# Appendix 5.1F
# Dispersion Modeling Protocol

# Dispersion Modeling Protocol for the Huntington Beach Energy Project

Prepared for

## AES Southland Development, LLC

690 N. Studebaker Road
Long Beach, CA 90803

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Submitted to

## South Coast Air Quality Management District and the California Energy Commission

Prepared by
CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

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# Acronyms

| | |
|---|---|
| °F | degrees Fahrenheit |
| $\mu g/m^3$ | micrograms per cubic meter |
| AES | AES Southland Development, LLC |
| AFC | Application for Certification |
| AGS | Alamitos Generating Station |
| AQRV | air quality-related values |
| ARB | California Air Resources Board |
| CAAQS | California Ambient Air Quality Standards |
| CCGT | Combined Cycle Gas Turbine |
| CEC | California Energy Commission |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| $CH_4$ | methane |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| EPA | United States Environmental Protection Agency |
| GHG | greenhouse gases |
| GRP | General Reporting Protocol |
| $H_2S$ | hydrogen sulfide |
| $H_2SO_4$ | sulfuric acid |
| HARP | Hotspots Analysis Reporting Program |
| HBEP | Huntington Beach Energy Project |
| HBGS | Huntington Beach Generating Station (existing) |
| HI | hazard index |
| HRA | health risk assessment |
| HRSG | heat recovery steam generators |
| km | kilometer |
| lb(s) | pound(s) |
| MICR | maximum individual cancer risk |
| MPSA | Mitsubishi Power Systems Americas |
| N/A | not applicable |
| $N_2O$ | nitrous oxide |
| NAAQS | National Ambient Air Quality Standards |
| NED | National Elevation Dataset |
| NEPA | National Environmental Policy Act |
| $NO_2$ | Nitrogen Dioxide |

| | |
|---|---|
| $NO_x$ | Oxides of Nitrogen |
| NS | No Standard |
| NSR | New Source Review |
| NSR | New Source Review |
| OEHHA | Office of Environmental Health Hazard Assessment |
| $PM_{10}$ | Particulate Matter less than 10 Microns in Aerodynamic Diameter |
| $PM_{2.5}$ | Particulate Matter less than 2.5 Microns in Aerodynamic Diameter |
| PPM | parts per million |
| ppmv | parts per million by volume |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential to Emit |
| PVMRM | plume volume molar ratio method |
| Q/D | emissions/distance |
| RELs | reference exposure levels |
| SCAQMD | South Coast Air Quality Management District |
| SIL | Significant Impact Level |
| $SO_2$ | sulfur dioxide |
| $SO_x$ | sulfur oxides |
| TAC | toxic air contaminants |
| TCR | The Climate Registry |
| tpy | ton(s) per year |
| USGS | United States Geological Survey |

SECTION 1

# Introduction

AES Southland Development, LLC, (AES) proposes to construct the Huntington Beach Energy Project (HBEP or Project) at the existing AES Huntington Beach Generating Station (HBGS) site at 21730 Newland Street, Huntington Beach, CA 92646 (see Figure 1-1). The HBEP will consist of two three-on-one combined-cycle power blocks with a net capacity of 939 megawatts. Each power block will consist of three Mitsubishi Power Systems Americas (MPSA) 501DA combustion turbines, one steam turbine, and an air cooled condenser. Each combustion turbine will be equipped with a heat recovery steam generator (HRSG) and will employ supplemental natural gas firing (duct firing). The turbines will use advanced combustion controls, dry low $NO_x$ burners, and selective catalytic reduction to limit oxides of nitrogen ($NO_x$) emissions to 2 parts per million by volume (ppmv). Emissions of carbon monoxide (CO) will be limited to 2 ppmv and volatile organic carbon (VOC) to 1 ppmv through the use of the advanced combustion controls, combined with the use of an oxidation catalyst. Good combustion practices and burning pipeline-quality natural gas will minimize emissions of the remaining pollutants.

The HBEP will retain the use of the two existing 275-horsepower diesel-fired emergency fire water pumps installed during the HBGS Units 3 and 4 retooling project in 2001. Because the fire water pumps have been permitted by the SCAQMD and are considered part of the existing background conditions, AES does not intend to include the fire pumps in the modeling analysis for HBEP. The HBEP will also reuse existing onsite potable water, natural gas, stormwater, process wastewater, sanitary pipelines, and electrical transmission facilities. There are no offsite linear developments proposed as part of the Project.

The HBEP will be permitted through the California Energy Commission (CEC) Application for Certification (AFC) licensing process and the South Coast Air Quality Management District (SCAQMD) New Source Review (NSR) permitting process. Because the HBEP includes the use of steam to generate electricity, the Project is also categorized as one of the 28 Prevention of Significant Deterioration (PSD) major source categories (40 Code of Federal Regulations [CFR] 52.21(b)(1)(i)). Therefore, the Project is subject to PSD permitting requirements if the net emission increase from the Project exceeds 100 tons per year (tpy) for any regulated pollutant, with the exception of greenhouse gases (GHG). The threshold for GHGs is a net increase of 100,000 tpy. Because the existing Huntington Beach Generating Station Units 1 and 2 will be retired and removed as part of the Project, the maximum 2 year historical past actual emissions from these two units between calendar years 2007 and 2011 will be subtracted from the potential to emit (PTE) for HBEP.

Despite the netting analysis, the resulting PTE is still expected to exceed the 100 tpy threshold for at least one of the PSD-regulated pollutants (see Section 3.3). Therefore, the Project will be considered a major stationary source in accordance with PSD regulations. The SCAQMD has also been delegated partial PSD permitting authority. Therefore, the PSD modeling results will be submitted to the SCAQMD as part of the permitting process.

Dispersion modeling will be conducted to demonstrate that the Project will neither cause a new violation of a state or federal ambient air quality standard nor make an existing violation significantly worse for nitrogen dioxide ($NO_2$), CO, particulate matter less than 10 microns in diameter ($PM_{10}$), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide ($SO_2$). AES intends to submit an air quality impact analysis to both the SCAQMD and CEC that evaluates the impacts from HBEP commissioning, start-up/shutdown, and normal facility operations. AES will also evaluate the demolition and construction-based air quality impacts per the CEC regulations. In addition, an assessment of the cumulative air quality impacts analysis and the potential human health risks associated with the operation of the proposed project will be performed. Although VOC and GHG emissions are included in the following discussion, AES does not intend to model VOC or GHG emissions as part of the air quality impacts analysis.

The following discussion presents the methodology proposed for evaluating the potential air quality and public health impacts associated with demolition, construction, commissioning, and operation of the HBEP.

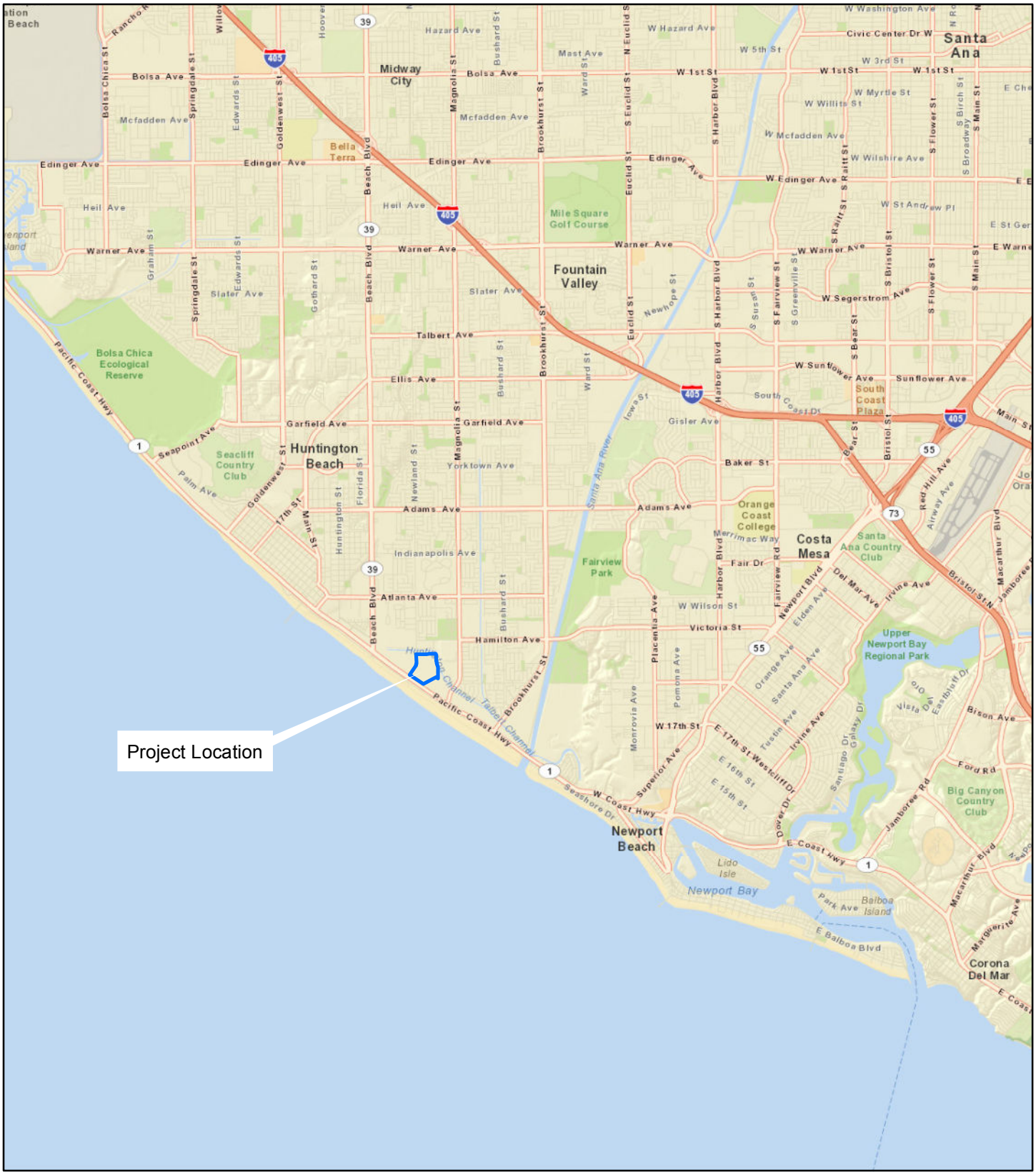


**FIGURE 1-1**
**Regional Location Map**
AES Huntington Beach Energy Project

CH2MHILL

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SECTION 2

# Existing Setting

## 2.1 Area Classifications

The HBEP will be located in Orange County, California. The County is in attainment for all federal National Ambient Air Quality Standards (NAAQS) with the exception of ozone, $PM_{10}$, and $PM_{2.5}$. The county is in attainment for all California Ambient Air Quality Standards (CAAQS) with the exception of ozone, $NO_2$, $PM_{10}$, and $PM_{2.5}$. The area classifications for each of the pollutants are included in Table 2-1.

TABLE 2-1
**State and Federal Air Quality Designations for the Orange County, California**

| Pollutant | State Designation | Federal Designation |
|---|---|---|
| Ozone | 1-Hour: Non-attainment (Extreme)<br>8-Hour: Non-attainment | 1-Hour: N/A<br>8-Hour: Non-attainment |
| CO | 1-Hour: Attainment<br>8-Hour: Attainment | 1-Hour: Attainment<br>8-Hour: Attainment |
| $NO_2$ | 1-Hour: Non-attainment<br>Annual: Non-attainment | 1-Hour: Attainment<br>Annual: Attainment |
| $SO_2$ | 1-Hour: Attainment<br>24-Hour: Attainment | 1-Hour: Attainment<br>24-Hour: N/A |
| $PM_{10}$ | 24-Hour: Non-attainment<br>Annual: Non-attainment | 24-Hour: Non-attainment<br>Annual: N/A |
| $PM_{2.5}$ | 24-Hour: N/A<br>Annual: Non-attainment | 24-Hour: Non-attainment<br>Annual: Non-attainment |
| Lead, $H_2S$, and Sulfates | Attainment, Unclassified, Attainment | Attainment, No federal standard,<br>No federal standard |

Source: California Air Resources Board (ARB), 2011; U.S. Environmental Protection Agency (EPA), 2011a.
N/A = Not Applicable
$H_2S$ = hydrogen sulfide

## 2.2 Background Concentrations

The three closest ARB-certified monitoring sites relative to the HBEP site are located approximately 3.5 miles northeast of the Project site in Costa Mesa, California (Orange County); approximately 13 miles to the north of the Project site in Anaheim, California (Orange County); and 15 miles to the northwest of the Project site in (South) Long Beach, California (Los Angeles County). The Mission Viejo and Long Beach monitoring stations are also ARB-certified monitoring sites located near the Project site. The Mission Viejo monitoring station is approximately 17 miles to the southeast of the Project site in Orange County, and the Long Beach monitoring station is approximately 17 miles to the northwest of the Project site in Los Angeles County.

Table 2-2 lists the pollutants monitored at each of the monitoring stations.

TABLE 2-2
**Summary of the Nearest Monitoring Stations and the Pollutants Monitored at Each Station**

| Monitoring Location | Ozone | $NO_2$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| North Coastal Orange County (Costa Mesa) | X | X | X | X | NA | NA |
| Saddleback Valley (Mission Viejo) | X | NA | X | NA | X | X |
| Central Orange County (Anaheim) | X | X | X | NA | X | X |
| South Coastal Los Angeles County 1 (Long Beach) | X | X | X | X | X | X |
| South Coastal Los Angeles County 2 (South Long Beach) | NA | NA | NA | NA | X | X |

X = Pollutant monitored at this location.
NA = Pollutant was not monitored at this location.

As outlined in 40 CFR 51, Appendix W, Section 9.2, the background data used to evaluate the potential air quality impacts need not be collected on a project site, as long as the data are representative of the air quality in the subject area. The following three criteria were used for determining whether the background data is representative: (1) location, (2) data quality, and (3) data currentness. These criteria are defined and apply to the Project as follows:

- **Location:** The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.

  The nearest monitoring station to the Project site is the North Costal Orange County (Costa Mesa) station. This site is located approximately 3.5 miles from the Project site. Based on a review of meteorological data collected at the Costa Mesa monitoring station, this station is also be downwind of the HBEP site for most meteorological conditions. Therefore, it is expected that the maximum short- and long-term concentrations will occur in proximity to this monitoring station.

  Because the Costa Mesa monitoring station does not include $PM_{10}$ and $PM_{2.5}$ monitoring equipment, the nearest representative location for $PM_{10}$ and $PM_{2.5}$ was selected based on the surrounding terrain and the wind roses from the Costa Mesa, Long Beach, Anaheim, and Mission Viejo monitoring stations (SCAQMD, 2009). The nearest complex terrain is located approximately 5.5 miles east-southeast of the Project site, and the wind roses suggest a westerly flow from Costa Mesa inland with flow toward the Mission Viejo monitoring station. Therefore, the Mission Viejo monitoring station was chosen as the most representative monitoring station for $PM_{10}$ and $PM_{2.5}$.

- **Data quality:** Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.

- The SCAQMD, ARB, and EPA ambient air quality data summaries will be used as the primary sources of data. Therefore, the data at all five monitoring stations listed in Table 2-2 will meet the data quality requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.

- **Data currentness:** The data are current if they have been collected within the preceding 3 years and are representative of existing conditions.

  The maximum ambient background concentrations from the period 2008 – 2010 will be combined with the modeled concentrations and used for comparison to the ambient air quality standards. Therefore, the data at all five monitoring stations listed in Table 2-2 represent the three most recent years of data available.

Based on the criteria presented above, the three most recent years of background $NO_2$, CO, $SO_2$, and ozone data from the Costa Mesa monitoring station and the three most recent years of background $PM_{10}$ and $PM_{2.5}$ from the Mission Viejo monitoring station will be combined with the modeled concentrations and used for comparison to

the ambient air quality standards. A summary of the background concentrations for 2008 through 2010 are presented in Table 2-3.

TABLE 2-3
**Background Air Concentrations (2008–2010)[a]**

| | | 2008 | | 2009 | | 2010 | | Maximum |
|---|---|---|---|---|---|---|---|---|
| **Pollutant** | **Averaging Time** | **ppm** | **µg/m³** | **ppm** | **µg/m³** | **ppm** | **µg/m³** | **µg/m³** |
| $NO_2$ [b] | 1-hour (max) | 0.081 | 152 | 0.065 | 122 | 0.070 | 132 | 152 |
| | 1-hour (98th percentile) | 0.064 | 120 | 0.057 | 107 | 0.056 | 105 | 120 |
| | Annual[d] | 0.0132 | 24.8 | 0.0130 | 24.5 | 0.0113 | 21.3 | 24.8 |
| $SO_2$ [b] | 1-hour (max) | 0.01 | 26.2 | 0.01 | 26.2 | 0.0095 | 24.9 | 26.2 |
| | 1-hour (99th percentile) | 0.008 | 20.9 | 0.006 | 15.7 | 0.006 | 14.4 | 20.9 |
| | 3-hour[e] | 0.0066 | 17.3 | 0.0066 | 17.3 | 0.0038 | 9.9 | 17.3 |
| | 24-hour | 0.003 | 7.9 | 0.004 | 10.5 | 0.0021 | 5.50 | 10.5 |
| CO [b] | 1-hour | 3 | 3,436 | 3 | 3,436 | 2 | 2,290 | 3,436 |
| | 8-hour | 2.0 | 2,290 | 2.2 | 2,519 | 2.1 | 2,405 | 2,519 |
| $PM_{10}$ [c] | 24-hour | -- | 42 | -- | 56 | -- | 34 | 56 |
| | Annual | _ | 22.6 | _ | 23.5 | _ | 18.1 | 23.5 |
| $PM_{2.5}$ [c] | 24-hour | -- | 32.6 | -- | 39.2 | -- | 19.9 | 39.2 |
| | Annual | _ | 10.4 | _ | 9.5 | _ | 8.0 | 10.4 |

[a] The SCAQMD, ARB, and EPA ambient air quality data summaries were used as reference.
[b] Data from the Costa Mesa monitoring station.
[c] Data from the Mission Viejo monitoring station.
[d] Annual Arithmetic Mean
[e] EPA Secondary Standard
PPM = parts per million
µg/m³ = micrograms per cubic meter

SECTION 3

# Methodology for Estimating Project-Related Emissions

## 3.1 Construction

The construction of the HBEP will require the removal of the existing HBGS Units 1, 2, and 5 during the construction process. Also, as previously discussed, existing Huntington Beach Generating Station Units 3 and 4 were licensed through the CEC (00-AFC-13C) and demolition of these units will be authorized under that license. Therefore, demolition of existing HBGS Units 3 and 4 is not part of the HBEP project definition. However, the demolition of HBGS Units 3 and 4 will be included as part of the CEC cumulative impact assessment.

Approximately 15 acres will be disturbed at the HBEP site during demolition and construction activities. Onsite demolition activities will include the removal of the non-operational Unit 5 peaker unit, the buildings and small tanks associated with Unit 5, and a fuel oil storage tank. Demolition of Units 1 and 2 will include an organized, top down, dismantling of the existing boiler units, generator, and stack. The existing foundation for Units 1 and 2 will remain largely intact at the conclusion of the demolition activities and most of the demolition debris will be transported to an offsite location where they can be recycled. Onsite construction activities will consist of installing six new combined cycle gas turbines (CCGT), various auxiliary equipment, and administrative structures. The HBEP will reuse existing onsite potable water, natural gas, stormwater, process wastewater, sanitary pipelines, and electrical transmission facilities to the maximum extent possible; however, some modification and interconnection of the HBEP into these systems will require construction activity.

HBEP construction will require both onsite and offsite laydown and construction parking areas. Approximately 22 acres of construction laydown will be required, with approximately 6 acres at the HBGS used for a combination of laydown and construction parking, and 16 acres at the Alamitos Generating Station (AGS) used for construction laydown. AES anticipates using a “just in time delivery” approach for the receipt of construction materials at the HBEP site. Large and heavy components of the generating units (e.g., turbines, heat recovery steam generators (HRSG) components) will arrive by ship or rail at the Port of Long Beach. From the Port of Long Beach, the large components of the generating units will be hauled to the AES Alamitos Generating Station (located 13 miles northwest of the HBEP site) to a designated laydown area. When the components are ready for installation, heavy haul trucks will transport the large components to the HBEP site.

Construction worker parking for HBEP and the demolition of the existing units at HBGS will be provided using a combination of parking on the Project site and offsite parking. A maximum of 300 parking spaces will be required during construction and demolition activities. Construction and demolition parking options include the following:

- Approximately 1.5 acres onsite at the Huntington Beach Generating Station (approximately 130 parking stalls)
- Approximately 3 acres of existing paved/graveled parking located adjacent to the HBEP across Newland Street (approximately 300 parking stalls)
- Approximately 2.5 acres of existing paved parking located at the corner of Pacific Coast Highway and Beach Boulevard (approximately 215 parking stalls)
- 225 parking stalls at the City of Huntington Beach shore parking west of the project site
- Approximately 1.9 acres at the Plain American Tank Farm located on Magnolia Street (approximately 170 parking stalls)

Onsite and offsite Project emissions will be divided into three categories: (1) vehicle and construction equipment exhaust; (2) fugitive dust from vehicle and construction equipment, including grading and bulldozing during

construction of HBEP Block 1 and Block 2; and (3) fugitive dust from demolition activities such as the top down removal of the boiler stack and loading waste haul trucks with the generated debris.

The following criteria pollutant emissions will be calculated: $NO_x$, sulfur oxides ($SO_x$), VOC, CO, $PM_{10}$, and $PM_{2.5}$. Fugitive dust and construction equipment exhaust emissions will be estimated using methodology and emission factors consistent with the California Emissions Estimator Model (CalEEMod; version 2011.1.1), which incorporates OFFROAD2007 and portions of the EPA's AP-42 (ENVIRON, 2011; SCAQMD et al., 2011). Vehicle exhaust emissions for both paved and unpaved roads will be estimated using EMFAC2007 (version 2.3) emission factors, as consistent with the CalEEMod methodology.[1]

Construction equipment GHG emissions will be estimated using emission factors from The Climate Registry (TCR) General Reporting Protocol (GRP, version 1.1) (TCR, 2008) and fuel consumption rates from OFFROAD2007. Vehicle emissions (trucks and worker commutes) will be estimated using emission factors from TCR GRP (version 1.1) (TCR, 2008) and fuel economy values from EMFAC2007 (version 2.3). The Council on Environmental Quality (CEQ) has provided draft guidance suggesting that quantities of direct GHG emissions equal to or greater than 25,000 metric tons of carbon dioxide equivalent ($CO_2e$) on an annual basis are meaningful and should be quantified and disclosed for project evaluations within the National Environmental Policy Act (NEPA) framework (CEQ, 2010). While this is not a NEPA evaluation, this threshold will be used as a guide for assessing whether GHG emissions from construction activities may be meaningful.

## 3.2 Commissioning

During the commissioning phase of HBEP Blocks 1 and 2, the MPSA 501DAs will initially be operated at various load rates without the benefit of the emission control systems to facilitate proper operation of the equipment. However, maximum hourly emission rates for $SO_2$, $PM_{10}$, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during commissioning. Therefore, emission calculations for commissioning activities will be limited to $NO_x$, CO, and VOC. The $NO_x$, CO, and VOC emissions will be estimated based on turbine performance data provided by the vendor, estimated durations and control efficiencies of each commissioning event, and turbine operating rates.

## 3.3 Operation

Emissions of $NO_x$, $SO_x$, CO, VOC, $PM_{10}$, and $PM_{2.5}$ to the atmosphere from the HBEP will occur from combustion of natural gas in each of the identical combustion turbines. Emission rates will be calculated based on vendor data and additional conservative assumptions of turbine performance. Turbine emissions and stack parameters, such as flow rate and exit temperature, will exhibit some variation with ambient temperature and operating load. Therefore, to evaluate the worst-case air quality impacts during normal operation, dispersion modeling will be conducted at 70, 80, 90 and 100 percent load at 32, 66, and 110 degrees Fahrenheit (°F). In addition to the normal operating load/temperature scenarios, emission estimates and an air quality impact analysis will also be conducted for startup and shutdown events. The proposed project will also include two existing diesel-fired emergency fire pumps permitted by the SCAQMD. Because the fire pumps were in operation prior to 2008, the air quality impacts associated with the fire pumps are part of the ambient background data (2008 – 2010) shown in Table 2-3. Therefore, emissions of $NO_x$, CO, $PM_{10}$, $PM_{2.5}$, and $SO_x$ from the diesel-fired emergency fire pumps will not be included in the analysis.

An estimate of the annual HBEP PTE criteria pollutant emissions and past actual emissions from 2007 through 2011 are presented in Table 3-1. The PTE estimates are based on preliminary engineering data, 5,000 hours of

[1] CalEEMod is a statewide computer model created by ENVIRON and the SCAQMD to quantify criteria pollutant and GHG emissions associated with the construction activities from a variety of land use projects (ENVIRON, 2011). Developed in cooperation with air districts throughout the state, CalEEMod is intended to standardize air quality analyses while allowing air districts to provide specific defaults reflecting regional conditions, regulations, and policies (SCAQMD et al.,2011). CalEEMod is generally viewed as an improvement and replacement of URBEMIS2007 by providing updated factors, methodologies, and defaults that are robustly documented.

base load operation without duct burner firing per turbine per year, 1,200 hours of base load operation with duct burner firing per turbine per year, and 624 startups and shutdowns per turbine per year.

TABLE 3-1
**Annual Facility Emission Estimates (tons per year)**

| | Facility Emission Totals – Tons Per Year (Estimate) | | | | | |
|---|---|---|---|---|---|---|
| **Facility** | **$NO_2$** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** | **VOC** | **CO** |
| HBGS Units 1 and 2 (Past Actual) | 50 | 7 | 17 | 10 | 10 | 2,400 |
| HBEP (PTE)[a] | 250 | 13 | 108 | 108 | 115 | 300 |
| Net Increase | 200 | 6 | 91 | 98 | 105 | -2,100 |

[a] Assumes six MPSA 501DA gas turbines operating 6,200 hours/year per turbine and 624 startups/shutdowns per turbine per year.

Combustion of natural gas in the turbines will also result in emissions of the following GHGs: carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Therefore, GHG emissions for normal facility operations will be calculated based on the maximum fuel usage predicted for HBEP and emission factors contained in the TCR GRP (version 1.1) (TCR, 2008). GHG emissions will be calculated for comparison to the PSD significance thresholds but will not be included in the dispersion modeling impact analysis.

Criteria pollutant emissions and GHG emissions from HBEP operational worker commutes and material deliveries will also be calculated. Criteria pollutant emissions will be estimated using emission factors from EMFAC2007 (version 2.3). GHG emissions will be estimated using emission factors from TCR GRP (version 1.1) (TCR, 2008) and fuel economy values from EMFAC2007 (version 2.3). Criteria pollutant and GHG emissions from HBEP operational worker commutes and material deliveries will be calculated for CEC informational purposes but will not be included in the dispersion modeling impact analysis.

SECTION 4

# Topography and Meteorology

## 4.1 Topography

The HBEP site is located near sea level on the California coast approximately 1.5 miles southeast of downtown Huntington Beach. The nearest complex terrain (i.e., terrain exceeding stack height) in relation to the proposed project is located in the San Joaquin Hills, approximately 5.5 miles (or approximately 9 kilometers [km]) to the east and southeast.

## 4.2 Meteorology

### 4.2.1 Meteorology for Dispersion Modeling

Meteorological data collected at the SCAQMD Costa Mesa monitoring station will be used to model the ambient air quality impacts. The meteorological data used for this analysis have been compiled by SCAQMD and include the period of January 1, 2005, through December 31, 2007. A wind rose for the Costa Mesa monitoring station is presented in Figure 4-1.

According to EPA's Guideline on Air Quality Models (EPA, 2000), representativeness of meteorological data used in dispersion modeling depends on (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected.

The monitoring site is located approximately 3.5 miles northeast of the existing HBGS. There are no complex terrain features between the monitoring site and the existing power plant. With the exception of the modeling domain located over the ocean, the land uses surrounding the monitoring site and the existing HBGS facility are similar and have been categorized as medium density residential. Because of the proximity of the meteorological station relative to the proposed project and the involvement of the SCAQMD in developing the meteorological data set, three years of monitored data have been considered adequate for this modeling analysis. Therefore, the monitoring station is considered representative of the HBEP site.

### 4.2.2 Upper Air Data

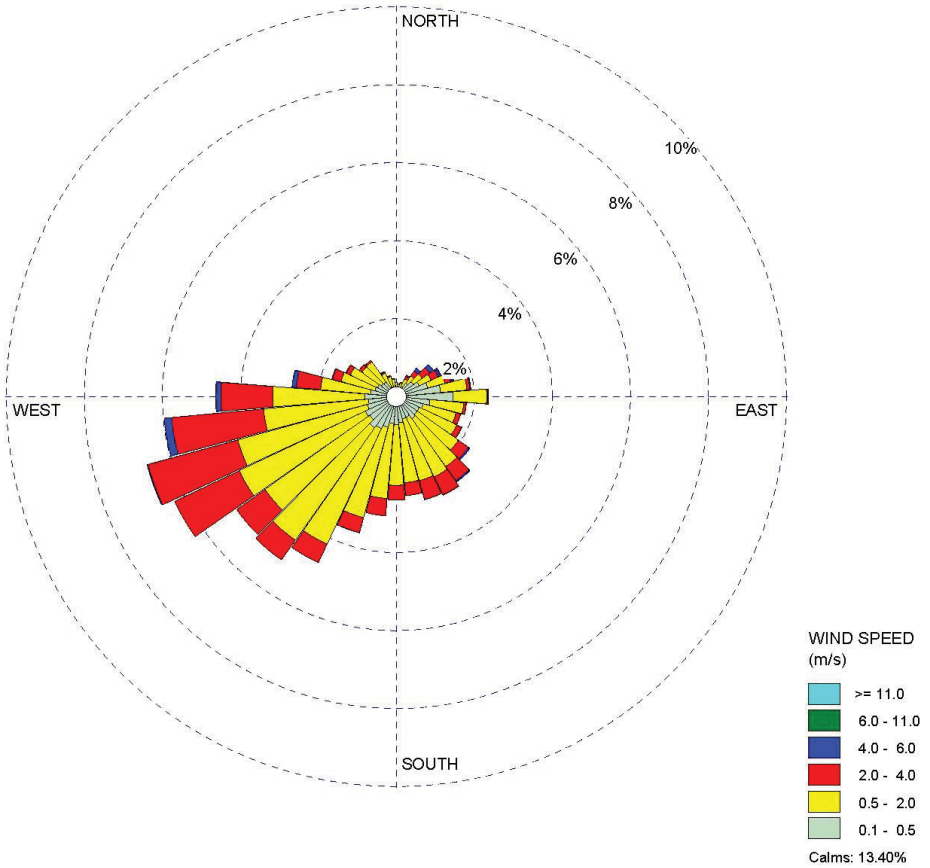
Twice-daily National Climatic Data Center soundings from the San Diego Miramar National Weather Service station (Station #03190) were coupled with the onsite surface data by the SCAQMD to create the AERMET meteorological data set.

### 4.2.3 AERMET Pre-Processing

The SCAQMD preprocessed the meteorological data with the AERMET preprocessor. The processed data are readily available on the SCAQMD website for download and use. SCAQMD model guidance recommends use of the nearest station to the project site.

WIND ROSE PLOT:
**csta**

DISPLAY:
**Wind Speed**
**Direction (blowing from)**




| COMMENTS: | DATA PERIOD: | COMPANY NAME: | |
|---|---|---|---|
| | **2005-2007**<br>**Jan 1 - Dec 31**<br>**00:00 - 23:00** | MODELER: | |
| | CALM WINDS:<br>**13.40%** | TOTAL COUNT:<br>**25385 hrs.** | |
| | AVG. WIND SPEED:<br>**1.06 m/s** | DATE:<br>**1/28/2009** | PROJECT NO.: |

WRPLOT View - Lakes Environmental Software

**FIGURE 4-1**
**SCAQMD Costa Mesa Meteorological Station Wind Rose**
AES Huntington Beach Energy Project

SECTION 5

# Dispersion Modeling Approach

## 5.1 Model Selection

The EPA approved AERMOD (Version 12060 or most recent version) dispersion model will be used to evaluate the air quality emissions from the HBEP. The AERMOD model is the latest generation of EPA's short-term model recommended for predicting impacts from industrial-point sources, as well as area and volume sources.

## 5.2 Model Input Defaults/Options

The AERMOD model will be used with regulatory default options as recommended in the EPA Guideline on Air Quality Models (EPA, 2005). The following supporting pre-processing programs for AERMOD will also be used:

- BPIP-Prime (Version 04274)
- AERMAP (Version 11103)

The technical options to be selected for the AERMOD model include the following:

- Regulatory default control options
- Receptor elevations and controlling hill heights obtained from AERMAP output

However, SCAQMD modeling guidance recommends running AERMOD with the non-default FLAT option (which assumes that all receptors and emission sources have the same elevation) for receptors with elevations below stack base. Therefore, AERMOD will be run again in FLAT mode for receptors with elevations below stack base. The maximum model design concentration from DEFAULT or FLAT will be used for comparison to the applicable standards.

The emission units will be modeled as point sources within AERMOD. Emission rates and other source parameters will be determined from the manufacturer's data or EPA-established emission factors.

Initially, a complete conversion of $NO_x$ emissions to $NO_2$ will be assumed. If this assumption leads to predicted exceedances of the NAAQS, CAAQS, or significance criteria for $NO_2$ identified in Section 6.0, Air Quality Impact Analysis, the default ratio of 0.75 $NO_2/NO_x$ will be applied to annual predicted impacts and 0.8 for 1-hour predicted impacts to determine $NO_2$ concentrations (EPA, 2010; EPA, 2011b).

If predicted $NO_2$ impacts require further refinement, the plume volume molar ratio method (PVMRM) will be used. PVMRM options will assume an initial in-stack $NO_2/NO_x$ ratio of 0.5 and an out of stack $NO_2/NO_x$ ratio of 0.8 (EPA, 2010; EPA, 2011b). Corresponding hourly ozone data from the Costa Mesa ozone monitoring station will be obtained from the SCAQMD.

## 5.3 Land Use / Classification

AERMOD will be run in urban dispersion mode because land use within 3 km of the HBEP site is primarily classified as urban (Auer Method). A population of 3,010,759 will be used in AERMOD, as recommended by the SCAQMD for projects in Orange County (SCAQMD, 2012).

## 5.4 Receptor Network

The base modeling receptor grid for the AERMOD modeling will consist of receptors that are placed at the ambient air boundary and Cartesian-grid receptors that are placed beyond the Project's site boundary at spacing that increases with distance from the origin. The Project's property boundary will be used as the ambient air boundary. Property boundary receptors will be placed at 30-meter intervals. Beyond the Project's property boundary, receptor spacing will be as follows:

- 50-meter spacing from property boundary to 500-meters from the origin
- 100-meter spacing from beyond 500-meters to 3 km from the origin
- 500-meter spacing from beyond 3 km to 10 km from the origin
- 1,000-meter spacing from beyond 10 km to 25 km from the origin
- 5,000-meter spacing from beyond 25 km to 50 km from the origin

All receptors and source locations will be expressed in Universal Transverse Mercator North American Datum 1983 (NAD83), Zone 11 coordinate system.

The base receptor grid will be extended if predicted concentration gradients are increasing at the edge of the grid. The base (coarse) receptor grid will be supplemented with receptors at closer (tighter) receptor spacing, where appropriate, so that the maximum points of impact have been identified.

AERMAP (Version 11103) will be used to calculate the receptor elevations and the controlling hill heights. Terrain in the vicinity of the project will be accounted for by assigning base elevations to each receptor. National Elevation Dataset (NED) files from the United States Geological Survey (USGS) will be obtained in one-third arc-second resolution for the 50-km grid. The AERMAP domain will be large enough to encompass the 10 percent slope factor required for calculating the controlling hill height.

For receptors with elevations below stack base, AERMOD will be run with the FLAT option. The maximum modeled design concentration from FLAT and DEFAULT AERMOD runs will be used for comparison to the applicable standards.

## 5.5 Source Characterization

### 5.5.1 Construction

The HBEP construction site will be represented as a set of volume sources and area sources in the modeling analysis. The exhaust emissions will be modeled as a set of volume sources with a plume centerline height of 4.6 meters, and the wind-blown and fugitive dust emissions will be modeled as an area source assuming an average release height of 1 meter. As discussed in Section 6.0, Air Quality Impact Analysis, predicted concentrations of $NO_x$, CO, $PM_{10}$, $PM_{2.5}$, and $SO_x$ from onsite construction-related activities will be combined with the ambient background concentrations and compared to the ambient air quality standards.

### 5.5.2 Commissioning

The combustion turbine exhaust stacks will be modeled as point sources within AERMOD. Exhaust parameters will be based on information provided by the vendor for each commissioning phase. Only maximum hourly impacts for $NO_x$ and CO will be modeled for each commissioning phase. Emission rates of $PM_{10}$, $PM_{2.5}$, and $SO_x$ are expected to be equal to or lower than normal operating rates due to reduced loads during commissioning.

### 5.5.3 Operation

The proposed combustion turbines will be modeled as point sources within AERMOD. Exhaust parameters will be based on information provided by the vendor. The modeling analysis will include a load screening to determine which operating conditions expected for the combustion turbines will yield the highest ground-level concentrations.

## 5.6 Building Wake Downwash and Good Engineering Practice

AERMOD can account for building downwash and cavity zone effects. Existing HBGS and the proposed HBEP stack locations, heights, building locations, and dimensions will be input to BPIP-PRIME. The first step of BPIP-PRIME determines and reports on whether or not a stack follows good engineering practice or is being subjected to wake effects from a structure or structures. The second step calculates direction-dependent equivalent building dimensions if a stack is being influenced by structure wake effects. The BPIP-PRIME output will be used in the AERMOD modeling.

SECTION 6

# Air Quality Impacts Analysis

As described above, the HBEP will require an ambient air quality analysis for pollutants for which there would be an increase in emissions. The sections below summarize the approach to address the requirements applicable to each reviewing agency and highlight the criteria required for each analysis.

## 6.1 SCAQMD New Source Review

### 6.1.1 Rule 1303 and Rule 1304

SCAQMD Rule 1303 requires an ambient air quality analysis for each new emission source to demonstrate that a proposed project will not cause a violation or make significantly worse an existing violation of the CAAQS or NAAQS. However, under Rule 1304(a)(2), the AES HBEP will be exempt from this rule because the HBEP is a replacement of existing electric utility steam boilers with combined cycle gas turbines with no increase in energy output rating. Therefore, a comparison of potential impacts on Regulation 1303, Appendix A-2 significant change in air quality thresholds is not required as part of this air quality impacts analysis. As previously discussed, the fire pump engines are existing permit units at HBGS that will be retained and used for the HBEP. Therefore, they will not be subject to modeling under Rule 1303 and 1304 requirements. Further, permit requirements limit operation to 200 hours per year and Rule 1304(a)(4) otherwise exempts these engines from modeling under SCAQMD requirements.

### 6.1.2 Rule 1401

This rule specifies limits for maximum individual cancer risk (MICR), cancer burden, and noncancer acute and chronic hazard index (HI) from new permit units, relocations, or modifications to existing permit units that emit toxic air contaminants listed in Rule 1401, Table I. The HBEP will be subject to the Rule 1401 new source review requirements. Therefore, a health risk assessment (HRA) will be completed as part of the air quality impacts analysis for the HBEP. The procedure for evaluating the potential impacts is discussed in Section 7.0, Human Health Risk Assessment.

### 6.1.3 Rule 2005

SCAQMD Rule 2005 sets forth pre-construction review requirements for new facilities subject to the requirements of the RECLAIM program, for modifications to RECLAIM facilities, and for facilities that increase their allocation to a level greater than their starting allocation plus non-tradable credits. The existing AES HBGS facility is currently subject to the RECLAIM requirements, and, as shown in Table 6-1, the proposed project will also exceed the major $NO_2$ modification threshold of 1 pound (lb)/day. Therefore, Rule 2005 requires an ambient air quality analysis to demonstrate the HBEP will not cause a significant increase in the air quality concentration of $NO_2$ as specified in Rule 2005, Appendix A.

TABLE 6-1
**Rule 2005 Emissions Levels That Trigger Dispersion Modeling Requirement**

| Pollutant | Estimated PTE – Past Actual (tons per year) | Major Source Threshold | Major Modification Threshold | Exceeds Threshold? (Yes/No) |
|---|---|---|---|---|
| $NO_x$ | 200 | 10 | 1 lb/day | Yes |
| $SO_2$ | 6 | 100 | 40 tpy | No |

The significance thresholds and the most stringent air quality standards for $NO_2$ are presented in Table 6-2. The maximum modeled $NO_2$ concentrations from the refined dispersion modeling analysis for each turbine will be compared to the significance values identified in Table 6-2. The maximum modeled $NO_2$ concentrations will also be added to representative background concentrations, and the results compared to the state and federal ambient air quality standards for $NO_2$. The highest ambient concentration from the most recent 3 years of ambient monitoring data will be used as the background concentration.

TABLE 6-2
**Rule 2005 Air Quality Thresholds and Standards Applicable to the Project (Per Emission Unit)**

| Averaging Period/ Pollutant | Significant Change in Air Quality Concentration[a] ($\mu g/m^3$) | National Ambient Air Quality Standard ($\mu g/m^3$) | California Ambient Air Quality Standards ($\mu g/m^3$) |
|---|---|---|---|
| $NO_2$ (1-hour) | 20 | 188[b] | 339 |
| $NO_2$ (Annual) | 1 | 100 | 57 |

[a] Allowable change in air quality concentration per emission unit.
[b] National 1-hour standard represents the 3-year average of the 98th percentile of the daily maximum 1-hour average

## 6.2 Prevention of Significant Deterioration

SCAQMD Regulation XVII sets forth pre-construction review requirements for stationary sources to ensure that air quality in clean air areas does not significantly deteriorate, while maintaining a margin for future industrial growth, and shall apply to pre-construction review of new or modified stationary sources that emit more than 100 tpy of federal attainment air contaminants. As discussed in Section 2.0, Existing Setting, CO, $NO_2$, and $SO_2$ are classified as federal attainment pollutants. Therefore, the estimated HBEP emissions were compared to the major source thresholds of 100 tpy and the significant emissions increase threshold of 40 tpy (Table 6-3) to determine which pollutants are subject to dispersion modeling requirements as outlined in Rule 1703. Based on the estimate emissions and attainment designations, $NO_x$ is the only attainment pollutant from HBEP that will exceed the significant emissions increase threshold and be subject to dispersion modeling requirements.

Low sulfur natural gas will be the only fuel allowed for the HBEP. Therefore, emissions of asbestos, beryllium, mercury, sulfur compounds, vinyl chloride, fluoride, and lead are expected to be negligible.

TABLE 6-3
**PSD Emissions Levels That Trigger Dispersion Modeling Requirements**

| Pollutant | Estimated PTE – Past Actual (tpy) | Significant Emission Increase Threshold[a] (tpy) | Exceeds Threshold? (Yes/No) |
|---|---|---|---|
| CO | -2,100 | 100 | No |
| $NO_x$ | 200 | 40 | Yes |
| $SO_2$ | 6 | 40 | No |
| VOC[b] | 105 | 40 | Yes |
| Asbestos | Negligible | 0.007 | No |
| Beryllium | Negligible | 0.0004 | No |
| Mercury | Negligible | 0.1 | No |
| Vinyl Chloride | Negligible | 1.0 | No |
| Fluorides | Negligible | 3 | No |
| Lead | Negligible | 0.6 | No |

TABLE 6-3
**PSD Emissions Levels That Trigger Dispersion Modeling Requirements**

| Pollutant | Estimated PTE – Past Actual (tpy) | Significant Emission Increase Threshold[a] (tpy) | Exceeds Threshold? (Yes/No) |
|---|---|---|---|
| Sulfuric Acid Mist | Negligible | 7 | No |
| Hydrogen Sulfide | Negligible | 10 | No |
| Total Reduced Sulfur (including $H_2S$) | Negligible | 10 | No |
| Reduced Sulfur Compounds (including $H_2S$) | Negligible | 10 | No |

[a] The PSD significance level is listed here for reference.

[b] Modeling is not required for VOCs.

A dispersion modeling analysis will be conducted to demonstrate that the HBEP will not cause or contribute to a violation of the NAAQS or CAAQS and will not exceed the PSD Class II Increment Standards for $NO_2$. To demonstrate compliance with the standards, the HBEP will be modeled in two tiers. A description of each tier is presented below.

#### 6.2.1.1 Tier 1 Analysis

The preliminary tier 1 analysis for each pollutant will be conducted as follows:

- If the predicted impacts are less than the significant impact levels (SIL) presented in Table 6-4 for each criteria pollutant, the modeling is complete for that pollutant and averaging period.
- If impacts are significant, a Tier 2 refined analysis will be conducted.

#### 6.2.1.2 Tier 2 Analysis

The refined tier 2 analysis will include a comparison to the ambient air quality standards and allowable increments as follows:

- For pollutants with concentrations greater than the respective SIL, a significant impact radius will be defined.
- The modeled design concentrations will be determined and compared to the respective NAAQS, CAAQS, and Class II Increments. These concentrations will include contributions from the facility, nearby sources, and ambient background concentrations.
- SCAQMD will be contacted to identify nearby sources, if any, that need to be included in the refined analysis.

Table 6-4 summarizes the Class II modeling significance levels, Class II PSD increments, and the significant monitoring concentration levels. Currently no ambient air quality data are collected at the existing HBGS. If modeling results for HBEP are greater than the significant monitoring concentrations listed in Table 6-4, onsite ambient air quality data collection may be required. If such monitoring is required, AES requests that the monitoring be conducted in parallel with HBEP construction and that alternate background levels listed in Table 2-3 be used for permit modeling.

TABLE 6-4
**PSD Air Quality Impact Standards Applicable to the Project**

| Averaging Period/ Pollutant | Significance Impact Level ($\mu g/m^3$) | PSD Increment ($\mu g/m^3$) | Significant Monitoring Concentrations ($\mu g/m^3$) |
|---|---|---|---|
| $NO_2$ (1-hour) | 7.8 | NS | NS |
| $NO_2$ (Annual) | 1 | 25 | 14 |

NS = No standard

### 6.2.1.3 Class I Area Analysis

In addition to addressing HBEP's impacts within the near field (i.e., Class II impacts), a Class I impact analysis is required to demonstrate that the HBEP will not cause or contribute to an exceedance of the Class I SIL or Increment Standards (Table 6-5) and will not adversely affect air quality-related values (AQRVs). In order to evaluate the potential impacts on Class I areas near the HBEP site, all Class I areas within 300 km of HBEP were identified. Based on this survey, the San Gabriel Wilderness and the Cucamonga Wilderness, which are approximately 70 km from the HBEP site, were identified as the nearest Class I areas. Figure 6-1 shows the locations and distances to the Class I areas within 300 km of the HBEP.

Federal Class I area air quality guidance (FLAG 2010) allows an emissions/distance (Q/D) factor of 10 to be used as a screening criteria for sources located more than 50 km from a Class I area. This screening criterion includes all AQRVs. Emissions are calculated as the total $SO_2$, $NO_x$, $PM_{10}$, and sulfuric acid ($H_2SO_4$) annual emissions (in tpy, based on 24-hour maximum allowable emissions). These emissions are divided by the distance (in km) from the Class I area.

Annual emissions of $NO_x$, $SO_2$, $H_2SO_4$ and $PM_{10}$ combined (based on maximum hourly emissions annualized) will be about 370 tpy. Therefore the maximum Q/D for the project will be approximately 370 tpy/69 km = ~5.4 ton/km-year which is below the FLAG 2010 guidance Q/D ratio of 10. Therefore, visibility and deposition modeling are not required for any of the Class I areas.

To address PSD Class I Increment thresholds, AERMOD will be used with a receptor ring at 50 km from the facility. The ring will be spaced in 5-degree increments centered on the HBEP site location. AERMOD maximum modeled impacts of $NO_x$ will be compared to the applicable SILs. If modeled impacts are below the SILs, then the project would be considered to have negligent impact at the more distant Class I areas. If impacts are above the SILs in the direction of the Class I areas, the SCAQMD would be contacted to determine a refined approach to quantify criteria pollutant impacts at the Class I areas.

TABLE 6-5
**Class I SIL and Increment Standards Applicable to the Project**

| Averaging Period/ Pollutant | Significance Impact Level ($\mu g/m^3$) | PSD Increment ($\mu g/m^3$) |
|---|---|---|
| $NO_2$ (1-hour) | NS | NS |
| $NO_2$ (Annual) | 0.1 | 2.5 |
| CO (1-hour) | NS | NS |
| CO (8-hour) | NS | NS |

NS = No standard

# 6.3 California Energy Commission Air Dispersion Analysis

The sections below summarize the requirements and modeling assessment to be submitted to the CEC.

## 6.3.1 Construction Emissions Impact Assessment

The HBEP construction site will be represented as a set of volume sources and an area source in the modeling analysis. The exhaust emissions will be modeled as a set of volume sources with a plume centerline height of 4.6 meters, and the wind-blown and fugitive dust emissions will be modeled as an area source assuming an average release height of 1 meter. Modeled concentrations of $NO_x$, CO, $PM_{10}$, $PM_{2.5}$, and $SO_x$ from construction activities related to the HBEP will be combined with the ambient background concentrations and compared to the ambient air quality standards. If the predicted $NO_2$ concentrations exceed the ambient air quality standards assuming a 100 percent conversion of NOx to $NO_2$, the $NO_2$ to NOx ratios developed as a function of downwind distance will be applied consistent with the SCAQMD Localized Significance Threshold Methodology (SCAQMD, 2003).

## 6.3.2 Commissioning Emissions Impact Assessment

The short-term concentrations of $NO_2$ and CO (i.e., the 1- and 8-hour impacts) from the commissioning phase of the HBEP will be combined with the ambient background concentrations and compared to the short-term ambient air quality standards. Because the commissioning phase is only expected to occur over a short period, annual impacts will not be evaluated for the commissioning phase of the HBEP.

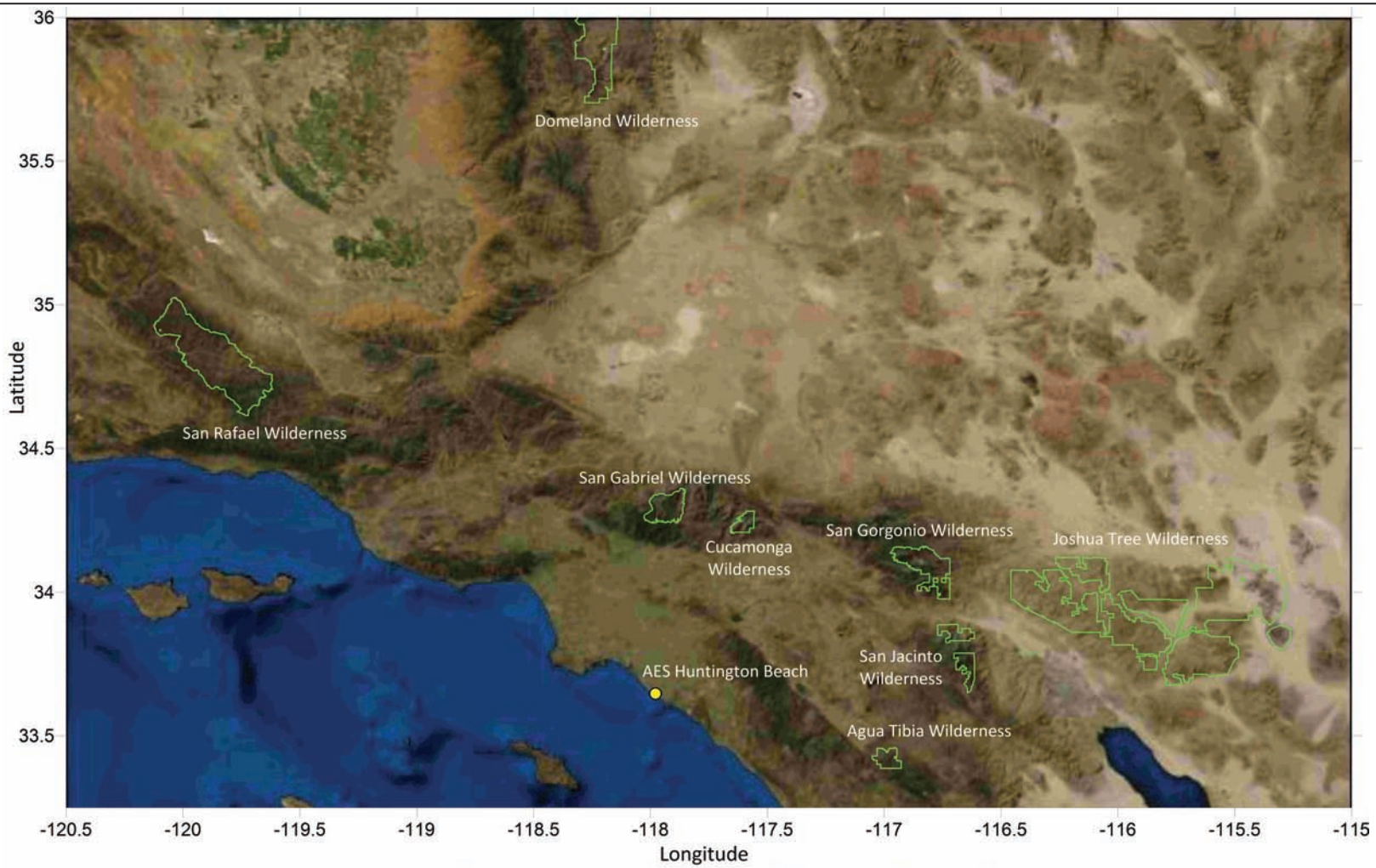
## 6.3.3 Operational Emissions NAAQS and CAAQS Impact Assessment

The maximum modeled concentrations from the refined analysis will be added to representative background concentrations and the results compared to the state and federal ambient air quality standards for $SO_2$, $NO_2$, CO, $PM_{10}$, and $PM_{2.5}$. The ambient concentrations from the most recent 3 years of ambient monitoring data identified in Section 2.0, Existing Setting, will be used as the background concentration.

## 6.3.4 Fumigation Impact Assessment

Fumigation can occur during the breakup of the nocturnal radiation inversion by solar warming of the ground surface. Shoreline fumigation occurs when a plume is emitted into a stable layer of air and is then mixed to the surface as a result of advection of the air mass to less stable surroundings. Under these conditions, an exhaust plume may be drawn to the ground with little diffusion, causing high ground-level pollutant concentrations, although typically for periods less than 1 hour.

SCREEN3 will be used to determine the predicted impacts associated with these fumigation scenarios. The maximum modeled concentrations from the fumigation impact assessment will then be added to representative background concentrations, and the results compared to the state and federal ambient air quality standards. The condition would be short-lived; therefore, impacts will only be compared to the 1-, 3-, 8-, and 24-hour standards.




## Distance to Nearby Class I Areas (km)

| Agua Tibia Wilderness | Cucamonga Wilderness | Domeland Wilderness | Joshua Tree Wilderness | San Gabriel Wilderness | San Gorgonio Wilderness | San Jacinto Wilderness | San Rafael Wilderness |
|---|---|---|---|---|---|---|---|
| 90.6 | 69.0 | 229.2 | 145.4 | 69.9 | 107.6 | 114.2 | 192.3 |

**FIGURE 6-1**
**Distance to Nearby Class I Areas**
AES Huntington Beach Energy Project

SECTION 7

# Human Health Risk Assessment

A human HRA will be performed to evaluate the potential cancer, chronic, and acute health impacts related to the HBEP. The HRA will follow the latest version of the *Air Toxics Hot Spots Program Risk Assessment Guidelines* (Office of Environmental Health Hazard Assessment [OEHHA], 2003), SCAQMD guidance documents (SCAQMD, 2011), and the EPA *Guideline on Air Quality Models* (EPA, 2005). In addition, for predicted cancer risks for residential receptors where the inhalation pathway is the dominant exposure pathway for cancer risks, the Derived (Adjusted) Method outlined in the ARB *Recommended Interim Risk Management Policy for Inhalation-based Residential Cancer Risk*, (ARB, 2003) will be used for the cancer risk evaluation.

Toxic air contaminants (TAC) from the turbines will be included in the HRA. Turbine emissions will be estimated assuming that all six turbines operate simultaneously under normal load conditions. For maximum hourly emissions, the maximum natural gas consumption rate per turbine will be used. For annual emissions, the annual average natural gas consumption rate per turbine will be used, assuming that the turbines will operate 5,000 hours of base load operation without duct burner firing, 1,200 hours of base load operation with duct burner firing, and 624 startups and shutdowns per turbine per year. Ammonia emissions associated with potential ammonia slip from the selective catalytic reduction system will be calculated based on a permit limit maximum of 5 ppmv, dry at 15 percent oxygen. An offsite consequence analysis for ammonia will be conducted for HBEP as part of a separate analysis.

An HRA for construction emissions associated with the HBEP will not be conducted for this project because construction emissions will be temporary and finite.

## 7.1 Model Selection

The HRA modeling for the normal HBEP operations will be conducted using the ARB *Hotspots Analysis Reporting Program* (HARP, version 1.4e), along with the ARB HARP file converter (version 1), and AERMOD. The HARP file converter converts the AERMOD output files to files compatible with the HARP modeling system. The AERMOD modeling approach, such as default options, source parameters, meteorological data, receptor spacing, and terrain data, will be similar to the criteria pollutant modeling analysis. The receptor grid will also include sensitive receptors as defined by SCAQMD and CEC regulations (Appendix B (g)(9)(E)(i)). The sensitive receptors included in the analysis will be based on a search conducted by Environmental Data Resources. Additionally, census block receptors will be included in the analysis in order to calculate the increased cancer burden. A unit emission rate (1 gram per second) will be used to model each source, as outlined in the HARP converter program manual.

## 7.2 Evaluation of Impacts

Cancer risks will be evaluated for each source and the HBEP based on the annual TAC ground-level concentrations, inhalation cancer potency, oral slope factor, frequency and duration of exposure at the receptor, and breathing rate of the exposed persons. Cancer risks will be estimated using a conservative assumption of 70-year continuous exposure duration for residential receptors and a 40-year, 5-day week, 8-hours-per-day exposure duration for commercial/industrial receptors. In addition, for predicted cancer risks for residential receptors where the inhalation pathway is the dominant pathway of cancer risks, the Derived (Adjusted) Method in HARP will be used for the cancer risk evaluation, based on the *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk* (ARB, 2003). To assess chronic and acute non-cancer exposures, annual and 1-hour TAC ground-level concentrations will be compared with the Reference Exposure Levels (RELs) developed by OEHHA to obtain a chronic or acute hazard index.

In addition to inhalation exposure, the HRA will assess potential health impacts related to exposure from homegrown produce, dermal absorption, soil ingestion, and mother's milk, as required by OEHHA guidelines

(OEHHA, 2003). The inhalation cancer potency, oral slope factor values, and RELs used to characterize health risks associated with the modeled impacts will be obtained from the most recent version of the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (OEHHA, 2011).

Consistent with SCAQMD Rule 1401, the modeled health risk values for each permitted unit will be compared to the following de minimus thresholds:

- Incremental increase in cancer risk of 10 in 1 million individuals (if the permitted unit is constructed with T-BACT)
- Incremental increase in cancer risk of 1 in 1 million individuals (if the permitted unit is constructed without T-BACT)
- Cancer burden greater than 0.5
- Chronic hazard index of 1.0
- Acute hazard index of 1.0

Predicted cancer risk and hazard indices less than the thresholds will be considered an acceptable increase in risk associated with the HBEP.

SECTION 8

# Cumulative Impacts Analysis

Per CEC requirements, a cumulative air quality modeling impacts analysis for the HBEP's typical operating mode will be conducted as part of the AFC process. Impacts from the Project will be combined with other stationary emission sources within a 6-mile radius that have received construction permits but are not yet operational or are in the permitting process (such as the NSR or CEQA permitting process). The stationary emission sources included in the cumulative impacts assessment will be limited to new or modified sources that would cause a net increase of 5 tons or more per modeled criteria pollutant. Therefore, VOC sources, equipment shutdowns, permit-exempt equipment registrations, rule compliance, permit renewals, or replacement/upgrading of existing systems will not be included in the cumulative impacts analysis. TAC emissions will also be excluded from the cumulative impacts analysis.

The sources to be included in the cumulative impact analysis will be determined by consulting the SCAQMD and CEC. The applicant will work with the SCAQMD and CEC staffs to identify those new air pollution sources within the 6-mile radius surrounding HBEP, which is centered approximately at 409,336 meters (East); 3,723,113 meters (North) (UTM, NAD83, zone 11).

The cumulative air quality impact analysis will be performed using the model settings and refined receptor grid outlined in Section 4.0, Topography and Meteorology, and Section 5.0, Dispersion Modeling Approach. The HBEP fence line for the cumulative sources will not be included in the modeling analysis.

The maximum predicted cumulative impacts will represent the impact at the receptor location identified as the maximum receptor for each pollutant in the ambient air quality impact assessment. The maximum modeled concentrations from the refined analysis will then be added to representative background concentrations, and the results compared to the state and federal ambient air quality standards for $SO_2$, $NO_2$, CO, $PM_{10}$, and $PM_{2.5}$. The highest ambient concentration from the most recent 3 years of ambient monitoring data will be used as the background concentration.

SECTION 9

# Presentation of Results

The results of the air dispersion modeling analyses for HBEP will be presented to each reviewing agency as follows:

- A description of modeling methodologies and input data.
- A summary of the results in tabular form.
- Modeling files used by AERMOD will be provided with the application on compact disk.
- Any significant deviations from the methodology proposed in this protocol will be presented.

SECTION 10

# References


California Air Resources Board (ARB).2011. *State Area Designations*. http://www.arb.ca.gov/desig/adm/adm.htm. Accessed December 2nd.

California Air Resources Board (ARB). 2003. *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk*. October 9.

Council on Environmental Quality (CEQ). 2010. *Memorandum for Heads of Federal Departments and Agencies*. February 18.

ENVIRON. 2011. *CalEEMod User's Guide, Appendix A*. February. http://www.aqmd.gov/caleemod/doc/AppendixA.pdf

FLAG. 2010. *Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (Revised 2010)*. November.

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

Office of Environmental Health Hazard Assessment (OEHHA). 2011. *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*. Feb 14.

U.S. Environmental Protection Agency (EPA). 2011a. *The Green Book Nonattainment Areas for Criteria Pollutants*. http://www.epa.gov/air/oaqps/greenbk/index.html. Accessed December 14th.

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

South Coast Air Quality Management District (SCAQMD). 2012. *AQMD Modeling Guidance for AERMOD*. Accessed February 2012. *http://www.aqmd.gov/smog/metdata/AERMOD_ModelingGuidance.html*.

South Coast Air Quality Management District (SCAQMD). 2011. *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588)*. June.

South Coast Air Quality Management District (SCAQMD). 2009. *The Development of AERMOD-Ready Meteorological Data for the South Coast Air Basin and the Coachella Valley*. Volume 1. April 17.

South Coast Air Quality Management District (SCAQMD). 2003. *Final Localized Significance Threshold Methodology*. (Revised July 2008). June.

South Coast Air Quality Management District (SCAQMD), Bay Area Air Quality Management District, Sacramento Metropolitan Air Quality Management District, San Joaquin Valley Air Pollution Control District, Santa Barbara County Air Pollution Control District, San Luis Obispo Air Pollution Control District (SCAQMD, et. al.). 2011. *Technical Paper: Methodology Reasoning and Policy Development of the California Emission Estimator Model*. July. http://www.aqmd.gov/caleemod/doc/TechPaper.pdf

The Climate Registry (TCR). 2008. *General Reporting Protocol.* May, as updated through January 2012. Available at http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/.

U.S. Environmental Protection Agency (EPA). 2010. *EPA Guidance Concerning the Implementation of the 1-Hour $NO_2$ NAAQS for the PSD Program*. EPA Office of Air Quality Planning and Standards. June 29.

U.S. Environmental Protection Agency (EPA). 2005. Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W, November.