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December 4, 2015

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Subject: Amended Huntington Beach Energy Project (Facility ID 115389)

Dear Mr. Lee:

AES Huntington Beach, LLC (AES) is submitting this letter in response to the South Coast Air Quality Management District's (SCAQMD) November 12, 2015 completeness determination letter for the Huntington Beach Energy Project's (HBEP) air permit application. Attached to this letter is a report documenting the HBEP's emissions, air quality and public health impacts, and regulatory compliance, revised to reflect the correct combined-cycle turbine volatile organic compound and particulate matter emission rates, increased operating profile for the simple-cycle turbines, and air toxics emission factors requested by SCAQMD staff. If you require further information, please do not hesitate contacting me at 562-493-7840.

Sincerely,

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Report

Revised Huntington Beach Energy Project Air Permit Application Documentation

Applicant
AES Huntington Beach, LLC

December 2015

Prepared by
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SECTION 1

Background

The Huntington Beach Energy Project (HBEP) is a proposed 844-megawatt (MW) nominal power plant to be located at the existing site of the Huntington Beach Generating Station (HBGS), situated approximately 900 feet from the Pacific Ocean. The surrounding area is a mix of residential, wetland preserve, public beach, and industrial land uses, and is bordered by a manufactured home/recreation vehicle park on the west, Huntington Beach Channel and residential areas to the north and east, a tank farm to the north, the Huntington Beach Wetland Preserve/Magnolia Marsh wetlands on the southeast, and the Huntington Beach State Park and Pacific Ocean to the south and southwest. The entire parcel on which the HBGS is located, including the switchyard and tank farm, is approximately 106 acres, and the new plant will be constructed on about 28.6 of those acres. The nearest inhabitants to the proposed project site are in a residential area approximately 300 to 400 feet west of the site.

The current HBGS consists of two utility boilers. Boilers 1 and 2 are identical units, each rated at 215 MW output and 2,021 million British thermal units per hour (MMBtu/hr) heat input. The boilers are equipped with selective catalytic reduction (SCR) systems, and are fired exclusively on natural gas. The boilers were built in the 1950s. There are two 275-horsepower (hp) diesel-fueled emergency engines, which were installed in 2001 for fire control, a 30,000-gallon urea storage tank, and two urea-to-ammonia converters. The urea is used in the SCR systems, and is converted into ammonia before injection into the boiler exhaust with the use of the urea-ammonia converters. There is also an old peaker turbine (Unit 5) that has been shut down and no longer operates, as well as Boilers 3 and 4, which have also been shut down.

The current ownership of the equipment at the site is split between AES Huntington Beach, LLC (AES), which owns Boilers 1 and 2, the two emergency engines, and the urea storage tank, and Edison Mission Energy, LLC, which purchased Boilers 3 and 4 and permanently retired them in November 2012. AES is the operator for all the equipment onsite. Boilers 1 and 2, along with their SCR systems, urea storage tank, and urea-to-ammonia converters will be shut down concurrent with the combined-cycle power block coming online.

As part of this project, AES has also proposed to shut down Boiler 7, rated at 4,752.2 MMBtu/hr heat input and 480 MW output, at the AES Redondo Beach Generating Station. Therefore, the total generating capacity being retired as part of this project is 910 MW.

The proposed new facility will consist of two power blocks (one combined-cycle and one simple-cycle) capable of producing a nominal power output of 844 MW net. The combined-cycle power block will consist of two combustion turbine generators (CTG), two heat recovery steam generators (HRSG) without duct firing, one steam turbine generator (STG), a natural-gas-fired auxiliary boiler, and auxiliary equipment including an aqueous ammonia storage tank and an oil/water separator. The simple-cycle power block will consist of two CTGs and auxiliary equipment including an aqueous ammonia storage tank and an oil/water separator. AES, a wholly-owned subsidiary of AES Southland Corp., will be the facility owner and operator of the new plant.

The plant will be designed to supply power to the wholesale energy market through the existing substation, located adjacent and to the northeast of the property. Output will depend on market conditions and dispatch requirements. The plant's expected availability is over 98 percent on an annual basis, with the actual capacity factor anticipated to be between 45 and 75 percent. AES expects the plant to be dispatched at peaking and intermediate loads on a regular basis. Therefore, the plant is designed to have the ability to start quickly – cold starts should be 60 minutes for the combined-cycle power block and 30 minutes for the simple-cycle power block – and can operate with only one turbine online at any given time.

The HBEP requires a significant revision to the existing Title V permit at the AES, Huntington Beach site (Facility ID# 115389). The new project is also subject to the oxides of nitrogen (NO_x) and oxides of sulfur (SO_x) Regional Clean Air Incentives Market (RECLAIM) and Prevention of Significant Deterioration (PSD)

regulations for nitrogen dioxide (NO₂), carbon monoxide (CO), greenhouse gases (GHG), and particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM₁₀).

Construction of the combined-cycle power block is scheduled to begin in the second quarter of 2017 and end in the second quarter of 2020. Construction of the simple-cycle power block is scheduled to begin in the second quarter of 2022 and end in the fourth quarter of 2023. Demolition of existing HBGS Unit 5 will make room for construction of the combined-cycle power block, and is scheduled to begin in the first quarter of 2016 and end in the second quarter of 2017. Similarly, demolition of existing HBGS Units 3 and 4 will make room for construction of the simple-cycle power block, and is scheduled to begin in the second quarter of 2020 and end in the second quarter of 2022. However, demolition of existing HBGS Units 3 and 4 is not considered part of the project. Existing HBGS Units 1 and 2 will be demolished following commercial operation of the simple-cycle power block, beginning in the first quarter of 2024 and ending in the fourth quarter of 2025.

SECTION 2

Process Description for Combustion Turbines

The gas turbine facility will consist of two combined-cycle and two simple-cycle combustion turbines. The combined-cycle power block will consist of two General Electric (GE) Frame 7FA.05 CTGs, each rated at 231.2 MW (International Organization for Standardization [ISO] gross) and equipped with dry low NO_x (DLN) burners, evaporative inlet air cooling, an SCR, and an oxidation catalyst, two HRSGs, and an STG rated at 230.9 MW (ISO gross). The combined-cycle power block will include a Rentech, model D-Type water tube auxiliary boiler rated at 71 MMBtu/hr, higher heating value (HHV) basis, with a single John Zink/Coen RMB low NO_x burner. The auxiliary boiler will also include an SCR and flue-gas recirculation emission controls. Other ancillary equipment includes an ammonia storage tank and an oil/water separator. The combined-cycle CTG exhaust stacks will be 150 feet tall and the auxiliary boiler exhaust stack will be 80 feet tall.

The simple-cycle power block will consist of two GE LMS 100PB CTGs, each rated at 100.8 MW (average ambient temperature gross) and equipped with DLN burners, evaporative inlet air-cooling, an SCR, and an oxidation catalyst, an ammonia storage tank, and an oil/water separator. The simple-cycle CTG exhaust stacks will be 80 feet tall.

Each power block is independently operated.

The system output will vary depending on the ambient air temperature condition, use of evaporative coolers, amount of auxiliary load, generator power factor, and other factors. At the site’s low temperature (maximum output case), the plant total output is restricted to 894.4 MW (693.6 MW for the combined-cycle CTGs and 200.8 MW for the simple-cycle CTGs). Table 2-1 presents the combined-cycle output on a per turbine basis. Table 2-2 presents the simple-cycle output on a per turbine basis.

TABLE 2-1
Combined-cycle Output Per Turbine

	ISO 59°F – 60% RH (Evaporative Cooling Off)	110°F – 8% RH (Evaporative Cooling On)	32°F – 87% RH (Evaporative Cooling Off)	66°F – 58% RH (Evaporative Cooling On)
Gas Turbine Heat Input, MMBtu/hr, HHV	2,240	2,123	2,273	2,248
Gas Turbine Gross Output ^a , kW	231,197	215,890	236,140	232,073
Steam Turbine Gross Output ^b , kW	115,470	96,702	110,675	114,838
Total Gross Power Output ^c , kW	346,667	312,592	346,815	346,911
Net Power Output, kW	339,875	318,160	340,745	340,840
Net Plant Heat Rate, Btu/kWh, LHV	5,967	6,271	6,017	5,984
Net Plant Heat Rate, Btu/kWh, HHV	6,576	6,912	6,672	6,596

^a On a per turbine basis.

^b One-half of the total steam turbine output.

^c Multiply by 2 to get the output per power block.

Notes:

- °F = degrees Fahrenheit
- Btu/kWh = British thermal unit(s) per kilowatt-hour
- kW = kilowatt
- LHV = lower heating value
- RH = relative humidity

TABLE 2-2
Simple-cycle Output Per Turbine

	110°F – 8% RH (Evaporative Cooling On)	32°F – 87% RH (Evaporative Cooling Off)	66°F – 58% RH (Evaporative Cooling On)
Gas Turbine Heat Input, MMBtu/hr, HHV	737	880	885
Gas Turbine Gross Output, kW	77,501	100,393	100,814
Net Power Output, kW	76,041	98,934	99,355
Net Plant Heat Rate, Btu/kWh, LHV	8,726	8,012	8,027
Net Plant Heat Rate, Btu/kWh, HHV	9,686	8,894	8,910

There will be no new transmission lines or gas lines needed for the project. Each of the components is discussed in more detail below.

2.1 Combined-cycle Turbine Data

The combined-cycle power block will consist of two GE Frame 7FA.05 CTGs, each rated at 231.2 MW (ISO gross) and equipped with DLN burners, evaporative inlet air cooling, an SCR, and an oxidation catalyst, two HRSGs, and an STG rated at 230.9 MW (ISO gross). Each turbine will be equipped with inlet air filters and coolers. The turbines will combust natural gas exclusively. Total heat input for two turbines at nominal conditions is 4,496 MMBtu/hr, HHV basis, and fuel use at these conditions is approximately 4.28 million cubic feet per hour (MMcf/hr), based on a natural gas heat content of 1,050 British thermal unit(s) per cubic foot (Btu/cf). Pertinent turbine specifications are summarized in Table 2-3.

TABLE 2-3
Combined-cycle Turbine Data

Parameter	Specification
CT Manufacturer	General Electric
Model	Frame 7FA.05
Fuel Type	Natural gas
Maximum Power Output	236.14 MW (1 turbine @ 32°F, no duct firing)
Maximum Heat Input	2,273 MMBtu/hr, HHV (1 turbine @ 32°F)
Maximum Fuel Consumption	2.16 MMcf/hr, HHV (1 turbine @ 32°F, 1,050 Btu/cf)
Maximum Exhaust Flow	75.7 MMcf/hr, dry @ 15% O ₂ (1 turbine @ 32°F)
NO _x Combustion Control	DLN 9 ppm
NO _x Post Combustion Control	SCR 2.0 ppm, 1-hour average
Ammonia Injection Rate per Turbine	242.0 lb/hr maximum
Steam Turbine Output	229.68 MW @ 65.8°F
Net Plant Heat Rate, LHV	5,967 Btu/kWh @ ISO
Net Plant Heat Rate, HHV	6,576 Btu/kWh @ ISO

Notes:

lb/hr = pound(s) per hour
O₂ = oxygen
ppm = part(s) per million

Each turbine will exhaust to an HRSG. The HRSGs are designed to convert heat from the exhaust gas to produce steam for use in the steam turbine. Exhaust gases enter the HRSG at approximately 1,100 degrees Fahrenheit (°F). The HRSGs and steam turbine both employ a triple pressure design. Feed water into the

HRSO will be converted to high, intermediate, and low-pressure steam for use in the steam turbine. The steam exits the steam turbine as low-pressure steam, enters the air-cooled condenser, and is cooled and condensed back into water. Each HRSO will vent to a separate exhaust stack.

2.2 Simple-cycle Turbine Data

The simple-cycle power block will consist of two GE LMS 100PB CTGs, each rated at 100.8 MW (average ambient temperature gross) and equipped with DLN burners, evaporative inlet air-cooling, an SCR, and an oxidation catalyst. The turbines will combust natural gas exclusively. Total heat input for two turbines at nominal conditions is 1,770 MMBtu/hr, HHV basis, and fuel use at these conditions is approximately 1.69 MMcf/hr, based on a natural gas heat content of 1,050 Btu/cf. Pertinent turbine specifications are summarized in Table 2-4.

TABLE 2-4
Simple-cycle Turbine Data

Parameter	Specification
CT Manufacturer	General Electric
Model	LMS 100PB
Fuel Type	Natural gas
Maximum Power Output	100.8 MW (1 turbine @ 65.8°F, no duct firing)
Maximum Heat Input	885 MMBtu/hr, HHV (1 turbine @ 65.8°F)
Maximum Fuel Consumption	0.84 MMcf/hr, HHV (1 turbine @ 65.8°F, 1,050 Btu/cf)
Maximum Exhaust Flow	56.5 MMcf/hr, dry @ 15% O ₂ (1 turbine @ 65.8°F)
NO _x Combustion Control	DLN 25 ppm
NO _x Post Combustion Control	SCR 2.5 ppm, 1-hour average
Ammonia Injection Rate per Turbine	180 lb/hr maximum
Net Plant Heat Rate, LHV	8,027 Btu/kWh @ 66°F
Net Plant Heat Rate, HHV	8,910 Btu/kWh @ 66°F

Each turbine will exhaust to an exhaust transition containing the air pollution control system and will vent to a separate exhaust stack.

2.3 Auxiliary Boiler

The combined-cycle power block will use steam supplied from the auxiliary boiler to reach its base load quickly while simultaneously reducing both startup time of the gas turbines and the associated emissions. The auxiliary boiler specifications are listed in Table 2-5.

TABLE 2-5
Auxiliary Boiler Specifications

Parameter	Specification
Boiler Manufacturer	Rentech
Maximum Heat Input	71 MMBtu/hr
Model No.	D-Type
Boiler Type	Water-tube
Fuel Type	Natural Gas
Maximum Fuel Consumption	0.068 MMcf/hr
Maximum Exhaust Flow	29,473 acfm
Maximum Exhaust Temperature	318°F

TABLE 2-5

Auxiliary Boiler Specifications

Parameter	Specification
NO _x Combustion Control	Low NO _x Burner
NO _x BACT Concentration at Stack Outlet	5 ppm @ 3% O ₂ (post-SCR)
CO BACT Concentration at Stack Outlet	50 ppm @ 3% O ₂ (post-SCR)

Notes:

acfm = actual cubic feet per minute

BACT = Best Available Control Technology

2.4 Air Pollution Control (APC) Equipment

APC equipment will be installed to control NO_x, CO, and volatile organic compounds (VOC) from the gas turbines. Each APC system will consist of the following: 1) DLN burner, 2) SCR, and 3) oxidation catalyst.

DLN Burners – Each CTG will include built-in pollution controls based on a dry combustion design (DLN burner) to reduce NO_x emissions. This control will reduce the combined-cycle CTG NO_x emissions to 9 part(s) per million by volume, dry basis (ppmvd) at 15 percent oxygen (O₂) and the simple-cycle CTG NO_x emissions to 25 ppmvd at 15 percent O₂. The DLN control will be fully operational when the turbine reaches a load of approximately 60 percent or more.

Oxidation Catalyst System – An oxidation catalyst will be installed in the HRSG section of the combined-cycle CTGs and the exhaust transition for the simple-cycle CTGs. The catalyst will be designed to reduce combined-cycle CTG exhaust gas CO to 2.0 ppmvd or less at 15 percent O₂ and VOC to 2.0 ppmvd at 15 percent O₂ and simple-cycle CTG exhaust gas CO to 4.0 ppmvd or less at 15 percent O₂ and VOC to 2.0 ppmvd at 15 percent O₂. Pertinent oxidation catalyst specifications are provided in Tables 2-6 and 2-7.

TABLE 2-6

Combined-cycle Oxidation Catalyst Data

Parameter	Specification
Manufacturer	BASF
Catalyst Type	Palladium in a honeycomb structure
Catalyst Volume	265.8 cf
Catalyst Area	1,679 ft ²
Reactor Dimensions	2.1" L X 26.17' W X 71.8' H (includes SCR catalyst housing)
Space Velocity	467,260 hr ⁻¹
Area Velocity	73,971 ft/hr
CO Removal Efficiency	70 – 85%
Outlet CO	2.0 ppmvd @ 15% O ₂
VOC Removal Efficiency	50 – 60%
Outlet VOC	2.0 ppmvd @ 15% O ₂
Minimum Operating Temperature	570°F

Notes:

cf = cubic feet

ft² = square feet

ft/hr = feet per hour

H = height

hr⁻¹ = per hour

L = length

W = width

TABLE 2-7
Simple-cycle Oxidation Catalyst Data

Parameter	Specification
Manufacturer	BASF Camet
Catalyst Type	Palladium in a honeycomb structure
Catalyst Volume	165.6 cf
Catalyst Area	794.8 ft ²
Reactor Dimensions	0.21' L X 22' W X 36' H (includes SCR catalyst housing)
Space Velocity	139,539 hr ⁻¹
Area Velocity	29,071 ft/hr
CO Removal Efficiency	90 – 96%
Outlet CO	4.0 ppmvd @ 15% O ₂
VOC Removal Efficiency	50 – 60%
Outlet VOC	2.0 ppmvd at 15% O ₂
Minimum Operating Temperature	500°F

SCR System – An SCR catalyst will be installed in the HRSG section of the combined-cycle CTGs, the exhaust transition for the simple-cycle CTGs, and the auxiliary boiler. The SCR system is expected to reduce NO_x emissions to 2.0 ppmvd at 15 percent O₂ on a 1-hour average for the combined-cycle CTGs, 2.5 ppmvd at 15 percent O₂ for the simple-cycle CTGs, and 5 ppmvd at 3 percent O₂ for the auxiliary boiler. The SCR catalyst will be located downstream of the CO catalyst, and will consist of a vanadium/titanium/tungsten type catalyst in a honeycomb structure. Aqueous ammonia (ammonium hydroxide at 19 percent concentration by weight) from the storage tank will be vaporized, diluted with air, and injected into the exhaust through an injection grid. The amount of ammonia injected will vary depending on NO_x reduction requirements, but will be approximately a 1-to-1 molar ratio of ammonia to NO_x. Tables 2-8 and 2-9 present the combined- and simple-cycle SCR system data.

TABLE 2-8
Combined-cycle SCR Catalyst Data

Parameter	Specification
Manufacturer	Cormetech
Catalyst Type	Titanium/Vanadium/Tungsten honeycomb
Catalyst Volume	1,289 cf
Catalyst Area	1,841 ft ²
Reactor Dimensions	18" L X 25.71' W X 71.6' H
Space Velocity	96,352 hr ⁻¹
Area Velocity	67,462 ft/hr
Ammonia Injection Rate	242 lbm/hr
Ammonia Slip	5.0 ppm
Outlet NO _x	2.0 ppm @ 15% O ₂
Guarantee	25,000 hours of operation, or 5 years
SCR/CO Catalyst Total Cost	\$1 million
Operating Temperature Range	570°F – 692°F

Note:

TABLE 2-8
Combined-cycle SCR Catalyst Data

Parameter	Specification
lbm/hr = pound-mole per hour	

TABLE 2-9
Simple-cycle SCR Catalyst Data

Parameter	Specification
Manufacturer	Cormetech CMHT
Catalyst Type	Titanium/Vanadium/Tungsten honeycomb
Catalyst Volume	1,370.4 cf
Catalyst Area	126.5 ft ²
Reactor Dimensions	11.5' L X 10.83' W X 11' H (includes CO catalyst housing)
Space Velocity	16,859 hr ⁻¹
Area Velocity	182,639 ft/hr
Ammonia Injection Rate	180 lbm/hr
Ammonia Slip	5.0 ppm
Outlet NO _x	2.5 ppm @ 15% O ₂
Guarantee	24,000 hours of operation, or 3 years
SCR/CO Catalyst Total Cost	\$1.1 million
Operating Temperature Range	500°F – 870°F

The SCR catalyst for the auxiliary boiler will be installed downstream of the low NO_x burner and will reduce the exhaust NO_x emissions from 9 ppmvd to 5 ppmvd at 3 percent O₂. The SCR catalyst will be manufactured by B&W. The catalyst material will be vanadium based on a homogeneous honeycomb titanium support matrix. The catalyst model will be from the FM Series. The total catalyst volume is 46 cubic feet (cf). The catalyst dimensions will be 3 feet 8 inches high by 5 feet 5 inches wide by 7 feet 3 inches in length. The life cycle of the SCR modules is expected to be 3 years. The SCR warranty is 5 ppmvd ammonia slip at 3 percent O₂. The operating range for the SCR catalyst will be 415°F to 628°F. Table 2-10 is a summary of the specifications of the SCR catalyst for the auxiliary boiler.

TABLE 2-10
Auxiliary Boiler SCR Catalyst Data

Parameters	Specifications
Catalyst Manufacturer	B&W
Catalyst Description	Vanadium
Catalyst Model No.	FM Series
Catalyst Volume	46 cf
Catalyst Area	28 ft ²
Space Velocity	485 hr ⁻¹
Area Velocity	47,800 ft/hr
Stack Outlet CO	50 ppmvd @ 3% O ₂

TABLE 2-10
Auxiliary Boiler SCR Catalyst Data

Parameters	Specifications
Stack Outlet NO _x	5 ppmvd @ 3% O ₂ (1-hour average)
Catalyst Life	3 years
Ammonia Injection Rate	19% aqueous ammonia, provided by the combined-cycle power block aqueous ammonia
Ammonia Source	Storage Tanks
Maximum Operating Temperature	628°F

2.5 Exhaust Stacks

Each combined-cycle CTG/HRSG will be equipped with an identical 20-foot-diameter, 150-foot-tall stack. Each simple-cycle CTG will be equipped with an identical 13.5-foot-diameter, 80-foot-tall stack. The stacks will contain sampling ports for exhaust gas testing. Table 2-11 contains stack data.

TABLE 2-11
Stack Data

Specification	Combined-cycle CTG	Simple-cycle CTG	Auxiliary Boiler
Stack Diameter (ft)	20	13.5	3
Stack Height (ft)	150	80	80
Stack Area (ft ²)	314.2	143.1	7.07
Exhaust Gas Temperature (°F)	194	853	318
Exhaust Gas Volume (MMcf/hr)	75.72 @ 32°F	56.29 @ 32°F	1.77
Exhaust Gas Velocity (ft/min)	4,017 @ 32°F	6,551 @ 32°F	4,170

Notes:

ft = foot

ft/min = feet per minute

2.6 Monitoring Systems

Each turbine will be equipped with continuous stack monitors for NO_x, CO, and O₂, along with a fuel meter. The auxiliary boiler will be equipped with a NO_x, O₂, and fuel meter. A data acquisition system is required to collect information from the analyzers and fuel meters to calculate exhaust flows and mass emissions of NO_x for transmission through the remote terminal unit (RTU). Other parameters which are required to be measured and recorded include the ammonia injection rate, exhaust temperature prior to the SCR catalyst, CTG output, and pressure drop across the SCR catalyst. A NO_x analyzer will be placed upstream of the SCR catalyst for fine tuning the ammonia injection rate and also for use in estimating ammonia slip.

2.7 Ammonia Storage Tanks

Each power block will include a separate ammonia storage tank. The combined-cycle power block and auxiliary boiler will use a 35,000-gallon tank (13 feet in diameter and 45 feet long horizontal tank) and the simple-cycle power block will use a 15,000-gallon tank (6 feet in diameter and 18 feet long horizontal tank) to store a 19 percent aqueous ammonia solution for use in the CTGs and auxiliary boiler SCRs. These tanks are horizontal pressure vessels with pressure relief valves (PRVs) set at 50 pressure square inch, gauge

(psig). During loading, vapors from the tanks are vented back to the filling truck through the vapor return line. The tanks are designed so that, under normal operating conditions, the pressure will not exceed the PRV setting. Expected average combined-cycle and simple-cycle CTG ammonia use is about 32.3 and 24 gallons per hour per CTG, respectively (242 pound(s) per hour [lb/hr] for a combined-cycle CTG and 180 lb/hr for a simple-cycle CTG).

2.8 Cooling System

There are no cooling towers associated with the combined-cycle CTGs as they will be air-cooled. Exhaust steam from the STG will be condensed in an air-cooled condenser. The air-cooled condenser will utilize large fans to blow ambient air across finned tubes through which the low-pressure steam flows. The condensate collects in a receiver located under the air-cooled condenser; condensate pumps will then return the condensate from the receiver back to the HRSGs for reuse. Steam generated by the auxiliary boiler will pass through the HRSGs and STG, and will be condensed in the air-cooled condenser. The simple-cycle CTGs generate no steam; therefore, steam condensing is not required.

2.9 Oil/Water Separator

There will be two new oil/water separators (OWS) installed, one to serve each power block. These OWS will collect potentially oily wastewater from equipment area wash downs and lubricant containing areas. The only potential oil contaminant is lubricating oil associated with the gas turbines and associated feed water pumps. Oil will be collected in the OWS and will be removed by vacuum truck before the oil collection section reaches its capacity.

SECTION 3

Emissions

Emissions from commissioning of the new gas turbines and operation of the new gas turbines and auxiliary boiler will consist of NO_x, CO, VOC, PM₁₀, particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (PM_{2.5}), sulfur dioxide (SO₂), GHGs, and air toxics. The GHGs evaluated include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and sulfur hexafluoride (SF₆), as applicable. Carbon dioxide equivalent (CO₂e) emissions were also determined, using the following global warming potentials (GWPs): 25 for CH₄, 298 for N₂O, and 22,800 for SF₆ (The Climate Registry, 2015).

3.1 Commissioning

Commissioning is a one-time event which occurs following installation and just prior to bringing the equipment online for commercial operation. The commissioning emissions are based on the estimated duration of each commissioning event, emission control efficiencies expected for each event, and turbine operating rates. The commissioning phase for each combustion technology is described in more detail below.

3.1.1 Combined-cycle Turbines

The total duration of the combined-cycle power block commissioning period is expected to be up to 1,992 hours (996 hours per CTG). During the commissioning period, each GE Frame 7FA.05 will be operated for up to 216 hours without emission control systems in operation. The maximum hourly and event commissioning emission rates for the GE Frame 7FA.05s are presented in Table 3-1. Because commissioning is expected to be completed within 1,992 hours, annual impacts for the combined commissioning and operation of the combined-cycle power block were also evaluated since annual emissions during the commissioning year could be higher than those during a noncommissioning year. Therefore, the annual average emission rates associated with commissioning and operation of the GE Frame 7FA.05s are also presented in Table 3-1.

TABLE 3-1
GE Frame 7FA.05 Turbine Commissioning Emission Rates

Commissioning Emissions	VOC	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}
Short-Term Emission Rates						
Maximum Hourly, lb/hr (per turbine) ^a	270	1,900	130	4.86	8.50	8.50
Total Commissioning Period, tons (per 2x1 block) ^b	14.7	101	27.6	4.84	8.47	8.47
Annual Emission Rates						
Annual Average Hourly, lb/hr (per turbine) ^c	N/A	N/A	16.1	N/A	7.38	7.38
Total Commissioning/Operation Period, tons (per 2x1 block) ^d	N/A	N/A	141	N/A	64.7	64.7

^a SO₂, PM₁₀, and PM_{2.5} emissions are not emitted in amounts greater than normal operating rates.

^b Total commissioning period SO₂, PM₁₀, and PM_{2.5} emissions are based on the maximum emission rates at 32°F multiplied by the total number of commissioning hours.

^c Annual average hourly emissions for evaluating annual impacts are based on the sum of total commissioning emissions and annual operation emissions per turbine, divided by 8,760.

^d Total commissioning/operation period emissions are based on the total commissioning period emissions presented here and the annual average operation emission rates at 65.8°F and 100 percent load.

Note:

N/A = not applicable (i.e., no annual average ambient air quality standard exists for these pollutants; therefore, annual average emissions were not modeled)

3.1.2 Simple-cycle Turbines

The total duration of the simple-cycle power block commissioning period is expected to be up to 560 hours (280 hours per turbine). During the commissioning period, each GE LMS 100PB will be operated for up to 4 hours without emission control systems in operation. The maximum hourly and event commissioning emission rates for the GE LMS 100PBs are presented in Table 3-2. Because commissioning is expected to be completed within 560 hours, annual impacts for the combined commissioning and operation of the simple-cycle power block were also evaluated since annual emissions during the commissioning year could be higher than those during a noncommissioning year. Therefore, the annual average emission rates associated with commissioning and subsequent operation of the GE LMS 100PBs are also presented in Table 3-2.

TABLE 3-2
GE LMS 100PB Turbine Commissioning Emission Rates

Commissioning Emissions	VOC	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}
Short-Term Emission Rates						
Maximum Hourly, lb/hr (per turbine) ^a	5.08	244	40.1	1.64	6.24	6.24
Total Commissioning Period, tons (per 2-turbine block) ^b	0.84	25.4	5.72	0.46	1.75	1.75
Annual Emission Rates						
Annual Average Hourly, lb/hr (per turbine) ^c	N/A	N/A	3.10	N/A	1.63	1.63
Total Commissioning/Operation Period, tons (per 2-turbine block) ^d	N/A	N/A	27.1	N/A	14.2	14.2

^a SO₂, PM₁₀, and PM_{2.5} emissions are not emitted in amounts greater than normal operating rates.

^b Total commissioning period SO₂, PM₁₀, and PM_{2.5} emissions are based on the maximum emission rates at 65.8°F multiplied by the total number of commissioning hours.

^c Annual average hourly emissions for evaluating annual impacts are based on the sum of total commissioning emissions and annual operation emissions per turbine, divided by 8,760.

^d Total commissioning/operation period emissions are based on the total commissioning period emissions presented here and the annual average operation emission rates at 65.8°F and 100 percent load.

Note:

N/A = not applicable (i.e., no annual average ambient air quality standard exists for these pollutants; therefore, annual average emissions were not modeled)

3.1.3 Auxiliary Boiler

The auxiliary boiler commissioning process includes first burner light-off, conditioning, establishing the air/fuel ratio curve, and establishing the SCR ammonia injection curve. The auxiliary boiler commissioning will occur over 5 days and will require up to 6 fired hours per day. The auxiliary boiler commissioning emissions will be the same as the auxiliary boiler cold startup emissions, presented in Table 3-3 below. As the auxiliary boiler commissioning will not overlap with operation of any other HBEP emission source, an impacts analysis is not required.

TABLE 3-3
Auxiliary Boiler Commissioning Emissions

Startup	NO _x Pounds	CO Pounds	VOC Pounds
Daily Emissions	8.44	8.68	9.36
Total Commissioning Emissions	42.2	43.4	46.8

3.2 Operation

Emissions were calculated for three basic operational modes, as follows:

- Startup, which occurs each time the gas turbine or auxiliary boiler is started
- Normal operation
- Shutdown, which occurs each time the gas turbine is shut down

3.2.1 Operating Schedule

AES has proposed the operating schedule for HBEP shown in Table 3-4 on a per turbine basis.

TABLE 3-4
Operating Schedule

Parameter	GE Frame 7FA.05		GE LMS 100PB	
	Events	Hours	Events	Hours
Annual Hours	--	6,100	--	1,750
Annual Cold Startup	24	24.0	0	--
Annual Warm Startup	100	50.0	0	--
Annual Hot Startup	376	188	350	175
Annual Shutdown	500	250	350	75.8
Total Annual Startup/ Shutdown Hours (per turbine)	--	512	--	251
Total Annual Operating Hours (per turbine)	--	6,612	--	2,001
Monthly Cold Startup	2	2.00	0	--
Monthly Warm Startup	15	7.50	0	--
Monthly Hot Startup	45	22.5	62	31.0
Monthly Shutdown	62	31.0	62	13.4
Total Monthly Startup/ Shutdown Hours (per turbine)	--	63.0	--	44.4
Monthly Operating Hours (per turbine)	--	681	--	700

The auxiliary boiler may operate 365 days per year with 24 cold starts, 48 warm starts, and 48 hot starts. Monthly operation assumes 2 cold starts, 4 warm starts, 4 hot starts, and 26,327 million British thermal units (MMBtu) per month of fuel consumption.

3.2.2 Hourly Emissions

The maximum hourly emissions for normal operation, startups, and shutdowns are presented in Tables 3-5 through 3-8 for each combustion technology.

TABLE 3-5
Maximum Hourly Emissions for Normal Operation (1 Turbine)

Pollutant	Emissions (lb/hr)			
	Uncontrolled GE Frame 7FA.05 ^a	Uncontrolled GE LMS 100PB ^b	Controlled GE Frame 7FA.05	Controlled GE LMS 100PB
NO _x	59.3	82.9	16.5	8.29

TABLE 3-5
Maximum Hourly Emissions for Normal Operation (1 Turbine)

Pollutant	Emissions (lb/hr)			
	Uncontrolled GE Frame 7FA.05 ^a	Uncontrolled GE LMS 100PB ^b	Controlled GE Frame 7FA.05	Controlled GE LMS 100PB
CO	35.2	202	10.0	8.07
VOC	5.75	4.62	5.75	2.31
PM ₁₀	9.0	6.24	8.50	6.24
SO ₂	4.86	1.64	4.86	1.64
Ammonia	////////	////////	15.3	6.14

^a Uncontrolled emission rates based on DLN without SCR, NO_x = 9 ppm and CO = 7.07 ppm.

^b Uncontrolled emission rates based on DLN without SCR, NO_x = 25 ppm, CO = 100 ppm, and VOC = 4 ppm.

TABLE 3-6
Maximum Hourly and Total Emissions for Startups and Shutdowns (1 GE Frame 7FA.05 Turbine)

Pollutant	Cold Start, 60 minutes		Warm Start, 30 minutes		Hot Start, 30 minutes		Shutdown, 30 minutes	
	lb/hr ^b	lb/event	lb/hr ^b	lb/event	lb/hr ^b	lb/event	lb/hr ^b	lb/event
NO _x ^a	61.0	61.0	25.2	17.0	25.2	17.0	18.2	10.0
CO ^a	325	325	142	137	142	137	138	133
VOC ^a	36.0	36.0	27.9	25.0	27.9	25.0	34.9	32.0
PM ₁₀	8.50	8.50	8.50	4.25	8.50	4.25	8.50	4.25
SO ₂	4.86	4.86	4.86	2.43	4.86	2.43	4.86	2.43

^a The NO_x, CO, and VOC emissions in this table are as reported by AES.

^b The lb/hr numbers represent the highest hour during the event.

Note:

lb/event = pound(s) per event

TABLE 3-7
Maximum Hourly and Total Emissions for Startups and Shutdowns (1 GE LMS 100PB Turbine)

Pollutant	Start, 30 minutes		Shutdown, 13 minutes	
	lb/hr ^b	lb/event	lb/hr ^b	lb/event
NO _x ^a	20.7	16.6	9.61	3.12
CO ^a	19.4	15.4	34.4	28.1
VOC ^a	3.96	2.80	4.87	3.06
PM ₁₀	6.24	3.12	6.24	3.12
SO ₂	1.64	0.82	1.64	0.82

^a The NO_x, CO, and VOC emissions in this table are as reported by AES.

^b The lb/hr numbers represent the highest hour during the event.

TABLE 3-8
Maximum Hourly and Total Emissions for Startups (Auxiliary Boiler)

Pollutant	Cold Start, 170 minutes		Warm Start, 85 minutes		Hot Start, 25 minutes	
	lb/hr ^b	lb/event	lb/hr ^b	lb/event	lb/hr ^b	lb/event
NO _x ^a	1.49	4.22	1.49	2.11	0.87	0.62
CO ^a	1.53	4.34	1.53	2.17	2.29	0.64
VOC ^a	1.65	4.69	1.65	2.34	0.85	0.69
PM ₁₀	0.30	0.85	0.30	0.43	0.30	0.13
SO ₂	0.048	0.14	0.048	0.068	0.048	0.020

^a The NO_x, CO, and VOC emissions in this table are as reported by AES.

^b The lb/hr numbers represent the highest hour during the event.

3.2.3 Monthly and Daily Emissions

The monthly operating schedules for the combined-cycle and simple-cycle CTGs are presented in Tables 3-9 and 3-10, respectively.

TABLE 3-9
Monthly Operating Schedule (GE Frame 7FA.05 Turbine)

Parameter	Number	Hours
Monthly Cold Starts	2	2.00
Monthly Warm Starts	15	7.50
Monthly Hot Starts	45	22.5
Monthly Shutdowns	62	31.0
Total Monthly Startup and Shutdown Hours	N/A	63.0
Total Monthly Operating Hours (not including startups and shutdowns)	N/A	681

Note:

N/A = not applicable

TABLE 3-10
Monthly Operating Schedule (GE LMS 100PB Turbine)

Parameter	Number	Hours
Monthly Starts	62	31.0
Monthly Shutdowns	62	13.4
Total Monthly Startup and Shutdown Hours	N/A	44.4
Total Monthly Operating Hours (not including startups and shutdowns)	N/A	700

Note:

N/A = not applicable

The maximum monthly and average daily emissions are presented in Tables 3-11 and 3-12 for the combined-cycle and simple-cycle CTGs, respectively.

As shown in Table 3-11, daily emissions are calculated as the monthly emissions divided by 30, based on the monthly operating schedule in Table 3-9.

TABLE 3-11

Maximum Monthly and Average Daily Emissions (GE Frame 7FA.05 Turbine)

Pollutant	Maximum Monthly Emissions (lb/month)	Average Daily Emissions (lb/day)
NO _x	25,587	853
CO	43,895	1,463
VOC	14,524	484
SO ₂	2,385	79.5
PM ₁₀	12,648	422
PM _{2.5}	12,648	422

Note:

lb/month = pound(s) per month

As shown in Table 3-12, daily emissions are calculated as the monthly emissions divided by 30, based on the monthly operating schedule in Table 3-10.

TABLE 3-12

Maximum Monthly and Average Daily Emissions (GE LMS 100PB Turbine)

Pollutant	Maximum Monthly Emissions (lb/month)	Average Daily Emissions (lb/day)
NO _x	14,039	468
CO	16,689	556
VOC	3,961	132
SO ₂	812	27.1
PM ₁₀	9,288	310
PM _{2.5}	9,288	310

Table 3-13 summarizes the auxiliary boiler maximum hourly, daily, and annual emission estimates.

TABLE 3-13

Auxiliary Boiler Maximum Hourly, Daily, and Annual Emission Estimates

Period	NO _x	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}	Fuel Use (MMBtu)
Hourly Emissions (lb/hr) ^a	0.42	2.83	0.28	0.048	0.30	0.30	70.8
Daily Emissions (lb/day) ^b	5.80	35.0	4.16	0.60	3.77	3.77	878
Monthly Emissions (lb/month) ^c	174	1,051	125	17.9	113	113	26,327
Annual Emissions (lb/year) ^d	2,054	12,384	1,473	211	1,333	1,333	310,096
Annual Emissions (tpy) ^d	1.03	6.19	0.74	0.11	0.67	0.67	--

^a Hourly emissions are based on the maximum hourly firing rate.

^b Daily emissions are the monthly emissions averaged over 30 days.

^c Monthly emissions assume two cold starts, four warm starts, four hot starts, and 26,327 MMBtu of fuel consumption per month.

^d Annual emissions assume 24 cold starts, 48 warm starts, 48 hot starts, and 310,096 MMBtu of fuel consumption per year.

3.2.4 Annual Emissions

Table 3-14 summarizes the annual criteria pollutant emissions for each combustion technology.

TABLE 3-14
Annual Criteria Pollutant Emissions

Pollutant	Annual Emissions per Unit (tpy)			Annual Emissions per Combustion Technology (tpy)*		
	GE Frame 7FA.05	GE LMS 100PB	Auxiliary Boiler	GE Frame 7FA.05	GE LMS 100PB	Auxiliary Boiler
NO _x	56.7	10.7	1.03	113	21.4	1.03
CO	92.2	14.7	6.19	184	29.4	6.19
VOC	31.1	3.05	0.74	62.1	6.10	0.74
SO ₂	5.30	0.55	0.11	10.6	1.09	0.11
PM ₁₀	28.1	6.24	0.67	56.2	12.5	0.67
PM _{2.5}	28.1	6.24	0.67	56.2	12.5	0.67

*Accounts for 2 GE Frame 7FA.05 turbines, 2 GE LMS 100PB turbines, and one auxiliary boiler.

Table 3-15 summarizes the annual GHG emissions for the facility.

TABLE 3-15
Annual GHG Emissions

	CO ₂	CH ₄	N ₂ O	CO ₂ e ^a
HBEP, MT/yr	1,776,830	42.0	88.4	1,804,233

^a Value includes SF₆ emissions associated with 10 circuit breakers with an assumed annual leak rate of 0.1 percent.

Note:

MT/yr = metric ton(s) per year

Table 3-16 summarizes the hourly and annual toxic emissions for the combined-cycle CTGs.

TABLE 3-16
Combined-cycle: Summary of Operation Emissions – Air Toxics

Compound	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
	lb/MMcf ^a	lb/MMBtu ^a	lb/hr ^b	lb/yr ^c	tpy	lb/hr	lb/yr	tpy
Ammonia ^d	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 ^e	1.80E-01	1.71E-04	0.39	2,548	1.27	0.78	5,096	2.55
Acrolein ^e	3.69E-03	3.51E-06	0.0080	52.2	0.026	0.016	104	0.052
Benzene ^e	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 ^e	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 ^f	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

TABLE 3-16
Combined-cycle: Summary of Operation Emissions – Air Toxics

Compound	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
	lb/MMcf ^a	lb/MMBtu ^a	lb/hr ^b	lb/yr ^c	tpy	lb/hr	lb/yr	tpy
TOTAL HAPs				11,563	5.78		23,125	11.6
TOTAL TACs				5,249	2.62		10,498	5.25

^a Provided by South Coast Air Quality Management District (SCAQMD) via e-mail correspondence on November 3, 2015, with the exception of ammonia. Units of lb/MMBtu calculated by dividing lb/MMcf by the gas heat content of 1,050 Btu/cf.

^b Hourly per turbine emissions calculated by multiplying the emission factor by 2,273 MMBtu/hr, HHV.

^c Annual per turbine emissions calculated by multiplying the emission factor by 2,248 MMBtu/hr, HHV and 6,612 hours/year.

^d Based on the operating exhaust ammonia limit of 5 ppmvd @ 15% O₂ and an F-factor of 8,710.

^e Emission factors account for the use of an oxidation catalyst, as provided by SCAQMD via e-mail correspondence on November 3, 2015.

^f Per Section 3.1.4.3 of AP-42 (U.S. Environmental Protection Agency [EPA], 2000), PAH emissions were assumed to be controlled up to 50% through the use of an oxidation catalyst.

Notes:

HAP	=	hazardous air pollutant
lb/MMBtu	=	pound(s) per million British thermal unit
lb/MMcf	=	pound(s) per million cubic foot
PAH	=	polycyclic aromatic hydrocarbon
TAC	=	toxic air contaminant

Table 3-17 summarizes the hourly and annual toxic emissions for the simple-cycle CTGs.

TABLE 3-17
Simple-cycle: Summary of Operation Emissions – Air Toxics

Compound	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
	lb/MMcf ^a	lb/MMBtu ^a	lb/hr ^b	lb/yr ^c	tpy	lb/hr	lb/yr	tpy
Ammonia ^d	5 ppm	--	6.14	12,277	6.14	12.3	24,553	12.3
1,3-Butadiene	4.39E-04	4.18E-07	0.00037	0.74	0.00037	0.00074	1.48	0.00074
Acetaldehyde ^e	1.80E-01	1.71E-04	0.15	304	0.15	0.30	607	0.30
Acrolein ^e	3.69E-03	3.51E-06	0.0031	6.22	0.0031	0.0062	12.4	0.0062
Benzene ^e	3.33E-03	3.17E-06	0.0028	5.62	0.0028	0.0056	11.2	0.0056
Ethylbenzene	3.26E-02	3.10E-05	0.027	55.0	0.027	0.055	110	0.055
Formaldehyde ^e	3.67E-01	3.50E-04	0.31	619	0.31	0.62	1,238	0.62
Naphthalene	1.33E-03	1.27E-06	0.0011	2.24	0.0011	0.0022	4.49	0.0022
PAHs ^f	9.18E-04	8.74E-07	0.00039	0.77	0.00039	0.00077	1.55	0.00077
Propylene Oxide	2.96E-02	2.82E-05	0.025	49.9	0.025	0.050	100	0.050
Toluene	1.33E-01	1.27E-04	0.11	224	0.11	0.22	449	0.22
Xylene	6.53E-02	6.22E-05	0.055	110	0.055	0.11	220	0.11
TOTAL HAPs				1,378	0.69		2,756	1.38
TOTAL TACs				625	0.31		1,251	0.63

^a Provided by SCAQMD via e-mail correspondence on November 3, 2015, with the exception of ammonia. Units of lb/MMBtu calculated by dividing lb/MMcf by the gas heat content of 1,050 Btu/cf.

TABLE 3-17

Simple-cycle: Summary of Operation Emissions – Air Toxics

Compound	Emission Factors		Emissions (per Turbine)			Emissions (Facility Total)		
	lb/MMcf ^a	lb/MMBtu ^a	lb/hr ^b	lb/yr ^c	tpy	lb/hr	lb/yr	tpy

^b Hourly per turbine emissions calculated by multiplying the emission factor by 885 MMBtu/hr, HHV.

^c Annual per turbine emissions calculated by multiplying the emission factor by 885 MMBtu/hr, HHV and 2,001 hours/year.

^d Based on the operating exhaust ammonia limit of 5 ppmvd @ 15% O₂ and an F-factor of 8,710.

^e Emission factors account for the use of an oxidation catalyst, as provided by SCAQMD via e-mail correspondence on November 3, 2015.

^f 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.

Table 3-18 summarizes the hourly and annual toxic emissions for the auxiliary boiler.

TABLE 3-18

Auxiliary Boiler: Summary of Operation Emissions – Air Toxics

Compound	Emission Factors			Emissions	
	lb/MMcf ^a	lb/MMBtu ^a	lb/hr ^b	lb/yr ^c	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				24.2	0.012
TOTAL TACs				6.70	0.0034

^a Provided by SCAQMD via e-mail correspondence on November 3, 2015. Units of lb/MMBtu calculated by dividing lb/MMcf by the gas heat content of 1,050 Btu/cf.

^b Hourly emissions calculated by multiplying the emission factor by 71 MMBtu/hr, HHV.

^c Annual emissions calculated by multiplying the emission factor by 310,096 MMBtu/year, HHV, which accounts for the auxiliary boiler operating at the maximum hourly firing rate with two cold starts, four warm starts, and four hot starts per month.

Air Quality Impacts Analysis

An air quality impacts analysis was conducted to compare worst-case ground-level impacts resulting from the HBEP with established state and federal ambient air quality standards and applicable South Coast Air Quality Management District (SCAQMD) significance criteria. The analysis was performed using the newest versions of AERMET (version 15181) and AERMOD (version 15181).¹ The stack parameters, emission rates, and results for each modeled scenario are described below, as related to commissioning and operation of the combined-cycle CTGs, simple-cycle CTGs, and auxiliary boiler.

4.1 Commissioning Impacts Analysis

For commissioning, a total of 6 scenarios were modeled, as listed below:

- Two GE Frame 7FA.05s at 10 percent load with auxiliary boiler operation
- Two GE Frame 7FA.05s at 40 percent load with auxiliary boiler operation
- Two GE Frame 7FA.05s at 80 percent load with auxiliary boiler operation
- Two GE LMS 100PBs at 5 percent load with operation of two GE Frame 7FA.05s and the auxiliary boiler
- Two GE LMS 100PBs at 75 percent load with operation of two GE Frame 7FA.05s and the auxiliary boiler
- Two GE LMS 100PBs at 100 percent load with operation of two GE Frame 7FA.05s and the auxiliary boiler

The stack parameters for each unit included in the modeled scenarios are presented in Appendix A, Table 1. Stack parameters presented include source coordinates, elevation, stack height, temperature, exit velocity, and stack diameter.

The short-term and annual emission rates (in gram(s) per second [g/s] and pound(s) per hour [lb/hr]) for each unit included in the modeled scenarios are presented in Appendix A, Table 2. These emission rates are the highest unabated emissions expected during commissioning. Only NO₂ and CO were modeled for the short-term averaging periods because SO₂, PM₁₀, and PM_{2.5} are not emitted in amounts greater than normal operating rates. In other words, results for short-term SO₂, PM₁₀, and PM_{2.5} were extracted from the operational modeling results, as discussed later within this response. Additionally, short-term modeling was only included for short-term NO₂ and CO for scenarios where the emission rates were not captured by another commissioning or operation scenario modeled. NO₂, PM₁₀, and PM_{2.5} were modeled for annual averaging periods, and the emission rates account for operation following commissioning activities.

The building parameters included in the modeled scenarios are presented in Appendix A, Table 3. The building parameters for the three GE Frame 7FA.05 commissioning scenarios include the presence of existing HGBS Units 1, 2, 3, and 4 in addition to those of the GE Frame 7FA.05s. The building parameters for the three GE LMS 100PB commissioning scenarios include the presence of the two GE Frame 7FA.05s and existing HGBS Units 1 and 2, in addition to those of the GE LMS 100PBs.

The results for each modeled scenario are presented in Appendix A, Table 4. As with the emission rates, these results are sorted by short-term and annual averaging periods. As noted, impacts for the GE Frame 7FA.05 scenarios include operation of the auxiliary boiler; NO₂ was modeled using the plume volume molar ratio method (PVMRM). Impacts for the GE LMS 100PB scenarios include operation of the auxiliary boiler and two GE Frame 7FA.05s at the worst-case operating conditions, as discussed later within this response. These results were used to identify the maximum impacts provided below.

¹ Note that use of the latest version of AERMET (version 15181) required reprocessing of the meteorological data, including the latest version of AERMINUTE (version 15272), per the methodology contained in Section 4.2.3 of the *Dispersion Modeling Protocol for the Amended Huntington Beach Energy Project* (see Appendix 5.1F of the HBEP permit application).

Table 4-1 presents the results of the GE Frame 7FA.05 commissioning impacts analysis. As indicated, the maximum predicted CO, NO₂, SO₂, annual PM₁₀, and PM_{2.5} commissioning impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. For PM₁₀, the 24-hour background concentration exceeds the California Ambient Air Quality Standard (CAAQS) without adding the modeled concentration. As a result, the predicted impact combined with the background concentration would be greater than the CAAQS. However, the commissioning activity would be finite, and the Project Owner will limit the hours of operation required to complete commissioning activities. Additionally, as described in Section 5.1.7.3 of the HBEP permit application, HBEP emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from GE Frame 7FA.05 commissioning will be less than significant.

TABLE 4-1

GE Frame 7FA.05 Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
CO	1-hour	4,341	3,321	7,662	23,000	40,000
	8-hour	3,000	2,519	5,519	10,000	10,000
NO ₂	1-hour (max) ^b	169	142	311	339	—
	Annual ^c	0.66	21.8	22.5	57	100
SO ₂	1-hour (max)	5.99	20.2	26.2	655	—
	3-hour	5.13	20.2	25.3	—	1,300
	24-hour	1.74	5.20	6.94	105	—
PM ₁₀	24-hour	5.64	51.0	56.6	50	150
	Annual	0.57	19.3	19.9	20	—
PM _{2.5}	24-hour (98th percentile) ^d	3.33	21.3	24.6	—	35
	Annual	0.57	8.60	9.17	12	12

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

^b The maximum 1-hour NO₂ concentration is based on AERMOD PVMRM output with an in-stack NO₂ to NO_x ratio of 0.5 and an out-of-stack NO₂ to NO_x ratio of 0.9 (EPA, 2011; California Air Pollution Control Officer's Association [CAPCOA], 2011). Hourly paired ozone data is from the SCAQMD Costa Mesa monitoring station.

^c The maximum annual NO₂ concentration includes an ambient NO₂ ratio of 0.75 (EPA, 2005).

^d 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.

Table 4-2 presents the results of the GE LMS 100PB commissioning impacts analysis. As indicated, the maximum predicted CO, NO₂, SO₂, annual PM₁₀, and PM_{2.5} commissioning impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. For PM₁₀, the 24-hour background concentration exceeds the CAAQS without adding the modeled concentration. As a result, the predicted impact combined with the background concentration would be greater than the CAAQS. However, the commissioning activity would be finite, and the Project Owner will limit the hours of operation required to complete commissioning activities. Additionally, as described in Section 5.1.7.3 of the HBEP permit application, HBEP emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from GE LMS 100PB commissioning will be less than significant.

TABLE 4-2

GE LMS 100PB Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
CO	1-hour	527	3,321	3,848	23,000	40,000
	8-hour	126	2,519	2,645	10,000	10,000
NO ₂ ^b	1-hour (max)	79.1	142	221	339	—
	Annual	0.50	21.8	22.3	57	100
SO ₂	1-hour (max)	5.76	20.2	26.0	655	—
	3-hour	5.01	20.2	25.2	—	1,300
	24-hour	1.66	5.20	6.86	105	—
PM ₁₀	24-hour	5.11	51.0	56.1	50	150
	Annual	0.52	19.3	19.8	20	—
PM _{2.5}	24-hour (98th percentile) ^c	3.04	21.3	24.3	—	35
	Annual	0.52	8.60	9.12	12	12

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

^b The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^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.

The commissioning activities associated with installation of the auxiliary boiler will occur prior to first fire of the combined-cycle CTGs. Therefore, an independent assessment of the auxiliary boiler commissioning impacts was not performed. However, the auxiliary boiler emissions were included in each of the modeled commissioning scenarios as being in normal operation only.

4.2 Operation Impacts Analysis

To evaluate the worst-case air quality impacts, each technology was assessed at peak, average, and minimum load at low, average, and high ambient temperatures². This assessment, referred to as a load analysis, included a total of 41 modeled scenarios, as listed below:

- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 32 degrees Fahrenheit (°F)
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 32°F

² Load rates and ambient temperatures based on turbine performance data provided in Tables 5.1B.3 and 5.1B.7 of Appendix 5.1B of the HBEP Permit Application.

- Operation of two GE Frame 7FA.05s at 45 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 45 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 45 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 32°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 44 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 44 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 44 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F
- Operation of two GE Frame 7FA.05s at 44 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 65.8°F

- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load with evaporative cooling, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 100 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 75 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 48 percent load, two GE LMS 100PBs at 100 percent load with evaporative cooling, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 48 percent load, two GE LMS 100PBs at 100 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 48 percent load, two GE LMS 100PBs at 75 percent load, and the auxiliary boiler at an ambient temperature of 110°F
- Operation of two GE Frame 7FA.05s at 48 percent load, two GE LMS 100PBs at 50 percent load, and the auxiliary boiler at an ambient temperature of 110°F

The stack parameters for each unit included in the load analysis are presented in Appendix B, Table 1. Stack parameters presented include source coordinates, elevation, stack height, temperature, exit velocity, and stack diameter.

The short-term and annual emission rates (in g/s and lb/hr) for each unit included in the load analysis are presented in Appendix B, Table 2. As shown, only the exhaust scenarios with combustion turbines operating at an average annual ambient temperature of 65.8°F include annual emission rates. Generally, the emission rates are based on the following:

- Short-term SO₂ emission rates for the GE Frame 7FA.05s and GE LMS 100PBs are based on a maximum fuel sulfur content of 0.75 grain per 100 dry standard cubic feet of natural gas.

- Hourly CO and NO₂ emission rates for the GE Frame 7FA.05s are based on cold startup events.
- Hourly CO and NO₂ emission rates for the GE LMS 100PBs are based on one startup, one shutdown, and the balance of the hour at steady-state operation.
- 8-hour CO emission rates for the GE Frame 7FA.05s are based on one cold start, one warm start, two shutdowns, and the balance of the period at steady-state operation.
- 8-hour CO emission rates for the GE LMS 100PBs are based on two startups, two shutdowns, and the balance of the period at steady-state operation.
- Hourly emission rates for the auxiliary boiler are based on steady-state operation at 100 percent load.
- Annual emission rates for the GE Frame 7FA.05s are based on 24 cold startups, 100 warm startups, 376 hot startups, 500 shutdowns, and 6,100 hours of steady-state operation.
- Annual emission rates for the GE LMS 100PBs are based on 350 hot startups, 350 shutdowns, and 1,750 hours of steady-state operation.
- Annual emission rates for the auxiliary boiler are based on 12 startups per month and a monthly heat input of 26,327 MMBtu.

The building parameters included in the load analysis are presented in Appendix B, Table 3. The building parameters include the presence of existing HGBS Units 1 and 2 in addition to those of the GE Frame 7FA.05s and the GE LMS 100PBs.

The results for each scenario modeled through the load analysis are presented in Appendix B, Table 4. As with the emission rates, only the exhaust scenarios with CTGs operating at an average annual ambient temperature of 65.8°F include annual averaging period results. These results were used to identify the maximum impacts described below.

Table 4-3 presents the maximum HBEP operational impacts. As indicated, the maximum predicted CO, NO₂, SO₂, annual PM₁₀, and PM_{2.5} operational impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. The 24-hour PM₁₀ background concentration exceeds the CAAQS without adding the modeled concentration. As a result, the predicted impact combined with the background concentration will be greater than the CAAQS. However, as described in Section 5.1.7.3 of the HBEP permit application, HBEP emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from operation will be less than significant.

TABLE 4-3

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

Pollutant	Averaging Time	Maximum Modeled Concentration, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
CO	1-hour	631	3,321	3,952	23,000	40,000
	8-hour	121	2,519	2,640	10,000	10,000
NO ₂ ^b	1-hour (max)	95	142	237	339	—
	1-hour (98th percentile) ^c	—	—	126	—	188
	Annual	0.64	21.8	22.4	57	100
SO ₂	1-hour (max)	5.76	20.2	26.0	655	—
	1-hour (99th percentile) ^d	4.86	8.80	13.7	—	196
	3-hour	5.01	20.2	25.2	—	1,300
	24-hour	1.66	5.20	6.86	105	365
PM ₁₀	24-hour	5.11	51.0	56.1	50	150
	Annual	0.64	19.3	19.9	20	—
PM _{2.5}	24-hour (98th percentile) ^e	3.04	21.3	24.3	—	35
	Annual	0.64	8.60	9.24	12	12

TABLE 4-3

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

Pollutant	Averaging Time	Maximum Modeled Concentration, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
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^a Background concentrations were the highest concentrations monitored during 2011 through 2013.

^b The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^c The total predicted concentration for the federal 1-hour NO₂ standard is the 5-year average, high-8th-high modeled concentration paired with 98th percentile seasonal hour-of-day background concentrations for 2010 through 2012.

^d The total predicted concentration for the federal 1-hour SO₂ standard is the 5-year average, high-4th-high modeled concentration combined with the 3-year average, 99th percentile background concentration.

^e 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.

4.2.1 Rule 2005

To demonstrate compliance with SCAQMD Rule 2005, each combustion unit was modeled individually using the stack parameters, emission rates, and building parameters from Appendix B, Tables 1, 2, and 3, respectively. The particular operational scenario selected for each combustion unit was chosen based on the load analysis results. In other words, only the parameters from the operational scenarios leading to the worst-case 1-hour, 1-hour federal, and annual NO₂ impacts were used. The results for each modeled scenario are presented in Appendix B, Table 5. These results were used to identify the maximum impacts described below.

The maximum modeled NO₂ concentrations are presented in Table 4-4 and are compared to the SCAQMD Rule 2005 significance threshold. Although each combustion emission unit was modeled, the results presented in Table 4-4 are only for the emission unit causing the highest modeled concentrations, in this case one combined-cycle CTG. The maximum modeled NO₂ concentrations were also added to representative background concentrations and compared to the state and federal ambient air quality standards for NO₂. Although the NO₂ concentrations per emission unit are greater than the SCAQMD Rule 2005 1-hour threshold, they are less than the ambient air quality standards and will be fully offset through the surrender of NO_x Regional Clean Air Incentives Market (RECLAIM) trading credits (RTCs). Therefore, the predicted NO₂ impacts from operation will be less than significant compared to SCAQMD Rule 2005.

TABLE 4-4

Rule 2005 Air Quality Thresholds and Standards Applicable to the HBEP (per emission unit)

Pollutant/Averaging Time	Maximum Modeled Concentration, $\mu\text{g}/\text{m}^3$ ^a	Significant Threshold, $\mu\text{g}/\text{m}^3$ ^b	Background Concentration, $\mu\text{g}/\text{m}^3$ ^c	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
NO ₂ (1-hour)	60.3	20	142	202	339	—
NO ₂ (Federal 1-hour)	62.0	N/A	98.2	160	—	188
NO ₂ (Annual)	0.27	1.0	21.8	22.1	57	100

^a The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^b Allowable change in air quality concentration per emission unit per SCAQMD Rule 2005, Appendix A.

^c Background concentrations were the highest concentrations monitored during 2011 through 2013.

4.2.2 Regulation XVII (Prevention of Significant Deterioration [PSD])

To demonstrate compliance with SCAQMD Regulation XVII, operation of the HBEP was modeled using the stack parameters, emission rates, and building parameters from Appendix B, Tables 1, 2, and 3, respectively. As with the Rule 2005 assessment, the particular operational scenario selected for each combustion unit was chosen based on the load analysis results. In other words, only the parameters from the operational

scenarios leading to the worst-case 1-hour and annual NO₂, 1-hour and 8-hour CO, and 24-hour and annual PM₁₀ impacts were used. However, for 24-hour PM₁₀, the scenario contributing the maximum impact had both GE Frame 7FA.05s operating at 44 percent load for 24 hours per day. Because this is an unlikely scenario, refined modeling was performed assuming one GE Frame 7FA.05 would operate 24 hours per day at 44 percent load and one GE Frame 7FA.05 would operate 20 hours per day at 44 percent load and 4 hours per day at 75 percent load. The results are presented in Appendix B, Table 6 and were used to identify the maximum impacts described below.

As shown in Table 4-5, the maximum predicted 1-hour CO, 8-hour CO, annual NO₂, 24-hour PM₁₀, and annual PM₁₀ impacts from operation of the HBEP are below the Class II significance impact levels (SILs), Class II PSD Increment Standards, and significant monitoring concentrations. Therefore, additional analysis of 1-hour CO, 8-hour CO, annual NO₂, 24-hour PM₁₀, and annual PM₁₀ impacts is not required. However, the maximum predicted 1-hour NO₂ impacts from operation of the HBEP exceed the Class II SIL, with a radius of impact with predicted concentrations greater than 7.52 micrograms per cubic meter (µg/m³) of 3.8 kilometers (km). Therefore, the cumulative impacts of the HBEP and competing sources were assessed for all receptors where the HBEP impacts alone exceeded the 1-hour NO₂ SIL, as described below.

TABLE 4-5

HBEP Predicted Impacts Compared to the PSD Air Quality Impact Standards

Pollutant/Averaging Time	Maximum Modeled Concentration, µg/m ³	Significant Impact Level, µg/m ³	PSD Class II Increment Standard, µg/m ³	Significant Monitoring Concentration, µg/m ³
CO (1-hour)	631	2,000	N/A	N/A
CO (8-hour)	121	500	N/A	575
NO ₂ (1-hour) ^a	94.5	7.52 ^c	N/A	N/A
NO ₂ (Annual) ^a	0.64	1.0	25	14
PM ₁₀ (24-hour) ^b	4.97	5.0	30	10
PM ₁₀ (Annual)	0.64	1.0	17	N/A

^a The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^b The 24-hour PM₁₀ concentration is based on one GE Frame 7FA.05 turbine operating 24 hours per day at 44 percent load and one GE Frame 7FA.05 turbine operating 20 hours per day at 44 percent load and 4 hours per day at 75 percent load.

^c The SIL for 1-hour NO₂ is based on SCAQMD correspondence.

Note:

N/A = not applicable (i.e., no standard)

To assess the cumulative impacts of the HBEP and competing sources, operation of the HBEP was modeled with concurrent operation of the competing sources listed below, which were approved by the SCAQMD on October 8, 2013³:

- HBGS Units 1 and 2
- Orange County Sanitation – Fountain Valley
- Orange County Sanitation – Huntington Beach
- Beta Offshore
- Shipping Lanes

The stack parameters for each unit included in the competing source assessment are presented in Appendix B, Table 7. Stack parameters presented include source coordinates, elevation, stack height, temperature, exit velocity, and stack diameter for point sources and elevation, release height, and horizontal and vertical dimensions for volume sources. The 1-hour NO₂ emission rates (in g/s and lb/hr) for each unit included in the competing source assessment are presented in Appendix B, Table 8. Note that the stack parameters and

³ Source parameters and emissions rates for all competing sources, with the exception of HBGS, were provided by SCAQMD.

emission rates used for the HBEP were selected based on the load analysis results. In other words, only the parameters from the operational scenarios leading to the worst-case federal 1-hour NO₂ impacts were used. The building parameters were taken from Appendix B, Table 3. The competing source assessment results are presented in Appendix B, Table 9 and were used to identify the maximum impacts described below.

The receptor grid used in the competing source assessment modeling, shown in Figure 4-1, includes only those receptors in which the worst-case HBEP 1-hour NO₂ impacts exceeded the SIL. In other words, only those receptors where the five-year average of modeled impacts exceed the SIL were included.

Table 4-6 presents a summary of the predicted cumulative 1-hour NO₂ impacts from operation of the HBEP and competing sources, as well as a comparison to the National Ambient Air Quality Standard (NAAQS). As shown, the predicted HBEP cumulative impacts, including a representative background NO₂ concentration, are below the NAAQS. Therefore, operation of the HBEP will not cause or contribute to a violation of the NAAQS.

TABLE 4-6
HBEP and Competing Source Predicted 1-hour NO₂ Impacts Compared to the NAAQS

Pollutant	Averaging Time	Total Predicted Concentration, µg/m ³ ^a	NAAQS, µg/m ³
NO ₂	1-hour	144	188

^a The total predicted concentration for the federal 1-hour NO₂ standard is the 5-year average, high-8th-high modeled concentration paired with 98th percentile seasonal hour-of-day background concentrations for 2010 through 2012.

To assess potential impacts to Class I areas, operation of the HBEP was modeled using the stack parameters, emission rates, and building parameters from Appendix B, Tables 1, 2, and 3, respectively. As with the Rule 2005 assessment, the particular operational scenario selected for each combustion unit was chosen based on the load analysis results. In other words, only the parameters from the operational scenarios leading to the worst-case annual NO₂ and 24-hour and annual PM₁₀ impacts were used. The results are presented in Appendix B, Table 10 and were used to identify the maximum impacts described below.

Table 4-7 presents a summary of the predicted annual NO₂, 24-hour PM₁₀, and annual PM₁₀ impacts and a comparison to the PSD Class I Increment Standards. The predicted impacts from operation of the HBEP are below the SILs. Therefore, the HBEP would have a negligible impact at the more distant Class I areas.

TABLE 4-7
HBEP Predicted Impacts Compared to the Class I SIL and PSD Class I Increment Standards

Pollutant/Averaging Time	Maximum Modeled Concentration at 50 km, µg/m ³	Significant Impact Level, µg/m ³	PSD Class I Increment Standard, µg/m ³
NO ₂ (Annual) ^a	0.0055	0.1	2.5
PM ₁₀ (24-hour)	0.042	0.3	2.0
PM ₁₀ (Annual)	0.0057	0.2	1.0

^a The annual NO₂ concentration includes an ambient NO₂ ratio of 0.75 (EPA, 2005).

4.2.3 Class II Visibility

A visibility analysis for Class II areas within 50 km of the HBEP was performed using the VISCREEN plume modeling program per the procedures outlined in the *Workbook for Plume Visual Impact Screening and Analysis* (U.S. Environmental Protection Agency [EPA], 1992), as described in Section 6.1.1 of the *Dispersion Modeling Protocol for the Amended Huntington Beach Energy Project* (see Appendix 5.1F of the HBEP permit application). Please note that Level I and Level II assessments were conducted using criterion for Class I areas, as no criteria exist for Class II areas. Therefore, the visibility assessment was conducted using overly conservative assumptions for Class II areas. However, even using the conservative approach, the modeled results from the visual assessment demonstrate that the HBEP would not adversely affect visibility at nearby Class II areas.

Huntington Beach Energy Project
Figure 4-1
Competing Source Receptor Grid
December 2015

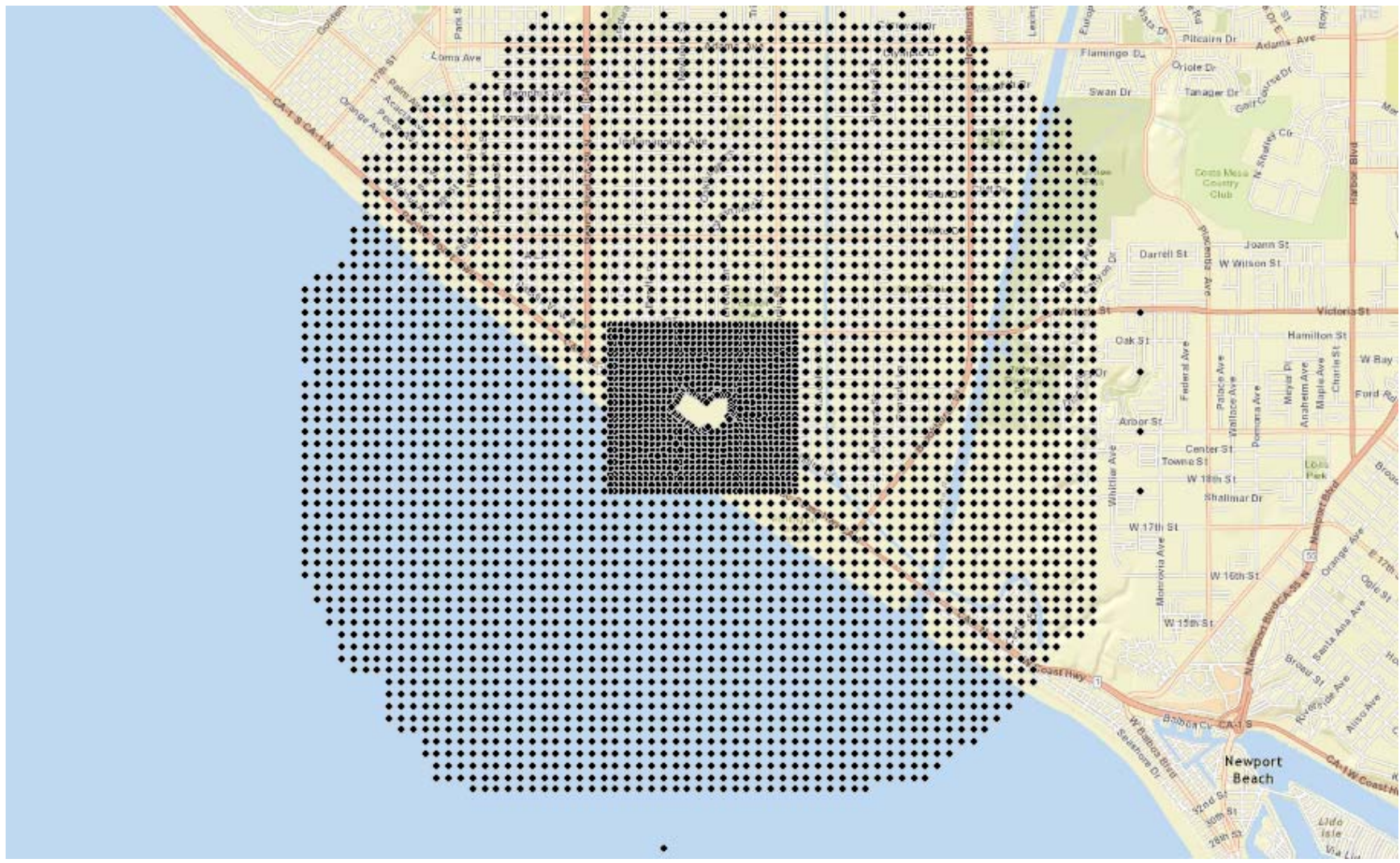


Table 4-8 summarizes the VISCREEN Level I modeled results for each Class II area evaluated, with the exception of Huntington Beach State Park (HB State Park), which was evaluated separately and is described in the following subsection. As shown, the maximum modeled values for color difference and contrast are presented for inside the area analyzed, regardless of the VISCREEN modeled lines of sight for the observer.

TABLE 4-8
HBEP Level I VISCREEN Results

Class II Area	Minimum Distance (km)	Maximum Distance (km)	Variable	Sky	Terrain	Criteria ^a
Crystal Cove State Park	12.5	18.4	Color Difference	2.489	5.405	2
			Contrast	0.03	0.029	0.05
Water Canyon National Park	33.6	42.9	Color Difference	1.102	1.654	2
			Contrast	0.013	0.014	0.05
Chino Hills State Park	35.8	41.6	Color Difference	0.905	1.522	2
			Contrast	0.011	0.014	0.05
San Mateo Canyon Wilderness Area	44.3	57.6	Color Difference	0.698	1.111	2
			Contrast	0.008	0.011	0.05

Bold values exceed the Class I significant impact criterion.

^a Levels of concern for Class I areas were used because no specific requirements or criteria exist for assessing Class II visibility impacts (Federal Land Managers [FLM], 2010).

As shown in Table 4-8, the Level I assessment results demonstrate that the HBEP would be below the significance criterion for both color difference and contrast at Water Canyon National Park, Chino Hills State Park, and San Mateo Wilderness Area. The Level I assessment did, however, exceed the criterion for color difference at Crystal Cove State Park and, therefore, required a Level II assessment. The Level II assessment results are summarized in Table 4-9.

TABLE 4-9
HBEP Level II VISCREEN Results

Class II Area	Minimum Distance (km)	Maximum Distance (km)	Wind Speed (m/s) ^a	Stability ^a	Variable	Sky	Terrain	Criteria ^b
Crystal Cove State Park	12.5	18.4	3	D	Color Difference	0.263	0.642	2
					Contrast	0.003	0.003	0.05

Bold values exceed the Class I significant impact criterion.

^a The Joint Frequency Distribution table used to calculate the wind speed and stability for the Level II assessment is presented in Appendix C, Table 1.

^b Levels of concern for Class I areas were used because no specific requirements or criteria exist for assessing Class II visibility impacts (FLM, 2010).

Note:

m/s = meter(s) per second

As shown in Table 4-9, the Level II assessment results for Crystal Cove State Park are below the conservative Class I area criterion for both color difference and contrast; therefore, the HBEP would not adversely affect visibility at nearby Class II areas.

Huntington Beach State Park. The HB State Park Class II area is a small swath of land which extends along the California Coast for 3.4 km, located directly west of the HBEP. The HB State Park is bordered to the west by the Pacific Ocean and bordered to the east by California State Highway 1. On average, the width of the HB State Park is about 160 meters (m), with a range of widths between 130 m to 230 m. A plume blight analysis using VISCREEN would evaluate the change in background contrast and color affecting an observer looking through the center of a plume. The viewer's background *within* the limited area of interest can be defined as either an object (mountain side or building) or sky. A viewer standing on the border of the HB

State Park looking across the beach or up the beach would not have any terrain or building to observe *within* the HB State Park. Therefore, the only feature *within* the HB State Park that would be observable is the sky. Areas outside of the HB State Park have not been identified and, therefore, were not evaluated.

The HB State Park is open between the hours of 6:00 am and 10:00 pm.⁴ Therefore, the frequency of atmospheric stability class and winds blowing from the HBEP across the HB State Park were determined for times when the HB State Park would be open. Table 4-10 provides a breakdown of the frequency of atmospheric stability class and winds blowing across the HB State Park toward the sectors of 120 degrees to 305 degrees from true north, based on the National Weather Service (NWS) John Wayne Airport meteorological data used throughout the air quality impacts analysis.

TABLE 4-10

Frequency and Stability of Winds Blowing from the HBEP Toward HB State Park Between 6 am and 10 pm

Stability	Count ^a	Average Wind Speed (m/s)	Frequency (%) ^b
F	868	1.6	2.0
E	720	2.0	1.6
D	1,081	3.3	2.5
C	554	2.5	1.3
B	316	1.8	0.7
A	14	1.8	0.0

^a The count of hours is based on the 5-year AERMET meteorological dataset.

^b The frequency is based on a total of 43,824 hours in the 5-year AERMET meteorological dataset.

Air dispersion modeling categorizes the effects of atmospheric turbulence and wind speed into six different atmospheric stability classes, A through F. Of these, A is the most unstable and F is the most stable. A plume is most likely to remain cohesive in E or F stability conditions and least likely to remain cohesive in A or B stability conditions; however, due to the close proximity of the HBEP to the HB State Park, the A or B stability conditions may not have the distance or time to disperse the plume downwind of the HBEP exhaust stacks. Hours associated with the E and F atmospheric stability classes would, by definition, never occur during daylight hours.⁵ Therefore, none of the Table 4-10 values associated with E or F stability conditions would have an effect on visibility at the HB State Park as those conditions would not occur during the daytime hour assessment period.

A VISCREEN Class II visibility analysis of the remaining atmospheric stability classes (A through D) and corresponding wind speeds identified in Table 4-10 was conducted. The procedures outlined in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA, 1992) were followed to conduct the analysis. Based on the frequency of winds blowing across the HB State Park from the HBEP and the modeled impacts, as presented in Table 4-11, an observer looking across the HB State Park would have the sky background Class I thresholds exceeded for either contrast or color difference during hours associated with stability classes A, B, C, and D. On average, this corresponds to 4.5 percent of the time or 395 hours⁶ per year when the sky background would be obstructed compared to the extremely conservative Class I area thresholds.

⁴ Please refer to http://www.parks.ca.gov/?page_id=643 for details.

⁵ D.B. Turner, *Workbook of Atmospheric Dispersion Estimates*, at page 6 (1969).

⁶ Cumulative frequency of stability classes A, B, C, and D multiplied by 8,760 hours per year.

TABLE 4-11
HBEP VISCREEN Analysis Results for HB State Park

Stability	VISCREEN Results (Contrast/Color Difference) ^a
D	0.098/7.589
C	0.076/5.921
B	0.182/10.141
A	0.139/7.873

^a Class I criteria of |0.05| for contrast and 2.0 for color difference.

^b Results presented are equivalent for either a Level I or Level II assessment. The Joint Frequency Distribution table used to calculate the wind speed and stability for the Level II assessment is presented in Appendix C, Table 2.

As noted above, this analysis is extremely conservative and only evaluates the HBEP's plume impacts on color difference and contrast in comparison to the more restrictive, and not necessarily appropriate, Class I area thresholds. Also, the VISCREEN model only allows for one source or exhaust stack to be evaluated. Therefore, in order to assess all 5 HBEP exhaust stacks, it was assumed that emissions from all 5 exhaust stacks are emitted from a single exhaust stack, which overestimates the HBEP's visibility impacts. Additionally, this analysis conservatively used the annual average background visual range at the HB State Park, when visual impacts associated with inland emission sources or regional haze may have a greater negative impact on the background visual range than the HBEP. Specifically, fires on the beach within the specified fire pits may have a greater negative impact on visibility at the HB State Park compared to the HBEP. This analysis also conservatively does not discount present natural weather conditions, such as fog or rain, where the background would be naturally obscured and a plume from the HBEP would not be perceptible.

Therefore, based on the limited and infrequent number of perceptibility impacts compared to the conservative Class I criteria identified using the VISCREEN model, the HBEP would not cause an adverse impairment to perceptibility at the HB State Park.

4.2.4 Fumigation

To assess both inversion break-up and shoreline fumigation impacts, modeling was performed using the stack parameters and emission rates from Appendix B, Tables 1 and 2, respectively. As with the Rule 2005 assessment, the particular operational scenario selected for each combustion unit modeled was chosen based on the load analysis results. In other words, only the parameters from the operational scenarios leading to the worst-case 1-hour NO₂, 1-hour, 3-hour, and 24-hour SO₂, 1-hour and 8-hour CO, and 24-hour PM₁₀ impacts were used. The effects of fumigation on the maximum modeled impacts were evaluated using AERSCREEN (version 15181). Tables 4-12 and 4-13 present the potential HBEP operational inversion break-up and shoreline fumigation impacts, respectively. As indicated in Table 4-12, the inversion break-up fumigation CO, NO₂, SO₂, and PM₁₀ concentrations combined with the background concentrations do not exceed the CAAQS or NAAQS, as applicable. Therefore, inversion break-up fumigation impacts of CO, NO₂, SO₂, and PM₁₀ would be less than significant. As indicated in Table 4-13, this is the same result for shoreline fumigation impacts. Details of the inversion break-up and shoreline fumigation modeling are presented in Appendix D.

TABLE 4-12

HBEP Operation Impacts Analysis – Inversion Break-up Fumigation Impacts Analysis Results Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	AERSCREEN Fumigation Result, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
NO ₂ ^b	1-hour (max)	85.3	142	227	339	—
	1-hour (max)	5.45	20.2	25.7	655	—
SO ₂	3-hour	5.32	20.2	25.5	—	1,300
	24-hour	5.21	5.20	10.4	105	—
CO	1-hour	529	3,321	3,850	23,000	40,000
	8-hour	147	2,519	2,666	10,000	10,000
PM ₁₀	24-hour	10.6	51.0	61.6	N/A	150

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

^b The 1-hour NO₂ concentration includes an ambient NO₂ ratio of 0.80 (EPA, 2011).

Note:

N/A = not applicable (i.e., area is designated nonattainment such that a comparison to the standard is not required)

TABLE 4-13

HBEP Operation Impacts Analysis – Shoreline Fumigation Impacts Analysis Results Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	AERSCREEN Fumigation Result, $\mu\text{g}/\text{m}^3$	Background Concentration, $\mu\text{g}/\text{m}^3$ ^a	Total Predicted Concentration, $\mu\text{g}/\text{m}^3$	CAAQS, $\mu\text{g}/\text{m}^3$	NAAQS, $\mu\text{g}/\text{m}^3$
NO ₂ ^b	1-hour (max)	47.2	142	189	339	—
	1-hour (max)	3.52	20.2	23.7	655	—
SO ₂	3-hour	3.55	20.2	23.8	—	1,300
	24-hour	2.13	5.20	7.33	105	—
CO	1-hour	125	3,321	3,446	23,000	40,000
	8-hour	37.6	2,519	2,557	10,000	10,000
PM ₁₀	24-hour	10.5	51.0	61.5	N/A	150

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

^b The 1-hour NO₂ concentration includes an ambient NO₂ ratio of 0.80 (EPA, 2011).

Note:

N/A = not applicable (i.e., area is designated nonattainment such that a comparison to the standard is not required)

SECTION 5

Public Health Impacts Analysis

A health risk assessment (HRA) was conducted to assess the potential public health impacts and exposure associated with airborne emissions from routine operation of the HBEP. As applicable, the HRA results were also compared to the limits for excess cancer risk, cancer burden, and noncancer chronic and acute hazard indices contained within SCAQMD Rule 1401.

The air toxics emissions for the GE Frame 7FA.05s, GE LMS 100PBs, and auxiliary boiler were calculated consistent with the emission factors presented in Section 3.4 and a natural gas heat content of 1,050 Btu/cf. 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 and homegrown pathways were selected to evaluate cancer risk and chronic hazard index at the Point of Maximum Impact (PMI), 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 (SCAQMD, 2015); 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 5-1 and 5-2. The results in Table 5-1 represent a comparison of the total predicted HBEP impact to the SCAQMD’s California Environmental Quality Act (CEQA) significance thresholds, while the results in Table 5-2 represent the predicted risk for each individual emission unit in accordance with SCAQMD Rule 1401.

As shown in Table 5-1, 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 5-1
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	681	409700	3723500	4.27
Cancer Risk at the MEIR (per million) ^c	815	410000	3723700	2.68
Cancer Risk at a Sensitive Receptor (per million) ^c	12905	409969.5	3724223	1.49
Cancer Risk at the MEIW (per million) ^d	681	409700	3723500	0.15
Chronic Hazard Index at the PMI	681	409700	3723500	0.011
Chronic Hazard Index at the MEIR	815	410000	3723700	0.0068
Chronic Hazard Index at a Sensitive Receptor	12905	409969.5	3724223	0.0038
Chronic Hazard Index at the MEIW	681	409700	3723500	0.011

TABLE 5-1

Operational Health Risk Assessment Summary: Facility ^a

Risk ^b	Receptor Number	Receptor Coordinates (UTM, m)		Value
		Easting	Northing	
Acute Hazard Index at the PMI	552	409600	3723300	0.056
Acute Hazard Index at the MEIR	719	410000	3723550	0.019
Acute Hazard Index at a Sensitive Receptor	12902	410027.1	3723140	0.013
Acute Hazard Index at the MEIW	552	409600	3723300	0.056

^a The results in Table 5-1 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.

Note:

UTM = Universal Transverse Mercator

As shown in Table 5-2, the GE Frame 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 100PBs 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 5-1 represent the maximum predicted impacts at one receptor from all sources combined. In contrast, the maximum impacts reported for each individual source in Table 5-2 may occur at different receptors. Therefore, the HBEP totals in Table 5-2 are not directly additive and should not be directly compared to the results presented in Table 5-1.

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 (SCAQMD, 2015). The cancer burden for the HBEP was estimated at 8.7×10^{-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.

TABLE 5-2

Operational Health Risk Assessment Summary: Individual Units ^a

Risk ^b	GE Frame 7FA.05-01	GE Frame 7FA.05-02	GE LMS 100PB-01	GE LMS 100PB-02	Auxiliary Boiler
Cancer Risk at the PMI (per million) ^c	1.71	2.37	0.086	0.086	0.30
Cancer Risk at the MEIR (per million) ^c	1.19	1.36	0.059	0.050	0.043
Cancer Risk at a Sensitive Receptor (per million) ^c	0.66	0.73	0.046	0.046	0.0078
Cancer Risk at the MEIW (per million) ^d	0.063	0.086	0.0031	0.0031	0.0088
Chronic Hazard Index at the PMI	0.0043	0.0060	0.00022	0.00022	0.00041
Chronic Hazard Index at the MEIR	0.0030	0.0034	0.00015	0.00013	0.000059
Chronic Hazard Index at a Sensitive Receptor	0.0017	0.0060	0.00012	0.00012	0.000011
Chronic Hazard Index at the MEIW	0.0043	0.0060	0.00022	0.00022	0.00041
Acute Hazard Index at the PMI	0.022	0.032	0.0017	0.0017	0.00070
Acute Hazard Index at the MEIR	0.0080	0.0090	0.0012	0.0012	0.00023
Acute Hazard Index at a Sensitive Receptor	0.0047	0.0065	0.00066	0.00070	0.00021
Acute Hazard Index at the MEIW	0.022	0.032	0.0017	0.0017	0.00070

^a The results in Table 5-2 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 OEHA Derived methodology.

Regulatory Evaluation

6.1 Laws, Ordinances, Regulations, and Standards

The Clean Air Act (CAA), implemented by the EPA, requires major new and modified stationary sources of air pollution to obtain a construction permit prior to commencing construction through a program known as the federal New Source Review (NSR) program. The requirements of the NSR program are dependent on whether the air quality in the area where the new source (or modified source) is being located attains the NAAQS. The program that applies in areas that are in attainment of the NAAQS is the PSD. The program that applies to areas where the air does not meet the NAAQS (termed nonattainment areas) is the nonattainment NSR.

EPA implements the NSR program through regional offices. Arizona, California, Hawaii, Nevada, and specific Pacific trust territories are administrated out of the EPA Region IX office in San Francisco. EPA typically delegates its NSR, Title V, and Title IV authority to local air quality agencies that have sufficient regulatory structure to implement these programs consistent with requirements of the CAA and implementing regulations. The SCAQMD has been delegated several of these programs, including the authority to administer the PSD program.

The California Air Resources Board (ARB) was established by the state legislature in 1967 with the purpose of attaining and maintaining healthy air quality, conducting research into causes and solutions to air pollution, and addressing the impacts that motor vehicles have on air quality. To this end, ARB implements the following programs:

- Establish and enforce motor vehicle emission standards, including fuel standards.
- Monitor, evaluate, and set health-based air quality standards.
- Conduct research to solve air pollution problems.
- Establish TAC control measures.
- Oversee and assist local air quality districts.

Air pollution control districts were established based on meteorological and topographical factors. The districts were established to enforce air pollution regulations for the purpose of attaining and maintaining all state and federal ambient air quality standards. The districts regulate air emissions by issuing air permits to stationary sources of air pollution in compliance with approved regulatory programs. Each district promulgates rules and regulations specific to air quality issues within its jurisdiction. The air emissions sources regulated by each district vary. The types of air pollution sources that might be regulated include manufacturers, power plants, refineries, gasoline service stations, and auto body shops.

The applicable laws, ordinances, regulations, and standards (LORS) and compliance with these requirements are discussed in more detail in the following sections.

6.2 Federal LORS

EPA promulgates and enforces federal air quality regulations, with Region IX administering the federal air programs in California. The federal CAA provides the legal authority to regulate air pollution from stationary sources. The applicable federal regulations are summarized in Table 6-1, along with the agency responsible for administration of the regulation.

TABLE 6-1
Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 Code of Federal Regulations (CFR) Part 50	Establishes ambient air quality standards for criteria pollutants.	EPA Region IX	The Project Owner conducted a dispersion modeling analysis to determine if the HBEP would exceed the state or federal ambient air quality standards. Dispersion modeling indicates the HBEP will not exceed the state or federal ambient air quality standards for the attainment pollutants during normal operations. Nonattainment pollutant emissions will be mitigated consistent with the SCAQMD's State Implementation Plan-Approved NSR program.
Title 40 CFR Part 51, NSR (SCAQMD Regulation XIII)	Requires pre-construction review and permitting of new or modified stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient air quality standards.	SCAQMD with EPA Region IX Oversight	Requires NSR facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS. The NSR requirements are implemented at the local level with EPA oversight (SCAQMD Regulation XIII). A Permit to Construct (PTC) and Permit to Operate (PTO) application will be obtained from SCAQMD prior to HBEP construction. As a result, the compliance requirements of 40 CFR 51 will be met.
Title 40 CFR Part 52, PSD	The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	SCAQMD with EPA Region IX Oversight	The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source. SCAQMD classifies an unlisted source (which is not in the specified 28 source categories) that emits or has the potential to emit 250 tpy of any pollutant regulated by the CAA as a major stationary source. For listed sources, the threshold is 100 tpy. NO _x , VOC, or SO ₂ emissions from a modified major source are subject to PSD if the cumulative emission increases for either pollutant exceeds 40 tpy. In addition, a modification at a non-major source is subject to PSD if the modification itself would be considered a major source. In May 2010, EPA issued the GHG permitting rule officially known as the "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule" (GHG Tailoring Rule), in which EPA defined six GHG pollutants (collectively combined and measured as CO ₂ e) as NSR-regulated pollutants. Under the GHG Tailoring Rule, new projects that emit GHG pollutants above certain threshold levels would be subject to PSD permitting beginning in July 2011. However, in July 2014, the U.S. Supreme Court ruled that EPA could not regulate GHG emissions alone. As a result, new sources with a GHG PTE equal to or greater than 100,000 tpy of CO ₂ e are no longer required to obtain a PSD permit specifically for GHG emissions. If the new source would require a PSD permit as a result of criteria pollutant PTE, a BACT analysis to evaluate GHG emissions control would still be required. The HBEP is a natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility and would be considered one of the 28 source categories. Therefore, the emission rates were compared to the 100 tpy threshold. As shown in Table 3-14, the emission increase in CO and NO _x would exceed the 100 tpy threshold per pollutant. Therefore, the HBEP would be subject to PSD analysis requirements for CO and NO _x . Since the HBEP exceeds the PSD thresholds for several criteria pollutants, a BACT analysis for GHG emissions control is required.

TABLE 6-1

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
			A PSD application was submitted to the SCAQMD and EPA as part of the HBEP permit application, which included a BACT analysis for GHG emissions control.
Title 40 CFR Part 60, Subpart KKKK (SCAQMD Regulation IX)	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	<p>40 CFR 60 Subpart KKKK – NO_x Emission Limits for New Stationary Combustion Turbines applies to all new combustion turbines that commence construction, modification, or reconstruction after February 18, 2005. The Rule requires natural-gas-fired turbines with a heat input greater than 850 MMBtu/hr to meet an NO_x emission limit of 15 ppm at 15 percent O₂, and an SO₂ limit of 0.060 lb/MMBtu. Alternatively, a fuel sulfur limit of 500 part(s) per million by weight (ppmw) could be met. Stationary combustion turbines regulated under this subpart would be exempt from the requirements of Subpart GG.</p> <p>The proposed combined-cycle and simple-cycle CTGs will use DLN burners with SCR systems and pipeline-quality natural gas and will comply with both the NO_x and SO₂ limits. The NO_x and SO₂ emissions from the combined-cycle CTGs will be 2 ppm at 15 percent O₂ and 0.0022 lb/MMBtu, respectively. The NO_x and SO₂ emissions from the simple-cycle CTGs will be 2.5 ppm at 15 percent O₂ and 0.0018 lb/MMBtu, respectively. The certified NO_x Continuous Emission Monitoring System (CEMS) will ensure compliance with the standard. Records of natural gas use and fuel sulfur content will ensure compliance with the SO₂ limit.</p>
Title 40 CFR Part 60, Subpart Dc (SCAQMD Regulation IX)	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	<p>40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units applies to steam generating units with design heat input rates between 10 and 100 MMBtu/hr that were installed after June 9, 1989.</p> <p>Because the HBEP’s auxiliary boiler will be fired exclusively on natural gas, the Project Owner will only be required to maintain monthly fuel consumption records for a minimum of two years.</p>
Title 40 CFR Part 60, Subpart TTTT	Establishes a new source performance standard for electrical generating facilities.	SCAQMD with EPA Region IX Oversight	<p>EPA promulgated New Source Performance Standard Subpart TTTT, which includes two potentially applicable GHG emission limits for newly constructed combustion turbines. A newly constructed or reconstructed stationary combustion turbine that supplies more than its design efficiency times its potential electric output as net-electric sales on a 3-year rolling average basis and combusts more than 90 percent natural gas on a heat input basis on a 12-operating-month rolling average basis must meet a limit of 450 kilograms (kg) of CO₂ per MWh of gross energy output (1,000 lb CO₂/MWh), or 470 kg of CO₂ per MWh of net energy output (1,030 lb CO₂/MWh).</p> <p>A newly constructed or reconstructed stationary combustion turbine that supplies its design efficiency times its potential electric output or less as net-electric sales on a 3-year rolling average basis and combusts more than 90 percent natural gas on a heat input basis on a 12-operating-month rolling average basis must meet a limit of 50 kg CO₂ per gigajoule (GJ) of heat input (120 lb CO₂/MMBtu).</p> <p>The applicable emission standard depends on whether a combustion turbine sells more electricity than its potential electrical output, which is calculated by multiplying the design</p>

TABLE 6-1
Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 63	Establishes national emission standards to limit emissions of HAPs or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established from facilities in specific categories.	SCAQMD with EPA Region IX Oversight	<p>efficiency and the potential electrical output, and combusts more than 90 percent natural gas. Assuming the combined-cycle power block will generate more electricity than the potential electrical output, the HBEP will need to comply with the 1,000 lb CO₂/MWh emission limit. The HBEP is exclusively fueled by natural gas with a combined-cycle power block design efficiency of approximately 56 percent. The HBEP's combined-cycle GHG efficiency is estimated at 766 lb CO₂/MWh-Net, assuming an 8 percent performance degradation, which clearly complies with Subpart TTTT's emission limit of 1,000 lb CO₂/MWh.</p> <p>The HBEP simple-cycle power block design efficiency is 41 percent and the potential HBEP simple-cycle power block's electrical output threshold is 718,320 MWh-Net (based on the design efficiency of 41 percent and the net electrical output of 200 MW for 8,760 hours per year). The HBEP simple-cycle power block's potential annual net electric sales are 376,800 MWh-Net, assuming 200 MWs-Net of generation and 1,884 hours per year of operation (1,750 operating hours plus 58 startup and 76 shutdown hours). Since the annual net electric sales are less than the electric output threshold, the HBEP simple-cycle power block must comply with Subpart TTTT emission limit of 50 kg CO₂ per GJ of heat input (120 lb CO₂/MMBtu). As a natural-gas fired facility, the HBEP is expected to emit CO₂ at a rate of 114 lb CO₂/MMBtu, thereby complying with the applicable emission limit in Subpart TTTT.</p> <p>40 CFR 63—National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories establishes emission standards to limit emissions of HAPs from specific source categories for Major HAP sources. Sources subject to 40 CFR 63 requirements must either use the maximum achievable control technology (MACT), be exempted under 40 CFR 63, or comply with published emission limitations. The potential NESHAP applicable to the HBEP is Subpart YYYY, which sets a formaldehyde emission limit or an operational limit of 91 part(s) per billion by volume (ppbv) for turbines. Note that Subpart JJJJJ is not applicable to the HBEP because the auxiliary boiler will be fired exclusively with natural gas.</p> <p>Projects would be subject to the 40 CFR 63 requirements if the HAP PTE is greater than or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs. The HBEP is not expected to exceed these thresholds and is not subject to NESHAPs.</p>
Title 40 CFR Part 64 (Compliance Assurance Monitoring [CAM] Rule)	Establishes onsite monitoring requirements for emission control systems.	SCAQMD with EPA Region IX Oversight	<p>40 CFR 64—CAM requires facilities to monitor the operation and maintenance of emissions control systems and report any control system malfunctions to the appropriate regulatory agency. If an emission control system is not working properly, the CAM Rule also requires a facility to take action to correct the control system malfunction. The CAM Rule applies to emissions units with uncontrolled PTE levels greater than applicable major source thresholds. Emission control systems governed by Title V operating permits requiring continuous compliance determination methods are generally compliant with the CAM Rule.</p> <p>The HBEP's CTGs will have emission control systems for NO_x and CO (SCR and oxidation catalyst); the HBEP's auxiliary boiler will have emission control systems for NO_x (SCR). However, emissions of NO_x and CO from the CTGs and NO_x from the auxiliary boiler would be directly</p>

TABLE 6-1

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 70 (SCAQMD Regulation XXX)	CAA Title V Operating Permit Program	SCAQMD with EPA Region IX Oversight	<p>measured by CEMS. Therefore, the HBEP is exempt from the CAM provisions based on the exemption in 40 CFR 64.2(b)(vi) and SCAQMD Regulation XX for NO_x.</p> <p>40 CFR 70—Operating Permits Program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. The requirements of 40 CFR 70 apply to facilities that are subject to New Source Performance Standards (NSPS) requirements and are implemented at the local level through SCAQMD Regulation XXX. According to Regulation XXX, Rule 3001, a facility would be required to submit a Title V application if the facility has a PTE greater than 10 tpy of NO_x or VOC, 100 tpy of SO₂, 50 tpy of CO, or 70 tpy of PM₁₀ or the HAP PTE is greater than or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs.</p> <p>The HBEP will exceed the Title V thresholds listed in SCAQMD Rule 3001. As a result, the HBEP submitted an application to modify the existing Title V permit.</p>
Title 40 CFR Part 72 (SCAQMD Regulation XXXI)	CAA Acid Rain Program	SCAQMD with EPA Region IX Oversight	<p>40 CFR 72—Acid Rain Program establishes emission standards for SO₂ and NO_x emissions from electric generating units through the use of market incentives, requires sources to monitor and report acid gas emissions, and requires the acquisition of SO₂ allowances sufficient to offset SO₂ emissions on an annual basis.</p> <p>An acid rain facility, such as the HBEP, must also obtain an acid rain permit as mandated by Title IV of the CAA. A permit application must be submitted to SCAQMD at least 24 months before operation of the new units commences. The application must present all relevant sources at the facility, a compliance plan for each unit, applicable standards, and estimated commencement date of operation.</p> <p>The necessary Title IV applications will be submitted as part of the permitting process.</p>

6.3 State LORS

ARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update, as necessary, the CAAQS; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the State Implementation Plan for achievement of the NAAQS.

The California Health and Safety Code, Section 41700 prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, that endanger the comfort, repose, health, or safety of the public, or that damage business or property.

In August 2006, the California legislature passed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 requires California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG. The HBEP will be subject to AB 32, and will be required to comply with all final rules, regulations, emissions limitations, emission reduction measures, or market-based compliance mechanisms adopted under AB 32. ARB promulgated a Cap and Trade regulation to limit GHG emissions and to develop a market-based compliance mechanism for the creation, sale, and use of GHG allowances.

In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on September 29, 2006. The law limits long-term investments in base load generation by the state's utilities to power plants that meet an emissions performance standard (EPS) jointly established by the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC). In response, the CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to, publicly owned utilities of 1,100 pound(s) CO₂ per megawatt-hour (lb CO₂/MWh). Base load generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for the HBEP will be approximately 50 percent. Therefore, as a non-base load facility, the HBEP is not subject to the EPS; however, despite its inapplicability, the HBEP's state-of-the-art, efficient combined-cycle and simple-cycle configurations nevertheless satisfy this requirement, emitting 709 lb CO₂/MWh and 1,036 lb CO₂/MWh, respectively.

The state has promulgated numerous laws and regulations at the state level (Toxic Air Contaminants and Air Toxic Hot Spots) which are effectuated at the local level by the air districts. A discussion of these state and local LORS is presented in Tables 6-2 and 6-3, respectively.

TABLE 6-2

Applicable State Laws, Ordinances, Regulations, and Standards for the Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
California Health & Safety Code, Section 41700	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	SCAQMD with ARB Oversight	The CEC Conditions of Certification and the air quality management district PTC processes are developed to ensure that no adverse public health effects or public nuisances result from operation of the HBEP.
California Assembly Bill 32 – Global Warming Solutions Act of 2006 (AB 32)	The purpose is to reduce carbon emissions within the state by approximately 25 percent by the year 2020.	SCAQMD with ARB Oversight	Requires ARB to develop regulations to limit and reduce GHG emissions.
California Code of Regulations, Title 17, Article 5	Establishes GHG limitations, reporting requirements, and a Cap and Trade offsetting program.	ARB	ARB has promulgated a Cap and Trade regulation that limits or caps GHG emissions and requires subject facilities to acquire GHG allowances. HBEP GHG emissions have been estimated and the Project Owner will report emissions and acquire allowances and offsets consistent with these regulations.
California Senate Bill 1368 – Emissions Performance Standards (SB 1368)	The law limits long-term investments in base load generation by the state's utilities to power plants that meet an EPS jointly established by the CEC and CPUC.	CEC with ARB Oversight	CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to, publicly owned utilities of 1,100 lb CO ₂ /MWh. The HBEP combined-cycle and simple-cycle units will emit 709 and 1,036 lb CO ₂ /MWh, respectively.

6.4 Local LORS

When the state's air pollution statutes were reorganized in the mid-1960s, local districts were required to be established in each county of the state. There are three different types of districts: county, regional, and unified. In addition, special air quality management districts, with more comprehensive authority over non-vehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including SCAQMD. Air quality management districts have principal responsibility for developing plans for meeting the NAAQS and CAAQS; for developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards; for implementing permit programs established for the construction, modification, and operation of sources of air pollution; and for enforcing air pollution statutes and regulations governing non-vehicular sources.

SCAQMD plans define the proposed strategies, including stationary source control measures and NSR rules, whose implementation will attain the CAAQS. The relevant stationary source control measures and NSR requirements are presented in Table 6-3.

TABLE 6-3
Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 201	Establishes an orderly procedure for the review of new and modified sources of air pollution through the issuance of permits.	SCAQMD	Rule 201 specifies that any facility installing nonexempt equipment that causes or controls the emission of air pollutants must first obtain a PTC from the SCAQMD. SCAQMD has three separate preconstruction review programs for new or modified sources of criteria pollutant emissions: Regulation XIII (NSR), Regulation XVII (PSD), and Rule 2005 (NSR for RECLAIM). Section 4.2 included an assessment of the air quality impacts in accordance with Regulation XIII, Regulation XVII, and Rule 2005. The completed SCAQMD PTC application forms were included in Appendix 5.1E of the HBEP permit application.
SCAQMD Rule 201.1	Incorporates the permit conditions in federally issued PTCs.	SCAQMD	A person constructing and/or operating equipment or an agricultural permit unit, pursuant to a PTC issued by the EPA, shall construct the equipment or agricultural permit unit in accordance with the conditions set forth in that permit, and shall operate the equipment or agricultural permit unit at all times in accordance with such conditions. A federal PSD permit will be obtained for the HBEP. The Project Owner will comply with the permit conditions established in the PSD permit.
SCAQMD Rule 212	Establishes standards for approving permits and issuing public notice.	SCAQMD	Rule 212 requires public notification if a. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX that may emit air contaminants is located within 1,000 feet from the outer boundary of a school; or b. Any new or modified facility which has onsite emission increases exceeding any of the daily maximums specified in subdivision (g) of this rule; or c. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX with increases in emissions of TACs, for which the Executive Officer has made a determination that a person may be exposed to a maximum incremental cancer risk (MICR) is greater than 1 in 1 million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted equipment unless the applicant can show the total facility-wide MICR is below 10 in 1 million (10×10^{-6}). The HBEP will be greater than 1,000 feet from the outer boundary of a school and the predicted total facility-wide MICR is less than 10 in 1 million. However, the onsite emissions will exceed the daily maximums listed in subdivision (g) of this Rule. Therefore, a public notice consistent with the requirements outlined in Rule 212 will be issued. The process for public notification and comment will include all of the applicable provisions of 40 CFR 51.161(b) and 40 CFR 124.10.
SCAQMD Rule 218	Establishes requirements for a CEMS.	SCAQMD	The owner or operator of any equipment subject to this Rule shall provide, properly install, operate, and maintain in calibration and good working order a certified CEMS to measure the concentration and/or emission rates, as applicable, of air contaminants and diluent gases, flow rates, and other required parameters. Each CTG and the auxiliary boiler will be equipped with a CEMS. These units will comply with all applicable requirements of Rule 218, Regulation XX (NO _x RECLAIM), and Title IV (Acid Rain – 40 CFR 75).
SCAQMD Rule 401	Establishes limits for visible emissions from stationary sources.	SCAQMD	Rule 401 prohibits visible emissions as dark as or darker than Ringlemann No. 1 for periods greater than 3 minutes in any hour. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the HBEP will not create visible emissions as dark as or darker than Ringlemann No. 1.
SCAQMD Rule 402	Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage businesses or property.	SCAQMD	A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or which endanger the comfort, repose, health or safety of any such persons or the public; or which cause, or have a natural tendency to cause, injury or damage to businesses or property. The CEC Conditions of Certification and the SCAQMD PTC process are designed to ensure that the operation of the HBEP will not cause a public nuisance.
SCAQMD Rule 403	Establishes requirements to reduce the amount of particulate matter (PM) entrained in the ambient air as a result of man-made fugitive dust sources.	SCAQMD	Rule 403 requires the implementation of best available control measures to minimize fugitive dust emissions and prohibits visible dust emissions beyond the property line, a 50 µg/m ³ incremental increase in PM ₁₀ concentrations across a facility as measured by upwind and downwind concentrations, and track-out of bulk material onto public, paved roadways. The HBEP will implement best available control measures as part of the Stormwater Pollution Prevention Plan to minimize fugitive dust emissions during construction and operation.
SCAQMD Rule 404	Establishes limits for PM emission concentrations.	SCAQMD	A person shall not discharge into the atmosphere from any source PM in excess of the concentration at standard conditions listed in Rule 404. However, per Rule 404.c, this Rule does not apply to emissions resulting from the combustion of liquid or gaseous fuels in steam generators or gas turbines. Because the CTGs and auxiliary boiler will combust natural gas only, Rule 404 is not applicable.
SCAQMD Rule 405	Establishes limits for PM mass emission rates.	SCAQMD	Emission rate limits are based upon the process weight (fuel burned) per hour. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the HBEP will comply with the Rule 405 PM emission limits.
SCAQMD Rule 407	Establishes limits for CO and SO _x emissions from stationary sources.	SCAQMD	Rule 407 prohibits CO and SO _x emissions in excess of 2,000 and 500 ppm, respectively, from any source. The CO emissions from the combined-cycle CTGs, simple-cycle CTGs, and auxiliary boiler will be less than 2 ppm, 4 ppm, and 50 ppm, respectively. Therefore, the HBEP meets the CO limit. In addition, equipment that complies with the requirements of Rule 431.1 is exempt from the SO _x limit. Since the facility will comply with Rule 431.1, the SO _x provisions of Rule 407 are not applicable.

TABLE 6-3
Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 409	Establishes limits for PM emissions from fuel combustion sources.	SCAQMD	Rule 409 prohibits PM emissions in excess of 0.1 grains per cubic foot of gas at 12 percent CO ₂ at standard conditions. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the HBEP will comply with the Rule 409 PM emission limits.
SCAQMD Rule 431.1	Establishes limits for the sulfur content of gaseous fuels to reduce SO _x emissions from stationary combustion sources.	SCAQMD	Rule 431.1 limits the sulfur content of natural gas calculated as hydrogen sulfide (H ₂ S) to be less than 16 part(s) per million by volume (ppmv). The sulfur content of the natural gas will be less than 0.75 grains of sulfur per 100 dry standard cubic feet (gr/dscf) of natural gas or 12.6 ppmv. Therefore, the HBEP will comply with the Rule 431.1 requirement.
SCAQMD Rule 474	Establishes limits for emissions of NO _x from stationary combustion sources.	SCAQMD	Per Rule 2001, NO _x RECLAIM facilities are exempt from the provisions of Rule 474. Since the HBEP will be a NO _x RECLAIM facility, Rule 474 is not applicable.
SCAQMD Rule 475	Establishes limits for combustion contaminant (PM) emissions from subject equipment.	SCAQMD	Rule 475 prohibits PM emissions that exceed both 11 lb/hr (per emission unit) and 0.01 gr/dscf at 3 percent O ₂ . The combined-cycle CTGs' PM emission rate will be 8.50 lb/hr and less than 0.01 gr/dscf. Similarly, the simple-cycle CTGs' PM emission rate will be 6.24 lb/hr and less than 0.01 gr/dscf.
SCAQMD Rule 476	Establishes limits for NO _x and PM emissions from steam generating equipment with a maximum heat input rating exceeding 50 MMBtu/hr.	SCAQMD	Per Rule 2001, NO _x RECLAIM facilities are exempt from the NO _x requirements for this rule. Therefore, only the PM provisions of this rule will apply. The combined-cycle CTGs' PM emission rate will be 8.50 lb/hr and less than 0.01 gr/dscf. Similarly, the simple-cycle CTGs' PM emission rate will be 6.24 lb/hr and less than 0.01 gr/dscf.
SCAQMD Rule 53	Establishes limits for emissions of sulfur compounds (SO _x) from stationary sources in Orange County.	SCAQMD	A person shall not discharge into the atmosphere sulfur compounds, which would exist as a liquid or gas at standard conditions, exceeding in concentration at the point of discharge 500 ppmv, calculated as SO ₂ . The use of low sulfur natural gas will result in SO ₂ concentrations significantly less than 500 ppmv.
SCAQMD Regulation IX, Permits (40 CFR 60)	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	See 40 CFR 60 (Table 6-1) to review applicability and the compliance assessment.
SCAQMD Regulation X, Permits (40 CFR 63)	Establishes national emission standards to limit emissions of HAPs or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established from facilities in specific categories.	SCAQMD with EPA Region IX Oversight	See 40 CFR 63 (Table 6-1) to review applicability and the compliance assessment.
SCAQMD Rule 1134	Establishes limits for emissions of NO _x from stationary gas turbines.	SCAQMD	Per Rule 2001, NO _x RECLAIM facilities are exempt from the provisions of Rule 1134. Therefore, Rule 1134 is not applicable to the HBEP.
SCAQMD Rule 1135	Establishes limits for emissions of NO _x from electricity generating systems.	SCAQMD	Per Rule 2001, NO _x RECLAIM facilities are exempt from the provisions of Rule 1135. Therefore, Rule 1135 is not applicable to the HBEP.
SCAQMD Rule 1146	Establishes limits for emissions of NO _x from industrial, institutional, and commercial boilers, steam generators, and process heaters.	SCAQMD	Per Rule 2001, NO _x RECLAIM facilities are exempt from the provisions of Rule 1146. Therefore, Rule 1146 is not applicable to the HBEP.

TABLE 6-3
Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule XIII, Permits (NSR)	Provides for the review of new and modified sources and provide mechanisms, including the use of BACT and emission offsets, by which authorities to construct such sources may be granted for non-RECLAIM pollutants.	SCAQMD	<p>Rule 1303(a) – BACT: BACT shall be applied to any new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia.</p> <p>The BACT requirements of Rule 1303 apply regardless of any modeling or offset exemption in Rule 1304. Therefore, a complete top-down BACT analysis was conducted for emissions of CO, VOC, SO₂, PM₁₀, PM_{2.5}, and GHG. The proposed BACT emission limits are presented in Section 5.1.7.3 of the HBEP permit application. A BACT analysis for NO_x was conducted as part of compliance with Rule 2005.</p> <p>Rule 1303(b)(1) – Modeling: As part of the NSR permit approval process, an air quality dispersion analysis must be conducted using a mass emissions-based analysis contained in the Rule or an approved dispersion model to evaluate impacts of increased criteria pollutant emissions from any new or modified facility on ambient air quality.</p> <p>The Project Owner conducted air dispersion modeling to demonstrate that the auxiliary boiler will not cause a violation, or make significantly worse an existing violation, of any state or federal ambient air quality standard. The CTGs are exempt from modeling requirements per Rule 1304, with the exception of Regulation XX pollutants.</p> <p>Rule 1303(b)(2) – Offsets: Unless exempt from offsets requirements pursuant to Rule 1304, emission increases shall be offset by either Emission Reduction Credits approved pursuant to Rule 1309, or by allocations from the Priority Reserve in accordance with the provisions of Rule 1309.1, or allocations from the Offset Budget in accordance with the provisions of Rule 1309.2. Offset ratios shall be 1.2-to-1.0 for Emission Reduction Credits and 1.0-to-1.0 for allocations from the Priority Reserve, except for facilities not located in the South Coast Air Basin, where the offset ratio for Emission Reduction Credits only shall be 1.2-to-1.0 for VOC, NO_x, SO_x and PM₁₀ and 1.0-to-1.0 for CO.</p> <p>The Project Owner will provide sufficient VOC and PM₁₀ Emission Reduction Credits to offset the auxiliary boiler's emissions at a 1.2-to-1.0 ratio; NO_x emissions will be addressed through Regulation XX. The CTGs are exempt from offset requirements per Rule 1304, with the exception of Regulation XX pollutants.</p> <p>Rule 1303(b)(3) – Sensitive Zone Requirements: Unless credits are obtained from the Priority Reserve, facilities located in the South Coast Air Basin are subject to the Sensitive Zone requirements specified in California Health & Safety Code Section 40410.5.</p> <p>The HBEP is located in Zone 1. Therefore, the Project Owner will obtain Emission Reduction Credits from Zone 1 only to offset emissions from the auxiliary boiler. The CTGs are exempt from offset requirements per Rule 1304, with the exception of Regulation XX pollutants.</p> <p>Rule 1303(b)(4) – Facility-wide Compliance: The HBEP will comply with all applicable rules and regulations of the SCAQMD.</p> <p>Rule 1303(b)(5)(A) – Alternative Analysis: Conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstrate that the benefits of the proposed project outweigh the environmental and social costs associated with that project.</p> <p>Rule 1303(b)(5)(B) – Statewide Compliance: Demonstrate prior to the issuance of a PTC that all major stationary sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA.</p> <p>The Project Owner has certified in SCAQMD Form 400-A (see Appendix 5.1E of the HBEP permit application) that all major sources under its ownership or control in the State of California are in compliance with all federal, state, and local air quality rules and regulations.</p> <p>Rule 1303(b)(5)(C) – Protection of Visibility: Conduct a modeling analysis for plume visibility in accordance with the procedures specified in Appendix B if the net emission increase from the new or modified source exceeds 15 tpy of PM₁₀ or 40 tpy of NO_x; and the location of the source, relative to the closest boundary of a specified federal Class I area, is within 28 km.</p> <p>Emissions of PM₁₀ and NO_x will exceed the emissions thresholds but the distance to the nearest Class I area is approximately 70 km. Therefore, a visibility analysis is not required.</p> <p>Rule 1303(b)(5)(D) – Compliance through CEQA: Because the CEC certification process is similar to the CEQA process, the applicable CEQA requirements have been addressed in the HBEP permit application.</p> <p>Rule 1304.1 – Electrical Generating Fee for Use of Offset Exemption: Requires the payment of fees to generate air quality improvements within the project area consistent with SCAQMD's approved Air Quality Management Plan.</p>

TABLE 6-3
Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 1325, Permits (Federal PM _{2.5} NSR)	Provides for the review of new and modified sources and mechanisms, including the use of lowest achievable emissions rate (LAER) and emission offsets, by which authorities to construct such sources may be granted for PM _{2.5} .	SCAQMD	<p>The Executive Officer shall deny the permit for a new major polluting facility; or major modification to a major polluting facility; or any modification to an existing facility that would constitute a major polluting facility in and of itself (i.e., the PTE is 100 tpy or more of PM_{2.5} or its precursors), unless each of the following requirements is met:</p> <p>(A) LAER is employed for the new or relocated source or for the actual modification to an existing source; and</p> <p>(B) Emission increases shall be offset at a ratio of 1.1-to-1.0 for PM_{2.5} and at the ratio required in Regulation XIII or Rule 2005 for NO_x and SO₂, as applicable; and</p> <p>(C) Certification is provided by the owner/operator that all major sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA; and</p> <p>(D) An analysis is conducted of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstration made that the benefits of the proposed project outweigh the environmental and social costs associated with that project.</p> <p>The HBEP will not exceed the 100-tpy threshold for PM_{2.5} (or PM_{2.5} precursors on a per-pollutant basis). Therefore, Rule 1325 is not applicable.</p>
SCAQMD Rule 1401, Permits (Toxics NSR)	Provides for the review of new and modified sources of TAC emissions to evaluate potential public exposure and health risk, to mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced.	SCAQMD	<p>T-BACT shall be applied to any new or modified source of TACs where the source risk is a cancer risk greater than 1 in 1 million (1×10^{-6}), a chronic hazard index greater than 1.0, or an acute hazard index greater than 1.0.</p> <p>The predicted MICR at the MEIR and MEIW for the HBEP are 2.68 and 0.15 in one million, respectively. The maximum predicted chronic and acute hazard indices for the HBEP are 0.011 and 0.056, respectively. These values are below the PTC or PTO facility thresholds for cancer risk of 10 in 1 million and the chronic and acute hazard index of 1.0. The predicted MICR at the MEIR and MEIW are 1.36 and 0.086, respectively, for an individual combined-cycle CTG; 0.059 and 0.0031, respectively, for an individual simple-cycle CTG; and 0.043 and 0.0088, respectively, for the auxiliary boiler. Although the combined-cycle CTG cancer risks exceed the individual unit threshold of 1 in 1 million, the HBEP will employ emission controls considered to be T-BACT. Therefore, the HBEP will comply with Rule 1401.</p>
SCAQMD Rule 1403, Permits (Asbestos Removal)	Specifies work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials.	SCAQMD	The Project Owner will comply with the requirements outlined in Rule 1403 prior to and during the removal of asbestos-containing materials.
SCAQMD Regulation XVII, Permits (PSD)	Allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	SCAQMD with EPA Region IX Oversight	See 40 CFR 52 (Table 6-1) to review applicability and the compliance assessment.

TABLE 6-3

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Regulation XX, Permits (NO _x RECLAIM)	Provides for the review of new and modified sources and provides mechanisms, including the use of BACT and emission offsets, by which authorities to construct such sources may be granted for RECLAIM pollutants.	SCAQMD	<p>Rule 2005(b)(1)(A) – BACT: BACT shall be applied to any new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia.</p> <p>A complete top-down BACT analysis was conducted for emissions of NO_x. The proposed BACT emission limits are presented in Section 5.1.7.3 of the HBEP permit application. A BACT analysis for CO, VOC, SO₂, PM₁₀, PM_{2.5}, and GHG was conducted as part of compliance with Rule 1303.</p> <p>Rule 2005(b)(1)(B) – Modeling: As part of the NSR permit approval process, an air quality dispersion analysis must be conducted for NO_x using a mass emissions-based analysis contained in the rule or an approved dispersion model, to evaluate impacts of increased NO_x emissions from any new or modified facility on ambient air quality.</p> <p>An air quality dispersion analysis was conducted for NO_x using the AERMOD dispersion model.</p> <p>Rule 2005(b)(2) – Offsets: NO_x emission increases shall be offset using RECLAIM trading credits at a ratio of 1.0-to-1.0.</p> <p>The HBEP will participate in the NO_x RECLAIM program and will secure the necessary offsets as outlined in Section 5.1.7 of the HBEP permit application.</p> <p>Rule 2005(e) – Trading Zone Requirements: Any increase in an annual allocation to a level greater than the facility's starting plus non-tradable allocations, and all emissions from a new or relocated facility, must be fully offset by obtaining RTCs originated in one of the two trading zones. A facility in Zone 1 may only obtain RTCs from Zone 1. A facility in Zone 2 may obtain RTCs from either Zone 1 or 2, or both.</p> <p>The HBEP is located in Zone 1. Therefore, the Project Owner will obtain RTCs from Zone 1 only.</p> <p>Rule 2005(g)(1) – Statewide Compliance: Demonstrate, prior to the issuance of a PTC, that all major stationary sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA.</p> <p>The Project Owner has certified in SCAQMD Form 400-A (see Appendix 5.1E of the HBEP permit application) that all major sources under its ownership or control in the State of California are in compliance with all federal, state, and local air quality rules and regulations.</p> <p>Rule 2005(g)(2) – Alternative Analysis: Conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstrate that the benefits of the proposed project outweigh the environmental and social costs associated with that project.</p> <p>The Project Owner has conducted a comparative evaluation of alternative sites as part of the Petition to Amend (PTA) process and has concluded that the benefits of providing grid reliability and increased employment in the surrounding area will outweigh the environmental and social costs incurred in the construction and operation of the proposed facility.</p> <p>Rule 2005(g)(3) – Compliance through CEQA: Because the CEC certification process is similar to the CEQA process, the applicable CEQA requirements have been addressed in the HBEP permit application.</p> <p>Rule 2005(g)(4) – Protection of Visibility: Conduct a modeling analysis for plume visibility in accordance with the procedures specified in Appendix B if the net emission increase from the new or modified source exceeds 40 tpy of NO_x; and the location of the source, relative to the closest boundary of a specified federal Class I area, is within 28 km.</p> <p>Emissions of NO_x will exceed the emissions thresholds; however, the distance to the nearest Class I area is approximately 70 km. Therefore, a visibility analysis is not required.</p> <p>Rule 2005(h) – Public Notice: The applicant shall provide public notice, if required, pursuant to Rule 212.</p> <p>The Project Owner will comply with the requirements for Public Notice outlined in Rule 212.</p> <p>Rule 2005(i) – Rule 1401 Compliance: All new or modified sources shall comply with the requirements of Rule 1401.</p> <p>The Project Owner will comply with the requirements of Rule 1401 as demonstrated in Section 5.</p> <p>Rule 2005(j) – Compliance with State and Federal NSR: The HBEP will comply with all applicable rules and regulations of the SCAQMD.</p>
SCAQMD Regulation XXX, Permits (Title V)	Implements the operating permit requirements of Title V of the CAA as amended in 1990.	SCAQMD with EPA Region IX Oversight	See 40 CFR 70 (Table 6-1) to review applicability and the compliance assessment.
SCAQMD Rule 3008, Title V Permits (PTE Limitations)	Exempts low-emitting facilities with actual emissions below a specific threshold from federal Title V permit requirements by limiting the facility's PTE.	SCAQMD	<p>This Rule shall apply to any facility that would, if it did not comply with the limitations set forth in either paragraphs (d)(1) or (d)(2) of Rule 3008, have the PTE air contaminants equal to or in excess of the thresholds specified in Table 2, subdivision (b) of Rule 3001 – Applicability, or, for GHGs, 100,000 or more tpy of CO₂e.</p> <p>The HBEP will exceed the Title V thresholds listed in Rule 3001. As a result, the Project Owner submitted an application to modify the existing Title V permit.</p>
SCAQMD Regulation XXXI, Permits (Acid Rain)	Incorporates by reference the provisions of 40 CFR 72 for purposes of implementing an acid rain program that meets the requirements of Title IV of the CAA.	SCAQMD with EPA Region IX Oversight	See 40 CFR 72 (Table 6-1) to review applicability and the compliance assessment.

SECTION 7

References

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Appendix A
Air Quality Impact Analysis—Commissioning

Huntington Beach Energy Project
Appendix A, Table 1
Commissioning Stack Parameters
December 2015

Point Sources

Scenario	Source ID	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
GE 7FA.05, 10% Load	7FA01	409449	3723146	3.66	45.7	361	9.33	6.10
	7FA02	409474	3723182	3.66	45.7	361	9.33	6.10
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91
GE 7FA.05, 40% Load	7FA01	409449	3723146	3.66	45.7	359	11.9	6.10
	7FA02	409474	3723182	3.66	45.7	359	11.9	6.10
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91
GE 7FA.05, 80% Load	7FA01	409449	3723146	3.66	45.7	366	16.1	6.10
	7FA02	409474	3723182	3.66	45.7	366	16.1	6.10
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91
GE LMS 100PB, 5% Load	7FA01	409449	3723146	3.66	45.7	350	12.2	6.10
	7FA02	409474	3723182	3.66	45.7	350	12.2	6.10
	LMS01	409149	3723193	3.66	24.4	728	10.0	4.11
	LMS02	409185	3723168	3.66	24.4	728	10.0	4.11
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91
GE LMS 100PB, 75% Load	7FA01	409449	3723146	3.66	45.7	350	12.2	6.10
	7FA02	409474	3723182	3.66	45.7	350	12.2	6.10
	LMS01	409149	3723193	3.66	24.4	694	33.3	4.11
	LMS02	409185	3723168	3.66	24.4	694	33.3	4.11
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91
GE LMS 100PB, Full Load	7FA01	409449	3723146	3.66	45.7	350	12.2	6.10
	7FA02	409474	3723182	3.66	45.7	350	12.2	6.10
	LMS01	409149	3723193	3.66	24.4	748	23.8	4.11
	LMS02	409185	3723168	3.66	24.4	748	23.8	4.11
	Aux Boiler	409438	3723236	3.66	24.4	432	21.2	0.91

This table contains the same information presented in Appendix 5.1C, Table 5.1C.4 of the HBEP permit application.

Huntington Beach Energy Project

Appendix A, Table 2^a

Commissioning Emission Rates

December 2015

Short-Term Pollutant Commissioning Emissions

Scenario	Source ID	1-hour NO ₂		1-hour CO		8-hour CO	
		(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
GE 7FA.05, 10% Load	7FA01	16.4	130	239	1,900	239	1,900
	7FA02	16.4	130	239	1,900	239	1,900
	Aux Boiler	0.054	0.42	0.36	2.83	0.30	2.37
GE 7FA.05, 40% Load	7FA01	8.60	68.3	Emission rates are captured by another modeled commissioning or operation scenario			
	7FA02	8.60	68.3				
	Aux Boiler	0.054	0.42				
GE 7FA.05, 80% Load	7FA01	7.94	63.0				
	7FA02	7.94	63.0				
	Aux Boiler	0.054	0.42				
GE LMS 100PB, 5% Load	7FA01	7.69	61.0	41.0	325	12.0	95.2
	7FA02	7.69	61.0	41.0	325	12.0	95.2
	LMS01	5.05	40.1	30.7	244	30.7	244
	LMS02	5.05	40.1	30.7	244	30.7	244
	Aux Boiler	0.054	0.42	0.36	2.83	0.30	2.37
GE LMS 100PB, 75% Load	7FA01	Emission rates are captured by another modeled commissioning or operation scenario		41.0	325	12.0	95.2
	7FA02			41.0	325	12.0	95.2
	LMS01			9.13	72.5	9.13	72.5
	LMS02			9.13	72.5	9.13	72.5
	Aux Boiler			0.36	2.83	0.30	2.37
GE LMS 100PB, Full Load	7FA01			Emission rates are captured by another modeled commissioning or operation scenario		41.0	325
	7FA02	41.0	325			12.0	95.2
	LMS01	11.3	90.0			11.3	90.0
	LMS02	11.3	90.0			11.3	90.0
	Aux Boiler	0.36	2.83			0.30	2.37

Annual Pollutant Commissioning Emissions

Scenario	Source ID	Annual NO ₂		Annual PM ₁₀		Annual PM _{2.5}	
		(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
GE 7FA.05 ^b	7FA01	1.42	11.3	0.93	7.38	0.93	7.38
	7FA02	1.42	11.3	0.93	7.38	0.93	7.38
	Aux Boiler	0.030	0.23	0.019	0.15	0.019	0.15
GE LMS 100PB ^c	7FA01	1.02	8.12	0.81	6.42	0.81	6.42
	7FA02	1.02	8.12	0.81	6.42	0.81	6.42
	LMS01	0.35	2.76	0.21	1.63	0.21	1.63
	LMS02	0.35	2.76	0.21	1.63	0.21	1.63
	Aux Boiler	0.030	0.23	0.019	0.15	0.019	0.15

^a This table contains the same information presented in Appendix 5.1C, Table 5.1C.5 of the HBEP permit application, with the exception of all emission rates for the auxiliary boiler; the GE 7FA.05, 10% load scenario; and all annual emission rates.

^b GE 7FA.05 annual emissions include emissions from commissioning as well as annual operation.

^c GE LMS 100PB annual emissions include emissions from commissioning as well as annual operation.

Huntington Beach Energy Project
Appendix A, Table 3
Commissioning Building Parameters
December 2015

GE 7FA.05 Commissioning Scenarios

Building Name	Number of Tiers	Tier Number	Base Elevation (m)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)	Corner 5 East (X) (m)	Corner 5 North (Y) (m)	Corner 6 East (X) (m)	Corner 6 North (Y) (m)	Corner 7 East (X) (m)	Corner 7 North (Y) (m)	Corner 8 East (X) (m)	Corner 8 North (Y) (m)	Corner 9 East (X) (m)	Corner 9 North (Y) (m)	
'AIRIN3'	1	-	3.66	21.6	9	409385	3723198	409377	3723187	409384	3723182	409387	3723182	409395	3723177	409401	3723185	409393	3723191	409391	3723194	409385	3723198	
'AIRIN4'	1	-	3.66	21.6	9	409426	3723221	409421	3723213	409412	3723218	409409	3723219	409402	3723223	409410	3723234	409416	3723230	409418	3723227	409426	3723221	
'HRSG1'	1	-	3.66	25.6	5	409424	3723169	409447	3723152	409443	3723145	409418	3723162	409424	3723169									
'HRSG2'	1	-	3.66	25.6	5	409449	3723205	409473	3723188	409468	3723182	409444	3723198	409449	3723205									
'ACC'	1	-	3.66	33.5	5	409549	3723302	409551	3723173	409512	3723173	409510	3723301	409549	3723302									
'STG'	1	-	3.66	17.9	5	409482	3723251	409490	3723251	409490	3723235	409482	3723235	409482	3723251									
'WALL1'	1	-	3.66	15.2	9	409566	3723274	409567	3723158	409519	3723157	409437	3723109	409436	3723110	409519	3723158	409566	3723159	409565	3723274	409566	3723274	
'WALL2'	1	-	3.66	6.10	7	409447	3723302	409427	3723301	409402	3723266	409402	3723265	409427	3723301	409447	3723301	409447	3723301					
'UNIT1L1'	2	1	3.66	23.2	4	409293	3723102	409312	3723128	409335	3723112	409317	3723086											
'UNIT1L2'	-	2	3.66	37.6	4	409301	3723114	409312	3723128	409335	3723112	409326	3723098											
'UNIT2L1'	2	1	3.66	23.2	4	409252	3723127	409272	3723153	409295	3723137	409277	3723111											
'UNIT2L2'	-	2	3.66	37.6	4	409261	3723139	409272	3723153	409295	3723137	409285	3723123											
'UNIT3L1'	2	1	3.66	23.2	4	409187	3723175	409206	3723202	409229	3723186	409211	3723159											
'UNIT3L2'	-	2	3.66	37.6	4	409195	3723187	409206	3723202	409229	3723186	409220	3723172											
'UNIT4L1'	2	1	3.66	23.2	4	409146	3723201	409165	3723228	409188	3723212	409170	3723185											
'UNIT4L2'	-	2	3.66	37.6	4	409154	3723213	409165	3723228	409188	3723212	409179	3723198											

Cylindrical Building Name	Base Elevation (m)	Center East (X) (m)	Center North (Y) (m)	Tank Height (m)	Tank Diameter (m)
Stack12	3.66	409274	3723095	61.0	6.27
Stack34	3.66	409165	3723168	61.0	6.27

Huntington Beach Energy Project
Appendix A, Table 3
Commissioning Building Parameters
December 2015

GE LMS 100PB Commissioning Scenarios

Building Name	Number of Tiers	Tier Number	Base Elevation (m)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)	Corner 5 East (X) (m)	Corner 5 North (Y) (m)	Corner 6 East (X) (m)	Corner 6 North (Y) (m)	Corner 7 East (X) (m)	Corner 7 North (Y) (m)	Corner 8 East (X) (m)	Corner 8 North (Y) (m)	Corner 9 East (X) (m)	Corner 9 North (Y) (m)
'AIRIN3'	1	-	3.66	21.6	9	409385	3723198	409377	3723187	409384	3723182	409387	3723182	409395	3723177	409401	3723185	409393	3723191	409391	3723194	409385	3723198
'AIRIN4'	1	-	3.66	21.6	9	409426	3723221	409421	3723213	409412	3723218	409409	3723219	409402	3723223	409410	3723234	409416	3723230	409418	3723227	409426	3723221
'HRSG1'	1	-	3.66	25.6	5	409424	3723169	409447	3723152	409443	3723145	409418	3723162	409424	3723169								
'HRSG2'	1	-	3.66	25.6	5	409449	3723205	409473	3723188	409468	3723182	409444	3723198	409449	3723205								
'ACC'	1	-	3.66	33.5	5	409549	3723302	409551	3723173	409512	3723173	409510	3723301	409549	3723302								
'STG'	1	-	3.66	17.9	5	409482	3723251	409490	3723251	409490	3723235	409482	3723235	409482	3723251								
'WALL1'	1	-	3.66	15.2	9	409566	3723274	409567	3723158	409519	3723157	409437	3723109	409436	3723110	409519	3723158	409566	3723159	409565	3723274	409566	3723274
'WALL2'	1	-	3.66	6.10	7	409447	3723302	409427	3723301	409402	3723266	409402	3723265	409427	3723301	409447	3723301	409447	3723301				
'UNIT1L1'	2	1	3.66	23.2	4	409293	3723102	409312	3723128	409335	3723112	409317	3723086										
'UNIT1L2'	-	2	3.66	37.6	4	409301	3723114	409312	3723128	409335	3723112	409326	3723098										
'UNIT2L1'	2	1	3.66	23.2	4	409252	3723127	409272	3723153	409295	3723137	409277	3723111										
'UNIT2L2'	-	2	3.66	37.6	4	409261	3723139	409272	3723153	409295	3723137	409285	3723123										
'AIRIN1'	1	-	3.66	15.6	5	409161	3723216	409148	3723225	409142	3723217	409155	3723207	409161	3723216								
'AIRIN2'	1	-	3.66	15.6	5	409196	3723179	409202	3723187	409216	3723178	409210	3723169	409196	3723179								
'CTG1'	1	-	3.66	9.45	7	409160	3723207	409158	3723209	409151	3723201	409147	3723197	409153	3723193	409156	3723198	409160	3723207				
'CTG2'	1	-	3.66	9.45	7	409194	3723184	409197	3723182	409192	3723172	409190	3723168	409184	3723172	409187	3723176	409194	3723184				

Cylindrical Building Name	Base Elevation (m)	Center East (X) (m)	Center North (Y) (m)	Tank Height (m)	Tank Diameter (m)
Stack12	3.66	409274	3723095	61.0	6.27

This table contains the same information presented in Appendix 5.1C, Table 5.1C.6 of the HBEP permit application.

Huntington Beach Energy Project
Appendix A, Table 4
Commissioning Results
December 2015

Short-Term Pollutant Commissioning Results

Scenario	Year	NO ₂ (µg/m ³) ^a		CO (µg/m ³)	
		1-hour	1-hour	1-hour	8-hour
GE 7FA.05, 10% Load ^b	2010	159	4,094	3,000	
	2011	151	3,993	2,734	
	2012	161	4,309	2,972	
	2013	169	4,249	2,807	
	2014	169	4,341	2,787	
GE 7FA.05, 40% Load	2010	65.7	-	-	
	2011	63.0	-	-	
	2012	64.9	-	-	
	2013	67.6	-	-	
	2014	72.7	-	-	
GE 7FA.05, 80% Load	2010	42.6	-	-	
	2011	35.3	-	-	
	2012	45.3	-	-	
	2013	31.6	-	-	
	2014	44.7	-	-	
GE LMS 100PB, 5% Load ^c	2010	75.6	504	117	
	2011	75.9	506	117	
	2012	79.0	527	115	
	2013	77.3	515	125	
	2014	79.1	527	126	
GE LMS 100PB, 75% Load ^c	2010	-	503	95.9	
	2011	-	506	91.2	
	2012	-	526	99.5	
	2013	-	514	96.5	
	2014	-	526	90.9	
GE LMS 100PB, Full Load ^c	2010	-	503	96.5	
	2011	-	506	91.3	
	2012	-	526	100	
	2013	-	515	96.6	
	2014	-	526	91.8	

^a The maximum 1-hour NO₂ concentrations include an ambient NO₂ ratio of 0.80 (EPA, 2011), unless otherwise noted.

^b 1-hour NO₂ impacts were modeled using the Plume Volume Molar Ratio Method.

^c The modeled impacts for the GE LMS 100PB commissioning scenarios include impacts from the auxiliary boiler and the GE 7FA.05 turbines operating in emissions scenario CC03.

Annual Pollutant Commissioning Results

Scenario	Year	NO ₂ (µg/m ³) ^d			PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
		Annual	Annual	Annual	Annual	Annual	Annual	
GE 7FA.05 ^e	2010	0.58	0.51	0.51	0.51			
	2011	0.60	0.52	0.52	0.52			
	2012	0.66	0.57	0.57	0.57			
	2013	0.66	0.57	0.57	0.57			
	2014	0.65	0.57	0.57	0.57			
GE LMS 100PB ^f	2010	0.44	0.46	0.46	0.46			
	2011	0.46	0.48	0.48	0.48			
	2012	0.50	0.52	0.52	0.52			
	2013	0.50	0.52	0.52	0.52			
	2014	0.50	0.52	0.52	0.52			

^d The maximum annual NO₂ concentrations include an ambient NO₂ ratio of 0.75 (EPA, 2005).

^e Annual commissioning impacts are based on total emissions from commissioning and annual operation of 2 GE 7FA.05 turbines operating in exhaust scenario CC07 and the auxiliary boiler.

^f Annual commissioning impacts are based on total emissions from operation of 2 GE 7FA.05 turbines operating in exhaust scenario CC07 and the auxiliary boiler, and commissioning and annual operation of 2 GE LMS 100PB turbines operating in exhaust scenario SC06 for NO₂ and SC07 for PM₁₀ and PM_{2.5}.

Appendix B
Air Quality Impact Analysis—Operation

Huntington Beach Energy Project
Appendix B, Table 1
Operational Stack Parameters
December 2015

Point Sources

Exhaust Scenario	Turbine Load (%)	Source ID	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
CC01	100	GE 7FA.05-01	409449	3723146	3.66	45.7	375	20.4	6.10
	100	GE 7FA.05-02	409474	3723182	3.66	45.7	375	20.4	6.10
CC02	75	GE 7FA.05-01	409449	3723146	3.66	45.7	354	15.6	6.10
	75	GE 7FA.05-02	409474	3723182	3.66	45.7	354	15.6	6.10
CC03	45	GE 7FA.05-01	409449	3723146	3.66	45.7	350	12.2	6.10
	45	GE 7FA.05-02	409474	3723182	3.66	45.7	350	12.2	6.10
CC04	100	GE 7FA.05-01	409449	3723146	3.66	45.7	374	20.1	6.10
	100	GE 7FA.05-02	409474	3723182	3.66	45.7	374	20.1	6.10
CC05	100	GE 7FA.05-01	409449	3723146	3.66	45.7	375	20.2	6.10
	100	GE 7FA.05-02	409474	3723182	3.66	45.7	375	20.2	6.10
CC06	75	GE 7FA.05-01	409449	3723146	3.66	45.7	353	14.9	6.10
	75	GE 7FA.05-02	409474	3723182	3.66	45.7	353	14.9	6.10
CC07	44	GE 7FA.05-01	409449	3723146	3.66	45.7	350	11.8	6.10
	44	GE 7FA.05-02	409474	3723182	3.66	45.7	350	11.8	6.10
CC08	100	GE 7FA.05-01	409449	3723146	3.66	45.7	378	20.2	6.10
	100	GE 7FA.05-02	409474	3723182	3.66	45.7	378	20.2	6.10
CC09	100	GE 7FA.05-01	409449	3723146	3.66	45.7	379	18.0	6.10
	100	GE 7FA.05-02	409474	3723182	3.66	45.7	379	18.0	6.10
CC10	75	GE 7FA.05-01	409449	3723146	3.66	45.7	365	13.9	6.10
	75	GE 7FA.05-02	409474	3723182	3.66	45.7	365	13.9	6.10
CC11	48	GE 7FA.05-01	409449	3723146	3.66	45.7	358	12.1	6.10
	48	GE 7FA.05-02	409474	3723182	3.66	45.7	358	12.1	6.10
SC01	100	GE LMS 100PB-01	409149	3723193	3.66	24.4	694	33.3	4.11
	100	GE LMS 100PB-02	409185	3723168	3.66	24.4	694	33.3	4.11
SC02	75	GE LMS 100PB-01	409149	3723193	3.66	24.4	709	28.7	4.11
	75	GE LMS 100PB-02	409185	3723168	3.66	24.4	709	28.7	4.11
SC03	50	GE LMS 100PB-01	409149	3723193	3.66	24.4	748	23.8	4.11
	50	GE LMS 100PB-02	409185	3723168	3.66	24.4	748	23.8	4.11
SC04	100	GE LMS 100PB-01	409149	3723193	3.66	24.4	697	33.1	4.11
	100	GE LMS 100PB-02	409185	3723168	3.66	24.4	697	33.1	4.11
SC05	100	GE LMS 100PB-01	409149	3723193	3.66	24.4	699	33.0	4.11
	100	GE LMS 100PB-02	409185	3723168	3.66	24.4	699	33.0	4.11
SC06	75	GE LMS 100PB-01	409149	3723193	3.66	24.4	709	28.4	4.11
	75	GE LMS 100PB-02	409185	3723168	3.66	24.4	709	28.4	4.11
SC07	50	GE LMS 100PB-01	409149	3723193	3.66	24.4	748	23.6	4.11
	50	GE LMS 100PB-02	409185	3723168	3.66	24.4	748	23.6	4.11
SC08	100	GE LMS 100PB-01	409149	3723193	3.66	24.4	726	29.4	4.11
	100	GE LMS 100PB-02	409185	3723168	3.66	24.4	726	29.4	4.11
SC09	100	GE LMS 100PB-01	409149	3723193	3.66	24.4	746	27.1	4.11
	100	GE LMS 100PB-02	409185	3723168	3.66	24.4	746	27.1	4.11
SC10	75	GE LMS 100PB-01	409149	3723193	3.66	24.4	769	23.7	4.11
	75	GE LMS 100PB-02	409185	3723168	3.66	24.4	769	23.7	4.11
SC11	50	GE LMS 100PB-01	409149	3723193	3.66	24.4	809	20.0	4.11
	50	GE LMS 100PB-02	409185	3723168	3.66	24.4	809	20.0	4.11
AB	100	Auxiliary Boiler	409438	3723236	3.66	24.4	432	21.2	0.91

This table contains the same information presented in Appendix 5.1C, Table 5.1C.8 of the HBEP permit application, with the exception of the turbine load.

Huntington Beach Energy Project

Appendix B, Table 2^a

Operational Emission Rates

December 2015

GE 7FA.05 Per Turbine Emission Rates

Exhaust Scenario	1-hour NO ₂ ^b		1-hour CO ^b		8-hour CO ^c		1-hour SO ₂		3-hour SO ₂		24-hour SO ₂		24-hour PM ₁₀		24-hour PM _{2.5}		Annual NO ₂ ^d		Annual PM ₁₀		Annual PM _{2.5}	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
CC01	7.69	61.0	41.0	325	12.3	97.9	0.61	4.86	0.61	4.86	0.61	4.86	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC02	7.69	61.0	41.0	325	12.2	96.4	0.48	3.84	0.48	3.84	0.48	3.84	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC03	7.69	61.0	41.0	325	12.0	95.2	0.37	2.95	0.37	2.95	0.37	2.95	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC04	7.18	57.0	36.2	287	11.0	87.5	0.61	4.81	0.61	4.81	0.61	4.81	1.07	8.50	1.07	8.50	1.63	13.0	0.81	6.42	0.81	6.42
CC05	7.18	57.0	36.2	287	11.0	87.4	0.60	4.78	0.60	4.78	0.60	4.78	1.07	8.50	1.07	8.50	1.61	12.8	0.81	6.42	0.81	6.42
CC06	7.18	57.0	36.2	287	10.8	85.9	0.47	3.72	0.47	3.72	0.47	3.72	1.07	8.50	1.07	8.50	1.30	10.3	0.81	6.42	0.81	6.42
CC07	7.18	57.0	36.2	287	10.7	84.6	0.35	2.79	0.35	2.79	0.35	2.79	1.07	8.50	1.07	8.50	1.02	8.12	0.81	6.42	0.81	6.42
CC08	6.68	53.0	27.7	220	8.80	69.9	0.58	4.60	0.58	4.60	0.58	4.60	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC09	6.68	53.0	27.7	220	8.72	69.2	0.52	4.16	0.52	4.16	0.52	4.16	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC10	6.68	53.0	27.7	220	8.57	68.0	0.42	3.33	0.42	3.33	0.42	3.33	1.07	8.50	1.07	8.50	-	-	-	-	-	-
CC11	6.68	53.0	27.7	220	8.46	67.1	0.34	2.67	0.34	2.67	0.34	2.67	1.07	8.50	1.07	8.50	-	-	-	-	-	-

GE LMS 100PB Per Turbine Emission Rates

Exhaust Scenario	1-hour NO ₂ ^e		1-hour CO ^f		8-hour CO ^e		1-hour SO ₂		3-hour SO ₂		24-hour SO ₂		24-hour PM ₁₀		24-hour PM _{2.5}		Annual NO ₂ ^g		Annual PM ₁₀		Annual PM _{2.5}	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
SC01	2.78	22.0	5.77	45.8	2.20	17.5	0.20	1.63	0.20	1.63	0.20	1.63	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC02	2.72	21.6	5.71	45.3	2.04	16.2	0.17	1.32	0.17	1.32	0.17	1.32	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC03	2.67	21.2	5.66	44.9	1.89	15.0	0.13	1.02	0.13	1.02	0.13	1.02	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC04	2.78	22.1	5.77	45.8	2.20	17.5	0.21	1.64	0.21	1.64	0.21	1.64	0.79	6.24	0.79	6.24	0.31	2.44	0.18	1.43	0.18	1.43
SC05	2.77	22.0	5.76	45.7	2.19	17.4	0.20	1.61	0.20	1.61	0.20	1.61	0.79	6.24	0.79	6.24	0.30	2.42	0.18	1.43	0.18	1.43
SC06	2.72	21.6	5.71	45.3	2.04	16.2	0.16	1.31	0.16	1.31	0.16	1.31	0.79	6.24	0.79	6.24	0.27	2.11	0.18	1.43	0.18	1.43
SC07	2.67	21.2	5.66	44.9	1.89	15.0	0.13	1.01	0.13	1.01	0.13	1.01	0.79	6.24	0.79	6.24	0.23	1.81	0.18	1.43	0.18	1.43
SC08	2.73	21.7	5.72	45.4	2.06	16.4	0.17	1.36	0.17	1.36	0.17	1.36	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC09	2.70	21.5	5.69	45.2	1.99	15.8	0.15	1.22	0.15	1.22	0.15	1.22	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC10	2.67	21.2	5.66	44.9	1.89	15.0	0.13	1.01	0.13	1.01	0.13	1.01	0.79	6.24	0.79	6.24	-	-	-	-	-	-
SC11	2.63	20.9	5.62	44.6	1.78	14.1	0.10	0.80	0.10	0.80	0.10	0.80	0.79	6.24	0.79	6.24	-	-	-	-	-	-

Auxiliary Boiler Emission Rates

Exhaust Scenario	1-hour NO ₂		1-hour CO		8-hour CO		1-hour SO ₂		3-hour SO ₂		24-hour SO ₂		24-hour PM ₁₀		24-hour PM _{2.5}		Annual NO ₂		Annual PM ₁₀		Annual PM _{2.5}	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
AB	0.054	0.42	0.36	2.83	0.30	2.37	0.0061	0.048	0.0061	0.048	0.003	0.025	0.020	0.157	0.020	0.157	0.030	0.23	0.019	0.15	0.019	0.15

^a This table contains the same information presented in Appendix 5.1C, Table 5.1C.9 of the HBEP permit application, with the exception of all auxiliary boiler emission rates, GE LMS 100PB annual emission rates, and GE 7FA.05 PM₁₀/PM_{2.5} emission rates.

^b Hourly CO and NO₂ emission rates for the GE 7FA.05s are based on cold startup events.

^c 8-hour CO emission rates for the GE 7FA.05s are based on one cold start, one warm start, two shutdowns, and the balance of the period at steady-state operation.

^d Annual emission rates for the GE 7FA.05s are based on 24 cold startups, 100 warm startups, 376 hot startups, 500 shutdowns, and 6,100 hours of steady-state operation.

^e Hourly CO and NO₂ emission rates for the GE LMS 100PBs are based on one startup, one shutdown, and the balance of the hour at steady-state operation.

^f 8-hour CO emission rates for the GE LMS 100PBs are based on two startups, two shutdowns, and the balance of the period at steady-state operation.

^g Annual emission rates for the GE LMS 100PBs are based on 350 hot startups, 350 shutdowns, and 1,750 hours of steady-state operation.

Huntington Beach Energy Project
Appendix B, Table 3
Operational Building Parameters
December 2015

Building Name	Number of Tiers	Tier Number	Base Elevation (m)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)	Corner 5 East (X) (m)	Corner 5 North (Y) (m)	Corner 6 East (X) (m)	Corner 6 North (Y) (m)	Corner 7 East (X) (m)	Corner 7 North (Y) (m)	Corner 8 East (X) (m)	Corner 8 North (Y) (m)	Corner 9 East (X) (m)	Corner 9 North (Y) (m)
'AIRIN3'	1	-	3.66	21.6	9	409385	3723198	409377	3723187	409384	3723182	409387	3723182	409395	3723177	409401	3723185	409393	3723191	409391	3723194	409385	3723198
'AIRIN4'	1	-	3.66	21.6	9	409426	3723221	409421	3723213	409412	3723218	409409	3723219	409402	3723223	409410	3723234	409416	3723230	409418	3723227	409426	3723221
'HRSG1'	1	-	3.66	25.6	5	409424	3723169	409447	3723152	409443	3723145	409418	3723162	409424	3723169								
'HRSG2'	1	-	3.66	25.6	5	409449	3723205	409473	3723188	409468	3723182	409444	3723198	409449	3723205								
'ACC'	1	-	3.66	33.5	5	409549	3723302	409551	3723173	409512	3723173	409510	3723301	409549	3723302								
'STG'	1	-	3.66	17.9	5	409482	3723251	409490	3723251	409490	3723235	409482	3723235	409482	3723251								
'WALL1'	1	-	3.66	15.2	9	409566	3723274	409567	3723158	409519	3723157	409437	3723109	409436	3723110	409519	3723158	409566	3723159	409565	3723274	409566	3723274
'WALL2'	1	-	3.66	6.1	7	409447	3723302	409427	3723301	409402	3723266	409402	3723265	409427	3723301	409447	3723301	409447	3723301				
'AIRIN1'	1	-	3.66	15.6	5	409161	3723216	409148	3723225	409142	3723217	409155	3723207	409161	3723216								
'AIRIN2'	1	-	3.66	15.6	5	409196	3723179	409202	3723187	409216	3723178	409210	3723169	409196	3723179								
'CTG1'	1	-	3.66	9.4	7	409160	3723207	409158	3723209	409151	3723201	409147	3723197	409153	3723193	409156	3723198	409160	3723207				
'CTG2'	1	-	3.66	9.4	7	409194	3723184	409197	3723182	409192	3723172	409190	3723168	409184	3723172	409187	3723176	409194	3723184				

This table contains the same information presented in Appendix 5.1C, Table 5.1C.10 of the HBEP permit application.

Huntington Beach Energy Project
Appendix B, Table 4
Operational Results – Load Analysis
December 2015

32°F Ambient Temperature Scenarios

Scenario Description ^a	Exhaust Scenario	Year	NO ₂ (µg/m ³) ^b		CO (µg/m ³)			SO ₂ (µg/m ³)			PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
			1-hour	1-hour (federal) ^c	1-hour	8-hour	1-hour	1-hour (federal)	3-hour	24-hour	24-hour	24-hour
GE 7FA.05 100% Load/ GE LMS 100PB 100% Load	CC01/SC01/AB	2010	43.2	102	288	28.6	4.28	2.08	2.95	0.55	1.10	0.72
		2011	22.2	105	148	25.1	2.20	1.80	1.59	0.43	0.86	0.73
		2012	43.0	102	287	26.2	4.26	1.75	1.69	0.63	1.20	0.74
		2013	21.6	103	144	26.3	2.14	1.78	1.61	0.48	0.97	0.75
		2014	41.5	103	276	27.4	4.11	2.14	2.25	0.53	1.04	0.79
GE 7FA.05 100% Load/ GE LMS 100PB 75% Load	CC01/SC02/AB	2010	43.2	102	288	28.6	4.28	2.08	2.95	0.55	1.10	0.72
		2011	22.2	105	148	25.2	2.20	1.80	1.59	0.43	0.87	0.75
		2012	43.0	103	287	26.2	4.26	1.75	1.69	0.63	1.21	0.76
		2013	21.6	103	144	26.3	2.14	1.78	1.61	0.48	0.98	0.77
		2014	41.5	103	276	27.4	4.11	2.14	2.25	0.53	1.05	0.81
GE 7FA.05 100% Load/ GE LMS 100PB 50% Load	CC01/SC03/AB	2010	43.2	102	288	28.6	4.28	2.08	2.95	0.55	1.10	0.73
		2011	22.2	105	148	25.2	2.20	1.80	1.59	0.42	0.88	0.77
		2012	43.0	103	287	26.2	4.26	1.75	1.69	0.63	1.23	0.77
		2013	21.7	103	144	26.4	2.14	1.78	1.60	0.48	0.99	0.80
		2014	41.5	103	276	27.5	4.11	2.14	2.25	0.53	1.07	0.85
GE 7FA.05 75% Load/ GE LMS 100PB 100% Load	CC02/SC01/AB	2010	64.4	118	430	61.9	5.07	4.31	4.16	1.20	2.81	1.28
		2011	58.0	108	387	54.5	4.52	3.76	3.44	0.70	1.66	1.27
		2012	68.9	108	459	66.0	5.37	3.73	3.61	1.05	2.42	1.47
		2013	57.8	105	385	65.4	4.51	3.81	3.84	0.89	2.12	1.28
		2014	67.8	106	452	60.5	5.28	4.24	4.07	1.01	2.44	1.35
GE 7FA.05 75% Load/ GE LMS 100PB 75% Load	CC02/SC02/AB	2010	64.4	118	430	61.9	5.07	4.31	4.16	1.20	2.81	1.28
		2011	58.0	109	387	54.5	4.52	3.76	3.44	0.70	1.67	1.28
		2012	68.9	108	459	66.1	5.37	3.73	3.61	1.05	2.42	1.48
		2013	57.8	105	385	65.5	4.51	3.81	3.84	0.89	2.13	1.28
		2014	67.8	106	452	60.5	5.28	4.24	4.07	1.01	2.45	1.36
GE 7FA.05 75% Load/ GE LMS 100PB 50% Load	CC02/SC03/AB	2010	64.4	118	430	61.9	5.07	4.31	4.16	1.20	2.81	1.29
		2011	58.0	109	387	54.5	4.52	3.76	3.44	0.70	1.68	1.29
		2012	68.9	108	459	66.1	5.37	3.73	3.61	1.05	2.44	1.48
		2013	57.8	105	385	65.5	4.51	3.81	3.84	0.89	2.13	1.29
		2014	67.8	106	452	60.5	5.28	4.24	4.06	1.01	2.46	1.37
GE 7FA.05 45% Load/ GE LMS 100PB 100% Load	CC03/SC01/AB	2010	89.0	140	594	114	5.41	4.81	4.35	1.52	4.51	2.53
		2011	85.2	122	569	107	5.20	4.66	4.56	1.20	3.60	2.60
		2012	89.8	128	599	121	5.48	4.84	5.01	1.51	4.40	2.81
		2013	88.4	117	590	105	5.40	4.92	4.81	1.35	3.98	2.86
		2014	94.5	123	630	109	5.76	5.05	4.70	1.53	4.57	3.11
GE 7FA.05 45% Load/ GE LMS 100PB 75% Load	CC03/SC02/AB	2010	89.0	140	594	114	5.41	4.81	4.35	1.52	4.51	2.53
		2011	85.2	122	569	107	5.20	4.66	4.56	1.20	3.60	2.60
		2012	89.8	128	600	121	5.48	4.84	5.01	1.51	4.40	2.82
		2013	88.5	117	591	105	5.40	4.92	4.81	1.35	3.98	2.86
		2014	94.5	123	630	109	5.76	5.05	4.70	1.53	4.57	3.12
GE 7FA.05 45% Load/ GE LMS 100PB 50% Load	CC03/SC03/AB	2010	89.0	140	594	114	5.41	4.81	4.35	1.52	4.51	2.54
		2011	85.2	122	569	107	5.19	4.66	4.56	1.20	3.61	2.60
		2012	89.8	128	600	121	5.48	4.84	5.01	1.51	4.41	2.82
		2013	88.5	117	591	105	5.40	4.92	4.81	1.35	3.98	2.86
		2014	94.5	123	631	109	5.76	5.05	4.70	1.52	4.58	3.12

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65.8°F Ambient Temperature Scenarios

Scenario Description ^a	Exhaust Scenario	Year	NO ₂ (µg/m ³) ^b			CO (µg/m ³)			SO ₂ (µg/m ³)			PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
			1-hour	1-hour (federal) ^c	Annual	1-hour	8-hour	1-hour	1-hour (federal)	3-hour	24-hour	24-hour	Annual	24-hour	Annual
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 100% Load with Evap.	CC04/SC04/AB	2010	41.0	102	0.29	258	27.2	4.35	2.27	3.05	0.58	1.16	0.23	0.73	0.23
		2011	22.2	105	0.32	140	23.0	2.36	1.86	1.54	0.44	0.88	0.25	0.74	0.25
		2012	41.7	102	0.33	263	25.4	4.43	1.71	1.77	0.68	1.28	0.26	0.76	0.26
		2013	21.0	102	0.35	132	24.2	2.23	1.86	1.71	0.49	0.98	0.27	0.76	0.27
		2014	40.1	103	0.36	253	25.2	4.26	2.25	2.36	0.55	1.06	0.28	0.80	0.28
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 100% Load	CC04/SC05/AB	2010	41.0	102	0.29	258	27.2	4.35	2.27	3.05	0.58	1.16	0.23	0.73	0.23
		2011	22.2	105	0.32	140	23.0	2.36	1.86	1.54	0.44	0.88	0.25	0.74	0.25
		2012	41.7	102	0.33	263	25.4	4.43	1.71	1.77	0.68	1.28	0.26	0.76	0.26
		2013	21.0	102	0.35	132	24.2	2.23	1.86	1.71	0.49	0.98	0.27	0.76	0.27
		2014	40.1	103	0.36	253	25.2	4.26	2.25	2.36	0.55	1.06	0.28	0.80	0.28
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 75% Load	CC04/SC06/AB	2010	41.0	102	0.29	258	27.2	4.35	2.27	3.05	0.58	1.16	0.24	0.75	0.24
		2011	22.2	105	0.32	140	23.1	2.36	1.86	1.54	0.43	0.89	0.25	0.76	0.25
		2012	41.7	102	0.33	263	25.4	4.43	1.71	1.77	0.67	1.29	0.26	0.77	0.26
		2013	21.0	103	0.35	132	24.2	2.23	1.86	1.71	0.49	0.99	0.27	0.78	0.27
		2014	40.1	103	0.36	253	25.2	4.26	2.25	2.36	0.54	1.08	0.28	0.82	0.28
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 50% Load	CC04/SC07/AB	2010	41.0	102	0.29	258	27.2	4.35	2.27	3.05	0.58	1.16	0.24	0.76	0.24
		2011	22.2	105	0.32	140	23.1	2.36	1.86	1.53	0.43	0.91	0.26	0.78	0.26
		2012	41.7	102	0.33	263	25.4	4.43	1.71	1.77	0.67	1.31	0.26	0.78	0.26
		2013	21.0	103	0.35	132	24.3	2.23	1.86	1.71	0.48	1.01	0.28	0.81	0.28
		2014	40.1	103	0.36	253	25.2	4.26	2.25	2.36	0.54	1.10	0.28	0.86	0.28
GE 7FA.05 100% Load/ GE LMS 100PB 100% Load with Evap.	CC05/SC04/AB	2010	40.8	102	0.29	257	26.9	4.26	2.16	2.98	0.56	1.14	0.23	0.72	0.23
		2011	21.4	105	0.32	135	22.8	2.24	1.90	1.53	0.42	0.86	0.25	0.74	0.25
		2012	41.1	102	0.32	259	25.2	4.30	1.66	1.70	0.66	1.27	0.26	0.75	0.26
		2013	20.7	102	0.35	130	24.0	2.16	1.81	1.64	0.47	0.97	0.27	0.75	0.27
		2014	39.6	103	0.35	250	25.0	4.14	2.14	2.28	0.53	1.05	0.27	0.79	0.27
GE 7FA.05 100% Load/ GE LMS 100PB 100% Load	CC05/SC05/AB	2010	40.8	102	0.29	257	26.9	4.26	2.16	2.98	0.56	1.14	0.23	0.72	0.23
		2011	21.4	105	0.32	135	22.8	2.24	1.90	1.53	0.42	0.86	0.25	0.74	0.25
		2012	41.1	102	0.32	259	25.2	4.30	1.66	1.70	0.66	1.27	0.26	0.75	0.26
		2013	20.7	102	0.35	130	24.0	2.16	1.81	1.64	0.48	0.97	0.27	0.75	0.27
		2014	39.6	103	0.35	250	25.0	4.14	2.14	2.28	0.53	1.05	0.27	0.79	0.27
GE 7FA.05 100% Load/ GE LMS 100PB 75% Load	CC05/SC06/AB	2010	40.8	102	0.29	257	26.9	4.26	2.16	2.98	0.56	1.14	0.24	0.74	0.24
		2011	21.4	105	0.32	135	22.8	2.24	1.90	1.53	0.42	0.87	0.25	0.76	0.25
		2012	41.1	102	0.32	259	25.2	4.30	1.66	1.70	0.66	1.28	0.26	0.76	0.26
		2013	20.7	103	0.35	130	24.0	2.16	1.81	1.64	0.47	0.99	0.27	0.78	0.27
		2014	39.6	103	0.35	250	25.0	4.14	2.14	2.28	0.53	1.07	0.28	0.82	0.28
GE 7FA.05 100% Load/ GE LMS 100PB 50% Load	CC05/SC07/AB	2010	40.8	102	0.29	257	26.9	4.26	2.16	2.98	0.56	1.14	0.24	0.75	0.24
		2011	21.4	105	0.32	135	22.9	2.24	1.90	1.53	0.42	0.89	0.26	0.78	0.26
		2012	41.2	102	0.32	259	25.2	4.30	1.66	1.70	0.66	1.30	0.26	0.77	0.26
		2013	20.7	103	0.35	130	24.0	2.16	1.81	1.64	0.47	1.00	0.28	0.81	0.28
		2014	39.6	103	0.35	250	25.0	4.14	2.14	2.28	0.53	1.09	0.28	0.85	0.28

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65.8°F Ambient Temperature Scenarios

Scenario Description ^a	Exhaust Scenario	Year	NO ₂ (µg/m ³) ^b			CO (µg/m ³)			SO ₂ (µg/m ³)			PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
			1-hour	1-hour (federal) ^c	Annual	1-hour	8-hour	1-hour	1-hour (federal)	3-hour	24-hour	24-hour	Annual	24-hour	Annual
GE 7FA.05 75% Load/ GE LMS 100PB 100% Load with Evap.	CC06/SC04/AB	2010	65.1	121	0.41	412	65.1	5.37	4.60	4.33	1.32	3.13	0.34	1.49	0.34
		2011	58.6	109	0.43	370	56.7	4.80	4.12	3.83	0.81	1.95	0.36	1.39	0.36
		2012	67.5	108	0.46	426	72.6	5.52	4.13	4.00	1.11	2.66	0.38	1.57	0.38
		2013	55.7	105	0.48	351	66.9	4.56	4.17	4.26	1.00	2.42	0.40	1.52	0.40
		2014	67.1	107	0.49	423	68.2	5.49	4.59	4.34	1.26	3.05	0.41	1.46	0.41
GE 7FA.05 75% Load/ GE LMS 100PB 100% Load	CC06/SC05/AB	2010	65.1	121	0.41	412	65.1	5.37	4.60	4.33	1.32	3.13	0.34	1.49	0.34
		2011	58.6	109	0.43	370	56.7	4.80	4.12	3.83	0.81	1.95	0.36	1.39	0.36
		2012	67.5	108	0.45	426	72.6	5.52	4.13	4.00	1.11	2.66	0.38	1.57	0.38
		2013	55.7	105	0.48	351	66.9	4.56	4.17	4.26	1.00	2.42	0.40	1.52	0.40
		2014	67.1	107	0.49	423	68.2	5.49	4.59	4.34	1.26	3.05	0.41	1.46	0.41
GE 7FA.05 75% Load/ GE LMS 100PB 75% Load	CC06/SC06/AB	2010	65.1	121	0.41	412	65.1	5.37	4.60	4.33	1.32	3.13	0.34	1.49	0.34
		2011	58.7	109	0.43	370	56.8	4.80	4.12	3.83	0.81	1.96	0.36	1.40	0.36
		2012	67.5	108	0.46	426	72.6	5.52	4.13	4.00	1.11	2.67	0.38	1.58	0.38
		2013	55.7	105	0.48	351	66.9	4.56	4.17	4.26	1.00	2.42	0.40	1.52	0.40
		2014	67.1	107	0.49	423	68.2	5.49	4.59	4.33	1.26	3.06	0.41	1.47	0.41
GE 7FA.05 75% Load/ GE LMS 100PB 50% Load	CC06/SC07/AB	2010	65.1	121	0.41	412	65.1	5.37	4.59	4.33	1.32	3.13	0.34	1.50	0.34
		2011	58.7	109	0.43	370	56.8	4.80	4.12	3.83	0.81	1.97	0.36	1.41	0.36
		2012	67.5	108	0.46	426	72.6	5.52	4.13	4.00	1.11	2.68	0.39	1.59	0.39
		2013	55.7	105	0.48	351	66.9	4.56	4.17	4.26	1.00	2.43	0.41	1.52	0.41
		2014	67.1	107	0.49	423	68.2	5.49	4.59	4.33	1.26	3.07	0.42	1.48	0.42
GE 7FA.05 44% Load/ GE LMS 100PB 100% Load with Evap.	CC07/SC04/AB	2010	85.7	137	0.57	541	114	5.28	4.79	4.36	1.52	4.74	0.55	2.78	0.55
		2011	82.1	124	0.57	519	101	5.07	4.63	4.52	1.22	3.85	0.56	2.72	0.56
		2012	87.8	130	0.62	555	115	5.43	4.78	5.01	1.66	5.10	0.61	2.97	0.61
		2013	86.7	117	0.63	548	99.7	5.36	4.86	4.75	1.28	3.99	0.62	3.32	0.62
		2014	92.1	123	0.64	582	108	5.69	4.93	4.68	1.56	4.90	0.63	3.37	0.63
GE 7FA.05 44% Load/ GE LMS 100PB 100% Load	CC07/SC05/AB	2010	85.7	137	0.57	541	114	5.28	4.79	4.36	1.52	4.74	0.55	2.78	0.55
		2011	82.1	124	0.57	519	101	5.07	4.63	4.52	1.22	3.85	0.56	2.72	0.56
		2012	87.8	130	0.62	555	115	5.43	4.78	5.01	1.66	5.10	0.61	2.97	0.61
		2013	86.7	117	0.63	548	99.7	5.36	4.86	4.75	1.28	3.99	0.62	3.32	0.62
		2014	92.1	123	0.64	582	108	5.69	4.93	4.68	1.56	4.90	0.63	3.37	0.63
GE 7FA.05 44% Load/ GE LMS 100PB 75% Load	CC07/SC06/AB	2010	85.7	137	0.57	541	114	5.28	4.79	4.36	1.52	4.74	0.56	2.79	0.56
		2011	82.1	124	0.57	519	101	5.07	4.63	4.52	1.22	3.85	0.56	2.73	0.56
		2012	87.9	130	0.62	555	115	5.43	4.78	5.01	1.66	5.11	0.61	2.97	0.61
		2013	86.7	117	0.63	548	99.7	5.36	4.86	4.75	1.28	3.99	0.63	3.33	0.63
		2014	92.1	123	0.64	582	108	5.69	4.93	4.68	1.55	4.91	0.64	3.37	0.64
GE 7FA.05 44% Load/ GE LMS 100PB 50% Load	CC07/SC07/AB	2010	85.7	137	0.57	541	114	5.28	4.79	4.36	1.52	4.74	0.56	2.80	0.56
		2011	82.1	124	0.57	519	101	5.07	4.63	4.52	1.22	3.85	0.56	2.73	0.56
		2012	87.9	130	0.62	555	115	5.43	4.78	5.01	1.66	5.11	0.61	2.98	0.61
		2013	86.7	117	0.63	548	99.7	5.36	4.86	4.75	1.28	4.00	0.63	3.33	0.63
		2014	92.1	123	0.64	582	108	5.69	4.93	4.68	1.55	4.92	0.64	3.38	0.64

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110°F Ambient Temperature Scenarios

Scenario Description ^a	Exhaust Scenario	Year	NO ₂ (µg/m ³) ^b		CO (µg/m ³)		SO ₂ (µg/m ³)			PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	
			1-hour	1-hour (federal) ^c	1-hour	8-hour	1-hour	1-hour (federal)	3-hour	24-hour	24-hour	
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 100% Load with Evap.	CC08/SC08/AB	2010	37.8	102	196	22.2	4.11	2.01	2.83	0.53	1.11	0.72
		2011	19.3	104	100	18.7	2.09	1.74	1.45	0.40	0.86	0.74
		2012	37.4	102	194	19.3	4.06	1.67	1.61	0.60	1.21	0.75
		2013	18.8	102	97.1	19.3	2.03	1.66	1.52	0.45	0.97	0.76
		2014	36.3	102	188	20.4	3.94	2.07	2.15	0.50	1.04	0.80
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 100% Load	CC08/SC09/AB	2010	37.8	102	196	22.2	4.11	2.01	2.83	0.53	1.11	0.72
		2011	19.3	104	100	18.7	2.09	1.74	1.45	0.40	0.87	0.75
		2012	37.4	102	194	19.3	4.06	1.67	1.61	0.60	1.22	0.76
		2013	18.8	102	97.1	19.3	2.03	1.66	1.52	0.45	0.97	0.77
		2014	36.3	102	188	20.4	3.94	2.07	2.15	0.50	1.05	0.81
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 75% Load	CC08/SC10/AB	2010	37.8	102	196	22.2	4.11	2.01	2.83	0.53	1.11	0.73
		2011	19.3	104	100	18.7	2.09	1.74	1.45	0.40	0.88	0.77
		2012	37.4	102	194	19.3	4.06	1.67	1.61	0.60	1.23	0.76
		2013	18.8	102	97.2	19.3	2.03	1.66	1.52	0.45	0.98	0.80
		2014	36.3	102	188	20.4	3.94	2.07	2.15	0.50	1.06	0.84
GE 7FA.05 100% Load with Evap./ GE LMS 100PB 50% Load	CC08/SC11/AB	2010	37.8	102	196	22.2	4.11	2.01	2.83	0.53	1.11	0.74
		2011	19.3	105	100	18.8	2.09	1.74	1.44	0.40	0.89	0.79
		2012	37.4	102	194	19.3	4.06	1.66	1.60	0.60	1.24	0.77
		2013	18.9	102	97.3	19.4	2.02	1.65	1.51	0.45	1.00	0.83
		2014	36.3	102	188	20.5	3.94	2.07	2.15	0.49	1.08	0.88
GE 7FA.05 100% Load/ GE LMS 100PB 100% Load with Evap.	CC09/SC08/AB	2010	44.5	103	231	28.7	4.33	2.67	3.23	0.70	1.57	0.83
		2011	29.0	105	150	20.8	2.82	1.96	1.55	0.42	0.97	0.79
		2012	45.7	102	237	23.6	4.44	2.05	1.96	0.67	1.45	0.88
		2013	23.6	102	122	26.2	2.30	1.98	2.00	0.55	1.25	0.82
		2014	44.3	103	230	25.4	4.31	2.57	2.73	0.58	1.30	0.86
GE 7FA.05 100% Load/ GE LMS 100PB 100% Load	CC09/SC09/AB	2010	44.5	103	231	28.7	4.33	2.67	3.23	0.70	1.57	0.84
		2011	29.0	105	150	20.8	2.82	1.96	1.55	0.42	0.98	0.80
		2012	45.7	102	237	23.6	4.44	2.05	1.96	0.66	1.45	0.88
		2013	23.6	102	122	26.2	2.30	1.98	2.00	0.55	1.25	0.83
		2014	44.3	103	230	25.4	4.31	2.57	2.73	0.58	1.31	0.87
GE 7FA.05 100% Load/ GE LMS 100PB 75% Load	CC09/SC10/AB	2010	44.5	103	231	28.7	4.33	2.67	3.23	0.70	1.57	0.84
		2011	29.0	105	150	20.9	2.82	1.96	1.55	0.42	0.99	0.82
		2012	45.7	102	237	23.6	4.44	2.05	1.96	0.66	1.46	0.88
		2013	23.6	103	122	26.3	2.30	1.98	2.00	0.55	1.26	0.84
		2014	44.3	103	230	25.4	4.31	2.57	2.73	0.58	1.31	0.89
GE 7FA.05 100% Load/ GE LMS 100PB 50% Load	CC09/SC11/AB	2010	44.5	103	231	28.7	4.33	2.67	3.23	0.70	1.57	0.85
		2011	29.0	105	150	20.9	2.82	1.96	1.55	0.42	1.00	0.85
		2012	45.7	102	237	23.7	4.44	2.05	1.96	0.66	1.48	0.90
		2013	23.6	103	122	26.3	2.30	1.97	2.00	0.55	1.27	0.88
		2014	44.3	103	230	25.4	4.31	2.57	2.72	0.57	1.32	0.92

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Scenario Description ^a	Exhaust Scenario	Year	NO ₂ (µg/m ³) ^b		CO (µg/m ³)		SO ₂ (µg/m ³)			PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	
			1-hour	1-hour (federal) ^c	1-hour	8-hour	1-hour	1-hour (federal)	3-hour	24-hour	24-hour	24-hour
GE 7FA.05 75% Load/ GE LMS 100PB 100% Load with Evap.	CC10/SC08/AB	2010	62.1	121	324	52.4	4.93	4.25	4.02	1.23	3.26	1.47
		2011	56.7	107	294	46.8	4.45	3.84	3.50	0.74	1.99	1.38
		2012	64.6	107	335	58.7	5.07	3.73	3.66	0.99	2.66	1.56
		2013	51.9	104	271	54.2	4.13	3.87	3.85	0.91	2.45	1.50
		2014	63.8	106	331	55.6	5.01	4.17	3.97	1.15	3.10	1.42
GE 7FA.05 75% Load/ GE LMS 100PB 100% Load	CC10/SC09/AB	2010	62.1	121	324	52.4	4.93	4.25	4.02	1.23	3.26	1.47
		2011	56.7	107	294	46.8	4.45	3.84	3.50	0.74	1.99	1.38
		2012	64.6	107	335	58.7	5.07	3.73	3.66	0.99	2.66	1.56
		2013	51.9	104	271	54.2	4.13	3.87	3.85	0.91	2.45	1.50
		2014	63.8	106	331	55.6	5.01	4.17	3.97	1.15	3.11	1.42
GE 7FA.05 75% Load/ GE LMS 100PB 75% Load	CC10/SC10/AB	2010	62.1	121	324	52.4	4.93	4.25	4.02	1.23	3.26	1.48
		2011	56.7	107	294	46.8	4.45	3.84	3.50	0.74	2.00	1.39
		2012	64.6	107	335	58.7	5.07	3.73	3.66	0.99	2.67	1.56
		2013	51.9	104	271	54.2	4.13	3.87	3.85	0.91	2.45	1.50
		2014	63.8	106	331	55.6	5.01	4.17	3.96	1.15	3.11	1.43
GE 7FA.05 75% Load/ GE LMS 100PB 50% Load	CC10/SC11/AB	2010	62.1	121	324	52.4	4.93	4.25	4.02	1.23	3.26	1.49
		2011	56.7	107	294	46.8	4.45	3.84	3.50	0.74	2.01	1.40
		2012	64.6	107	335	58.8	5.07	3.73	3.66	0.99	2.67	1.57
		2013	51.9	104	271	54.2	4.13	3.87	3.85	0.91	2.45	1.50
		2014	63.8	106	331	55.6	5.01	4.17	3.96	1.15	3.12	1.43
GE 7FA.05 48% Load/ GE LMS 100PB 100% Load with Evap.	CC11/SC08/AB	2010	74.9	127	390	77.9	4.82	4.21	3.83	1.34	4.31	2.34
		2011	70.7	117	369	67.1	4.56	4.04	3.97	0.95	3.09	2.32
		2012	73.0	116	381	81.2	4.72	4.12	4.27	1.23	3.93	2.48
		2013	72.0	109	376	70.2	4.65	4.18	4.22	1.13	3.61	2.59
		2014	78.0	111	407	74.2	5.03	4.31	4.05	1.26	4.09	2.68
GE 7FA.05 48% Load/ GE LMS 100PB 100% Load	CC11/SC09/AB	2010	74.9	127	390	77.9	4.82	4.21	3.83	1.34	4.31	2.34
		2011	70.7	117	369	67.1	4.56	4.04	3.97	0.95	3.10	2.33
		2012	73.0	116	381	81.2	4.72	4.12	4.27	1.23	3.93	2.48
		2013	72.0	109	376	70.2	4.65	4.17	4.22	1.13	3.61	2.59
		2014	78.0	111	407	74.2	5.03	4.31	4.05	1.26	4.09	2.69
GE 7FA.05 48% Load/ GE LMS 100PB 75% Load	CC11/SC10/AB	2010	74.9	127	390	77.9	4.82	4.21	3.83	1.34	4.31	2.34
		2011	70.7	117	369	67.1	4.56	4.04	3.97	0.95	3.10	2.33
		2012	73.0	116	381	81.2	4.72	4.12	4.27	1.23	3.93	2.49
		2013	72.0	109	376	70.2	4.65	4.17	4.22	1.13	3.62	2.59
		2014	78.0	111	407	74.2	5.03	4.31	4.05	1.26	4.10	2.69
GE 7FA.05 48% Load/ GE LMS 100PB 50% Load	CC11/SC11/AB	2010	74.9	127	390	78.0	4.82	4.21	3.83	1.34	4.31	2.35
		2011	70.7	117	369	67.1	4.56	4.04	3.97	0.95	3.11	2.33
		2012	73.0	116	381	81.3	4.72	4.12	4.27	1.23	3.94	2.49
		2013	72.0	109	376	70.2	4.65	4.17	4.22	1.13	3.62	2.59
		2014	78.1	111	407	74.2	5.03	4.31	4.04	1.26	4.11	2.69

^a All modeled scenarios include two GE 7FA.05 turbines, two GE LMS 100PB turbines, and the auxiliary boiler.

^b The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^c The total predicted concentration for the federal 1-hour NO₂ standard is the high-8th-high modeled concentration paired with 98th percentile seasonal hour-of-day background concentrations for 2010 through 2012.

Huntington Beach Energy Project
Appendix B, Table 5
Operational Results – SCAQMD Rule 2005
December 2015

GE 7FA.05 Unit 1

Year	1-hour Concentration ($\mu\text{g}/\text{m}^3$) ^{a, b}	1-hour Federal Concentration ($\mu\text{g}/\text{m}^3$) ^{a, c}	Annual Concentration ($\mu\text{g}/\text{m}^3$) ^{a, d}
2010	38.9	40.0	0.17
2011	34.5	35.5	0.17
2012	38.9	41.0	0.19
2013	42.2	43.8	0.19
2014	43.1	39.4	0.19

GE 7FA.05 Unit 2

Year	1-hour Concentration ($\mu\text{g}/\text{m}^3$) ^{a, b}	1-hour Federal Concentration ($\mu\text{g}/\text{m}^3$) ^{a, c}	Annual Concentration ($\mu\text{g}/\text{m}^3$) ^{a, d}
2010	60.3	52.0	0.23
2011	53.3	49.1	0.24
2012	52.7	51.2	0.27
2013	58.5	62.0	0.26
2014	55.0	53.6	0.27

GE LMS 100PB Unit 1

Year	1-hour Concentration ($\mu\text{g}/\text{m}^3$) ^{a, b}	1-hour Federal Concentration ($\mu\text{g}/\text{m}^3$) ^{a, c}	Annual Concentration ($\mu\text{g}/\text{m}^3$) ^{a, d}
2010	2.94	2.96	0.014
2011	3.03	3.05	0.017
2012	3.09	3.11	0.017
2013	3.12	3.14	0.020
2014	2.60	2.61	0.019

GE LMS 100PB Unit 2

Year	1-hour Concentration ($\mu\text{g}/\text{m}^3$) ^{a, b}	1-hour Federal Concentration ($\mu\text{g}/\text{m}^3$) ^{a, c}	Annual Concentration ($\mu\text{g}/\text{m}^3$) ^{a, d}
2010	2.95	2.97	0.014
2011	3.01	3.03	0.016
2012	3.12	3.14	0.017
2013	3.07	3.10	0.020
2014	2.88	2.91	0.019

Auxiliary Boiler

Year	1-hour Concentration ($\mu\text{g}/\text{m}^3$) ^a	1-hour Federal Concentration ($\mu\text{g}/\text{m}^3$) ^a	Annual Concentration ($\mu\text{g}/\text{m}^3$) ^a
2010	2.73	2.73	0.23
2011	2.54	2.54	0.24
2012	2.67	2.67	0.24
2013	2.32	2.32	0.23
2014	2.38	2.38	0.23

^a The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^b The modeled impact for the 1-hour NO₂ CAAQS for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC03 and SC03, respectively.

^c The modeled impact for the 1-hour NO₂ NAAQS for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC07, respectively.

^d The modeled impact for the Annual NO₂ AAQS for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC06, respectively.

Huntington Beach Energy Project
Appendix B, Table 6
Operational Results – Class II SIL and Increment
December 2015

Year	NO ₂ (µg/m ³) ^a		CO (µg/m ³)		PM ₁₀ (µg/m ³)	
	1-hour ^b	Annual ^c	1-hour ^b	8-hour ^b	24-hour ^d	Annual ^e
2010	89.0	0.57	594	114	4.63	0.56
2011	85.2	0.57	569	107	3.69	0.56
2012	89.8	0.62	600	121	4.97	0.61
2013	88.5	0.63	591	105	3.89	0.63
2014	94.5	0.64	631	109	4.78	0.64

^a The maximum 1-hour and annual NO₂ concentrations include ambient NO₂ ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

^b The modeled impact for the 1-hour NO₂, 1-hour CO, and 8-hour CO Class II SIL and Increment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC03 and SC03, respectively.

^b The modeled impact for the Annual NO₂ Class II SIL and Increment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC06, respectively.

^d The 24-hour PM₁₀ concentration is based on the GE LMS 100PB turbines operating in exhaust scenario SC07, one GE 7FA.05 turbine operating 24 hours per day in exhaust scenario CC07, and one GE 7FA.05 turbine operating 20 hours per day in exhaust scenario CC07 and 4 hours per day in exhaust scenario CC06.

^e The modeled impact for the Annual PM₁₀ Class II SIL and Increment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC07, respectively.

Huntington Beach Energy Project
Appendix B, Table 7^{a, b}
Competing Source Stack Parameters
December 2015

Point Sources

Facility	Source ID	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
HBEP	7FA01	409449	3723146	3.66	45.7	350	11.8	6.10
	7FA02	409474	3723182	3.66	45.7	350	11.8	6.10
	LMS01	409149	3723193	3.66	24.4	748	23.6	4.11
	LMS02	409185	3723168	3.66	24.4	748	23.6	4.11
	AUXBOILER	409438	3723236	3.66	24.4	432	21.2	0.91
Huntington Beach Generating Station (HBGS)	BOILER12	409274	3723095	3.66	61.0	367	7.90	6.27
Orange County Sanitation - Fountain Valley (OCSFV)	1730101	412962	3728359	8.00	7.41	1,089	1.37	2.23
	1730102	412914	3728328	7.70	7.62	475	7.03	0.55
	1730103	412935	3728401	8.00	18.9	533	17.9	0.76
	1730104	412942	3728391	8.00	18.9	533	17.9	0.76
	1730105	412939	3728396	8.00	18.9	533	17.9	0.76
Orange County Sanitation - Huntington Beach (OCSHB)	2911001	411071	3722313	1.60	7.62	475	7.44	0.53
	2911002	411096	3722214	1.60	7.41	1089	1.37	0.68
	2911003	411240	3722455	1.60	18.0	589	22.9	0.76
	2911004	411248	3722455	1.60	18.0	589	22.9	0.76
	2911005	411255	3722455	1.60	18.0	589	22.9	0.76
	2911006	411263	3722455	1.60	18.0	589	22.9	0.76
	2911007	411270	3722455	1.60	18.0	589	22.9	0.76
Beta Offshore (Beta)	16607301	395222	3716431	0	18.3	661	31.1	0.30
	16607302	395222	3716431	0	18.3	641	30.0	0.30
	16607303	395222	3716431	0	18.3	585	24.2	0.30
	16607304	394082	3717932	0	18.3	663	28.7	0.30
	16607305	394082	3717932	0	18.3	684	34.7	0.30
	16607306	394082	3717932	0	18.3	583	21.1	0.30
	16607307	395265	3716554	0	18.3	671	39.4	0.61
	16607308	395265	3716554	0	18.3	671	38.1	0.61
	16607309	395265	3716554	0	18.3	677	37.5	0.61
	16607310	395265	3716554	0	18.3	671	81.2	0.76
	16607311	395265	3716554	0	18.3	669	81.1	0.76
	16607312	395265	3716554	0	18.3	668	81.4	0.76
	16607313	395265	3716554	0	22.9	464	8.35	0.51

Volume Sources

Facility	Source ID	Base Elevation (m)	Release Height (m)	Initial Horizontal Dimension (m)	Initial Vertical Dimension (m)
Shipping Lanes (525 sources)	734601-774425	0	0.0	186	23.3

^a Competing source data provided by SCAQMD.

^b This table contains the same information presented in Appendix 5.1C, Table 5.1C.12 of the HBEP permit application.

Huntington Beach Energy Project
Appendix B, Table 8^{a, b}
Competing Source Emission Rates
December 2015

Emission Rates for PSD 1-hour NO₂ Competing Source Modeling

Facility	Source ID	1-hour NO ₂	
		(g/s)	(lb/hr)
HBEP	7FA01	7.18	57.0
	7FA02	7.18	57.0
	LMS01	2.67	21.2
	LMS02	2.67	21.2
	AUXBOILER	0.054	0.42
HBGS	BOILER12	4.32	34.3
OCSFV	1730101	0.65	5.17
	1730102	0.01	0.08
	1730103	0.98	7.78
	1730104	0.98	7.78
	1730105	0.98	7.78
OCSHB	2911001	0.08	0.60
	2911002	0.11	0.87
	2911003	0.87	6.90
	2911004	0.87	6.90
	2911005	0.87	6.90
	2911006	0.87	6.90
	2911007	0.87	6.90
Beta	16607301	1.90	15.1
	16607302	1.90	15.1
	16607303	1.90	15.1
	16607304	1.90	15.1
	16607305	1.90	15.1
	16607306	1.90	15.1
	16607307	0.37	2.94
	16607308	0.31	2.46
	16607309	0.35	2.78
	16607310	2.52	20.0
	16607311	2.48	19.7
	16607312	2.48	19.7
	16607313	10.3	81.6
Shipping Lanes (Total for 525 sources)	734601-774425	25.5	202

^a Competing source data provided by SCAQMD.

^b This table contains the same information presented in Appendix 5.1C, Table 5.1C.13 of the HBEP permit application, with the exception of the auxiliary boiler 1-hour NO₂ emission rate.

Huntington Beach Energy Project
Appendix B, Table 9
Competing Source Results
December 2015

1-hour NO₂ Concentrations (µg/m³)^{a, b}

Year	2010	2011	2012	2013	2014
All	140	147	148	143	144
HBEP	75.4	71.0	73.2	74.1	76.0
HBGS	5.15	5.08	5.32	5.12	4.73
OCSFV	8.92	8.92	8.87	8.91	9.02
OCSHB	56.2	54.0	54.1	54.1	53.7
BETA	58.2	63.2	62.6	66.8	66.1
SHIPS	24.3	23.4	23.9	22.6	23.3

^a The total predicted concentration for the federal 1-hour NO₂ standard is the high-8th-high modeled concentration paired with 98th percentile seasonal hour-of-day background concentrations for 2010 through 2012.

^b The modeled impact for the 1-hour NO₂ competing source assessment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC03 and SC03, respectively.

Huntington Beach Energy Project
Appendix B, Table 10
Operational Results – Class I SIL and Increment
December 2015

Annual NO₂ Concentrations (µg/m³) at 50 km Receptor Ring^{a, b}

Year	2010	2011	2012	2013	2014
All	0.0054	0.0054	0.0055	0.0051	0.0047
GE 7FA.05 Unit 1	0.0021	0.0022	0.0022	0.0020	0.0019
GE 7FA.05 Unit 2	0.0021	0.0022	0.0022	0.0021	0.0019
GE LMS 100PB Unit 1	0.0005	0.0005	0.0005	0.0005	0.0004
GE LMS 100PB Unit 2	0.0005	0.0005	0.0005	0.0005	0.0004
Auxiliary Boiler	0.0001	0.0001	0.0001	0.0001	0.0001

24-hour PM₁₀ Concentrations (µg/m³) at 50 km Receptor Ring^c

Year	2010	2011	2012	2013	2014
All	0.038	0.039	0.042	0.036	0.038
GE 7FA.05 Unit 1	0.012	0.012	0.013	0.011	0.012
GE 7FA.05 Unit 2	0.012	0.012	0.013	0.011	0.012
GE LMS 100PB Unit 1	0.0080	0.0074	0.008	0.0070	0.0075
GE LMS 100PB Unit 2	0.0080	0.0074	0.008	0.0071	0.0075
Auxiliary Boiler	0.0005	0.0007	0.0004	0.0006	0.0006

Annual PM₁₀ Concentrations (µg/m³) at 50 km Receptor Ring^c

Year	2010	2011	2012	2013	2014
All	0.0055	0.0056	0.0057	0.0053	0.0049
GE 7FA.05 Unit 1	0.0023	0.0023	0.0023	0.0022	0.0020
GE 7FA.05 Unit 2	0.0023	0.0023	0.0023	0.0022	0.0020
GE LMS 100PB Unit 1	0.0005	0.0005	0.0005	0.0004	0.0004
GE LMS 100PB Unit 2	0.0005	0.0005	0.0005	0.0004	0.0004
Auxiliary Boiler	8.0E-05	8.0E-05	8.0E-05	8.0E-05	7.0E-05

^a The maximum annual NO₂ concentrations include an ambient NO₂ ratio of 0.75 (EPA, 2005).

^b The modeled impact for the Annual NO₂ Class I SIL and Increment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC06, respectively.

^c The modeled impact for the 24-hour and annual PM₁₀ Class I SIL and Increment for the GE 7FA.05 and GE LMS 100PB units are based on exhaust scenarios CC07 and SC07, respectively.

Appendix C
Air Quality Impact Analysis—Joint Frequency
Distributions for VISCREEN

Huntington Beach Energy Project
Appendix C, Table 1
Joint Frequency Distribution for Crystal Cove State Park
December 2015

Stability Class	Wind Speed (m/s)	Transport Time (hours)	σ_y (meters)	σ_z (meters)	μ (m/s)	$\sigma_y \times \sigma_z \times \mu$ (m ³ /s)	Count	Frequency*	Cumulative Frequency*
F	1	3.47	330.4	50.9	0.5	8,406	120	0.3	0.3
E	1	3.47	496.3	87.8	0.5	21,776	67	0.2	0.4
F	2	1.74	330.4	50.9	1.5	25,219	54	0.1	0.5
F	3	1.16	330.4	50.9	2.5	42,032	5	0.0	0.6
D	1	3.47	662.9	153.0	0.5	50,726	45	0.1	0.7
E	2	1.74	496.3	87.8	1.5	65,327	41	0.1	0.8
E	3	1.16	496.3	87.8	2.5	108,878	21	0.0	0.8
D	2	1.74	662.9	153.0	1.5	152,178	59	0.1	0.9
E	4	0.87	496.3	87.8	3.5	152,429	0	0.0	0.9
D	3	1.16	662.9	153.0	2.5	253,630	12	0.0	1.0
D	4	0.87	662.9	153.0	3.5	355,082	19	0.0	1.0
D	5	0.69	662.9	153.0	4.5	456,534	8	0.0	1.0
D	6	0.58	662.9	153.0	5.5	557,986	1	0.0	1.0
D	7	0.50	662.9	153.0	6.5	659,438	0	0.0	1.0
D	8	0.43	662.9	153.0	7.5	760,890	0	0.0	1.0

* Frequency and cumulative frequency based on all hours of the day.

Notes:

m/s = meter(s) per second

m³/s = cubic meters per second

σ_y = Pasquill-Gifford horizontal diffusion coefficient

σ_z = Pasquill-Gifford vertical diffusion coefficient

μ = wind speed (based off of wind speed Bin average)

Huntington Beach Energy Project
Appendix C, Table 2
Joint Frequency Distribution for Huntington Beach State Park
December 2015

Stability Class	Wind Speed (m/s)	Transport Time (hours)	σ_y (meters)	σ_z (meters)	μ (m/s)	$\sigma_y \times \sigma_z \times \mu$ (m ³ /s)	Count	Frequency	Cumulative Frequency
F	1	0.017	2.64	1.59	0.5	2.10	1,702	3.9	3.9
E	1	0.017	3.98	2.39	0.5	4.76	675	1.5	5.4
F	2	0.009	2.64	1.59	1.5	6.31	955	2.2	7.6
D	1	0.017	5.33	3.10	0.5	8.27	370	0.8	8.4
F	3	0.006	2.64	1.59	2.5	10.51	195	0.4	8.9
E	2	0.009	3.98	2.39	1.5	14.28	635	1.4	10.3
E	3	0.006	3.98	2.39	2.5	23.81	158	0.4	10.7
D	2	0.009	5.33	3.10	1.5	24.80	527	1.2	11.9
E	4	0.004	3.98	2.39	3.5	33.33	63	0.1	12.0
D	3	0.006	5.33	3.10	2.5	41.33	264	0.6	12.7
D	4	0.004	5.33	3.10	3.5	57.87	66	0.2	12.8
D	5	0.003	5.33	3.10	4.5	74.40	53	0.1	12.9
D	6	0.003	5.33	3.10	5.5	90.93	96	0.2	13.1
D	7	0.002	5.33	3.10	6.5	107.47	64	0.1	13.3
D	8	0.002	5.33	3.10	7.5	124.00	46	0.1	13.4

Appendix D
Air Quality Impact Analysis—Fumigation

Huntington Beach Energy Project
Appendix D, Table 1
Inversion Break-up and Shoreline Fumigation Analyses
December 2015

AERSCREEN Inversion Break-Up Fumigation Impact Analysis Results

Pollutant	Averaging Period	Fumigation Impacts ^a (µg/m ³)	Background (µg/m ³)	Total (µg/m ³)	CAAQS (µg/m ³)	Above CAAQS?	NAAQS (µg/m ³)	Above NAAQS?
PM ₁₀	24-hour	10.6	51.0	61.6	N/A	no	150	no
NO ₂ ^b	1-hour	85.3	142	227	339	no	N/A	no
SO ₂	1-hour	5.45	20.2	25.7	655	no	N/A	no
	3-hour	5.32	20.2	25.5	N/A	no	1,300	no
	24-hour	5.21	5.20	10.41	105	no	N/A	no
CO	1-hour	529	3,321	3,850	23,000	no	40,000	no
	8-hour	147	2,519	2,666	10,000	no	10,000	no

Notes:

^a Fumigation impacts were calculated by multiplying the 1 g/s unit emission AERSCREEN impacts by source emissions. The sum of all emission sources are displayed.

^b 1-hour NO₂ impact assumes an 80 percent ambient ratio method.

AERSCREEN Shoreline Fumigation Impact Analysis Results

Pollutant	Averaging Period	Fumigation Impacts ^a (µg/m ³)	Background (µg/m ³)	Total (µg/m ³)	CAAQS (µg/m ³)	Above CAAQS?	NAAQS (µg/m ³)	Above NAAQS?
PM ₁₀	24-hour	10.5	51.0	61.5	N/A	no	150	no
NO ₂ ^b	1-hour	47.2	142	189	339	no	N/A	no
SO ₂	1-hour	3.52	20.2	23.7	655	no	N/A	no
	3-hour	3.55	20.2	23.8	N/A	no	1,300	no
	24-hour	2.13	5.20	7.33	105	no	N/A	no
CO	1-hour	125	3,321	3,446	23,000	no	40,000	no
	8-hour	37.6	2,519	2,557	10,000	no	10,000	no

Notes:

^a Fumigation impacts were calculated by multiplying the 1 g/s unit emission AERSCREEN impacts by source emissions. The sum of all emission sources are displayed.

^b 1-hour NO₂ impact assumes an 80 percent ambient ratio method.

Huntington Beach Energy Project
Appendix D, Table 1
Inversion Break-up and Shoreline Fumigation Analyses
December 2015

AERSCREEN Inputs for Shoreline Fumigation Impact Analysis for Unit Emissions

Emission Source	Scenario	Emission Rate (g/s)	Stack Height (m)	Stack Inside Diameter (m)	Stack Exit Velocity (m/s)	Stack Gas Exit Temperature (K)	Distance to Shore (m)
GE LMS 100PB Simple-cycle 1	1	1	24.4	4.11	33.3	694	350
GE LMS 100PB Simple-cycle 2	1	1	24.4	4.11	33.3	694	350
GE LMS 100PB Simple-cycle 1	3	1	24.4	4.11	23.8	748	350
GE LMS 100PB Simple-cycle 2	3	1	24.4	4.11	23.8	748	350
GE LMS 100PB Simple-cycle 1	4	1	24.4	4.11	33.1	697	350
GE LMS 100PB Simple-cycle 2	4	1	24.4	4.11	33.1	697	350
GE LMS 100PB Simple-cycle 1	7	1	24.4	4.11	23.6	748	350
GE LMS 100PB Simple-cycle 2	7	1	24.4	4.11	23.6	748	350
GE 7FA.05 Combined-cycle 1	3	1	45.7	6.10	12.2	350	500
GE 7FA.05 Combined-cycle 2	3	1	45.7	6.10	12.2	350	550
GE 7FA.05 Combined-cycle 1	7	1	45.7	6.10	11.8	350	500
GE 7FA.05 Combined-cycle 2	7	1	45.7	6.10	11.8	350	550
Auxiliary Boiler	N/A	1	24.4	0.91	21.2	432	575

Notes:

AERSCREEN was run with a Rural option, minimum temperature of 275.1 K and maximum temperature of 315.1 K (based on AERMET data), minimum wind speed of 0.5 m/s, and 100 m anemometer height. Surface profile of water and climate profile of average.

AERSCREEN Outputs for Shoreline Fumigation Impact Analysis for Unit Emissions

Emission Source	Scenario	Inversion Break-Up Fumigation Impacts ($\mu\text{g}/\text{m}^3$)				Shoreline Fumigation Impacts ($\mu\text{g}/\text{m}^3$)			
		1-hour	3-hour	8-hour	24-hour	1-hour	3-hour	8-hour	24-hour
GE LMS 100PB Simple-cycle 1	1	1.96	1.96	1.76	1.17	8.60	8.60	7.74	5.16
GE LMS 100PB Simple-cycle 2	1	1.96	1.96	1.76	1.17	8.60	8.60	7.74	5.16
GE LMS 100PB Simple-cycle 1	3	2.47	2.47	2.23	1.48	11.1	11.1	9.95	6.63
GE LMS 100PB Simple-cycle 2	3	2.47	2.47	2.23	1.48	11.1	11.1	9.95	6.63
GE LMS 100PB Simple-cycle 1	4	1.96	1.96	1.77	1.18	8.62	8.62	7.76	5.17
GE LMS 100PB Simple-cycle 2	4	1.96	1.96	1.77	1.18	8.62	8.62	7.76	5.17
GE LMS 100PB Simple-cycle 1	7	2.49	2.49	2.24	1.49	11.1	11.1	10.0	6.68
GE LMS 100PB Simple-cycle 2	7	2.49	2.49	2.24	1.49	11.1	11.1	10.0	6.68
GE 7FA.05 Combined-cycle 1	3	5.95	5.95	5.35	3.57				
GE 7FA.05 Combined-cycle 2	3	5.95	5.95	5.35	3.57				
GE 7FA.05 Combined-cycle 1	7	6.08	6.08	5.47	3.65				
GE 7FA.05 Combined-cycle 2	7	6.08	6.08	5.47	3.65				
Auxiliary Boiler	N/A	38.1	38.1	34.3	22.8				

Notes:

GE 7FA.05 Combined-cycle 1, GE 7FA.05 Combined-cycle 2, and Auxiliary Boiler are all located > 500 m from the shore. As a result, AERSCREEN was not able to calculate impacts.

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 Appendix D, Table 1
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Criteria Pollutant Emissions

Pollutant	Averaging Period	GE LMS 100PB Simple-cycle 1	GE LMS 100PB Simple-cycle 2	GE 7FA.05 Combined-cycle 1	GE 7FA.05 Combined-cycle 2	Auxiliary Boiler
PM ₁₀	24-hour	0.79	0.79	1.07	1.07	0.020
NO ₂	1-hour	2.67	2.67	7.69	7.69	0.054
SO ₂	1-hour	0.20	0.20	0.37	0.37	0.0061
	3-hour	0.21	0.21	0.35	0.35	0.0061
	24-hour	0.21	0.21	0.35	0.35	0.0031
CO	1-hour	5.66	5.66	41.0	41.0	0.36
	8-hour	1.89	1.89	12.0	12.0	0.30