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November 11, 2015

Mr. Chris Perri
Permit Engineer
Engineering and Compliance
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

Subject: Huntington Beach Energy Project Permit Application (Facility ID 115389)

Dear Mr. Perri:

AES Huntington Beach, LLC (AES) is submitting this letter in response to the South Coast Air Quality Management District's (SCAQMD) November 3, 2015, request for additional information pertaining to the Huntington Beach Energy Project's (HBEP) air permit application. This letter presents AES's responses to the requested information.

1. What stack temperature and exit velocity was used for the annual operating scenario?

Response: The stack parameters for each of the individual emission sources, including stack temperature and exit velocity, and emission rates used to model the annual operating scenarios are presented in Attachment 1, Table 1. Modeled results per emission source and for the HBEP are also presented.

2. What is the 3 year average 99th percentile 1-hour NO2 background (Table 4-3, page 4-6 of the supplemental information submittal)?

Response: Per SCAQMD direction, the seasonal hour-of-day background values were calculated from data collected between 2010 and 2012 at the Costa Mesa monitoring station. These background values were input to the AERMOD computer model for use in the 1-hour nitrogen dioxide (NO_2) modeling scenarios, along with an ambient NO_2 to nitrogen oxides (NO_X) ratio of 0.8[1]. Within AERMOD, the high-8th-high modeled concentration at each receptor was combined with the seasonal hour-of-day background concentration, resulting in a total predicted impact. The highest predicted 1-hour NO_2 impact was based on the General Electric (GE) 7FA.05 turbines operating in exhaust scenario CC07 (65.8 degrees Fahrenheit [°F] ambient and a 44 percent turbine load), the GE LMS-100PB turbines operating in exhaust scenario SC07 (65.8°F ambient and a 50 percent turbine load), and operation of the auxiliary

[1] U.S. Environmental Protection Agency (EPA). 2011. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*. EPA Office of Air Quality Planning and Standards. March 1.

boiler (at 100 percent load for 20 minutes per day and the balance of daily operation at 25 percent load). The stack parameters and emission rates associated with these exhaust scenarios are presented in Attachment 1, Table 2. Because the background concentration is selected and added to the modeled concentration within the AERMOD dispersion modeling program itself, we cannot say with certainty which seasonal hour-of-day background concentration is included in the highest predicted impact. The seasonal hour-of-day background concentrations entered into AERMOD are provided in Attachment 1, Table 3.

3. What is the emission rate and stack parameters for the 24 hour PM10 with 20 hours minimum load and 4 hours average load?

Response: The stack parameters and emission rates used to model 24-hour particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}) for comparison to the Class II Significant Impact Level of 5 micrograms per cubic meter ($\mu g/m^3$) and Increment Standard of 30 $\mu g/m^3$ are presented in Attachment 1, Table 4. Modeled results for the HBEP are also presented.

4. What are the emission rates and stack parameters used for the VISCREEN models?

Response: The VISCREEN model does not use stack or exhaust parameters, but only facility-wide annual emission rates in tons per year. The annual emission rates input to VISCREEN are shown at the beginning of each VISCREEN output file, which were submitted with the Petition to Amend (PTA).

5. What are the stack parameters used for the HRA?

Response: The stack parameters and emission rates used to conduct the health risk assessment (HRA) are presented in Attachment 1, Table 5. The predicted cancer risk, chronic hazard index, and acute hazard index at the Point of Maximum Impact (PMI) are also presented in Attachment 1, Table 5 for each emission source and for the HBEP.

6. Was a soil deposition analysis performed?

Response: The HBEP area is highly urbanized and no commercial crops are located within the area. As such, a qualitative assessment is provided below which compares HBEP's impacts to the secondary national ambient air quality standards (NAAQS), which were established to include protection against visibility impairment and damage to animals, crops, vegetation, and buildings. Table DR6-1 presents a comparison of HBEP's maximum operational impacts to the secondary NAAQS. As shown in Table DR6-1, HBEP's operational impacts, after the addition of an applicable background concentration, do not exceed the secondary NAAQS and are therefore not expected to impair visibility or damage livestock, crops, vegetation, or buildings.

Table DR6-1

HBEP Operation Impacts Analysis – Maximum Modeled Impacts Compared to the Secondary National Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	Secondary NAAQS, µg/m³
NO_2 [b]	Annual	0.56	21.8	22.4	100
SO_2	3-hour	4.94	20.2	25.1	1,300
PM_{10}	24-hour	5.38	51.0	56.4	150
$PM_{2.5}$	24-hour (98thpercentile) [c]	3.13	21.3	24.4	35
	Annual	0.59	8.60	9.19	15

[a] Background concentrations were the highest concentrations monitored during 2011 through 2013.

[b] The annual NO_2 concentration includes an ambient NO_2 ratio of 0.75[2].

[c] The total predicted concentration for the federal 24-hour $PM_{2.5}$ standard is the 5-year average, high-8th-high modeled concentration combined with the 3-year average, 98th percentile background concentration.

$PM_{2.5}$ = particulate matter with aerodynamic diameter less than or equal to 2.5 microns
SO_2 = sulfur dioxide

7. Can you provide some discussion as to why the scenario of 24 hours at minimum load for the CCTG is not a likely occurrence? Also, what is the minimum load being refereed to here, in terms of percentage? And the average?

Response: The combined-cycle gas turbine (CCGT) power block minimum load is represented by one combustion turbine operating at minimum output (44 percent) with the steam turbine operating. Operating both turbines of the CCGT at minimum load results in their most inefficient condition (highest heat rate) and is not an expected nor sensible operating condition for two reasons. First, the same electrical output from the two combustion turbines operating at their minimum load could be achieved by operating one combustion turbine at a higher load rate (i.e., more efficient, lower heat rate), which provides more cost effective power delivery and lower risk of mechanical or electrical failure or trip. Secondly, the combustion turbines have a 10-minute start-up cycle (10 minutes to minimum power output with 30 minutes to BACT levels) which allows for very fast response to changing electrical demand such that operating one combustion turbine for 24 hours at minimum load for the purposes of operational readiness is not required. It is an unlikely scenario that electrical demand would require the minimum output of the CCGT for an extended period of time and if such demand did occur, the unit would be operating at an inefficient heat rate and would be displaced by more efficient generation from another source.

The reference to average load rate equates to a combustion turbine operating rate of 75 percent load, as measured in electrical production.

[2] U.S. Environmental Protection Agency (EPA). 2005. *Guideline on Air Quality Models*. 40 Code of Federal Regulations (CFR) 51, Appendix W. November.

8. The emission factors we use for toxics are different than what you used. In the case of the turbines, there are only slight differences. But for the boilers, we don't use AP-42, we use Ventura County. There is no speciation in the Ventura County factors and no metals.

   The emission factors for a boiler between 10-100 mmbtu/h, in lbs/mmcf are presented below.

Pollutant	CAS	Factor, lbs/mmcf
Benzene	71432	0.0058
Formaldehyde	50000	0.0123
PAHs (excluding napthalene)	1150	0.0001
Naphthalene	91203	0.0003
Acetaldehyde	75070	0.0031
Acrolein	107028	0.0027
Toluene	108883	0.0265
Xylene	1330207	0.0197
ethyl benzene	100414	0.0069
Hexane	110543	0.0046

   The turbine emission factors are presented below.

Pollutant	CAS	(lbs/MMcf)	(lbs/MMcf) with CO cat
1,3 butadiene	106990	4.39E-04	
Acetaldehyde	75070	4.08E-02	1.80E-01
Acrolein	107028	6.53E-03	3.69E-03
Benzene	71432	1.22E-02	3.33E-03
Ethylbenzene	100414	3.26E-02	
formaldehyde	50000	7.24E-01	3.67E-01
Naphthalene	91203	1.33E-03	
PAH (excluding naphthalene)	1150	9.18E-04	
propylene oxide	75569	2.96E-02	
Toluene	108883	1.33E-01	
Xylenes	1330207	6.53E-02	

   Also, the SCAQMD uses a natural gas heat content of 1050 btu/cf to convert lbs/mmcf to lbs/mmbtu.

   Response: The air toxics emissions for the GE 7FA.05 turbines, GE LMS-100PB turbines, and auxiliary boiler were calculated consistent with the emission factors and natural gas heat content presented above. Detailed calculations are presented in Attachment 1, Tables 6 through 8. These emission rates were used to conduct an HRA for routine operation of the HBEP, the results of which are discussed below.

   The *Hotspots Analysis Reporting Program Version 2* was used to perform the HRA, based on model inputs similar to those used for the criteria pollutant modeling, with the following SCAQMD-specific triggers:

- Mandatory minimum pathways (inhalation, dermal, soil ingestion, and mother's milk) were selected to evaluate cancer risk and chronic hazard index at the PMI, if at a nonresidential location
- Mandatory minimum pathways and homegrown pathways were selected to evaluate cancer risk and chronic hazard index at the Maximum Exposed Individual Resident (MEIR) and sensitive receptor
- Worker pathways (inhalation, dermal, and soil) were selected to evaluate cancer risk and chronic hazard index at the Maximum Exposed Individual Worker (MEIW)
- The Draft Risk Management Policy (RMP) Derived method was used to calculate cancer risk at the PMI, MEIR, and sensitive receptor, consistent with SCAQMD guidance[3]; the Office of Environmental Health Hazard Assessment (OEHHA) Derived method was used for all remaining scenarios

A summary of the excess cancer risk and chronic and acute hazard indices at the PMI, as well as the maximum predicted public health impacts for worker, residential, and sensitive receptors, has been included in Tables DR8-1 and DR8-2. The results in Table DR8-1 represent a comparison of the total predicted HBEP impact to the SCAQMD California Environmental Quality Act (CEQA) significance thresholds, while the results in Table DR8-2 represent the predicted risk for each individual emission unit in accordance with SCAQMD Rule 1401. The model input and output files are included with this submission on compact disc.

As shown in Table DR8-1, predicted impacts for the HBEP are below the significance thresholds of 10 in 1 million for excess cancer risk and chronic and acute hazard index of 1.0. Therefore, the predicted health risks associated with the HBEP will be less than significant.

TABLE DR8-1
Operational Health Risk Assessment Summary: Facility [a]

Risk [b]	Receptor Number	Receptor Coordinates (UTM, m)		Value
		Easting	Northing	
Cancer Risk at the PMI (per million) [c]	31	409566.2	3723313	6.18
Cancer Risk at the MEIR (per million) [c]	815	410000	3723700	2.86
Cancer Risk at a Sensitive Receptor (per million) [c]	12905	409969.5	3724223	1.53
Cancer Risk at the MEIW (per million) [d]	31	409566.2	3723313	0.22
Chronic Hazard Index at the PMI	31	409566.2	3723313	0.015
Chronic Hazard Index at the MEIR	815	410000	3723700	0.0072
Chronic Hazard Index at a Sensitive Receptor	12905	409969.5	3724223	0.0039

[3] South Coast Air Quality Management District (SCAQMD). 2015. *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act*. June.

TABLE DR8-1
Operational Health Risk Assessment Summary: Facility [a]

Risk [b]	Receptor Number	Receptor Coordinates (UTM, m)		Value
		Easting	Northing	
Chronic Hazard Index at the MEIW	31	409566.2	3723313	0.015
Acute Hazard Index at the PMI	583	409600	3723350	0.073
Acute Hazard Index at the MEIR	719	410000	3723550	0.020
Acute Hazard Index at a Sensitive Receptor	12902	410027.1	3723140	0.014
Acute Hazard Index at the MEIW	583	409600	3723350	0.073

[a] The results in Table DR8-1 represent the combined predicted risk for all five combustion units operating simultaneously.

[b] A facility with an excess cancer risk less than 10 in 1 million individuals is considered to be less than significant. A chronic or acute hazard index less than 1.0 for the facility is considered to be a less-than-significant health risk.

[c] Cancer risk values are based on the Draft RMP methodology.

[d] Cancer risk values are based on the OEHHA Derived methodology.

m = meter(s)

UTM = Universal Transverse Mercator

As shown in Table DR8-2, the GE 7FA.05s exceed the incremental increase in cancer risk threshold of 1 in 1 million; therefore, best available control technology for toxics (T-BACT) will be required for these units. The GE LMS-100PB gas turbines and auxiliary boiler do not trigger the regulatory requirement for T-BACT as their predicted impacts are below the incremental increase in cancer risk threshold of 1 in 1 million. Although not required in all cases, the emission control technologies included in the HBEP for all emission sources are considered to be T-BACT. All sources have predicted impacts below the chronic and acute hazard index of 1.0, resulting in less-than-significant impacts with controls.

It should be noted that the maximum impacts reported in Table DR8-1 represent the maximum predicted impacts at one receptor from all sources combined. In contrast, the maximum impacts reported for each individual source in Table DR8-2 may occur at different receptors. Therefore, the HBEP totals in Table DR8-2 are not directly additive and should not be directly compared to the results presented in Table DR8-1.

Because the predicted cancer risk, per individual unit, is greater than 1 in 1 million, the cancer burden was calculated for each census block receptor consistent with SCAQMD guidance[4]. The cancer burden for the HBEP was estimated at 8.4×10^{-9}, which is well below the significance threshold of 0.5. Therefore, the HBEP will not significantly increase cancer burden in the vicinity of the site.

[4] South Coast Air Quality Management District (SCAQMD). 2015. *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act*. June.

TABLE DR8-2
Operational Health Risk Assessment Summary: Individual Units [a]

Risk [b]	GE 7FA.05-01	GE 7FA.05-02	GE LMS-100PB-01	GE LMS-100PB-02	Auxiliary Boiler
Cancer Risk at the PMI (per million) [c]	2.02	4.08	0.0607	0.0605	0.299
Cancer Risk at the MEIR (per million) [c]	1.25	1.49	0.0410	0.0375	0.0429
Cancer Risk at a Sensitive Receptor (per million) [c]	0.676	0.786	0.0319	0.0317	0.00784
Cancer Risk at the MEIW (per million) [d]	0.0731	0.148	0.00220	0.00219	0.00884
Chronic Hazard Index at the PMI	0.0051	0.010	0.00016	0.00015	0.00041
Chronic Hazard Index at the MEIR	0.0032	0.0038	0.00011	0.000096	0.000059
Chronic Hazard Index at a Sensitive Receptor	0.0017	0.0020	0.000082	0.000081	0.000011
Chronic Hazard Index at the MEIW	0.0051	0.010	0.00016	0.00015	0.00041
Acute Hazard Index at the PMI	0.030	0.043	0.0017	0.0017	0.00070
Acute Hazard Index at the MEIR	0.0081	0.010	0.0012	0.0012	0.00023
Acute Hazard Index at a Sensitive Receptor	0.0048	0.0072	0.00078	0.00078	0.00021
Acute Hazard Index at the MEIW	0.030	0.043	0.0017	0.0017	0.00070

[a] The results in Table DR8-2 represent the predicted excess risk for each individual emission unit in accordance with SCAQMD Rule 1401.

[b] A source with an excess cancer risk less than 1 in 1 million individuals is considered to be less than significant. A source with an excess cancer risk less than 10 in 1 million is considered less than significant if T-BACT is installed. A chronic or acute hazard index less than 1.0 for each source is considered to be a less-than-significant health risk.

[c] Cancer risk values are based on the Draft RMP Derived methodology.

[d] Cancer risk values are based on the OEHHA Derived methodology.

If you require further information, please do not hesitate contacting me at 562-493-7840.

Sincerely,

Stephen O'Kane
Manager
AES Huntington Beach, LLC
Attachments

cc: Robert Mason/CH2M HILL
Jennifer Didlo/AES
Melissa Foster/Stoel Rives

Attachment 1
Supporting Documentation for Air Quality Impacts Analysis and Health Risk Assessment

Huntington Beach Energy Project
Attachment 1, Table 1
Annual Operation Load Scenario Details
November 2015

Annual Operation Load Scenario : Stack Parameters, Emission Rates, and Results

Exhaust Scenario		CC04		CC05		CC06		CC07		SC04		SC05		SC06		SC07		AB
Source ID		GE 7FA.05-01	GE 7FA.05-02	GE 7FA.05-01	GE 7FA.05-02	GE 7FA.05-01	GE 7FA.05-02	GE 7FA.05-01	GE 7FA.05-02	GE LMS 100PB-01	GE LMS 100PB-02	GE LMS 100PB-01	GE LMS 100PB-02	GE LMS 100PB-01	GE LMS 100PB-02	GE LMS 100PB-01	GE LMS 100PB-02	Auxiliary Boiler
Parameter	**Units**	**Values per Emission Unit**																
Stack Parameters																		
Easting (X)	m	409449	409474	409449	409474	409449	409474	409449	409474	409149	409185	409149	409185	409149	409185	409149	409185	409438
Northing (Y)	m	3723146	3723182	3723146	3723182	3723146	3723182	3723146	3723182	3723193	3723168	3723193	3723168	3723193	3723168	3723193	3723168	3723236
Base Elevation	m	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66
Load	%	100	100	100	100	75	75	44	44	100	100	100	100	75	75	50	50	N/A
Ambient Temperature	°F	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	N/A
Stack Height	m	45.7	45.7	45.7	45.7	45.7	45.7	45.7	45.7	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
Temperature	K	374	374	375	375	353	353	350	350	697	697	699	699	709	709	748	748	432
Exit Velocity	m/s	20.1	20.1	20.2	20.2	14.9	14.9	11.8	11.8	33.1	33.1	33.0	33.0	28.4	28.4	23.6	23.6	21.2
Stack Diameter	m	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	0.91
Emission Rates																		
Annual NO_2	g/s	1.63	1.63	1.61	1.61	1.30	1.30	1.02	1.02	0.24	0.24	0.23	0.23	0.21	0.21	0.18	0.18	0.017
	lb/hr	13.0	13.0	12.8	12.8	10.3	10.3	8.12	8.12	1.88	1.88	1.86	1.86	1.66	1.66	1.46	1.46	0.14
Annual PM_{10}	g/s	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.010
	lb/hr	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.082
Annual $PM_{2.5}$	g/s	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.010
	lb/hr	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.082
Annual NO_2 Results per Emission Source																		
Maximum Modeled Impact [a, b]	µg/m³	0.27		0.27		0.38		0.45		0.030		0.029		0.030		0.030		0.14
Background Concentration [c]	µg/m³	21.8		21.8		21.8		21.8		21.8		21.8		21.8		21.8		21.8
Total Impact	µg/m³	22.1		22.1		22.2		22.3		21.8		21.8		21.8		21.8		21.9
Annual PM_{10} Results per Emission Source																		
Maximum Modeled Impact [a]	µg/m³	0.19		0.19		0.33		0.51		0.021		0.022		0.025		0.029		0.11
Background Concentration [d]	µg/m³	19.3		19.3		19.3		19.3		19.3		19.3		19.3		19.3		19.3
Total Impact	µg/m³	19.5		19.5		19.6		19.8		19.3		19.3		19.3		19.3		19.4
Annual $PM_{2.5}$ Results per Emission Source																		
Maximum Modeled Impact [a]	µg/m³	0.19		0.19		0.33		0.51		0.021		0.022		0.025		0.029		0.11
Background Concentration [d]	µg/m³	8.60		8.60		8.60		8.60		8.60		8.60		8.60		8.60		8.60
Total Impact	µg/m³	8.79		8.79		8.93		9.11		8.62		8.62		8.62		8.63		8.71
Annual NO_2 Facility-wide Results																		
Maximum Modeled Impact [b, e]	µg/m³									0.56								
Background Concentration [c]	µg/m³									21.8								
Total Impact	µg/m³									22.4								
Annual PM_{10} Facility-wide Results																		
Maximum Modeled Impact [f]	µg/m³									0.59								
Background Concentration [d]	µg/m³									19.3								
Total Impact	µg/m³									19.9								
Annual $PM_{2.5}$ Facility-wide Results																		
Maximum Modeled Impact [f]	µg/m³									0.59								
Background Concentration [d]	µg/m³									8.60								
Total Impact	µg/m³									9.19								

Notes:
N/A = Not applicable

[a] Maximum modeled turbine impacts are for the operation of both turbines operating at the appropriate exhaust scenario.

[b] The maximum modeled annual NO_2 impacts include an ambient ratio of 0.75 (EPA, 2005).

[c] The annual NO_2 background concentration is the highest concentration monitored during 2011 through 2013 at the Costa Mesa monitoring station.

[d] The annual PM_{10} and $PM_{2.5}$ background concentrations are the highest concentrations monitored during 2011 through 2013 at the Mission Viejo monitoring station.

[e] The maximum modeled annual NO_2 facility-wide impact is based on both GE 7FA.05 turbines operating at minimum load (exhaust scenario CC07), both GE LMS-100PB turbines operating at average load (exhaust scenario SC06), and the auxiliary boiler.

[f] The maximum modeled annual PM_{10} and $PM_{2.5}$ facility-wide impacts are based on both GE 7FA.05 turbines operating at minimum load (exhaust scenario CC07), both GE LMS-100PB turbines operating at minimum load (exhaust scenario SC07), and the auxiliary boiler.

Huntington Beach Energy Project

Attachment 1, Table 2

1-hour NO_2 Operation Load Scenario Details

November 2015

1-hour NO_2 Operation Load Scenario: Stack Parameters and Emission Rates

Exhaust Scenario		CC07		SC07		AB
Source ID		GE 7FA.05-01	GE 7FA.05-02	GE LMS 100PB-01	GE LMS 100PB-02	Auxiliary Boiler
Parameter	**Units**	**Values per Emission Unit**				
Stack Parameters						
Easting (X)	m	409449	409474	409149	409185	409438
Northing (Y)	m	3723146	3723182	3723193	3723168	3723236
Base Elevation	m	3.66	3.66	3.66	3.66	3.66
Load	%	44	44	50	50	N/A
Ambient Temperature	°F	65.8	65.8	65.8	65.8	N/A
Stack Height	m	45.7	45.7	24.4	24.4	24.4
Temperature	K	350	350	748	748	432
Exit Velocity	m/s	11.8	11.8	23.6	23.6	21.2
Stack Diameter	m	6.10	6.10	4.11	4.11	0.91
Emission Rates						
1-hour NO_2	g/s	7.18	7.18	2.67	2.67	0.027
	lb/hr	57.0	57.0	21.2	21.2	0.21

Notes:

N/A = Not applicable

Huntington Beach Energy Project

Attachment 1, Table 3

Seasonal Hour-of-Day Background NO_2 Concentrations*

November 2015

3-Year Average Seasonal Hour-of-Day Background NO_2 Concentrations (98th Percentile Values)

Hour-of-Day	Spring	Summer	Fall	Winter
1	37.3	8.98	28.7	37.3
2	35.0	9.12	26.5	36.0
3	35.2	8.61	28.2	33.8
4	23.4	12.9	27.0	27.9
5	32.6	17.2	27.5	33.4
6	35.2	18.3	29.8	34.5
7	41.7	22.3	36.5	37.4
8	43.8	18.7	41.0	46.1
9	33.8	13.3	38.7	50.5
10	21.9	10.7	37.3	51.2
11	25.1	10.1	31.4	46.7
12	20.0	8.32	32.4	47.8
13	19.4	6.27	25.1	47.9
14	16.2	6.39	19.9	48.7
15	16.4	6.06	22.3	47.6
16	14.8	7.87	24.0	51.1
17	15.0	7.78	29.7	53.0
18	25.9	8.39	42.1	51.9
19	35.9	11.5	44.3	50.7
20	46.3	11.0	41.1	46.0
21	44.8	12.1	37.8	46.7
22	41.6	11.5	35.3	44.2
23	41.1	11.0	32.7	41.7
24	39.4	10.3	29.1	39.2

Notes:

*Background concentrations monitored at the Costa Mesa Monitoring Station for 2010 through 2012.

Huntington Beach Energy Project

Attachment 1, Table 4

24-hour PM_{10} Class II SIL and Increment Details

November 2015

24-hour PM_{10} Class II SIL and Increment: Stack Parameters, Emission Rates, and Results

Exhaust Scenario		CC07 [a]		CC06 [b]		SC07		AB
Source ID		GE 7FA.05-01	GE 7FA.05-02	GE 7FA.05-01	GE 7FA.05-02	GE LMS 100PB-01	GE LMS 100PB-02	Auxiliary Boiler
Parameter	**Units**	**Values per Emission Unit**						
Stack Parameters								
Easting (X)	m	409449	409474	409449	409474	409149	409185	409438
Northing (Y)	m	3723146	3723182	3723146	3723182	3723193	3723168	3723236
Base Elevation	m	3.66	3.66	3.66	3.66	3.66	3.66	3.66
Load	%	44	44	75	75	50	50	N/A
Ambient Temperature	°F	65.8	65.8	65.8	65.8	65.8	65.8	N/A
Stack Height	m	45.7	45.7	45.7	45.7	24.4	24.4	24.4
Temperature	K	350	350	353	353	748	748	432
Exit Velocity	m/s	11.8	11.8	14.9	14.9	23.6	23.6	21.2
Stack Diameter	m	6.10	6.10	6.10	6.10	4.11	4.11	0.91
Emission Rates								
24-hour PM_{10}	g/s	1.13	1.13	1.13	1.13	0.79	0.79	0.012
	lb/hr	9.00	9.00	9.00	9.00	6.24	6.24	0.091
Facility-wide Results								
Maximum Modeled Impact [c, d]	$\mu g/m^3$	4.93						

Notes:

N/A = Not applicable

[a] To comply with the Class II SILs and Increments, both GE 7FA.05 turbines were assumed to operate for 20 hours per day in this exhaust scenario.

[b] To comply with the Class II SILs and Increments, both GE 7FA.05 turbines were assumed to operate for 4 hours per day in this exhaust scenario.

[c] Background concentrations are not used in the comparison to Class II SILs and Increments and are not, therefore, presented here.

[d] The maximum modeled impact is based on both GE 7FA.05 turbines operating 20 hours per day at minimum load (exhaust scenario CC07) and 4 hours per day at average load (exhaust scenario CC06).

Huntington Beach Energy Project
Attachment 1, Table 5
Operational HRA Details
November 2015

Operational HRA: Stack Parameters, Emission Rates, and Results

Exhaust Scenario		CC07		SC07		AB
Source ID		GE 7FA.05-01	GE 7FA.05-02	GE LMS 100PB-01	GE LMS 100PB-02	Auxiliary Boiler
Parameter	**Units**	**Values per Emission Unit**				
Stack Parameters						
Easting (X)	m	409449	409474	409149	409185	409438
Northing (Y)	m	3723146	3723182	3723193	3723168	3723236
Base Elevation	m	3.66	3.66	3.66	3.66	3.66
Load	%	44	44	50	50	N/A
Ambient Temperature	°F	65.8	65.8	65.8	65.8	N/A
Stack Height	m	45.7	45.7	24.4	24.4	24.4
Temperature	K	350	350	748	748	432
Exit Velocity	m/s	11.8	11.8	23.6	23.6	21.2
Stack Diameter	m	6.10	6.10	4.11	4.11	0.91
Emission Rates						
Ammonia	lb/hr	15.2	15.2	6.14	6.14	N/A
	lb/yr	100,290	100,290	8,595	8,595	N/A
1,3-Butadiene	lb/hr	0.0010	0.0010	0.00037	0.00037	N/A
	lb/yr	6.21	6.21	0.52	0.52	N/A
Acetaldehyde	lb/hr	0.39	0.39	0.15	0.15	0.00021
	lb/yr	2,548	2,548	213	213	0.92
Acrolein	lb/hr	0.0080	0.0080	0.0031	0.0031	0.00018
	lb/yr	52.2	52.2	4.36	4.36	0.80
Benzene	lb/hr	0.0072	0.0072	0.0028	0.0028	0.00039
	lb/yr	47.1	47.1	3.93	3.93	1.71
Ethylbenzene	lb/hr	0.071	0.071	0.027	0.027	0.00047
	lb/yr	462	462	38.5	38.5	2.04
Formaldehyde	lb/hr	0.79	0.79	0.31	0.31	0.00083
	lb/yr	5,196	5,196	433	433	3.63
Naphthalene	lb/hr	0.0029	0.0029	0.0011	0.0011	0.000020
	lb/yr	18.8	18.8	1.57	1.57	0.089
PAHs	lb/hr	0.0010	0.0010	0.00039	0.00039	0.0000067
	lb/yr	6.50	6.50	0.54	0.54	0.030
Propylene Oxide	lb/hr	0.064	0.064	0.025	0.025	N/A
	lb/yr	419	419	35.0	35.0	N/A
Toluene	lb/hr	0.29	0.29	0.11	0.11	0.0018
	lb/yr	1,883	1,883	157	157	7.83
Xylene	lb/hr	0.14	0.14	0.055	0.055	0.0013
	lb/yr	924	924	77.1	77.1	5.82
Hexane	lb/hr	N/A	N/A	N/A	N/A	0.00031
	lb/yr	N/A	N/A	N/A	N/A	1.36
Results per Emission Source						
Cancer Risk at the PMI (per million)*		2.02	4.08	0.061	0.061	0.30
Chronic Hazard Index at the PMI		0.0051	0.010	0.00016	0.00015	0.00041
Acute Hazard Index at the PMI		0.030	0.043	0.0017	0.0017	0.00070
Facility-wide Results						
Cancer Risk at the PMI (per million)*				6.18		
Chronic Hazard Index at the PMI				0.015		
Acute Hazard Index at the PMI				0.073		

Notes:
N/A = Not applicable
*Cancer risk values are based on the Draft Risk Management Policy Derived methodology.

Huntington Beach Energy Project
Attachment 1, Table 6
Combined Cycle: Summary of Operation Emissions – Air Toxics
November 2015

Assumptions:

Maximum Heat Input Case:	Base load operation	
Total Operations (per turbine - includes startup and shutdown hours):	6,612	hrs/yr
Gas Heat Content:	1,050	MMBtu/MMscf
Maximum Hourly Heat Input (per turbine):	2,273	MMBtu/hr (HHV)
Average Annual Heat Input (per turbine):	2,248	MMBtu/hr (HHV)
Number of Turbines:	2	

Proposed Project	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
Compound	lb/MMcf [a]	lb/MMBtu [a]	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy
Ammonia [b]	5 ppm	-	15.2	100,290	50.1	30.5	200,580	100
1,3-Butadiene	4.39E-04	4.18E-07	0.0010	6.21	0.0031	0.0019	12.4	0.0062
Acetaldehyde [c]	1.80E-01	1.71E-04	0.39	2,548	1.27	0.78	5,096	2.55
Acrolein [c]	3.69E-03	3.51E-06	0.0080	52.2	0.026	0.016	104	0.052
Benzene [c]	3.33E-03	3.17E-06	0.0072	47.1	0.024	0.014	94.3	0.047
Ethylbenzene	3.26E-02	3.10E-05	0.071	462	0.23	0.14	923	0.46
Formaldehyde [c]	3.67E-01	3.50E-04	0.79	5,196	2.60	1.59	10,391	5.20
Naphthalene	1.33E-03	1.27E-06	0.0029	18.8	0.0094	0.0058	37.7	0.019
PAHs [d]	9.18E-04	8.74E-07	0.0010	6.50	0.0032	0.0020	13.0	0.0065
Propylene Oxide	2.96E-02	2.82E-05	0.064	419	0.21	0.13	838	0.42
Toluene	1.33E-01	1.27E-04	0.29	1,883	0.94	0.58	3,766	1.88
Xylene	6.53E-02	6.22E-05	0.14	924	0.46	0.28	1,849	0.92
TOTAL HAPs				**11,563**	**5.78**		**23,125**	**11.6**
TOTAL TACs				**5,249**	**2.62**		**10,498**	**5.25**

Notes:

[a] Provided by SCAQMD via e-mail correspondence on 11/3/2015, with the exception of ammonia. Units of lb/MMBtu calculated by dividing lb/MMscf by the gas heat content.

[b] Based on the operating exhaust NH_3 limit of 5 ppmv @ 15% O_2 and an F-factor of 8,710.

[c] Emission factors account for the use of an oxidation catalyst, as provided by SCAQMD via e-mail correspondence on 11/3/2015.

[d] Per Section 3.1.4.3 of *AP-42* (EPA, 2000), PAH emissions were assumed to be controlled up to 50% through the use of an oxidation catalyst.

Huntington Beach Energy Project
Attachment 1, Table 7
Simple Cycle: Summary of Operation Emissions – Air Toxics
November 2015

Assumptions:

Maximum Heat Input Case:	Base load operation	
Total Operations (per turbine - includes startup and shutdown hours):	1,401	hrs/yr
Gas Heat Content:	1,050	MMBtu/MMscf
Maximum Hourly Heat Input (per turbine):	885	MMBtu/hr (HHV)
Average Annual Heat Input (per turbine):	885	MMBtu/hr (HHV)
Number of Turbines:	2	

Proposed Project	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
Compound	**lb/MMcf [a]**	**lb/MMBtu [a]**	**lb/hr**	**lb/yr**	**tpy**	**lb/hr**	**lb/yr**	**tpy**
Ammonia [b]	5 ppm	-	6.14	8,595	4.30	12.3	17,190	8.60
1,3-Butadiene	4.39E-04	4.18E-07	0.00037	0.52	0.00026	0.00074	1.04	0.00052
Acetaldehyde [c]	1.80E-01	1.71E-04	0.15	213	0.11	0.30	425	0.21
Acrolein [c]	3.69E-03	3.51E-06	0.0031	4.36	0.0022	0.0062	8.72	0.0044
Benzene [c]	3.33E-03	3.17E-06	0.0028	3.93	0.0020	0.0056	7.87	0.0039
Ethylbenzene	3.26E-02	3.10E-05	0.027	38.5	0.019	0.055	77.0	0.039
Formaldehyde [c]	3.67E-01	3.50E-04	0.31	433	0.22	0.62	867	0.43
Naphthalene	1.33E-03	1.27E-06	0.0011	1.57	0.00079	0.0022	3.14	0.0016
PAHs [d]	9.18E-04	8.74E-07	0.00039	0.54	0.00027	0.00077	1.08	0.00054
Propylene Oxide	2.96E-02	2.82E-05	0.025	35.0	0.017	0.050	69.9	0.035
Toluene	1.33E-01	1.27E-04	0.11	157	0.079	0.22	314	0.16
Xylene	6.53E-02	6.22E-05	0.055	77.1	0.039	0.11	154	0.077
TOTAL HAPs				**965**	**0.48**		**1,929**	**0.96**
TOTAL TACs				**438**	**0.22**		**876**	**0.44**

Notes:

[a] Provided by SCAQMD via e-mail correspondence on 11/3/2015, with the exception of ammonia. Units of lb/MMBtu calculated by dividing lb/MMscf by the gas heat content.

[b] Based on the operating exhaust NH_3 limit of 5 ppmv @ 15% O_2 and an F-factor of 8,710.

[c] Emission factors account for the use of an oxidation catalyst, as provided by SCAQMD via e-mail correspondence on 11/3/2015.

[d] Per Section 3.1.4.3 of *AP-42* (EPA, 2000), PAH emissions were assumed to be controlled up to 50% through the use of an oxidation catalyst.

Huntington Beach Energy Project
Attachment 1, Table 8
Auxiliary Boiler: Summary of Operation Emissions – Air Toxics
November 2015

Assumptions:

Total Operations:	8,760	hrs/yr
Gas Heat Content:	1,050	MMBtu/MMscf
Maximum Hourly Heat Input:	70.8	MMBtu/hr (HHV)
Maximum Annual Heat Input [a]:	310,096	MMBtu/yr (HHV)

Proposed Project	Emission Factors		Emissions		
Compound	**lb/MMscf [b]**	**lb/MMBtu [b]**	**lb/hr**	**lb/yr**	**tpy**
Benzene	5.80E-03	5.52E-06	3.91E-04	1.71E+00	8.56E-04
Formaldehyde	1.23E-02	1.17E-05	8.29E-04	3.63E+00	1.82E-03
PAHs	1.00E-04	9.52E-08	6.74E-06	2.95E-02	1.48E-05
Naphthalene	3.00E-04	2.86E-07	2.02E-05	8.86E-02	4.43E-05
Acetaldehyde	3.10E-03	2.95E-06	2.09E-04	9.16E-01	4.58E-04
Acrolein	2.70E-03	2.57E-06	1.82E-04	7.97E-01	3.99E-04
Toluene	2.65E-02	2.52E-05	1.79E-03	7.83E+00	3.91E-03
Xylene	1.97E-02	1.88E-05	1.33E-03	5.82E+00	2.91E-03
Ethylbenzene	6.90E-03	6.57E-06	4.65E-04	2.04E+00	1.02E-03
Hexane	4.60E-03	4.38E-06	3.10E-04	1.36E+00	6.79E-04
TOTAL HAPs				**17.5**	**0.0087**
TOTAL TACs				**14.6**	**0.0073**

Notes:

[a] The auxiliary boiler will operate at the maximum hourly firing rate and will have two cold starts, four warm starts, and four hot starts per month.

[b] Provided by SCAQMD via e-mail correspondence on 11/3/2015. Units of lb/MMBtu calculated by dividing lb/MMscf by the gas heat content.