Unit 6 N2O	Unit 6 VOC	Unit 6 CO	Unit 6 NOx	Unit 6 SOx	Unit 6 PM10	Unit 6 CO2	Unit 6 CH4	Unit 6 N2O
2008	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2008	5	150,324	153,820	225.49	14,229.18	790.69	90.19	237.51	8,161.69	0.138	0.138								
2008	6	607,625	624,031	911.44	57,515.67	2,587.98	364.58	960.05	33,111.09	0.562	0.562								
2008	7	83,190	85,353	124.78	7,874.47	636.59	49.91	131.44	4,528.82	0.077	0.077								
2008	8	1,587,701	1,627,394	2,381.55	150,286.22	7,719.42	952.62	2,508.57	86,349.52	1.465	1.465								
2008	9	350,175	358,929	525.26	33,146.32	2,139.49	210.10	553.28	19,044.79	0.323	0.323								
2008	10	752,124	770,928	1,128.19	71,193.45	4,175.33	451.27	1,188.36	40,905.42	0.694	0.694								
2008	11	1,148,348	1,178,205	1,722.52	108,698.60	5,815.08	689.01	1,814.39	62,515.57	1.060	1.060								
2008	12	39,796	40,950	59.69	3,766.91	192.51	23.88	62.88	2,172.79	0.037	0.037								
2009	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	6	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	7	151,917	155,867	364.60	0.00	1,530.82	91.15	136.73	8,270.30	0.140	0.140								
2009	8	704,678	722,295	1,691.23	0.00	4,279.64	422.81	634.21	38,324.95	0.650	0.650								
2009	9	1,003,937	1,027,027	2,409.45	0.00	5,690.49	602.36	903.54	54,494.06	0.924	0.924								
2009	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000								
2009	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.77	223.36	17.78	1.97	4.57	357,879.01	6.07	6.07
2010	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.77	223.36	17.78	1.97	4.57	357,879.01	6.07	6.07
2010	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.77	223.36	17.78	1.97	4.57	357,879.01	6.07	6.07
2010	3	0	0	0.00	0.00	2.59	0.00	0.00	0.00	0.000	0.000	5.77	223.36	17.78	1.97	4.57	357,879.01	6.07	6.07
2010	4	128,646	131,605	308.75	23,799.57	1,666.80	77.19	115.78	6,982.97	0.118	0.118	5.93	235.26	18.61	2.01	4.62	364,861.98	6.19	6.19
2010	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.81	228.14	18.22	1.97	4.50	356,700.29	6.05	6.05
2010	6	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	5.36	199.38	16.92	1.79	4.02	323,589.20	5.49	5.49
2010	7	6,679	6,866	16.03	1,235.65	39.24	4.01	6.01	364.32	0.006	0.006	5.30	196.06	16.63	1.76	3.96	319,424.69	5.42	5.42
2010	8	631,732	648,789	1,516.16	116,870.39	3,440.94	379.04	568.56	34,424.72	0.584	0.584	4.87	179.36	14.49	1.48	2.99	267,499.90	4.54	4.54
2010	9	260,787	265,742	625.89	48,245.52	1,714.50	156.47	234.71	14,100.25	0.239	0.239	4.92	186.91	14.27	1.45	2.83	262,555.36	4.45	4.45
2010	10	479,372	491,357	1,150.49	88,683.87	2,344.65	287.62	431.44	26,071.38	0.442	0.442	4.93	195.65	13.36	1.37	2.45	247,721.32	4.20	4.20
2010	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.07	141.30	10.45	1.02	1.55	185,205.75	3.14	3.14
2010	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.04	139.42	10.35	1.01	1.52	183,032.96	3.10	3.10
2011	1	587,196	572,874	1,409.27	42,219.40	0.00	352.32	528.48	30,396.71	0.516	0.516	4.75	160.53	10.35	1.19	1.78	213,429.66	3.62	3.62
2011	2	0	0	0.00	0.00	2,447.64	0.00	0.00	0.00	0.000	0.000	4.75	160.53	11.58	1.19	1.78	213,429.66	3.62	3.62
2011	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.75	160.53	11.58	1.19	1.78	213,429.66	3.62	3.62
2011	4	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.75	160.53	11.58	1.19	1.78	213,429.66	3.62	3.62
2011	5	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.75	160.53	11.58	1.19	1.78	213,429.66	3.62	3.62
2011	6	146,002	142,441	350.41	10,497.55	1,264.50	87.60	131.40	7,557.92	0.128	0.128	4.92	165.78	12.21	1.23	1.85	220,987.59	3.75	3.75
2011	7	276,591	269,845	663.82	19,886.90	1,362.98	165.95	248.93	14,317.98	0.243	0.243	5.07	175.72	12.13	1.27	1.90	227,035.26	3.85	3.85
2011	8	682,151	665,513	1,637.16	49,046.68	3,357.08	409.29	613.94	35,312.14	0.599	0.599	5.04	200.24	11.67	1.26	1.89	224,022.45	3.80	3.80
2011	9	481,784	470,033	1,156.28	34,640.26	2,326.61	289.07	433.61	24,939.96	0.423	0.423	4.42	217.56	9.98	1.10	1.66	194,468.35	3.30	3.30
2011	10	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.42	217.56	9.98	1.10	1.66	194,468.35	3.30	3.30
2011	11	72,361	73,868	173.67	5,202.76	515.34	43.42	65.12	3,919.46	0.066	0.066	4.50	220.16	10.24	1.13	1.69	198,387.80	3.37	3.37
2011	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.50	220.16	10.24	1.13	1.69	198,387.80	3.37	3.37
2012	1	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.50	220.16	10.24	1.13	1.69	198,387.80	3.37	3.37
2012	2	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.50	220.16	10.24	1.13	1.69	198,387.80	3.37	3.37
2012	3	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.50	220.16	10.24	1.13	1.69	198,387.80	3.37	3.37
2012	4	594,154	583,648	409.97	2,792.52	3,733.89	356.49	653.57	30,968.37	0.525	0.525	4.55	209.66	11.27	1.27	1.96	222,373.21	3.77	3.77
2012	5	872,283	887,984	601.87	4,099.73	3,071.83	523.37	959.51	47,116.41	0.799	0.799	4.86	211.71	12.81	1.53	2.44	269,489.62	4.57	4.57
2012	6	144,009	146,746	99.37	676.84	470.15	86.41	158.41	7,786.32	0.132	0.132	4.91	212.05	13.04	1.57	2.52	277,275.93	4.70	4.70
2012	7	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	4.90	211.43	13.03	1.57	2.51	276,911.61	4.70	4.70
2012	8	1,113,732	1,137,120	768.47	5,234.54	4,999.69	668.24	1,225.10	60,335.60	1.023	1.023	4.52	155.61	13.80	1.71	2.84	302,822.49	5.14	5.14
2012	9	212,353	217,449	146.52	998.06	1,161.70	127.41	233.59	11,537.86	0.196	0.196	4.28	131.99	13.53	1.70	2.84	300,260.10	5.09	5.09
2012	10	705,569	723,208	486.84	3,316.17	3,275.42	423.34	776.13	38,373.41	0.651	0.651	3.95	89.31	13.99	1.77	3.01	312,562.14	5.30	5.30
2012	11	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	3.95	89.31	13.99	1.77	3.01	312,562.14	5.30	5.30
2012	12	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	3.95	89.31	13.99	1.77	3.01	312,562.14	5.30	5.30
										Max 24-Month Rolling		**5.93**	**235.26**	**18.61**	**2.01**	**4.62**	**364,861.98**	**6.19**	**6.19**

Notes:

Emissions of NOx are from AES daily CEMS report. VOC, CO, SOx, and PM10 emissions are calculated based on AER and source test emission factors.

CO2 Emission Rate:	53.06	kg/MMBtu	Reference: CO2 emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.1, assuming average natural gas heat content of 1,047 btu/scf.
CH4 Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.
N2O Emission Rate:	0.9	g/MMBtu	Reference: CH4 and N2O emission factor from TCR General Reporting Protocol, Default Emission Factors (April 2, 2013 update) Table 12.5.

Alamitos Energy Center
Table 5.1B.15
Summary of Facility Past Actual Emissions: Years 2008 - 2012
December 2013

		Criteria Pollutant Rolling 24-Month Emissions (Tons)					GHG Rolling 24-Month Emissions (Metric Tons)		
Year	Month	VOC	CO	NOx	SOx	PM10	CO2	CH4	N2O
2009	12	51.08	2,254.85	128.94	13.63	32.50	2,463,028.63	41.78	41.78
2010	1	50.33	2,255.30	127.09	13.38	32.09	2,417,660.78	41.01	41.01
2010	2	50.24	2,255.30	126.90	13.35	32.04	2,412,228.65	40.92	40.92
2010	3	51.12	2,326.91	130.01	13.59	32.55	2,456,329.37	41.66	41.66
2010	4	51.37	2,359.31	131.64	13.68	32.64	2,472,039.68	41.93	41.93
2010	5	49.40	2,276.88	127.49	13.23	31.53	2,390,551.66	40.55	40.55
2010	6	46.65	2,190.85	122.64	12.53	29.88	2,263,946.87	38.40	38.40
2010	7	44.17	2,141.05	120.43	12.11	28.98	2,187,745.03	37.11	37.11
2010	8	40.99	2,065.59	115.58	11.45	27.12	2,067,352.18	35.07	35.07
2010	9	37.98	1,999.83	110.91	10.87	25.72	1,963,100.04	33.30	33.30
2010	10	34.65	1,918.91	103.69	10.19	24.05	1,839,132.88	31.20	31.20
2010	11	29.33	1,712.47	93.87	9.07	21.66	1,635,460.65	27.74	27.74
2010	12	26.02	1,597.64	88.68	8.53	20.71	1,536,967.66	26.07	26.07
2011	1	27.34	1,647.59	91.92	8.98	21.34	1,615,485.44	27.40	27.40
2011	2	28.30	1,692.69	96.11	9.35	21.65	1,679,409.68	28.49	28.49
2011	3	28.65	1,717.68	97.85	9.48	21.75	1,700,705.68	28.85	28.85
2011	4	28.52	1,696.99	97.41	9.45	21.06	1,700,156.83	28.84	28.84
2011	5	28.23	1,678.51	96.82	9.36	20.43	1,681,449.12	28.52	28.52
2011	6	28.25	1,672.72	97.95	9.41	20.04	1,687,050.39	28.62	28.62
2011	7	26.26	1,556.61	91.01	8.68	17.82	1,550,646.18	26.30	26.30
2011	8	24.89	1,493.73	86.18	8.22	16.11	1,462,510.41	24.81	24.81
2011	9	21.86	1,357.57	76.14	7.21	13.35	1,275,024.43	21.63	21.63
2011	10	20.98	1,337.24	72.72	6.89	12.42	1,217,888.26	20.66	20.66
2011	11	20.68	1,325.33	71.34	6.78	11.92	1,196,927.84	20.30	20.30
2011	12	20.53	1,331.31	71.00	6.74	11.74	1,190,610.35	20.20	20.20
2012	1	20.91	1,380.25	73.04	7.02	12.30	1,239,289.82	21.02	21.02
2012	2	21.25	1,380.44	74.42	7.21	12.71	1,270,936.91	21.56	21.56
2012	3	20.41	1,297.53	71.44	6.98	12.23	1,229,254.36	20.85	20.85
2012	4	20.95	1,308.53	74.12	7.39	13.21	1,298,486.53	22.02	22.02
2012	5	21.88	1,327.19	78.53	7.97	14.47	1,403,299.73	23.80	23.80
2012	6	21.93	1,300.62	78.78	8.05	14.72	1,417,406.89	24.04	24.04
2012	7	21.51	1,228.21	77.95	8.07	14.77	1,420,283.66	24.09	24.09
2012	8	21.46	1,169.90	81.75	8.64	16.09	1,523,319.55	25.84	25.84
2012	9	20.91	1,119.54	82.71	8.75	16.31	1,542,646.67	26.17	26.17
2012	10	20.60	1,029.46	84.04	8.93	16.82	1,574,758.76	26.71	26.71
2012	11	20.76	1,006.22	85.49	9.04	17.16	1,594,893.57	27.05	27.05
2012	12	21.11	1,001.17	86.87	9.16	17.50	1,616,593.76	27.42	27.42
Max 24-Month Rolling		**51.37**	**2,359.31**	**131.64**	**13.68**	**32.64**	**2,472,039.68**	**41.93**	**41.93**
Max Annual		**25.7**	**1,179.65**	**65.8**	**6.8**	**16.3**	**1,236,019.84**	**21.0**	**21.0**