5.2 Air Quality

The proposed Palmdale Hybrid Power Project (PHPP or Project) will involve the construction and operation of various sources of air emissions, including construction equipment during the construction phase of the Project, and combustion turbines, duct burners, auxiliary boiler, heat transfer fluid (HTF) heater, cooling tower, and emergency diesel-fired engines during the operations phase.

This Section focuses on "criteria" pollutants, i.e., pollutants for which there are established ambient air quality standards set to protect health and the environment. There are seven primary criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), respirable particulate matter (PM10), fine particulate matter (PM2.5), sulfur dioxide (SO_2), and lead. The Project will emit insignificant amounts of lead, and hence it will not be discussed further. The Project will also emit toxic air contaminants (TAC), including byproducts of fuel (natural gas) combustion, diesel particulate matter (DPM) from diesel fuel combustion; both organic and inorganic compounds from the operation of the cooling tower; and greenhouse gas (GHG) emissions from fuel combustion. The impacts associated with TAC emissions are addressed in Section 5.10, Public Health.

This Air Quality section describes the LORS applicable to the Project equipment and operations (Section 5.2.1), the affected environment of the Project location (Section 5.2.2), a control technology assessment for the Project (Section 5.2.3), an assessment of impacts from Project construction and operation, including emission calculations and modeling analyses (Section 5.2.4), and proposed mitigation measures (5.2.5).

5.2.1 LORS Compliance

Construction and operation of the Project will be performed in accordance with the applicable laws, ordinances, regulations and standards (LORS). In California, air quality regulation for stationary sources falls mainly to the local air districts. This Project is located within the Antelope Valley Air Quality Management District (AVAQMD). The California Air Resources Board (ARB) provides oversight of the air districts, and also implements statewide air quality programs as described below. The U.S. Environmental Protection Agency (EPA) implements the requirements of the Federal Clean Air Act (CAA), including programs which have been delegated to the local air districts for implementation. The various Federal, California and AVAQMD LORS are summarized in Table 5.2-1. In addition to the table, both applicable and some non-applicable LORS are briefly discussed following the table.

5.2.1.1 Federal LORS

The EPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS) and enforcing the CAA. Various federal programs have been developed to regulate sources of air pollutants, including stationary, mobile and area sources. These programs include New Source Review (NSR) and other permitting requirements, as well as emissions standards for new and modified sources. Most of these federal programs have been delegated to the AVAQMD for implementation in the local area.

Table 5.2-1 Federal, State and Local LORS Applicable to Air Quality

LORS	Applicability	Where Discussed in AFC
Federal		
Prevention of Significant Deterioration (PSD) CAA §160-169A, 42 United States Code (USC) §7470-7491, 40 Code of Federal Regulations (CFR) Parts 51 and 52.	Requires PSD review, facility permitting, Best Available Control Technology (BACT) and increment consumption analysis for significant emissions from new major sources.	Sections 5.2.1.1, 5.2.3 and 5.2.4.2
CAA, Sections 171 – 193, 42 USC, Section 7501	Requires NSR facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which area is designated non-attainment for NAAQS.	Sections 5.2.1.1, 5.2.1.3 and 5.2.3
CAA, Section 401 (Title IV), 42 USC, Section 7651; 40 CFR Part 72 (Acid Rain Program)	Requires reductions in NO_X and SO_2 emissions to reduce acid deposition.	Sections 5.2.1.1, 5.2.1.3 and 5.2.1.5
CAA, Section 501 (Title V), 42 USC, Section 7661, 40 CFR Part 70	Establishes a comprehensive permit program for major stationary sources.	Sections 5.2.1.1, 5.2.1.3, 5.2.1.4 and 5.2.1.5
CAA, Section 111, 42 USC, Section 7411; 40 CFR Part 60 - New Source Performance Standards (NSPS), Subpart A	Establishes the monitoring, reporting and recordkeeping requirements for sources subject to NSPS standards.	Section 5.2.1.1
CAA, Section 111, 42 USC, Section 7411; 40 CFR Part 60 - NSPS, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines	Establishes emission standards for compression ignition internal combustion engines, including emergency fire water pump engines and emergency electrical generator engines.	Section 5.2.1.1
CAA, Section 111, 42 USC, Section 7411; 40 CFR Part 60 - NSPS, Subpart KKKK Standards of Performance for Stationary Combustion Turbines	Establishes emission standards for NO_X and SO_X emissions from combustion turbines and duct burners.	Section 5.2.1.1
State		
Title 17 California Code of Regulations (CCR), Section 93115, Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines	Establishes emission limits, operating limits, fuel use restrictions, monitoring and recordkeeping requirements on stationary compression ignition engines, including emergency fire water pump engines and emergency electrical generator engines.	Section 5.2.1.2
AB 32 California Global Warming Solutions Act of 2006	Provides the statutory foundation for State-wide GHG reduction measures.	Section 5.2.1.2

LORS	Applicability	Where Discussed in AFC
SB 1368, Greenhouse Gas (GHG) Emissions Performance Standard	Sets emission performance standards for GHG emissions per unit of power output.	Section 5.2.1.2
Local (AVAQMD)		
Rule 217 – Provision for Sampling and Testing Facilities	Establishes the requirement to provide and maintain such facilities as are necessary for sampling and testing.	Section 5.2.1.3
Rule 218 – Stack Monitoring	Establishes the requirement to provide; properly install, maintain in calibration, in good working order and in operation; approved stack monitoring systems to measure the concentration of specified air contaminants and diluents gases in the emissions from affected sources.	Section 5.2.1.3
Rule 401 – Visible Emissions	Limits visible emissions.	Section 5.2.1.3
Rule 402 – Nuisance	Prohibits the discharge 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 business or property.	Section 5.2.1.3
Rule 403 – Fugitive Dust	Limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and man-made conditions resulting in wind erosion.	Section 5.2.1.3
Rule 404 – Particulate Matter - Concentration	Limits particulate matter (PM) emissions in excess of the limits stated in the rule. The PM emission limits are a function of exhaust flow rate from the device.	Section 5.2.1.3
Rule 407 – Liquid and Gaseous Contaminants	Limits CO and SO_2 emissions to 2,000 parts per million (ppm) by volume and 500 ppm by volume, respectively, measured on a dry basis, averaged over 15 consecutive minutes.	Section 5.2.1.3
Rule 409 – Combustion Contaminants	Limits discharge of combustion contaminants into the atmosphere from fuel burning equipment exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12 percent of carbon dioxide (CO_2) at standard conditions.	Section 5.2.1.3
Rule 430 – Breakdown Provisions	Requires that the AVAQMD be notified of any occurrence which constitutes a breakdown condition within prescribed timeframes.	Section 5.2.1.3
Rule 442 – Usage of Solvents	Limits emissions of volatile organic compounds (VOCs) into the atmosphere from all VOC containing materials not subject to source specific rules to 1,190 pounds per month per facility.	Section 5.2.1.3

LORS	Applicability	Where Discussed in AFC
Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen	Limits NO_X discharges into the atmosphere from any non-mobile fuel burning equipment calculated at three percent O_2 on a dry basis averaged over a minimum of 15 consecutive minutes to specified concentrations.	Section 5.2.1.3
Rule 475 – Electric Power Generating Equipment	Limits combustion contaminant discharges into the atmosphere from any equipment having a maximum rating of more than 10 net MW used to produce electric power.	Section 5.2.1.3
Rule 476 – Steam Generating Equipment	Limits NO_X discharges into the atmosphere from any equipment having a maximum heat input rate of more than 50 MMBtu per hour used to produce steam.	Section 5.2.1.3
Rule 900 – Standards of Performance for New Stationary Sources (NSPS)	Adopts by reference all the applicable provisions regarding standards of performance for new stationary sources as set forth in 40 CFR, Part 60.	Section 5.2.1.3
Rule 1000 – National Emission Standards for Hazardous Air Pollutants (NESHAP)	Adopts by reference all the applicable provisions regarding National Emissions Standards for Hazardous Air Pollutants as set forth in 40 CFR, Part 61.	Section 5.2.1.3
Rule 1110.2 – Emissions From Stationary, Non-road & Portable Internal Combustion Engines	Limits emissions of NO_X, VOCs and CO from stationary or portable internal combustion engines (ICEs), but does exempt emergency ICEs which operate less than 200 hours per year as determined by an elapsed operating time meter.	Section 5.2.1.3
Rule 1113 – Architectural Coatings	Limits VOC emissions from architectural coatings.	Section 5.2.1.3
Rule 1121 – Control Of Nitrogen Oxides From Residential Type, Natural Gas-Fired Water Heaters	Establishes NO_X emission limits from residential water heaters with heat inputs less than 75,000 British thermal units (Btu) per hour.	Section 5.2.1.3
Rule 1122 – Solvent Degreasers	Limits VOC content of solvent used in solvent degreasers and cold cleaners and establishes work practices for performing a cleaning operation.	Section 5.2.1.3
Rule 1135 – Emissions Of Oxides Of Nitrogen From Electric Power Generating Systems	Establishes NO_X emission limits from electric power generating systems.	Section 5.2.1.3
Rule 1146 – Emissions Of Oxides Of Nitrogen From Industrial, Institutional, And Commercial Boilers, Steam Generators, And Process Heaters	Establishes NO_X and CO emissions limits for boilers, steam generators, and process heaters of than 5 million (MM)Btu per hour or more rated heat input capacity used in all industrial, institutional, and commercial operations except for boilers used by electric utilities to generate electricity.	Section 5.2.1.3
Rule 1171 – Solvent Cleaning Operations	Limits VOC content of solvent used in cleaning and establishes work practices for performing a cleaning operation.	Section 5.2.1.3

LORS	Applicability	Where Discussed in AFC
Regulation XIII – New Source Review; Rule 1303 – Requirements	Establishes the requirements that must be met to obtain a PTC including the requirement to comply with BACT, provide emission offsets for emission increase above a specified threshold, provide modeling, an alternatives analysis and a compliance certification.	Section 5.2.1.3
Rule 1306 – Electric Energy Generating Facilities	Establishes a procedure whereby an AFC prepared for the CEC can be considered equivalent to an application for a PTC.	Section 5.2.1.3
Rule1310 – Federal Major Facilities and Federal Major Modifications	Sets forth additional requirements and procedures for permitting federal major modifications and presumptive federal major modifications.	Section 5.2.1.3
Rule 1401 – New Source Review For Toxic Air Contaminants	Establishes a procedure to estimate the health risk posed by a new or modified facility, and sets acceptable risk limits above which a permit will not be issued.	Section 5.2.1.3
Regulation XVII – Prevention of Significant Deterioration	Implements the requirements of the federal Prevention of Significant Deterioration (PSD) permitting program.	Section 5.2.1.3
Regulation XXX – Title V Program	Implements the requirements of the federal operating permit program.	Section 5.2.1.3

Federal Major Source Programs

There are several federal permitting and CAA programs that are applicable primarily to major sources of emissions. These programs include the Prevention of Significant Deterioration (PSD) regulations, the Operating Permits Program under Title V of the CAA Amendments of 1990, National Emission Standards for Hazardous Air Pollutants (NESHAP), which are codified in two parts: 40 CFR 61 and 40 CFR 63, and the Risk Management Program (RMP) under Title III of the CAA Amendments of 1990, codified at 40 CFR 68.

The AVAQMD has been delegated authority by the EPA to implement and enforce most Federal requirements that are applicable to the Project, including the new source performance standards (NSPS) and national emissions standards for hazardous air pollutants (NESHAP). Compliance with the AVAQMD regulations ensures compliance and consistency with the corresponding Federal requirements as well. The Project will also be required to comply with the Federal Operating Permits (Title V) and Acid Rain requirements (Title IV). Since the AVAQMD has received delegation for implementing Title IV through its Title V permit program, the Applicant will secure an AVAQMD Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions. As required by AVAQMD rules, the Project will comply with these requirements by submitting a Title V application within one year after starting commercial operation of the facility.

The AVAQMD has not been delegated the authority to implement PSD review for attainment pollutants. The EPA PSD program applies to a new major facility that will emit 250 tons per year (tpy) or more, or if it is one of the listed PSD source categories in the Federal Clean Air Act that has a potential to emit 100 tpy or more of an attainment pollutant. The Project is one of the listed categories (fossil fuel fired steam electric generating facility) and will emit more than 100 tpy of NO_X, CO, and PM/PM10/PM2.5, as shown in Table

5.2-27. The Project will comply with this PSD requirement by applying for a PSD permit from EPA Region IX. All of the PSD requirements, including BACT, air quality impact assessment, and air quality related values (e.g., visibility) analyses are addressed and shown to comply in Sections 5.2.3 and 5.2.4.

There are no Part 61 standards applicable to the facility operations. As shown in Section 5.2.4, the emissions from the Project are well below the thresholds for the NESHAP programs and, hence, 40 CFR 63 standards are not applicable to this Project. The 19.5 percent concentration ammonia proposed for the Project exempts the Project from RMP applicability. Therefore, neither these Federal regulations, nor the AVAQMD rules that implement these requirements, are included as applicable requirements in Table 5.2-12.

New Source Performance Standards

NSPS are federal standards promulgated for new and modified sources in designated categories codified in 40 CFR Part 60. NSPS are emission standards that are progressively tightened over time in order to achieve on-going air quality improvement without unreasonable economic disruption. The NSPS impose uniform requirements on new and modified sources throughout the nation. These standards are based on the best demonstrated technology (BDT) for emission control. BDT refers to the best system of continuous emissions reduction that has been demonstrated to work in a given industry, considering economic costs and other factors, such as energy use. In other words, a new source of air pollution must install the best control system currently in use within that industry.

The format of the standard can vary from source to source. It can be a numerical emission limit, a design standard, an equipment standard, or a work practice standard. Primary enforcement responsibility of the NSPS rests with EPA, but this authority can be delegated to the states or local air districts. States can adopt an NSPS or impose limitations of their own, as long as the state requirements are at least as stringent as the federal requirements. The NSPS potentially applicable to the Project are summarized below. Enforcement of the NSPS has been delegated to the AVAQMD.

Subpart A ***General Provisions.*** Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Because the Project is potentially subject to Subparts IIII and KKKK, the requirements of Subpart A will also apply. The Project operator will comply with the applicable notifications, performance testing, recordkeeping and reporting outlined in Subpart A.

Subpart IIII ***Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.*** Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines that commence construction after July 11, 2005. Relevant to the proposed Project, the rule applies to the fire water pump CI engine and to the emergency electrical generator engine as follows:

(i) Non-fire pump engines manufactured after April 1, 2006;

(ii) Fire pump engines with less than 30 liters per cylinder manufactured after 2009; or

(iii) Fire pump engines manufactured as a certified National Fire Protection Association (NFPA) fire water pump engine after July 1, 2006.

For the purpose of this rule, "manufactured" means the date the owner places the order for the equipment. Based on the timeline projected for obtaining approval of the Project, the applicant expects that the engines will be ordered (and thus manufactured) in 2009.

Owners and operators of fire water pump engines with a displacement of less than 30 liters per cylinder must comply with the emission standards listed for all pollutants. For a model year 2009 or later 300-horsepower (hp) engines, the limits are 2.6 grams per horsepower-hour (g/hp-hr) for CO, 3.0 g/hp-hr for non-methane hydrocarbons (NMHC) and NO_X combined, and 0.15 g/hp-hr for PM. In model years 2009 – 2011, manufacturers of fire water pump stationary CI engines in this engine power category with a rated speed of greater than 2,650 revolutions per minute may comply with the emission limitations for 2008 model year engines. The Project will install an engine meeting these standards.

Owners and operators of non-fire pump engines must comply with the emission standards listed for all pollutants. For a model year 2006 or later engine with 750 or more hp, the limits are 2.6 g/hp-hr for CO, 4.8 g/hp-hr for NMHC and NO_X combined, and 0.15 g/hp-hr for PM. The Project will install an emergency generator engine meeting these standards.

Subpart KKKK ***Standards of Performance for Stationary Combustion Turbines*** Subpart KKKK places emission limits of NO_X and SO_X on new combustion turbines. For new combustion turbines firing natural gas with a rated heat input greater than 850 MMBtu per hour, NO_X emissions are limited to 15 ppm at 15 percent O_2 or 54 nanograms per Joule (ng/J) of useful output (0.43 pounds per megawatt-hour [lb/MWh]).

SO_X emissions are limited by either of the following compliance options:

1. The operator must not cause to be discharged into the atmosphere from the subject stationary combustion turbine any gases which contain SO_2 in excess of 110 ng/J (0.90 lb/MWh) gross output, or
2. The operator must not burn in the subject stationary combustion turbine any fuel which contains total potential sulfur emissions in excess of 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input. If the turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

As described in Section 5.2.3, the Project will use a Selective Catalytic Reduction (SCR) system to reduce NO_X emissions to 2.0 ppm to meet rule requirements, and pipeline natural gas to limit SO_X emissions to 0.0006 pounds per MMBtu to meet rule requirements.

5.2.1.2 State LORS

The California ARB became part of the California Environmental Protection Agency (CalEPA) in 1991. The agency is responsible for ensuring implementation of the California Clean Air Act (CCAA), meeting California requirements of the federal CAA, and establishing CAAQS. It is also responsible for setting vehicle emission standards and fuel specifications, and for regulating emissions from other sources such as consumer products and certain types of mobile equipment (e.g., lawn and garden equipment, industrial forklifts). ARB also implements the Airborne Toxic Control Measure (ATCM) and other air toxics programs, as discussed further in Section 5.10, Public Health.

Airborne Toxic Control Measure for Stationary Compression Ignition Engines

The California ATCM for compression ignition (CI) engines specifies operating requirements and exhaust emission standards for stationary CI engines. Although this is an ATCM, it contains emission standards for criteria pollutants. In addition, it requires the use of ARB diesel fuel (15 ppm sulfur by weight).

To drive the fire water pump, the Applicant will install a new stationary CI engine that will meet the Tier 3 emissions standards for offroad engines and will limit the non-emergency hours of operation to the number of hours necessary to comply with the testing requirements of National Fire Protection Association (NFPA) 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2002 edition as required by the ATCM (CCR §93115.6(a)(4)(A)(1)). The Project will limit the hours of operation of the fire water pump engine to one hour per week, not to exceed 50 hours per year, as recommended by NFPA 25, and will install a totalizing hour meter to substantiate compliance with the use limitation.

To drive the emergency generator, the Applicant will install a new stationary CI engine that will meet the Tier 2 emissions standards for offroad engines and will limit the non-emergency hours of operation to no more than 50 hours per year, and will install a totalizing hour meter to substantiate compliance with the use limitation.

The Project will use only ARB diesel fuel in both the emergency generator and in the fire water pump engines and will retain purchase records and the Material Safety Data Sheet (MSDS) and/or technical data sheet to substantiate compliance with the 15 ppm fuel sulfur requirement.

AB 32 California Global Warming Solutions Act of 2006

California's major initiatives for reducing climate change or greenhouse gas (GHG) emissions are outlined in Assembly Bill 32 (signed into law 2006), 2005 Executive Order and a 2004 ARB regulation to reduce passenger car GHG emissions. These efforts aim at reducing GHG emissions to 1990 levels by 2020 - a reduction of about 25 percent, and then an 80 percent reduction below 1990 levels by 2050. The main strategies for making these reductions are outlined in the Scoping Plan. The AB 32 Scoping Plan contains the main strategies California will use to reduce the greenhouse gases (GHG) that cause climate change. The Scoping Plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. These measures have been introduced through four workshops between November 30, 2007 and April 17, 2008. A draft Scoping Plan was released for public review and comment on June 26, 2008 followed by more workshops in July, 2008. The Plan will go to the Board for adoption in November, 2008. PHPP will comply with the requirements of these regulations when adopted.

SB 1368 GHG Emissions Performance Standard

On January 25, 2007, the California Public Utilities Commission (PUC) adopted an interim GHG Emissions Performance Standard. The Emissions Performance Standard (EPS) is a facility-based emissions standard requiring that all new long-term commitments for baseload generation to serve California consumers be with power plants that have emissions no greater than a combined cycle gas turbine plant. That level is established at 1,100 pounds of CO_2 per megawatt-hour. “New long-term commitment” refers to new plant investments (new construction), new or renewal contracts with a term of five years or more, or major investments by the utility in its existing baseload power plants.

The PUC implemented Senate Bill 1368, which prohibits load-serving entities (LSEs), which includes investor-owned utilities, energy service providers, and community choice aggregators, from entering into a long-term financial commitment for baseload generation unless it complies with a GHG emissions performance standard. To help mitigate climate change, the PUC has long anticipated capping GHG emissions in order to ensure LSEs make long-term commitments to energy resources that have GHG emissions profiles that are at least as clean as California's existing portfolio. The PUC approved a policy statement indicating its intent regarding GHG emissions in October 2005.

Since then, Governor Schwarzenegger signed into law SB 1368 and AB 32, which requires reporting and verification of statewide GHG emissions. The PUC is implementing the EPS according to SB 1368 and may revisit the EPS once an emissions cap is operational in California as required by AB 32.

The PUC has jurisdiction over the energy commitments of investor-owned utilities. SB 1368 gives additional authority to the PUC to implement and enforce the EPS for electric service providers (competitive retail providers delivering energy to consumers within the service territories of the investor-owned utilities) as well as any potential community choice aggregators (CCAs) that may form in the future (there are currently no CCAs operating in California, though a number are in the planning stages). SB 1368 also grants specific authority to the CEC to implement and enforce an EPS for the municipal utilities in California. The PUC and the CEC are working closely together to ensure that the standards adopted are as consistent as possible.

The EPS of 1,100 pounds of CO_2 per megawatt-hour is the baseline for combined cycle gas turbine plants. As a hybrid plant with both a combined cycle gas turbine and 50 MW solar array, PHPP will surpass the requirement by emitting approximately 850 pounds per megawatt-hour.

Health & Safety Code §39658, Maximum Achievable Control Technology Standards

Health & Safety (H&S) Code §39658(b)(1) states that when EPA adopts a standard for a TAC pursuant to §112 of the Federal CAA (42 USC §7412), such standard becomes the ATCM for the TAC. Once an ATCM has been adopted it becomes enforceable by the AVAQMD 120 days after adoption or implementation (H&S Code §39666(d)). EPA has not to date adopted a Maximum Achievable Control Technology (MACT) standard that is applicable to the proposed Project. Should EPA adopt an applicable MACT standard in the future, the AVAQMD will be required to enforce said MACT as an ATCM on the proposed Project. MACT is also required for each major source of TAC. As shown in Section 5.10, Public Health, and Appendix G.3, Air Emission Calculations, PHPP will not emit more than 10 tpy of any individual TAC, and will not collectively emit more than 25 tpy of all TAC; therefore, MACT is not required.

5.2.1.3 Local LORS

The local LORS are administered by the AVAQMD. The AVAQMD's Regulations and Rules potentially applicable to the Project are described below.

Regulation II Permits

AVAQMD Rule 201 Permits Required

Any person building, altering or replacing any equipment, the use of which may cause the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, must first obtain authorization for such construction from the AVAQMD. A PTC shall remain in effect until the

PTO for the equipment for which the application was filed is granted, denied, or canceled. This document serves as an application for a PTC.

AVAQMD Rule 202 Temporary Permit to Operate

A person shall notify the AVAQMD before operating or using equipment granted a PTC. Upon such notification, the PTC shall serve as a temporary PTO for the equipment until the PTO is granted or denied. The equipment shall not be operated contrary to conditions specified in the PTC, and testing requirements must be satisfied. The Project will comply with this rule by applying for a permit from the AVAQMD in a timely manner.

AVAQMD Rule 203 Permit to Operate

A person shall not operate or use any equipment, the use of which may cause the issuance of air contaminants, or the use of which may reduce or control the issuance of air contaminants, without first obtaining a written PTO from AVAQMD, or except as provided in Rule 202. The equipment shall not be operated contrary to the conditions specified in the permit to operate. The Project will comply with this rule by obtaining a permit from the AVAQMD in a timely manner and complying with the stated conditions.

AVAQMD Rule 217 Provision for Sampling and Testing Facilities

The permittee may be required to provide and maintain such facilities as are necessary for sampling and testing. In the event of such requirements, the AVAQMD shall notify the applicant in writing of the required size, number and location of sampling ports; the size and location of the sampling platform; the access to the sampling platform, and the utilities for operating the sampling and testing equipment. The platform and access shall be constructed in accordance with the General Industry Safety Orders of the State of California. The Project will provide such facilities for the combustion turbines and other equipment for which source testing is required.

AVAQMD Rule 218 Stack Monitoring

The owner or operator shall provide, install, and maintain continuous monitoring systems to measure the specific pollutants from fossil fuel-fired steam generators with heat input of 250 MMBtu or more per hour. The combustion turbines are subject to this rule and will install the required Continuous Emissions Monitoring Equipment (CEMS). The boiler proposed for this Project is rated at 100 MMBtu per hour and, therefore, is not subject to the requirements of this rule. The HTF heater does not produce steam and is not subject to the rule.

AVAQMD Rule 219 Equipment not Requiring a Written Permit Pursuant to Regulation II

The Project will employ a number of devices that emit air pollutants, but are exempt from permit pursuant to one or more exemptions listed in Rule 219, including two diesel fuel storage tanks piped exclusively to emergency engines, water trucks used for mirror washing, HTF piping fugitives, lube oil reservoir(s) (storage tanks), heating ventilation and air conditioning (HVAC) systems, a water heater, water treatment systems, and storage tanks for water treatment chemicals.

AVAQMD Rule 226 Limitations on Potential to Emit

The Project is a major source and will comply with Regulation XXX requirements rather than limit its potential to emit. Thus, this rule is not applicable.

Regulation III Fees

AVAQMD Rule 301 Permit Fees

Permit application fees will be paid to the AVAQMD with the air permit application.

Regulation IV Prohibitions

AVAQMD Rule 401 Visible Emissions

A person shall not discharge into the atmosphere, from any single source of emissions whatsoever, any air contaminant for a period or periods aggregating more than three (3) minutes in any one hour which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart. The Project emission sources will be equipped with BACT and combust clean fuels and, consequently, compliance with this rule is expected.

AVAQMD Rule 402 Nuisance

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 business or property. Due to the application of BACT on each emission source and the distance from the emission sources to any potential receptors, compliance with this rule is expected.

AVAQMD Rule 403 Fugitive Dust

The purpose of this rule is to reduce the amount of PM10 emitted from significant man-made fugitive dust sources and in an amount sufficient to maintain the NAAQS. The provisions of this rule apply to specified bulk storage, earthmoving, construction and demolition, and man-made conditions resulting in wind erosion.

Project construction will involve bulk storage of soils, earthmoving, construction and demolition, and man-made conditions that have the potential for fugitive dust emissions. The Project operator, or its contractors, will follow the fugitive dust control strategy outlined in a Dust Control Plan that will be prepared for the Project.

Project operations will involve routine vehicle travel within the solar collector field in order to wash the mirrors and earthmoving during contaminated soil management associated with the bioremediation facility. These operations have the potential for fugitive dust emissions. The owner, or its contractors, will follow the fugitive dust control strategy outlined in the Dust Control Plan that will be prepared for the Project.

AVAQMD Rule 404 Particulate Matter - Concentration

Rule 404 applies to any person who discharges PM emissions into the atmosphere from any single source operation. The rule limits PM emissions based upon the exhaust flow rate. The provisions of this rule do not apply to emissions resulting from the combustion of liquid or gaseous fuels in steam generators or combustion turbines. The Project HTF heater will comply with this rule by using only natural gas fuel. The fire water pump and emergency generator engines are subject to and will comply with this rule by using only ultra-low sulfur diesel fuel. The cooling tower will comply by utilizing a high-efficiency drift eliminator.

AVAQMD Rule 405 Particulate Matter – Emission Rate

A person shall not discharge into the atmosphere from any source operation, particulate matter in excess of the limits shown in the rule. This rule is generally applied to processes that handle bulk dry materials, and is not generally applied to combustion processes, as there is not "process weight" on which to base the emissions limit.

AVAQMD Rule 407 Liquid and Gaseous Contaminants

A person shall not discharge into the atmosphere from any equipment: 1) CO exceeding 2,000 ppm by volume measured on a dry basis, averaged over 15 consecutive minutes; or 2) sulfur compounds which would exist as liquid or gas at standard conditions, calculated as SO_2 and averaged over 15 consecutive minutes, exceeding 500 ppm by volume. The use of pipeline quality natural gas fuel and good combustion practice for the combustion turbines, duct burners, auxiliary boiler and HTF heater and ultra-low sulfur diesel fuel in the fire water pump engine and emergency electrical generator engine will ensure compliance with this rule. As shown in Section 5.2.3, CO emissions from the combustion turbines will meet the BACT requirement of 2.0 ppm, and the auxiliary boiler and HTF heater will both meet emission limits of 50 ppm. The SO_2 concentration from each combustion source is less than 1 ppmv.

AVAQMD Rule 409 Combustion Contaminants

A person shall not discharge into the atmosphere from the burning of fuel, combustion contaminants exceeding 0.1 grain per cubic foot of gas calculated to 12 percent of CO_2 at standard conditions averaged over a minimum of 15 consecutive minutes. The use of pipeline natural gas fuel for the duct burners, auxiliary boiler and HTF heater ensures compliance with this rule. This rule does not apply to emissions from internal combustion engines, such as the combustion turbines, fire water pump or emergency generator engines.

AVAQMD Rule 430 Breakdown Provisions

The owner or operator shall notify the AVAQMD of any occurrence which constitutes a breakdown condition. The owner or operator shall demonstrate the nature and extent of the breakdown by providing to the AVAQMD signed contemporaneous operating logs and/or other relevant evidence which shows that:

(a) The breakdown occurred and that the owner/operator can identify the cause of the breakdown; and

(b) The equipment was, at the time of the breakdown, being properly operated; and

(c) During the period of the breakdown, the owner/operator took all reasonable steps to minimize levels of emissions and to correct the condition that lead to the breakdown.

Such relevant evidence shall be submitted to the AVAQMD within 60 days of the date the breakdown was reported to the AVAQMD. The Project will make such notifications and reports, as may become necessary.

AVAQMD Rule 442 Usage of Solvents

A person shall not discharge VOCs into the atmosphere from all VOC containing materials, emissions units, equipment or processes subject to this rule, in excess of 1,190 pounds per month for the entire facility. All VOC-containing materials subject to this rule, whether in its form for intended use or as a waste or used product, shall be stored in nonabsorbent, non-leaking containers which shall be kept closed at all times, except when filling or emptying, and disposed of in a manner to prevent evaporation of VOCs into the

atmosphere from the facility. Usage records for all VOC-containing materials subject to this rule shall be maintained pursuant to Rule 109. Usage of solvents will be limited to maintenance clean-up; usage and emissions are not expected to exceed 1,190 pounds per month. Should the Project use any materials subject to this rule, it will document usage accordingly to ensure the emissions do not exceed the allowable monthly limit.

AVAQMD Rule 463 Storage of Organic Liquids

This rule applies to any above-ground stationary tank with a capacity of 19,815 gallons or greater used for storage of organic liquids, and any above-ground tank with a capacity between 251 gallons and 19,815 gallons used for storage of gasoline. The Project will have HTF (solar array), insulating mineral oil (transformers), hydraulic oil (combustion turbine, steam turbine and other equipment), and lubricating oil on site, as well as diesel fuel stored at the facility. However, none of the containers will exceed the threshold limit of 19,815 gallons and, therefore, this rule will not apply to the Project.

AVAQMD Rule 466 Pumps and Compressors

This rule applies to any pump or compressor handling a ROC, where a ROC is any chemical compound which contains the element carbon, which has a Reid vapor pressure (RVP) greater than 80 millimeters mercury (mmHg) (1.55 pounds per square inch [psi]), or an absolute vapor pressure (AVP) greater than 36 mmHg (0.7 psi) at 20 degrees Centigrade (ºC), excluding CO, CO_2, carbonic acid, carbonates and metallic carbides and excluding methane, 1,1,1- trichloroethane, methylene chloride, trifluoromethane, and chlorinated-fluorinated hydrocarbons. The Project will have HTF (solar array), insulating mineral oil (transformers), hydraulic oil (combustion turbine, steam turbine and other equipment), and lubricating oil on site, as well as diesel fuel stored at the facility. However, none of these materials will exceed the threshold vapor pressure limits and gasoline will not be stored in tanks at the facility and, therefore, this rule will not apply to the Project.

AVAQMD Rule 466.1 Valves and Flanges

This rule applies to any valve or flange handling a ROC, where a ROC is any chemical compound which contains the element carbon, which has a RVP greater than 80 mmHg (1.55psi), or an AVP greater than 36 mmHg (0.7 psi) at 20ºC, excluding CO, CO_2, carbonic acid, carbonates and metallic carbides and excluding methane, 1,1,1- trichloroethane, methylene chloride, trifluoromethane, and chlorinated-fluorinated hydrocarbons. The Project will have HTF (solar array), insulating mineral oil (transformers), hydraulic oil (combustion turbine, steam turbine and other equipment), and lubricating oil on site, as well as diesel fuel stored at the facility. However, none of these materials will exceed the threshold vapor pressure limits and, therefore, this rule will not apply to the Project.

AVAQMD Rule 474 Fuel Burning Equipment – Oxides of Nitrogen

This rule applies to non-mobile fuel burning equipment with a heat input of at least 555 MMBtu per hour. The auxiliary boiler proposed for this Project is rated at 100 MMBtu per hour, and the HTF heater is rated at 40 MMBtu per hour. Thus, neither unit is subject to the requirements of this rule.

AVAQMD Rule 475 Electric Power Generating Equipment

A person shall not discharge into the atmosphere from any equipment having a maximum rating of more than 10 net MW used to produce electric power, combustion contaminants that exceed both of the following two limits:

(a) 11 pounds per hour;
(b) 0.01 grains per standard cubic foot (gr/scf) calculated at three percent O_2 on a dry basis averaged over 15 consecutive minutes or any other averaging time specified by the AVAQMD.

The emission rate of combustion contaminants (i.e, PM10, as defined in AVAQMD Rule 102) exceeds 11 pounds per hour from each combustion turbine, however, the stack concentration is approximately 0.0022 gr/dscf at full fire with duct burners on.

AVAQMD Rule 476 Steam Generating Equipment

This rule applies to equipment with a heat input of at least 50 MMBtu per hour. The auxiliary boiler proposed for this Project is rated at 100 MMBtu per hour, and the heater is rated at 40 MMBtu per hour. Thus, neither unit is subject to the requirements of this rule.

Regulation IX Standards of Performance for New Stationary Sources

AVAQMD Rule 900 Standards of Performance for New Stationary Sources (NSPS)

As stated in Section 5.2.1.1, the Project will be subject to 40 CFR 60, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, and it will comply by purchasing equipment that meets the applicable emission standards. The Project will also be subject to 40 CFR 60 Subpart KKKK, Standards of Performance for Stationary Combustion Turbines. Operation of the turbines with current BACT will ensure that the Project complies with the Part KKKK emission limits.

Regulation X National Emission Standards for Hazardous Air Pollutants

AVAQMD Rule 1000 National Emission Standards for Hazardous Air Pollutants (NESHAP)

As stated in Section 5.2.1.1.2, the Project will not be a major source of hazardous air pollutants (HAPs), and thus these standards are not applicable to the Project .

Regulation XI Source Specific Standards

AVAQMD Rule 1113 Architectural Coatings

The purpose of this rule is to limit VOC emissions from architectural coatings. This rule specifies architectural coatings, storage, cleanup and labeling requirements. With limited exceptions, no person shall: 1) manufacture, blend or repackage for sale within the District; 2) supply, sell or offer for sale within the District; or 3) solicit for application or apply within the District any architectural coating with a VOC content in excess of the corresponding limit specified in the Table 1 of the rule. The Project will comply with the requirements of this rule if architectural coatings are applied at the Project during construction or subsequent maintenance activities.

AVAQMD Rule 1121 Control of Nitrogen Oxides from Residential-Type, Natural-Gas-Fired Water Heaters

A person shall not distribute, sell, offer for sale, or install within the District gas-fired water heaters with heat input rates less than 75,000 Btu per hour that:

(a) Emit NO_X in excess of 93 pounds of NO_X (calculated as NO_2) per billion Btu of heat output; or
(b) Are not certified in accordance with the requirements of the rule.

The Project will comply with this rule by purchasing only compliant equipment.

AVAQMD Rule 1122 Solvent Degreasers

This rule applies to all persons who own or operate remote reservoir cold cleaners, batch-loaded cold cleaners, open-top vapor degreasers, and all types of conveyorized degreasers that carry out solvent cleaning operations with a solvent containing VOCs. Solvent cleaning operations that are regulated by this rule include, but are not limited to, the removal of uncured coatings, adhesives, inks, and contaminants such as dirt, soil, oil, and grease from parts, products, tools, machinery, and equipment. The Project will comply with the requirements of this rule if such equipment is used at the facility.

AVAQMD Rule 1135 Emissions of Oxides of Nitrogen from Electric Power Generating Systems

This rule is applicable only to units existing on July 19, 1991, which are owned or operated by any one of the following: Southern California Edison, Los Angeles Department of Water and Power, City of Burbank, City of Glendale, and City of Pasadena, or any of their successors. The Project will be constructed after 1991 and is not owned by any entity listed in the rule; therefore, this rule is not applicable to the Project.

AVAQMD Rule 1146 Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters

This rule applies to boilers, steam generators, and process heaters of equal to or greater than 5 MMBtu per hour rated heat input capacity used in any industrial, institutional, or commercial operations with the exception of boilers used by electric utilities to generate electricity. Thus the rule is not applicable to the proposed 100 MMBtu per hour boiler, but it is applicable to the proposed 40 MMBtu per hour heater. The heater will comply with the limitations of the rule by operating with ultra-low-NO_X burners meeting a BACT limit of nine (9) ppmv NO_X and 50 ppmv CO.

AVAQMD Rule 1171 Solvent Cleaning Operations

This rule applies to all persons who use VOC-containing materials in solvent cleaning operations during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or general work areas, and to all persons who store and dispose of VOC-containing materials used in solvent cleaning. The Project will comply with the requirements of this rule if solvent cleaning occurs at the facility during construction or subsequent maintenance activities.

Regulation XIII New Source Review

AVAQMD Regulation XIII New Source Review

This rule provides for preconstruction review of new and modified stationary sources of affected pollutants to insure emissions will not interfere with attainment of ambient air quality standards (AAQS); ensures appropriate new and modified sources of affected pollutants are constructed with BACT; and provides for no significant net increase in emissions from new and modified stationary sources for all non-attainment pollutants and their precursors. Rule 1303 addresses the specific requirements of BACT and offsets.

BACT: An applicant shall provide BACT for all affected pollutants expected to be emitted from a new emissions unit and for all affected pollutants expected to increase from a modified existing emissions unit. Each of the permitted devices proposed for the Project will employ current BACT. The manner in which the Project will comply with BACT is addressed in more detail in Section 5.2.3.

Offsets: An applicant must provide offsets for new or modified stationary source of PM10, SO_X, NO_X or VOC for the source's potential to emit when the source's potential to emit equals or exceeds the offset trigger levels identified in the rule. If offsets are required, they must be provided at specified ratios. Offsets are required for the Project because the emissions of PM10, NO_X and VOC do exceed the applicable thresholds.

Under Federal and California law, the AVAQMD is required to implement a NSR program that attains, or makes reasonable progress toward attaining, the AAQS within the District. If the pollutant concentrations in ambient air exceed the standards, then the area is designated nonattainment, and offsets must be provided for major new sources or modifications to existing sources. The District is required to develop an Air Quality Management Plan (also referred to as a State Implementation Plan or SIP), which identifies rules and other measures that must be adopted to attain or maintain compliance with the AAQS. AVAQMD Regulation XIII, New Source Review program, is the cornerstone of this process within the District. This regulation provides the requirements, such as how offset calculations must be done and thresholds over which emissions must be offset. It also defines which pollutants must be offset, what ratios must be used, and the criteria of what can be used as an emission reduction credit (ERC). If a project meets the requirements of these rules, then the mitigation (i.e., ERC) can be considered to be completely effective since the program has been developed to ensure eventual attainment of the AAQS. Additional detail of the Applicant's offset strategy is provided in Section 5.2.5.2.

Additional Procedural Requirements Specified in Rule 1302:

Alternative siting: For sources requiring an analysis of alternative sites, sizes, and production processes and environmental control techniques, pursuant to Section 173 of the Federal CAA, the applicant must prepare an analysis functionally equivalent to requirements of Division 13, Section 21000 et. seq. of the Public Resources Code. An alternatives analysis is contained in Section 4.0 of this AFC.

Visibility impacts analysis: Any new major source or major modification shall be subject to review of its impact on visibility in any mandatory Class I area in accordance with 40 CFR 51.307(b)(2). The Project is a major source; thus, a visibility impacts analysis is provided in Section 5.2.4.2 of this AFC.

Modeling: Emissions from a new or modified stationary source shall not make worse an exceedance of an AAQS. In making this determination, the AVAQMD will take into account increases in cargo carrier and secondary emissions and offsets provided pursuant to this rule. The Project emissions exceed the offset trigger levels and, therefore, modeling is required for the Project. A modeling analysis is presented in Section 5.2.4.2.

Compliance certification: The owner or operator of a proposed new major source or major modification shall certify in writing all major stationary sources owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in California, and subject to emission limitations, are in compliance, or on a schedule for compliance, with all applicable emission limitations and standards. Because the Project is a major source of air pollutants, the compliance certification is required and will be provided to the AVAQMD.

AVAQMD Rule 1306 Electric Energy Generating Facilities

The AVAQMD will consider the AFC to be equivalent to an application pursuant to District Rule 1302(B) during the Determination of Compliance review, and will apply all applicable provisions of District Rule 1302 to the application. If the information contained in the AFC does not meet the requirements which would otherwise comprise a complete application pursuant to District Rule 1302(B)(1), the AVAQMD will, within 20 calendar days of receipt of the AFC, specify the information needed to render the application complete and so inform the CEC. This AFC meets the application requirements of Rule 1302.

AVAQMD Rule 1310 Federal Major Facilities and Federal Major Modifications

The provisions of this Rule apply to:

(a) Any Federal Major Modification.

(b) Any Presumptive Federal Major Modification or

(c) Any Federal Major Facility which requests a Plant Wide Applicability Limit pursuant to the rule.

The Project is a new source, not a modification, and does not plan to request a Plant Wide Applicability Limit. Thus, this rule is not applicable.

Regulation XIV Toxics and Other Non-Criteria Pollutants

AVAQMD Rule 1401 New Source Review for Toxic Air Contaminants

The AVAQMD shall analyze the application and Comprehensive Emission Inventory Report for the emission units, determine what rules are applicable, calculate prioritization scores for carcinogenic effects, non-carcinogenic acute and chronic effects, require the preparation of a Health Risk Assessment (HRA), if needed, and then analyze the HRA to calculate the risk to the exposed population. Requirements for the installation of Best Available Control Technology for Toxics (T-BACT) can be imposed if the calculated risk exceeds the standards in the rule. If the calculated risk is considered significant, the permit will be denied. Compliance with Rule 1401 and a HRA are provided in Section 5.10, Public Health.

Regulation XVII Prevention of Significant Deterioration

Regulation XVII implements the federal PSD program. Because the Project is an unlisted stationary source (as defined by the rule) that emits or has the potential to emit 40 tpy or more of CO, it is required to obtain a PSD permit. A key element of the application is to verify that the emissions do not cause an increase in ambient emission concentration above those allowed in the rule. AVAQMD is not currently delegated to administer the PSD program. A PSD application will be submitted to EPA Region IX in a timely manner.

The owner or operator of a major stationary source or major modification shall, after construction of the stationary source or modification, conduct such ambient monitoring as the District determines is necessary to determine the effect emissions from the stationary source or modification may have, or are having, on air quality in any area. The Project Owner will perform monitoring as requested.

Regulation XXX Title V Permits

Any new facility which is subject to this regulation shall submit an application for a federal operating permit no later than 12 months after commencing operations. As the Project will be a major source, subject to the federal operating permit program, it will apply for a Title V permit in a timely manner.

5.2.1.4 Involved Agencies

Under the AFC process, the Project must obtain a Determination of Compliance (DOC) from the AVAQMD, (the DOC will contain all of the requirements normally contained within a PTC). The Project will also be required to obtain a PSD permit from EPA. Contact information for these agencies are provided in Table 5.2-2.

Table 5.2-2 Agencies and Agency Contacts

Agency Contact	Phone/E-mail	Permits/Issue
Gerardo Rios, Chief EPA Region 9 75 Hawthorne Street Mail Code: AIR-3 San Francisco, CA 94105	415-972-3974 rios.gerardo@epa.gov	PSD Permit
Bret Banks, Operations Manager Antelope Valley AQMD 43301 Division St., Ste. 206 Lancaster, CA 93535-4649	661) 723-8070 bbanks@mdaqmd.ca.gov	Air permit (DOC/PTC), Title V and IV permit.

5.2.1.5 Required Permits and Permit Schedule

Table 5.2-3 lists the air quality related permits that are required for the Project. As noted above, under the CEC licensing process, the AVAQMD will issue a DOC; however, a DOC is equivalent to the PTC issued by the AVAQMD for other sources. Once the Project is built, the AVAQMD will issue a PTO in conjunction with the CEC license. This table also provides the schedule for when applications for these permits are needed.

Table 5.2-3 Permits Required and Permit Schedule

Permit/Approval	Schedule
DOC/PTC	In accordance with AVAQMD Rule 1306, this AFC serves as an application for the DOC/PTC. The AVAQMD will work within the timeframes of the CEC's AFC process to issue the DOC.
PTO	Once the equipment becomes operational, a PTO must be obtained by the operator.
Title IV Permit	The Project Owner will file the required application 24 months in advance of planned operations. The Project will secure an AVAQMD Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions.
Title V Permit	An application for an initial Title V permit will be submitted within 12 months after the facility begins operation.
PSD Permit	An application for a PSD permit will be submitted to EPA shortly after the AFC has been filed with the CEC.

5.2.2 Affected Environment

The Project site is located in the City of Palmdale, California at the southwestern edge of the Mojave Desert at an average elevation of 2,505 feet above mean sea level (amsl). The Tehachapi Mountains, located to

southwest of the Project site, reach elevations above 5,000 amsl within 10 miles of the site. The approximately 377-acre site is vacant and appears not to be disturbed by previous agricultural use or construction of any kind. The site is bounded by East Avenue M on the north side, a private road, Site 1 Road, on the east side, East Avenue M-12 on the south side, and will develop a new site boundary on the west. Palmdale Air Force Plant 42 facility is located directly across Site 1 Road and East Avenue M-12 on the east and south sides, respectively.

Land uses in the immediate area of the plant site, in addition to Air Force Plant 42, range from unused parcels to light industry, e.g., automobile wrecking yards, trucking companies, and automobile/heavy truck repair facilities. These land uses are confined predominately to the area to the north to northwest of the Project site. The closest residential land uses to the Project site are located west of State Route 14, approximately 2.5 miles west of the plant site and to the north of East Avenue L.

The Project site is located in the Mojave Desert which is classified as a “high desert.” It is a transition between the “hot” Sonoran Desert to the south and the “cold” Great Basin Desert to the north. Characteristic of a desert climate, the Mojave Desert has extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies.

The area is characterized by very hot summer temperatures, with the mean maximum temperatures in June through August exceeding 80 degrees Fahrenheit (°F). Winter temperatures are more moderate, with mean maximum temperatures between 46°F and 56°F, and with lows between 39°F and 42°F during November through January. Minimum temperatures below freezing (32°F) occur on an average of about 80 days per year.

The average annual precipitation is 7.90 inches for the period from 1931 through 2006, with approximately 74 percent of the precipitation each year occurring between December and March. There is, however, a summer thunderstorm season from July to September with occasional violent heavy precipitation that can produce flash flooding. June and July are the driest months with an average combined annual rainfall of 0.09 inches.

Large-scale weather patterns in the area are generally influenced by moderately intense anti-cyclonic circulation (e.g., associated with high pressure systems). During the summer, a large subtropical high pressure system off the coast of California, in combination with the rain shadow produced by the coastal ranges and the mountain ranges that border the Mojave Desert to the west and south, keeps the Mojave Desert area sunny and dry. However, the presence of a thermal low pressure area above the Mojave Desert promotes atmospheric transport from the Los Angeles Basin. During the winter months, the strength of the Pacific High pressure area wanes, and 20 to 30 frontal systems may pass through the area each year. Some of these frontal systems are sufficiently strong to produce rain in the area.

The most significant large-scale phenomena affecting air quality in the Project area are the transport winds from the northwest and southwest. These winds are responsible for bringing ozone and other pollutants through the mountain passes from the Los Angeles Basin (Cajon and Soledad Passes) and the San Joaquin Valley (Tehachapi Pass). As will be discussed later in this section, pollutant transport into the Mojave Desert Air Basin (MDAB) is the primary reason for the periods of Federal and California ozone standard violations.

5.2.2.1 Meteorological Data

For air quality impact analyses, hourly meteorological data are needed for modeling purposes. Hourly surface meteorological data characteristic of the Project site are available from the Palmdale Regional Airport (KPME, WMO ID 72382). The airport meteorological tower is located less than one and one-half miles from the Project site. Three years of data for the years 2002 through 2004 were used in the impact analyses. Representative upper air data for the same time period were obtained from the Mercury/Desert Rock, Nevada, upper air sounding site (WMO ID 72387) (NCDC, 2006).

Winds

A wind rose based on the Palmdale Regional Airport winds for 2002 to 2004 is presented in Figure 5.2-1. Quarterly wind roses and frequency distributions are provided in **Appendix G.1**.

The prevailing winds for Palmdale, California, range from southerly to westerly approximately 75 percent of the time with the majority from the southwest, based on the 2002 to 2004 wind data collected at the Palmdale Regional Airport. Calm periods occur 10.31 percent of the time, and the frequency of winds from north through south-southeast are each less than four percent.

The prevailing winds are the result of large scale circulation patterns, afternoon sea breezes that enter the Mojave Desert by way of the Tehachapi Pass from the California Central Valley and the Soledad Pass from the Los Angeles Basin, and nighttime drainage winds from the Tehachapi Mountains that are orientated northwest/southeast on the southwest side, approximately six miles from the Lancaster Division Street monitoring station, at the closest point. The highest wind speeds experienced at the monitoring site occur during spring afternoons due to increased heating of the land that far exceeds the heating of the ocean surface at that time of year. These high wind speeds are associated with southwesterly to westerly winds passing predominately through the Soledad Pass and to a lesser degree, the Tehachapi Pass. The development of the northeasterly Santa Ana Winds during the late fall and winter appears to have much less impact to the prevailing winds measured at the Lancaster Division Street Station when compared with the monitoring station located in the City of Mojave, approximately 30 miles to the north.

Temperature

Temperatures in the Project area can be very hot during the summer months and very cold during the winter months. Table 5.2-4 summarizes daily maximum and minimum temperatures, extreme high and low temperatures by month; the mean number of days the maximum temperature exceeds 90°F, the mean number of days the minimum temperature is less than 0°F per month, and the mean number of days the minimum temperature is less than 32°F and less than 0°F each month.

Precipitation

Average annual precipitation in the Project area, based on Lancaster records, is 7.90 inches with approximately 74 percent of the precipitation occurring in the months between December and March. Table 5.2-5 summarizes mean, highest monthly and daily rainfall by month; mean number of days with rainfall of 0.10, 0.50, and 1.0 inches or more; and mean and one-day maximum snowfall.

Table 5.2-4 Temperature Data for Lancaster, California

Month	Monthly Temperatures			Extremes		Mean Number of Days			
						Maximum		Minimum	
	Daily Max	Daily Min	Mean	Highest Mean	Lowest Mean	90°F & Above	32°F & Below	32°F & Below	0°F & Below
Jan	80	4	43.5	48.5	39.9	0.0	0.0	20.6	0.0
Feb	82	13	47.6	55.0	41.9	0.0	0.0	14.8	0.0
Mar	91	18	51.8	59.4	46.2	0.0	0.0	7.5	0.0
Apr	98	28	58.2	64.3	48.2	1.5	0.0	1.1	0.0
May	105	32	65.3	70.8	58.9	6.9	0.0	0.0	0.0
Jun	113	38	73.7	80.7	68.8	17.2	0.0	0.0	0.0
Jul	114	45	81.5	85.1	78.0	29.1	0.0	0.0	0.0
Aug	113	44	79.6	83.7	75.9	27.9	0.0	0.0	0.0
Sep	112	27	73.0	76.7	67.5	19.2	0.0	0.1	0.0
Oct	99	19	62.4	67.2	56.8	5.4	0.0	1.6	0.0
Nov	90	12	50.7	56.0	45.8	0.1	0.0	12.4	0.0
Dec	85	11	43.2	50.2	38.6	0.0	0.0	22.3	0.0
Annual	114	4	60.9	63.0	59.3	107.4	0.0	80.4	0.0
Reference: WRCC, 2008.									

Table 5.2-5 Precipitation Data for Lancaster, California

Month	Rainfall						Snowfall inches	
	Inches			Mean Number of Days				
	Mean	Highest Monthly	Highest Daily	0.10" or more	0.50" or more	1.0" or more	Mean	One-Day Max.
Jan	1.51	7.50	2.44	3	1	0	0.8	19
Feb	1.65	7.24	2.43	3	1	1	0.2	4
Mar	1.28	5.22	2.39	3	1	0	0	2
Apr	0.47	2.47	1.00	1	0	0	0	0
May	0.13	1.66	1.10	0	0	0	0	0
Jun	0.04	0.71	0.60	0	0	0	0	0
Jul	0.05	0.57	0.38	0	0	0	0	0
Aug	0.18	1.46	1.46	1	0	0	0	0
Sep	0.20	2.12	1.63	0	0	0	0	0
Oct	0.34	3.53	1.78	1	0	0	0	0
Nov	0.68	5.62	1.89	2	0	0	0.1	10

5.2.2.2 Ambient Air Quality Data

As previously noted, the Project site is located in the MDAB and is under the jurisdiction of the Antelope Valley Air Quality Management District (AVAQMD). Federal and California ambient air quality standards are shown in Table 5.2-6. The attainment status of the Project area with respect to the Federal and California air quality standards is summarized in Table 5.2-7.

Table 5.2-6 National and California Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 µg/m^3)		—		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m^3)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		—	—	—
Lead[8]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990 California Air Resources Board (04/01/08)

Table 5.2-6 National and California Ambient Air Quality Standards (Continued)

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calender year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (04/01/08)**

Table 5.2-7 Summary of Attainment Status of the Project Area

Pollutant	Attainment Status	
	Federal Standards	**California Standards**
Ozone – 1 Hour	No longer applicable	Extreme Non-attainment
Ozone – 8 Hour	Moderate Non-attainment	Non-attainment
CO	Unclassified / Attainment	Attainment
NO_2	Unclassified	Attainment
SO_2	Unclassified	Attainment
PM10	Unclassified	Non-attainment
PM2.5	Unclassifiable / Attainment	Unclassified
Lead Particulates	No Designation	Attainment
Reference: ARB 2008a.		

The closest air quality monitoring stations to the Project site are: the Lancaster Division Street Monitoring Station, located at 43301 Division Street in Lancaster; the Burbank West Palm Avenue Monitoring Station located at 228 West Palm Avenue in Burbank; the Mojave Poole Street Station located at 923 Poole Street in Mojave; and the Victorville Station located at 14306 Park Avenue in Victorville. AVAQMD operates the Lancaster Division Street Station, South Coast Air Quality Management District (SCAQMD) operates the Burbank West Palm Avenue, and Kern County Air Pollution Control District (KCAPCD) operates the Mojave Poole Street Station, and the Mojave Desert Air Quality Management District (MDAQMD) operates the Victorville Station. Table 5.2-8 summarizes the locations of these monitoring stations, the pollutants monitored, and the approximate distance from the Project site.

Table 5.2-8 Air Quality Monitoring Stations Closest to the Project Site

Monitoring Site	Pollutants Measured at Monitoring Station						Approx Distance and Direction from Project Site	County
	O_3	NO_2	SO_2	CO	PM10	PM2.5		
Lancaster	X	X	---	X	X	X	1.5 miles NW	Los Angeles
Mojave	X	X	---	---	X	X	33 miles N	Kern
Burbank	X	X	X	X	X	X	29 miles SW	Los Angeles
Victorville[a]	X	X	X	X	X	X	38 miles ESE	San Bernardino

[a] Victorville used for CO and SO_2 data, as Mojave does not monitor these pollutants
Reference: ARB 2008b.

Lancaster Division Street is the closest monitoring station to the Project site. This station is expected to provide data that are the most representative of the Project site since it is located less than two miles from the Project plant site. Since both the PHPP plant site and Lancaster Division Street Station are both located in the same urban environment and have the same influences of transport from the Los Angeles Basin through the Soledad Pass, it is expected to provide good estimates of the existing air quality at the plant site.

Tables 5.2-9 through 5.2-13 provide summaries of air quality data collected at the Lancaster, Burbank, Mojave and/or Victorville monitoring stations and the number of times that the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS) were exceeded for each parameter for the years 2005 through 2007.

The Lancaster area is moderate non-attainment for the national 8-hour ozone standards, and extreme non-attainment and non-attainment for the California 1-hour and 8-hour ozone standards, respectively. These attainment statuses are reflected in the ambient monitoring data presented in Table 5.2-9. The PHPP will be a source of ozone precursor pollutant emissions.

Table 5.2-9 Ozone Data for Monitoring Stations Closest to the Power Plant Site

Site	# Day >1-Hr CAAQS	Highest 1-Hr Observation (ppm)	# Days >8-hr NAAQS	Highest 8-Hr Observation (ppm)
Calendar Year 2007				
Lancaster	16	0.118	14	0.101
Burbank	13	0.116	0	0.097
Mojave	0	0.092	0	0.084
Calendar Year 2006				
Lancaster	22	0.132	16	0.105
Burbank	25	0.166	6	0.129
Mojave	10	0.109	8	0.101
Calendar Year 2005				
Lancaster	42	0.127	31	0.103
Burbank	13	0.142	2	0.108
Mojave	8	0.113	9	0.096
Reference: ARB 2008c.				

Table 5.2-10 provides PM10 monitoring data for the region. The Project area is classified as non-attainment for the California 24-hour PM10 standard. The California standard was exceeded a maximum of 25.7 days at Lancaster, a maximum of 25 days at Burbank, and on a maximum of 36.6 days at Mojave, during the 2005 to 2007 period.

Monitoring data for PM2.5 presented in Table 5.2-11 shows that the NAAQS and CAAQS were not exceeded during the 2005 to 2007 period, which is consistent with the national unclassified/attainment and California unclassified status for this pollutant.

CO, NO_2 and SO_2 data presented in Tables 5.2-12, 5.2-13 and 5.2-14 are below the applicable NAAQS and CAAQS and are consistent with the attainment status for these pollutants. SO_2 is not measured at Mojave or Lancaster, and CO is not monitored at the Mojave Station. Therefore, Victorville data are provided.

Table 5.2-10 PM10 Data for Monitoring Stations Closest to the Power Plant Site

Site	# Days > 24-Hr NAAQS	# Days > 24-Hr CAAQS	Annual State Average (µg/m^3)	Highest State 24-Hr Average (µg/m^3)
Calendar Year 2007				
Lancaster	6.5	18.3	28.3	181
Burbank	0	5	ND [1]	107
Mojave	ND [1]	36.6	36.0	339
Calendar Year 2006				
Lancaster	0	25.7	25.2	58
Burbank	0	10	ND [1]	69
Mojave	ND [1]	25.7	30.5	77
Calendar Year 2005				
Lancaster	0	ND [1]	ND [1]	47
Burbank	0	5	33.2	90
Mojave	ND [1]	19.1	26.1	70

[1]ND – Insufficient data to determine valid value so value not reported on the ARB website.
Reference: ARB 2008c.

Table 5.2-11 PM2.5 Data for Monitoring Stations Near the Power Plant Site

Site	# Days > 24-Hr NAAQS	National Annual Average (µg/m^3)	National Highest 24-Hr Average (µg/m^3)
Calendar Year 2007			
Lancaster	0	8.0	25.0
Burbank	ND [1]	16.9	56.5
Mojave	ND [1]	ND [1]	ND [1]
Calendar Year 2006			
Lancaster	0	7.4	18.0
Burbank	0	16.5	50.7
Mojave	ND [1]	ND [1]	ND [1]
Calendar Year 2005			
Lancaster	0	8.9	28.0
Burbank	ND [1]	17.8	63.1
Mojave	ND [1]	ND [1]	ND [1]

[1]ND – Insufficient data to determine valid value, so value not reported by ARB.
Reference: ARB 2008c.

Table 5.2-12 CO Data for Monitoring Stations Near the Power Plant Site

Site	Highest 8-Hr Observation, (ppm)	# Days > 1- or 8-Hr NAAQS	# Days > 1- or 8-Hr CAAQS
Calendar Year 2007			
Lancaster	1.25	0	0
Burbank	2.78	0	0
Victorville	1.61	0	0
Calendar Year 2006			
Lancaster	1.60	0	0
Burbank	3.38	0	0
Victorville	1.56	0	0
Calendar Year 2005			
Lancaster	1.54	0	0
Burbank	3.40	0	0
Victorville	1.63	0	0
Reference: ARB 2008c.			

Table 5.2-13 NO_2 Data for Monitoring Stations Near the Power Plant Site

Site	Highest 1-Hr Observation (ppm)	# Days > 1-Hr CAAQS	Annual Average (ppm)
Calendar Year 2007			
Lancaster	0.064	0	0.015
Burbank	0.087	0	0.029
Mojave	PR [2]	PR [2]	PR [2]
Calendar Year 2006			
Lancaster	0.066	0	0.015
Burbank	0.103	0	0.027
Mojave	PR [2]	PR [2]	PR [2]
Calendar Year 2005			
Lancaster	0.074	0	0.015
Burbank	0.089	0	0.029
Mojave	0.044	0	ND [1]

[1] ND – Insufficient data to determine valid value so value not reported by ARB.
[2] PR – Parameter removed from monitoring site.
Reference: ARB 2008c.

Table 5.2-14 SO_2 Data for Monitoring Stations Near the Power Plant Site

Site	Highest 1-Hr Observation (ppm)	# Days >1-Hr CAAQS	Annual Average (ppm)
Calendar Year 2007			
Burbank	0.003	0	0
Victorville	0.005	0	0.001
Calendar Year 2006			
Burbank	0.004	0	0
Victorville	0.005	0	0.001
Calendar Year 2005			
Burbank	0.006	0	0
Victorville	0.003	0	0.001
Reference: ARB 2008c.			

5.2.3 Control Technology Assessment

5.2.3.1 Introduction

This section presents a preliminary control technology assessment (BACT Analysis) for the combined-cycle hybrid power plant. The assessment presented herein is a preliminary determination based on the most current data readily available through on-line databases.

For the proposed Project, a control technology assessment is required for the following emission sources:

- Combustion turbine and duct burners;
- Auxiliary boiler;
- HTF heater;
- Emergency generator engine;
- Emergency fire water pump engine; and
- Cooling tower.

5.2.3.2 BACT/LAER Applicability

The proposed Project is located within the jurisdiction of the Antelope Valley Air Quality Management District, and physically within the MDAB. This area is designated as a non-attainment area with respect to ozone and PM10 and attainment with respect to NO_X, PM2.5, SO_2 and CO. Although the AVAQMD is in attainment with the ambient air quality standards for SO_2 and NO_X, NO_X is a precursor to ozone, and both SO_2 and NO_X are precursors to PM10, which are non-attainment air pollutants. There are no ambient air quality standards for VOC; however, VOC is a precursor to ozone. Therefore, SO_2, NO_X and VOC are treated as non-attainment air pollutants as well. The net result is that VOC, NO_X, SO_2, and PM10 are subject

to AVAQMD's NSR rule, Regulation XIII. CO and PM2.5 are attainment pollutants and are subject to AVAQMD's PSD rule, Regulation XVII.

NSR

The AVAQMD's NSR Rule 1303(A) requires an applicant for a PTC or a PTO to apply BACT on a pollutant-specific basis to:

- Any new or modified permit unit which emits, or has the potential to emit, 25 pounds per day or more of any nonattainment air pollutant or its precursors; or
- All new or modified permit units at a new or modified facility which emits, or has the potential to emit, 25 tpy or more of any nonattainment air pollutant or its precursors.

As the proposed Project has the potential to emit more than 25 tpy of NO_X and VOC, which are precursors to ozone and/or PM10, and the potential to emit more than 25 tpy of PM10, BACT is required for NO_X, VOC and PM10 emissions. Although SO_2 emissions are not expected to exceed 25 pounds per day or 25 tpy, the Project will implement BACT for SO_2 for the combustion sources.

According to AVAQMD Rules 1301 (LL) and 1303 (B), the proposed Project is a major facility. AVAQMD Rule 1301(N) defines BACT for a new major facility as the most stringent of:

- The most stringent emission limit or control technique which has been achieved in practice, for such permit unit, class or category of source; or
- Lowest Achievable Emission Rate (LAER) as defined in AVAQMD Rule 1301(KK), i.e., the rate of emissions which is not in excess of the amount allowable under the applicable NSPS as found in 40 CFR 60 and which reflects the most stringent emissions limitation which is:
    (1) Contained in the SIP of any State for such class or category of source, unless the owner/operator of the source demonstrates that such limitations are not achievable; or
    (2) Achieved in practice by such class or category of source; or
- Any other emission limitation or control technique, and/or different fuel demonstrated in practice to be technologically feasible and cost-effective by the Air Pollution Control Officer or by ARB.

This definition of BACT is similar to the definition of LAER under the Federal non-attainment NSR regulations. In the following discussion of control technology assessment, BACT as required by AVAQMD rules is referred to as LAER to avoid confusion with the Federal requirement for the use of BACT (which is less stringent than LAER) for attainment pollutants under the PSD regulations.

PSD

The Project is one of the listed 28 major facility categories and it has a potential to emit more than 40 tpy of a regulated air contaminant (CO and PM2.5 in this case). Therefore, according to the AVAQMD Rule 1702 (m), the proposed Project is a major source. AVAQMD Rule 1703 requires BACT for a new major facility that emits attainment pollutants in amounts that exceed the defined significant emission increase. For the PHPP, BACT under PSD is required for CO and PM2.5, since the potential CO and PM2.5 emissions exceed 40 tpy.

Methodology

EPA guidance for a "top-down" BACT analysis requires reviewing the possible control options starting with the best control efficiency. In the course of the BACT analysis, one or more options may be eliminated from consideration because they are demonstrated to be technically infeasible or have unacceptable energy, economic, or environmental impacts on a case-by-case (site-specific) basis. The steps required for a "top-down" BACT review are:

1. Identify available control technologies;
2. Eliminate technically infeasible options;
3. Rank remaining technologies;
4. Evaluate remaining technologies (in terms of economic, energy, and environmental impacts); and
5. Select BACT (the most efficient technology that cannot be rejected for economic, energy, or environmental impact reasons).

Publicly-available information on emission control technologies was reviewed for step one of this analysis. The recently-approved Victorville 2 (VV2) Hybrid Power Project's control technology assessment was used as a baseline for this assessment due to the similarity of the equipment. Databases reviewed include SCAQMD BACT/LAER Guidelines, EPA's RACT/BACT/LAER Clearinghouse (RBLC), and the recent or pending projects in the CEC database.

A device-specific and pollutant-specific BACT/LAER determination is provided in the following subsections. Each BACT determination is made through the five-step process to identify available control technologies, eliminate technically infeasible options, rank and evaluate remaining technologies, and BACT selection.

5.2.3.3 BACT/LAER Determination for Combustion Turbines and Duct Burners

The proposed combustion turbines will operate in combined-cycle mode. In a combined-cycle, hot exhaust from the combustion turbine generators is ducted through a waste heat recovery steam generator (HRSG), which may also be fired, to produce steam to drive a steam turbine generator. Since the combustion turbine and HRSG are coupled together in a combined-cycle configuration, and exhaust through a single stack, they are considered to be one combustion train for purposes of the evaluation of BACT/LAER emissions control.

Permitting activity within the past several years has resulted in lower emission standards for combined-cycle combustion turbines and, therefore, the database review was focused only on determinations from 2003 and later. The majority of determinations reviewed are based on exclusively natural gas-fired turbines. The determinations reviewed include combined-cycle turbines with a capacity greater than 100 MW. The list of projects compiled from the various databases is provided in Appendix G.2.

5.2.3.3.1 Control Technology Review for NO_X

LAER for NO_X for Normal Operation

The technologies employed for NO_X emissions reductions at combined-cycle power facilities are listed below in descending order of effectiveness:

- SCR or EmeraChem (EMx™) and other technologies
- EMx™ System or SCR individually
- Low NO_X combustors
- Water or steam injection

All of the listed technologies are feasible, as they have all been achieved in practice. SCR or EMx™ are seldom used as stand-alone control technologies on a combustion turbine application. The "other technologies" commonly employed include low-NO_X combustors and steam or water injection. The following discussion is focused on a comparison of SCR to EMx™. All other identified control technologies are demonstrated to be less effective, and have been eliminated from further consideration.

The California Energy Commissions (CEC) has approved or is expected to approve several projects at a NO_X emission rate of 2 ppm, including:

- VV2 Project, approved in July 2008; NO_X of 2.0 ppm, one-hour average, with SCR technology
- Roseville Combined-cycle - Roseville Electric, online in 2007; NO_X of 2.0 ppm, one-hour average with SCR technology
- Southeast Region Energy Project - City of Vernon, 2006; NO_X of 2.0 ppm, one-hour average with SCR technology

The limit of 2 parts per million volume (ppmv) dry, i.e., corrected to 15 percent oxygen (O_2), is currently considered to be BACT for NO_X from a natural gas-fired combined-cycle system. At 2 ppm, both EMx™ and SCR technologies are considered equivalent with respect to NO_X control for small (i.e., less than 10 MW) natural gas-fired turbines. To date, EMx™ has not been achieved in practice for a large combined-cycle power project. EMx™ is almost 2.5 times more expensive than SCR. All similar combined-cycle combustion turbine projects reviewed during the BACT analysis and listed in Appendix G.2 employ SCR for NO_X control.

EMx™ technology is not achieved in practice for large turbines; it is excessively costly and has not demonstrated to be significantly better than SCR. Therefore, based on the review of current SCR and EMx™ permits, emission limits, and technical feasibility for use in large combustion turbines like proposed for the Project, the applicant recommends SCR as BACT. A NO_X emission limit of 2.0 ppm at 15 percent O_2 and a one-hour averaging time is recommended as BACT under steady-state normal operating conditions. The same aggressive limit is proposed when duct burners are also firing in the HRSG.

Ammonia Slip Associated with SCR

Emissions of unreacted ammonia, or "ammonia slip," are a necessary collateral emissions from the operation of SCR, especially when NO_X is being controlled to LAER levels. Ammonia is a potential

contributor to formation of PM10/PM2.5 in the atmosphere by reaction with gaseous nitric acid or sulfuric acid (byproducts of combustion and reactions with water in the stack), although most such reactions are not ammonia-limited due the consistent presence of naturally occurring ammonia in the atmosphere. A trade-off exists between the minimization of NO_X and the minimization of ammonia slip when SCR is used to control NO_X.

The VV2 Project was recently approved by the CEC and MDAQMD with an ammonia slip limit of 5 ppm.

Information from permits in the SCAQMD BACT Guidelines provides the following limits for ammonia:

- Magnolia Power Project, Burbank, California; ammonia slip of 5 ppm
- Vernon City Power & Light, Vernon, California; ammonia slip of 5 ppm

The lowest ammonia slip level permitted for combined-cycle turbines with duct burners that seek to reduce NO_X to 2 ppm is determined to be 5 ppm.

The CEC has approved several projects at an ammonia emission rate of 10 ppm, including:

- Los Esteros Critical Energy Facility, Phase II, Santa Clara County, California – 2006
- Roseville Energy Park, Placer County, California – 2005
- Blythe Energy Project II, Riverside County, California – 2005

All these facilities are/will be equipped with duct burners.

An American National Power (ANP) facility was recently permitted for 2 ppm ammonia at 15 percent oxygen, with a one-hour average time, and the initial testing demonstrated compliance with these limits. However, the catalyst manufacturers (e.g., Mitsubishi/Cormetech) need some allowance for degradation of catalyst within the warranty/guarantee period (e.g., five years following installation). The systems permitted for 2 ppm ammonia are new, and it is yet to be determined if these systems will continue this performance to the end of the catalyst's useful life. The NO_X emissions and ammonia injection rate will increase as the catalyst degrades and thus the control performance degrades over the lifetime of the catalyst. Therefore, the 2 ppm ammonia limit is not yet confirmed as achieved in practice throughout the catalyst life.

Based on the BACT review, the BACT recommendation for this Project is an ammonia slip of no more than 5 ppm at 15 percent oxygen, with a one-hour average time during steady-state, normal operating conditions. The same aggressive limit is proposed when duct burners are also firing in the HRSG.

NO_X LAER Determination for Startup and Shutdown

The use of SCR to control NO_X is not technically feasible when the SCR catalyst is outside of the manufacturer's recommended operating temperature range. Outside of these temperatures, ammonia cannot be introduced to control NO_X, since the ammonia will not react with the NO_X completely. Therefore, SCR cannot be used to control NO_X emissions during turbine startup or shutdown when the SCR catalyst temperature is below the minimum operating temperature.

NO_X is emitted in diffusion flame mode in the turbine combustor during the first phases of startup, albeit at low fuel input rates. When turbine load reaches conditions that are predetermined by the turbine control

system, the combustors switch to dry low-NO_X (DLN) operation, and NO_X emissions are controlled with the DLN combustion system of the turbine. Once conditions reach minimum temperature at which ammonia injection can be initiated, normal operation of the SCR system is rapidly achieved.

The Project is proposing to permit a gas-fired auxiliary boiler and solar array that will be used to preheat the combined-cycle systems' steam seals and piping, as well as a novel HRSG that is designed to enable faster startups. This technology is referred to by the manufacturer (GE) as their "Rapid Start Process" or RSP, and is expected to reduce the duration of startups compared to conventional combined-cycle units. By shortening the duration of startup times, the RSP technology may be capable of reducing total startup emissions on the order of 50 percent.

There are no other technically feasible control techniques to further reduce emissions of NO_X during startup and shutdown. Mass emission rate limits, in pounds per event, proposed during startup and shutdown, and the specification of GE's RSP technology, therefore, represent LAER for emissions of NO_X during the short-term startup and shutdown events. The following NO_X emission rate limits are proposed for these periods:

Hot/warm Startup:	40 pounds/event per turbine
Cold Startup:	96 pounds/event per turbine
Shutdown:	57 pounds/event per turbine

5.2.3.3.2 Control Technology Review for CO

BACT for CO for Normal Operation

The technologies employed for CO emissions reductions at combined-cycle power facilities are listed below in descending order of effectiveness:

- Combination of technologies, i.e. oxidation catalyst with good combustion practice
- Oxidation catalyst
- Good combustion practices

All of the listed technologies are feasible, as they have all been achieved in practice.

An oxidation catalyst with good combustion practice will be used as a control technology for this Project. All other identified control technologies are demonstrated to be less effective, and have been eliminated from further consideration.

In the last five years, projects have been permitted in California for CO levels ranging from 2.0 to 4.0 ppm. For example, CO emission limits listed for similar combined-cycle turbines approved or under review in the CEC database include:

- VV2 Project, 2008; CO of 3.0 ppm, one-hour average
- El Segundo Power Redevelopment Project , 2007; CO of 3.0 ppm
- San Gabriel Generating Station – Reliant, 2007; CO of 2.0 ppm , one-hour average
- Southeast Region Energy Project - City of Vernon, 2006; CO of 2.0 ppm, three-hour average

Many facilities are listed in the RBLC since 2003 with CO permit limits of 2 ppm at 15 percent O_2. Duct burners will emit additional CO, which will increase the uncontrolled emission levels entering the oxidation catalyst. Several recent projects, including the Duke Energy Arlington Valley Energy Facility in Maricopa County, Arizona and Copper Mountain Power in Clark County, Nevada have CO permit limits of 3.0 ppm when duct firing, and 2.0 ppm when not. The following facilities were recently granted permits with proposed CO limits of less than 2 ppm:

- Kleen Energy Systems, (RBLC Id-CT-015) 2008; CO of 1.7 ppm, one-hour average with duct firing and CO of 0.9 ppm, one-hour average without duct firing
- CPV Warren (RBLC Id-VA-0304), 2007; CO of 2.5 ppm with power augmentation and duct burner and 1.3 ppm without power augmentation and duct burner

A complete listing of RBLC projects, as well as others, is included in Appendix G.2.

Although some power projects mentioned above have proposed CO limits of less than 3 ppm, these are recent projects which are either not on-line or which have not yet had the proposed limits verified through performance testing. The systems permitted for 2 ppm CO or less employ oxidation catalyst to control CO. For the recently permitted projects, it is yet to be determined if these systems will continue the proposed performance to the end of the catalyst's useful life. The CO emissions will increase as the catalyst degrades and thus the control performance degrades over the lifetime of the catalyst. The performance of these systems has not been verified over the useful life period of the catalyst, which is typically five years. Therefore, the CO limits of 2 ppm or less cannot be considered to have been achieved in practice.

Based on the BACT review, the Project proposes CO BACT emission limits of 2.0 ppmv dry (corrected to 15 percent O_2) over a one-hour averaging time without duct burners, and 3.0 ppmv dry (corrected to 15 percent O_2) over a one-hour averaging time when duct burners are firing. These emission limits will be achieved with use of an oxidation catalyst.

CO BACT Determination for Startup and Shutdown

CO emissions during startup and shutdown are controlled to a lesser extent than during normal operation because the oxidation catalyst is below its normal operating temperature range. Similar to the emissions of other pollutants, the RSP technology may be capable of reducing total startup CO emissions on the order of 50 percent.

There are no other technically feasible control techniques to further reduce emissions of CO during startup and shutdown. The mass emission rate limits, in pounds per event, proposed to limit CO emissions during startup and shutdown, therefore, represent LAER, which goes beyond the BACT levels required for this Project.

The following CO emission rate limits during these periods are proposed:

Hot/warm Startup:	329 pounds/event per turbine
Cold Startup:	410 pounds/event per turbine
Shutdown:	337 pounds/event per turbine

5.2.3.3.3 Control Technology Review for VOC

LAER for VOC for Normal Operation

The technologies employed for VOC emissions reductions at combined-cycle power facilities are listed below in descending order of effectiveness:

- Combination of technologies, i.e. oxidation catalyst with good combustion practice
- Oxidation catalyst
- Good combustion practices

All of the listed technologies are feasible, as they have all been achieved in practice.

An oxidation catalyst with good combustion practice will be used as a control technology for this Project. All other identified control technologies are demonstrated to be less effective, and have been eliminated from further consideration.

The similar VV2 Project was recently permitted with a VOC limit of 2 ppm, one-hour average.

The lowest levels of VOC listed for similar combined-cycle turbines in the SCAQMD BACT Guidelines include:

- Magnolia Power, Burbank, California, 2004; VOC of 2.0 ppm, one-hour average
- Vernon City Power & Light, Vernon, California, 2004; VOC of 2.0 ppm, one-hour average

The CEC has approved projects at emission rates ranging from 1 ppm to 2 ppm VOC. For instance, Blythe Energy Project II is at 1 ppm and Roseville Energy Park is at 2 ppm.

Many facilities are listed in the RBLC with VOC permit limits of 2 ppm at 15 percent O_2. Duct burners will emit additional VOC, which will increase the uncontrolled emission levels entering the oxidation catalyst. The following facilities were recently granted a permit with a proposed VOC limit of less than 2 ppm:

- CPV Warren (RBLC Id-VA-0304), 2007; VOC of 1.0 ppm with duct firing and 0.7 ppm without duct firing
- FPL Energy Turkey Point Power Plant (RBLC Id- FL-0263), 2005; VOC of 1.9 ppm with duct firing and 1.3 ppm without duct firing

A complete listing of RBLC projects, as well as others, is included in Appendix G.2.

Although some power plant projects mentioned above have proposed VOC limits of less than 2 ppm, these are recent projects which are either not on-line or have not had the proposed limits verified.

As with CO emissions, the systems permitted for less than 2 ppm VOC employ oxidation catalyst to control VOC. For the recently permitted projects, the performance of these systems has not been verified over the useful life period of the catalyst which is typically five years. Therefore, the proposed VOC limits of less than 2 ppm cannot be considered to have been achieved in practice at this time.

Based on the BACT review, the Project proposes an oxidation catalyst achieving approximately 40 percent destruction of non-methane, non-ethane organic hydrocarbons as LAER for VOC. The combustion turbines with oxidation catalyst will result in VOC concentrations on the order of 1.4 ppmv dry at 15 percent O_2, one-

hour average time when the duct burners are not in use. When duct burning is employed, the concentration of VOC emissions will not exceed 2.0 ppmv dry at 15 percent O_2, with a one-hour averaging period.

VOC LAER Determination for Startup and Shutdown

VOC emissions during startup and shutdown are controlled to a lesser extent than during normal operation because the oxidation catalyst is below its normal operating temperature range. Similar to the emissions of other pollutants, the GE RSP technology may be capable of reducing total startup VOC emissions on the order of 50 percent. There are no other technically feasible control techniques to further reduce emissions of VOC during startup and shutdown. The mass emission rate limits, in pounds per event, proposed to limit VOC emissions during startup and shutdown therefore represent LAER.

The following emission rate limits during these periods are proposed:

Hot/warm Startup:	28 pounds/event per turbine
Cold Startup:	31 pounds/event per turbine
Shutdown:	29 pounds/event per turbine

5.2.3.3.4 Control Technology Review for PM, PM10 and PM2.5

LAER for PM10 and BACT for PM/PM2.5 for Normal Operation

The technologies employed for PM/PM10/PM2.5 emissions reductions at combined-cycle power facilities are listed below in descending order of effectiveness:

- Combination of technologies
- Public Utilities Commissions (PUC)-regulated pipeline-quality natural gas fuel
- Low sulfur fuel
- Lube oil vent coalescer
- Air inlet cooler/filter
- Good combustion practices

All of the listed technologies are feasible, as they have all been achieved in practice.

The applicant has proposed the use of the top-ranked technology, a combination of technologies including low sulfur fuel, lube oil vent coalescer, air inlet cooler/filter and good combustion practices for the control of PM10 emissions. All other identified control technologies (used individually) are demonstrated to be less effective, and have been eliminated from further consideration.

The lowest levels of PM10 emissions listed for similar combined-cycle turbines in the SCAQMD BACT Guidelines include:

- Magnolia Power, Burbank, California, 2004; PM10 of 0.01 grains per standard cubic foot (gr/scf)
- Vernon City Power & Light, Vernon, California, 2004; PM10 of 0.01 gr/scf

Both of these permits also use hourly emission limits to define LAER for PM10.

The RBLC generally cites the use of pipeline quality natural gas as BACT or LAER for PM10 from combined-cycle combustion turbines. The CEC has also indicated the use of pipeline quality natural gas as BACT for the Blythe Energy Project II and the Los Esteros Critical Energy Facility, Phase II, and has imposed hourly emission limits reflecting the capacity of the equipment.

As the equipment and the source of natural gas for the Project is similar to that of the Victorville 2 Hybrid Power Project, similar hourly emission rates are proposed for the Project. The proposed hourly mass emissions limits for two turbines of 12 pounds per hour when the duct burners are off and 18 pounds per hour when the duct burners are on, and the exclusive use of pipeline quality natural gas represent LAER for the proposed combined-cycle turbines.

PM10 LAER and PM2.5 BACT Determination for Startup and Shutdown

Since PM/PM10/PM2.5 emissions generally result from impurities in the natural gas burned or combustion air and do not depend on an emissions control system, the proposed LAER mass limits that govern normal operation also represent LAER for PM/PM10/PM2.5 emissions during startup and shutdown.

5.2.3.3.5 Control Technology Review for SO_2

BACT for SO_2 for Normal Operation

The technologies employed for SO_2 emissions reductions at combined-cycle power facilities are listed below in descending order of effectiveness:

- PUC-regulated pipeline-quality natural gas fuel
- Low sulfur fuel

The listed technologies are feasible, as they have all been achieved in practice.

No limits for SO_2 are listed for similar combined-cycle turbines in the SCAQMD BACT Guidelines other than monthly mass emission limits. The RBLC generally cites the use of pipeline-quality natural gas as BACT for SO_2 from combined-cycle combustion turbines. The CEC has approved or is expected to approve several projects which have proposed the use of pipeline-quality natural gas as BACT for SO_2. The sulfur content in the gas ranges from 0.2 grains per 100 dscf for Victorville 2 Hybrid Power Project to 1 grain per 100 dscf for the proposed Reliant San Gabriel Generating Station.

Like the VV2 Project, the PHPP combustion turbines will be fired exclusively with natural gas and will use the same gas that fuels the High Desert Power Project (HDPP). HDPP is required to maintain records of the sulfur content of the gas, and has demonstrated that the sulfur content has remained below 0.2 grains of sulfur per 100 dscf on an annual average basis. Therefore, the exclusive use of pipeline-quality natural gas with an annual average sulfur content of 0.2 grains per 100 dscf represents BACT for the proposed combined-cycle systems.

SO_2 BACT Determination for Startup and Shutdown

Since SO_2 emissions result from the oxidation of sulfur in the natural gas burned, the proposed mass limits that govern normal operation also represent BACT for emissions during startup and shutdown.

5.2.3.4 BACT/LAER Determination for Auxiliary Boiler and HTF Heater

The proposed Project will include a 100 MMBtu/hr auxiliary boiler and a 40 MMBtu/hr HTF heater. Both will be fired on pipeline-quality natural gas. The auxiliary boiler will operate a maximum of 500 hours per year, and the HTF heater will operate no more than 1,000 hours per year. The auxiliary boiler is primarily designed to shorten the duration of startups as part of GE's RSP technology; therefore, the boiler itself is part of the control technology designed to minimize emissions during startup of the combustion turbines.

Permitting activity within the past several years has resulted in lower emission standards for boilers and, therefore, the database review was focused only on determinations from 2003 and later. The list of projects compiled from the various databases is summarized in Appendix G.2.

LAER for NOx

The technologies employed for NO_X emissions reduction are listed below in descending order of effectiveness:

- SCR
- Ultra-low-NO_X burners
- Low-NO_X burners with flue gas recirculation
- Flue gas recirculation
- Good combustion practice and natural gas fuel

SCR was mentioned as an alternative control technology for boilers by the Bay Area Air Quality Management District (BAAQMD) in their BACT guidance document. SCR is known to successfully control NO_X to very low concentrations in large furnaces and boilers, although there is little evidence that this technology has been applied to boilers in the size range of the proposed units. One key limitation relative to the technical feasibility of SCR for the proposed auxiliary boiler and HTF heater is that the temperature of the exhaust gas will be below the low end of the proper temperature range for the SCR catalyst. SCR also requires a substantial capital investment for the catalyst bed, additional power for operations (additional blower horsepower is required to overcome the pressure drop in the catalyst bed), and the use of hazardous aqueous or anhydrous ammonia as the reducing agent. Based on the database review of boilers with similar heat rates, SCR is not used for NO_X control on boilers in the size range of the proposed units, as evidenced by the large number of applications cited that use low-NO_X or ultra-low-NO_X burner technologies. Due to the temperature inconsistency, limited number of hours of steady state operation, higher cost, additional energy requirements, the need to use a hazardous material (ammonia), and lack of evidence that SCR is used on boilers or heaters in the size range of the proposed units, SCR is determined to be infeasible for these devices.

The next most effective NO_X control option is the use of ultra-low NO_X burners. The auxiliary boiler will be equipped with ultra-low NO_X burners with a stack NO_X concentration of 9 ppm at three percent O_2 with a

recommended averaging period of one hour. The HTF heater will also emit 9 ppm NO_X or less. The use of ultra-low-NO_X burners and the emission limit of 9 ppm represent LAER for the proposed auxiliary boiler and HTF heater.

BACT for CO and LAER for VOC

The technologies employed for CO and VOC emissions reduction are listed below in descending order of effectiveness:

- Oxidation catalyst
- Good combustion practices

Oxidation catalysts are known to successfully control CO and VOC to very low concentrations in large furnaces and boilers, although there is little evidence that this technology has been applied to boilers or heaters in the size range of the proposed units. Oxidation catalysts are mentioned as an alternative control technology by the BAAQMD in their BACT guidance document for larger combustion sources (i.e., greater than 50 MMBtu/hour). Oxidation catalysts require a substantial capital investment for the catalyst bed, and additional power for operations (additional blower horsepower is required to overcome the pressure drop in the catalyst bed). Based on the database review of process heaters and boilers with similar heat rates, it appears that oxidation catalysts are not used for CO and VOC control on boilers or heaters in the size range of the proposed units. Due to the limited hours of operation of the boiler and heater, substantially higher cost, additional energy requirements, and lack of evidence that oxidation catalysts are used on boilers or heaters in this size range, oxidation catalysts are determined to be infeasible for these devices.

The next most effective CO and VOC control option is the use of good combustion practices. Good combustion practice is recommended as BACT for this application. A recent BACT analysis for the proposed Reliant San Gabriel Generating Station proposed a CO limit of 25 ppm at three percent O_2 with a 15-minute averaging period. The facility was recently granted a permit (March 2008) but these emissions levels have not been demonstrated through performance testing. Hence these levels are not considered to be achieved in practice.

Based on several recent BACT determinations, 50 ppm at three percent O_2 is recommended as BACT for CO emissions. A one hour averaging period is recommended.

The auxiliary boiler and the HTF heater will be limited to 0.005 pounds per MMBtu of VOC at full load as part of the inherent design of the ultra-low-NO_X burner. Both units will burn only natural gas and will achieve BACT using good combustion practices during normal operation as well as during startup and shutdown.

LAER for PM10, BACT for PM/PM2.5, and BACT for SO_2

The technologies employed for PM, PM10, PM2.5 and SO_2 emissions reduction are listed below in descending order of effectiveness:

- Pipeline-quality natural gas fuel
- Low-sulfur fuel
- Good combustion practices

The listed technologies are feasible, as they have all been achieved in practice.

PM/PM10/PM2.5 emissions for both the auxiliary boiler and the HTF heater will be limited through the use of low sulfur pipeline quality natural gas. LAER for PM10 and BACT for PM2.5 will be achieved by the exclusive use of low sulfur pipeline-quality natural gas during normal operations.

The pipeline gas is expected to contain no more than 0.2 grains of sulfur per 100 dscf of natural gas for an emission rate of 0.0006 lb/MMBtu of SO_2. Use of pipeline quality natural gas is considered BACT for SO_2 for these emission sources.

5.2.3.5 BACT/LAER Determination for Emergency Diesel Generator and Fire-Water Pump Engines

The Project will include an emergency diesel generator rated at approximately 2,000 kW and a diesel fire-water pump rated at approximately 135 kW. These emergency diesel engines will each operate for a maximum of 50 hours per year for testing. Emergency operation of the engines is unknown and not limited by regulation.

LAER for NO_X and VOC and BACT for CO

The technologies employed for NO_X, VOC and CO emissions control for internal combustion engines are listed below in descending order of effectiveness:

- Catalytic converter
- Oxidation catalyst
- California ATCM-compliant engine
- NSPS-compliant engine

Catalytic converters and oxidation catalysts have been proposed and used on a limited number of diesel engines in California; however, neither has been used on emergency engine installations due to the high cost and limited environmental benefit (due to the low number of hours of operation). Catalytic converters and oxidation catalysts are, therefore, determined to be infeasible for this application.

The remaining feasible control technology for this Project is the NSPS-compliant engine. NSPS, 40 CFR 60 Subpart IIII, was promulgated July 11, 2006 (71 FR 39154) by EPA for stationary diesel engines. Title 17, CCR Section 93115, the California ATCM for Stationary CI Engines, provides standards for new stationary emergency standby diesel-fueled engines. The California emission standards specified in 13 CCR Section 2423 and the PM emission limits specified in 17 CCR Section 93115 are at least as stringent as the Subpart IIII. Therefore, compliance with the California emission standards and limits constitutes LAER for the emergency diesel generator and fire-water pump engines.

The emergency diesel generator engine will meet the California Tier 2 limit of 6.4 grams per kilowatt-hour (g/kW-hr) of NO_X plus NMHC for 2006 - 2010 model year diesel engines rated above 560 kW. The fire-water pump engine will meet the California Tier 3 limit of 4.0 g/kW-hr for NO_X plus NMHC emissions for 2006 - 2010 model year diesel engines rated between 130 and 224 kW. Use of engines that comply with these emission limits, plus an enforceable operating restriction of 50 hours per year for maintenance and

testing constitutes LAER for NO_X emissions for both the emergency generator and the fire-water pump engines.

The emergency diesel generator engine will meet the California Tier 2 limit of 3.5 g/kW-hr of CO for 2006 - 2010 model year diesel engines rated above 560 kW. The fire-water pump engine will meet the California Tier 3 limit of 3.5 g/kW-hr for CO emissions for 2006 - 2010 model year diesel engines rated between 130 and 224 kW. Use of engines that comply with these emission limits, plus an enforceable operating restriction of 50 hours per year for maintenance and testing constitutes LAER for CO emissions for both the emergency generator and the fire-water pump engines.

The emergency diesel generator engine will meet the California Tier 2 limit of 6.4 g/kW-hr of NO_X plus NMHC for 2006 - 2010 model year diesel engines rated above 560 kW. NMHC is assumed to be equivalent to VOC. The fire-water pump engine will meet the California Tier 3 limit of 4.0 g/kW-hr for NO_X plus NMHC emissions for 2006 - 2010 model year diesel engines rated between 130 and 224 kW. Use of engines that comply with these emission limits, plus an enforceable operating restriction of 50 hours per year for maintenance and testing constitutes LAER for VOC emissions for both the emergency generator and the fire-water pump engines.

LAER for PM10 and BACT for PM/PM2.5

The technologies employed for PM10/PM2.5 emissions control for CI engines are listed below in descending order of effectiveness:

- Diesel particulate trap
- California ATCM-compliant engine
- NSPS-compliant engine

Diesel particulate traps have been proposed and used on a limited number of diesel engines; however, they have not been used on emergency engine installations due to the high cost and limited environmental benefit (due to the low number of hours of operation). Diesel particulate traps are, therefore, determined to be infeasible for this application.

An ATCM-compliant engine is recommended as BACT for this application. The California emission limit for emergency engines with 31 to 50 hours per year allowed for maintenance and testing is 0.15 grams per brake horsepower-hour (g/bhp-hr). Therefore, compliance with an emission limit of 0.15 g/bhp-hr plus an enforceable operating restriction of 50 hours per year for maintenance and testing constitutes LAER/BACT for PM10/PM2.5 emissions for both the emergency generator and the fire-water pump engines.

BACT for SO_2

Only low sulfur diesel fuel (15 ppm by weight) will be burned in the emergency generator and fire-water pump engines. No add-on SO_2 controls are available for these sources. Therefore, use of low-sulfur fuel constitutes BACT for SO_2 emissions from these units.

5.2.3.6 BACT/LAER Determination for Evaporative Mechanical Draft Cooling Tower

Criteria pollutant emissions from the cooling tower, and hence the BACT determination, are limited to PM, PM10 and PM2.5. The technologies available for control of PM/PM10/PM2.5 from cooling towers include:

- Use of alternative cooling technologies such as “dry” cooling.
- High-efficiency drift eliminator for wet cooling tower.

The dry cooling method is not economically feasible for this Project (see Section 4.0 of this AFC). Furthermore, other projects have demonstrated that additional criteria pollutant emissions would be generated in order to make up the power lost due to the additional electrical loads that occur in a dry-cooled plant.

LAER for PM10 and BACT for PM/PM2.5 from evaporative cooling towers is the use of high efficiency drift eliminators. No other control technology has been identified that could reduce emissions of PM/PM10/PM2.5 from an evaporative cooling tower beyond levels that can be achieved with state-of-the-art drift eliminators. The Project will install a ten-cell cooling tower with a circulation rate of approximately 130,000 gallons per minute. Drift eliminators will be used to limit the drift rate to 0.0005 percent (based on circulation rate). Use of the drift eliminators and a drift rate of 0.0005 percent constitute LAER for PM10 and BACT for PM/PM2.5 emissions from the proposed evaporative cooling tower.

5.2.3.7 BACT/LAER Determination for HTF Expansion Tank/Ullage System

Unlike the existing solar energy plants, the PHPP will use a closed vapor system for the HTF expansion tanks. At the existing facilities that utilize parabolic trough mirror technology, the HTF expansion tanks are blanketed with nitrogen gas to keep the headspace in the expansion tanks non-explosive. The nitrogen may become saturated with VOC as it is in contact with the HTF and any volatile HTF breakdown products. At the existing solar thermal plants, when the HTF heats and expands, the nitrogen gas, which is potentially saturated with VOC, is vented to atmosphere. A recently constructed parabolic trough mirror solar project in Nevada vents these emissions through control equipment such as activated carbon. With the PHPP system, when the HTF heats and expands, the VOC-saturated nitrogen will be captured, compressed, and stored in a small pressurized tank. When the HTF cools and contracts, the nitrogen is replaced from the pressurized tank. This design serves to conserve nitrogen and completely eliminates VOC emissions from the expansion tanks.

5.2.3.8 Summary of BACT/LAER Emission Rates

A summary of the BACT/LAER emission rates proposed for the Project, based on the above evaluation, are provided in Table 5.2-15.

Table 5.2-15 Summary of BACT/LAER for the Project

Source	NO_X	CO	VOC	PM/PM10/PM2.5	SO_X
Combined-Cycle Units (Combustion turbines and HRSGs)[1]	2.0 ppm, at 15% O_2 1-hr avg	3.0 ppm, at 15% O_2 1-hr avg	2.0 ppm, at 15% O_2 1-hr avg	Pipeline quality natural gas	Pipeline quality natural gas
Auxiliary Boiler and HTF Heater	9 ppm at 3% O_2 and 1-hr avg	50 ppm at 3% O_2 and 1-hr avg	0.005 lb/MMBtu	0.007 lb/MMBtu	0.0006 lb/MMBtu
Emergency diesel generator	6.4 g/kW-hr NO_X + NMHC	3.5 g/kW-hr	6.4 g/kW-hr NO_X +NMHC	0.15 g/bhp-hr	15 ppm fuel S
Emergency fire-water pump	4.0 g/kW-hr NO_X + NMHC	3.5 g/kW-hr	4.0 g/kW-hr NO_X +NMHC	0.15 g/bhp-hr	15 ppm fuel S
Cooling Tower	n/a	n/a	n/a	0.0005% drift eliminator	n/a
HTF Expansion Tanks	n/a	n/a	Closed system	n/a	n/a

[1] Emissions rates in ppm are by volume dry at 15 percent O_2. Compliance for NO_X and CO determined with CEMS; VOC with source tests.

5.2.4 Environmental Impacts

This section provides a discussion of air quality impacts from criteria pollutant and GHG emissions from the PHPP. Section 5.10, Public Health provides a discussion of the impacts to public health from potential emissions of TAC.

5.2.4.1 Emissions

This section provides the criteria pollutant emissions calculated for the Project. Emissions have been estimated for the three phases of the Project: construction, commissioning, and operation, each of which is discussed below. In addition, estimates of GHG emissions from operation of the Project are provided.

Construction

During the construction of the PHPP, there will be emissions similar to those associated with any large industrial construction project. On-site emissions will arise primarily from heavy-duty vehicles and equipment. On-site fugitive dust emissions will also be generated during site preparation and during construction. Off-site emissions will occur from construction worker vehicles and material delivery trucks. The construction-related emissions are transient in nature and will cause some unavoidable but minor localized short-term impacts.

The Project will include construction of the combined-cycle power block, a solar array, a 7.4-mile reclaimed water supply pipeline, a 8.7-mile natural gas supply pipeline, a 1.0-mile sanitary waste water line, a 1.0-mile potable water supply line, and the Project's electric transmission line, comprised of two segments, of approximately 35.6 miles.

Construction of the combined-cycle power plant and the solar array will require approximately 27 months and 24 months, respectively. Construction of the reclaimed water supply line will require approximately nine months, construction of the natural gas pipeline will require approximately 15 months, construction of the sanitary wastewater line will require approximately five months, and construction of the potable water supply line will require approximately two months. Transmission line construction will occur over a 26-month period. Construction of Project elements will occur concurrently.

Table 5.2-16 summarizes maximum daily on-site and off-site emissions and Table 5.2-17 summarizes maximum annual on-site emissions during construction of the combined-cycle facility and solar array. Table 5.2-18 summarizes maximum daily emissions during construction of the reclaimed water supply pipeline, the natural gas pipeline, the sewer line, the potable water pipeline, and each of the two transmission line segments. Details of the construction emission calculations are contained in Appendix G.3.

Table 5.2-16 Maximum Daily Combined-Cycle and Solar Array Facility Construction Emissions

Project Component	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Combined-Cycle Facility, Onsite	254.1	20.2	105.8	0.1	55.7	16.3
Solar Array, Onsite	325.0	23.0	128.9	0.3	93.4	23.8
Combined-Cycle Facility, Off-Site	161.6	16.6	58.7	0.1	19.0	5.3
Solar Array, Off-Site	225.8	24.9	115.2	0.2	28.1	8.7

Table 5.2-17 Maximum Annual Onsite Combined-Cycle Facility and Solar Array Construction Emissions

Project Component	CO (tpy)	VOC (tpy)	NO_X (tpy)	SO_X (tpy)	PM10 (tpy)	PM2.5 (tpy)
Combined-Cycle Facility	32.0	2.4	12.3	< 0.05	6.6	2.0
Solar Array	36.9	2.7	14.4	< 0.05	7.7	2.2

Table 5.2-18 Maximum Daily Reclaimed Water, Sanitary Sewer, Natural Gas, Backup Water and Transmission Line Construction Emissions

Project Component	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Reclaimed Water Pipeline	164.6	27.5	90.6	0.1	41.9	13.8
Natural Gas Pipeline	164.6	27.5	90.6	0.1	41.9	13.8
Sanitary Wastewater Line	51.0	7.8	24.2	< 0.05	10.1	3.4
Potable Water Pipeline	51.0	7.8	24.2	< 0.05	10.1	3.4
Transmission Line Segment 1	156.1	30.0	219.7	0.2	84.1	23.6
Transmission Line Segment 2	195.4	33.8	255.6	0.3	309.7	72.4

Commissioning Emissions

Following construction of the Project and prior to commercial operation, the combustion turbines, steam turbine, emissions control equipment, HRSGs, and other plant equipment will be tested and tuned. Further, the HRSGs, steam piping, condensers, and other equipment handling steam and condensate will be cleaned of dirt, oil, mill scale and debris. This cleaning is usually accomplished with steam blows. According to EPA guidance (EPA 1980), steam blows are considered a construction activity.

All of these commissioning operations will require operation of the combustion turbines at loads from zero percent to 100 percent of full load. During much of this period, the emissions from the plant will be higher than the normal operating and startup emissions because the combustion turbine burners may not yet be tuned for optimal emissions and the post-combustion emissions control equipment (e.g., SCR and oxidation catalyst) will not yet be in operation.

The emission levels during plant commissioning were estimated by considering the types of tests that would be conducted, combustion turbine loads during the tests, and operability of the SCR and oxidation catalyst systems during the tests. Using this information combined with estimated partial-load emissions information for the combustion turbines obtained from the combustion turbine manufacturer, and known SCR and oxidation catalyst control efficiency, emissions for each test were estimated. Since the combustion turbine combustors will not have been tuned prior to of the start of commissioning, and SCR and oxidation catalyst will not be installed until after DLN tuning is complete, a factor was applied to the calculated emissions to account for additional combustion turbine emissions above those predicted by the combustion turbine manufacturer for normal tuned partial-load operation. Since it is not possible to precisely predict the emissions of the combustion turbines prior to tuning or the load conditions required to facilitate tuning of the combustors, the emissions are only estimates. During commissioning, the combustion turbines will normally be run intermittently.

Full Speed-No Load Test (No SCR in Operation)

These tests involve starting the combustion turbines, ramping them up to design operating specifications, and then holding them at that point while not generating electrical power output. This allows testing of the combustion turbine ignition system, testing of the synchronizing system for the electric generator, and testing of the turbine over-speed safety system. During this test, the heat input into the combustion turbine will be approximately 25 percent of the maximum heat input rating. The initial HRSG boilout will be conducted simultaneously with this test in preparation for the steam blows.

Steam Blows (No SCR in Operation)

During this period, the combustion turbines and HRSGs are operated to generate low pressure steam. This steam is released through vents at the ends of each of the branches in the steam piping in order to heat up the piping and create a high velocity motive force to dislodge and remove dirt, mill scale, oil, and other debris from the inside of the piping and the inside of the HRSG components. These contaminants must be removed prior to admission of steam into the steam turbine to prevent damage to the steam turbine. The combustion turbines will be operated at a load of 7.5 percent to about 30 percent of full load (power output basis) during this period, with a heat input of 35 to 40 percent of maximum heat input rating.

Full Load Tests (No SCR in Operation)

These tests will include further tests of the steam turbine, HRSG and associated equipment. During these tests, the combustion turbines will be started and ramped up to 100 percent output with 100 percent of its maximum heat input rating.

DLN Tuning Part Load Tests (No SCR in Operation)

These tests allow the combustion turbine combustors to be tuned to minimize emissions, while also testing the HRSG and steam turbine. During these tests, the combustion turbine will be started and ramped up to various load points from 7.5 percent to 100 percent in 5-MW intervals. The combustion turbines will operate with a heat input of 25 percent to 100 percent of maximum heat input rating.

Full Load Tests (SCR Tuning)

These tests will include tuning of the ammonia injection system to minimize stack exhaust NO_X. During these tests, the combustion turbines will be started and ramped up to 100 percent output with 100 percent of its maximum heat input rating.

Full and Peak Load Tests (SCR Operational)

These tests will include additional testing of the combustion turbines, steam turbine, HRSG and associated plant equipment. The duct burner system will also be tested to verify system operation at its full design capacity. During these tests, the combustion turbine will be started and ramped up to 100 percent output with 100 percent of its maximum heat input rating. The duct burners will also be started and ramped to 100 percent of their maximum heat input rating. The SCR and oxidation catalyst systems are expected to be fully operational during these tests.

Worst-case Emissions

As discussed above, it is not possible to precisely predict the emissions of the combustion turbines prior to tuning and to predict all the load conditions and hold points for the combustion turbines during commissioning of the Project. Due to manufacturing tolerances of the combustion turbines and other equipment and variances in plant design and manufacturer's equipment, each plant will operate a little differently until the plant can be fully tuned to attain stable and optimal operation. Combustion turbines may need to be held at different load points in different plants to facilitate the tuning. Therefore, determining the maximum hourly emissions rates during commissioning is difficult. The maximum hourly emission rates for each combustion turbine/HRSG unit could be as high as 242 pounds per hour of NO_X and 1,337 pounds per hour of CO during the steam blow, and 197 pounds per hour of NO_X and 467 pounds per hour of CO while operating with untuned combustors prior to installation of the SCR or oxidation catalyst systems. The Project is not expected to be operated at these high emissions rates for sustained periods. However, operation at these high emission rates is possible and may be needed to allow tuning problems to be identified and corrected. Steps will be taken to minimize these short-term emissions.

Table 5.2-19 summarizes the anticipated emissions during the commissioning period. The commissioning period is complete when all plant equipment is operating as intended, all plant systems tuning and checkout is complete, CEMS certification is complete, and plant emissions testing is complete. The commissioning period is expected to be accomplished within 624 hours of first-fire for each combustion turbine.

Table 5.2-19 Estimated Emissions During Commissioning Period

Emissions	NO_X	CO	VOC
Maximum hourly emissions during steam blows (lb/hr) (one combustion turbine)	242	1,337	55
Maximum hourly emissions during commissioning (lb/hr) (one combustion turbine)	197	467	17
Total for two combustion turbines (tons)	32	118	11

Normal Operation

For the following discussions, the emissions of PM, PM10 and PM2.5 are considered to be equivalent for the combustion equipment and cooling tower. This is a conservative assumption. Only PM10 is called out in the following discussion regarding operation emissions.

Combustion Turbines and Duct Burners

Emissions from the Project combustion turbine units were based on process information provided by Kiewit Power Engineers, emission guarantees from GE, and a review of source test data for PM10. Annual emissions were calculated for two scenarios: (1) continuous operation of both combustion turbines throughout the year (i.e., no startups, shutdowns or offline periods); and (2) annual operations that include the maximum anticipated number of startups and shutdowns, offline periods prior to each startup, and continuous operation for the rest of the year.

Emissions for continuous operation throughout the year were based on both combustion turbines operating at full load for 8,760 hours per year with 2,000 hours of duct burning in each unit at the average temperature of 64°F. Note that the annual average temperature in the Project area is 78°F; emissions estimates at 64°F will be higher due to the higher air density at 64°F, leading to more conservative impacts analyses.

Annual emissions accounting for startups, shutdowns, and offline periods prior to startups were based on:

- Hot Start and Warm Start - 80 minute startup duration with 260 hot/warm startups per unit per year (total of 346.7 hours per year for hot or warm starts). For each hot or warm start, the turbines are assumed to be offline for an average of 6 hours prior to the startup (total of 1,560 hours per year offline prior to hot or warm starts).
- Cold Start - 110 minute startup duration with 50 cold startups per unit per year (total of 91.7 hours per year for cold starts). For each cold start, the turbines are assumed to be offline for an average of 48 hours (total of 2,400 hours per year offline prior to cold starts).
- Shutdown - 30 minute shutdown duration with 310 shutdowns per unit per year (total of 155 hours per year for shutdowns).
- Continuous Operation with Duct Firing - 2,000 hours per year.
- Continuous Operation without Duct Firing - 2,207 hours per year.

Emissions for both cases (i.e., continuous operation and operation with start-up and shutdowns) and the higher emissions for the two cases are summarized in Table 5.2-20. Maximum hourly emissions from the two turbines are shown in Table 5.2-21. As shown in the table, maximum emissions for NO_X, PM10, VOC and SO_2 occur when there are continuous operations. This is generally always true for PM10 and SO_2 since emissions of those two pollutants are not higher during startup and shutdown than during normal operations. However, it is unusual that NO_X would not be higher when accounting for startup and shutdown events. The Project is unusual in this regard because of the GE Rapid Start Process option, which reduces the time needed in startup mode. CO emissions are greatest when startups and shutdowns are included even with the Rapid Start option since CO emissions are so much greater during startup before the oxidation catalyst is fully functional. Details of the operation emission calculations for the turbines and duct burners are in Appendix G.3.

Table 5.2-20 Maximum Annual Emissions from Combustion Turbines

Operating Scenario	NO_X (tpy)	CO (tpy)	VOC (tpy)	PM10 (tpy)	SO_2 (tpy)
Continuous Operation all Year	113.7	77.5	39.6	117.1	8.8
Operation with Startup/Shutdown and Offline Periods	88.4	252.6	37.2	n/a	n/a
Maximum Annual Emissions[1]	**113.7**	**252.6**	**39.6**	**117.1**	**8.8**
[1] "Maximum Annual Emissions" is the largest total in either the first or second line of this table.					

Table 5.2-21 Maximum Hourly Emissions from Two Combustion Turbines

Operating Mode	NO_X (lb/hr)	CO (lb/hr)	VOC (lb/hr)	PM10 (lb/hr)	SO_2 (lb/hr)
Full-Load Operation					
Without duct firing	25.5	15.6	8.9	24	1.98
With duct firing	27.3	25.0	9.5	36	2.12
Hot Warm Start	60	494	42.0	---	---
Cold Start	105	447	33.8	---	---
Shutdown	228	1,348	116.0	---	---

Auxiliary Boiler and HTF Heater

The Project will include a natural gas-fired auxiliary boiler in order to facilitate rapid startup of the combustion turbines. It will operate a maximum of 500 hours per year and will have a heat input of 100 MMBtu per hour. NO_X emissions are based on 9 parts per million by volume dry (ppmvd) at three percent O_2 and CO emissions are based on 50 ppmvd at three percent O_2. SO_2 emissions are based on 0.2 grains of sulfur per 100 dscf of natural gas. PM10 and VOC emissions were calculated using emission factors from EPA AP-42 (EPA, 1998). Auxiliary boiler emissions are presented in Table 5.2-22. Details of the auxiliary boiler emission calculations are provided in Appendix G.3.

Table 5.2-22 Maximum Hourly and Annual Auxiliary Boiler Emissions

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emissions (tpy)
NO_X	1.100	0.2750
VOC	0.537	0.1343
CO	3.681	0.9202
SO_2	0.059	0.0146
PM10	0.742	0.1855

The HTF heater will operate a maximum of 1,000 hours per year and will have a heat input of 40 MMBtu/hr. NO_X emissions are based on 9 ppmvd at three percent O_2 and CO emissions are based on 50 ppmvd at three percent O_2. SO_2 emissions are based on 0.2 grains of sulfur per 100 dscf of natural gas. VOC and PM10 emissions were calculated using emission factors from EPA AP-42 (EPA, 1998). HTF heater emissions are presented in Table 5.2-23. Details of the HTF heater emission calculations are in Appendix G.3.

Table 5.2-23 Maximum Hourly and Annual HTF Heater Emissions

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emissions (tpy)
NO_X	0.440	0.220
VOC	0.215	0.107
CO	1.472	0.736
SO_2	0.023	0.012
PM10	0.297	0.148

Emergency Diesel Generator and Fire-Water Pump Engine

The Project's emergency diesel generator will operate a maximum of 50 hours per year for maintenance and testing and will have an output of two MW. NO_X, VOC and CO emission factors were set equal to the California Tier 2 emission limits, with the assumption that 95 percent of the emission limit for NO_X plus NMHC is NO_X. SO_2 emissions were calculated using a fuel sulfur content of 15 ppm by weight. The PM10 emission factor was set equal to the 0.15 g/bhp-hr limit specified in 17 CCR Section 93115. Emergency diesel generator emissions are presented in Table 5.2-24. Emissions from emergency operation of the engine are not estimated.

Table 5.2-24 Maximum Hourly and Annual Emergency Diesel Generator Emissions

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emissions (tpy)
NO_X	26.80	0.67
VOC	1.41	0.04
CO	15.43	0.39
SO_2	0.03	0.0007
PM10	0.88	0.022

The emergency diesel firewater pump engine will operate a maximum of 50 hours per year for maintenance and testing. NO_X, VOC and CO emission factors were set equal to the California Tier 3 emission limits, with the assumption that 95 percent of the emission limit for NO_X plus NMHC is NO_X. SO_2 emissions were calculated using a fuel sulfur content of 15 ppm by weight. The PM10 emission factor was set equal to the 0.15 g/bhp-hr limit specified in 17 CCR Section 93115. Emergency diesel fire-water pump engine emissions are presented in Table 5.2-25. Emissions from emergency operation of the engine are not estimated.

Table 5.2-25 Maximum Hourly and Annual Emergency Diesel Fire-water Pump Emissions

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emissions (tpy)
NO_X	1.14	0.03
VOC	0.06	0.00
CO	1.05	0.03
SO_2	0.002	0.000
PM10	0.06	0.0015

Cooling Tower

The Project will include a 10-cell cooling tower with drift eliminators. Total Suspended Particulate (TSP) was calculated based on the maximum water circulation rate and the amount of Total Dissolved Solids (TDS)/Total Suspended Solids (TSS) in the water. The reduction due to the drift eliminator was then applied. PM10 was calculated by assuming 100 percent of TSP is PM10 and PM2.5. Hourly and annual emissions are listed in Table 5.2-26. Details of the cooling tower emission calculations are in Appendix G.3.

Table 5.2-26 Maximum Hourly and Annual Cooling Tower PM10 Emissions

Parameter	Value
Water Circulation Rate	130,000 gpm
Total Liquid Drift	0.0005%
Expected TDS/TSS of Circulated Water	5,000 ppmw
PM10 Emissions	1.63 lb/hr

Details of the emergency diesel generator and fire-water pump engine emission calculations are in Appendix G.3.

Vehicle Emissions

The Project will require periodic vehicle travel over the unpaved portions of the solar field to perform routine maintenance including mirror washing, maintenance inspections and repairs of the piping network, herbicide application and dust suppressant application. Criteria pollutant emissions are expected from the combustion of fuels in the vehicles and fugitive PM10 and PM2.5 emissions are expected from vehicle traffic in the solar fields.

Vehicle criteria pollutant emissions are calculated as the anticipated miles traveled multiplied by an emission factor. The emission factors, except fugitive emissions from entrained road dust, were compiled by running

the ARB's EMFAC2007 (version 2.3) Burden Model (ARB, 2007) and dividing calculated daily emissions by daily vehicle-miles-traveled. All vehicles are assumed to be heavy-duty diesel vehicles. All the emission factors account for the emissions from start, running and idling exhaust. The VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained unpaved road dust. Vehicle distance (daily and annual) and average speed are assumed based on operational knowledge of the SEGS facility at Kramer Junction. Vehicle emissions are summarized in Table 5.2-27; emission calculations are shown in Appendix G.3.

Total Project Emissions Summary

Table 5.2-27 shows the annual potential to emit for the Project. The Project will be a major source of NO_X, CO, VOC, and PM10. For modeling purposes, PM2.5 was assumed to be equal to PM10 emissions for these sources.

Table 5.2-27 Total Annual Potential Emissions, Normal Operation

Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	PM/PM10/PM2.5 (tpy)	SO_2 (tpy)
Combustion turbines/HRSGs	113.7	252.6	39.64	117.1	8.83
Auxiliary Boiler	0.28	0.92	0.13	0.19	0.015
HTF Heater	0.22	0.74	0.11	0.15	0.012
Emergency Generator	0.67	0.39	0.04	0.022	0.0007
Fire-Water Pump Engine	0.03	0.026	0.001	0.0015	5.0E-05
Cooling Tower	n/a	n/a	n/a	7.1	n/a
Maintenance Vehicles	0.39	0.12	0.03	1.51	0.00
Total	**115.3**	**254.8**	**40.0**	**126.1**	**8.9**

GHG Emissions

The combustion turbines, duct burners, boiler, auxiliary heater and emergency fire water pump and emergency generator engines and circuit breakers may emit GHG, including CO_2, methane (CH_4), nitrous oxide (N_2O) and sulfur hexafluoride (SF_6). The methodology used to calculate GHG emissions from each of these sources is explained below.

Calculation Methodology

GHG emissions from operation of the combustion sources including the combustion turbines, duct burners, emergency engines, heater and boiler are based on the maximum usage of the units by the Project and the emission factors listed in California Climate Action Registry General Reporting Protocol (GRP) (CCAR, 2007a).

The annual natural gas usage for the combustion turbines, duct burners, auxiliary boiler, and HTF heater are estimated based on the predicted operating schedule and maximum fuel consumption rate. The annual diesel usage for the fire water pump and the emergency diesel generator engines are estimated based on fuel consumption rate and the maintenance operating schedule of 50 hours per year each. GHG emissions

are not estimated for emergency use of these engines. The SF_6 emission rate is based on the amount of in-use SF_6 and the manufacturer-guaranteed leak rate.

CO_2 equivalents (CO_2e) are calculated using the global warming potential (GWP) provided in Appendix C of the GRP (CCAR 2007b). For example, the GWP of methane is 21 times that of CO_2 and the GWP of N_2O is 310 times that of CO_2.

Summary of GHG Emissions

Total GHG emissions from the Project are summarized in Table 5.2-28. Additional details of the calculations are provided in Appendix G.3.

Table 5.2-28 Summary of GHG Emissions

Source	CO_2 Emissions (metric tpy)	CH_4 Emissions (metric tpy)	N_2O Emissions (metric tpy)	SF_6 Emissions (metric tpy)	CO_2 Equivalents (metric tpy)
Turbine 1	920,954	102	1.74	---	923,643
Turbine 2	920,954	102	1.74	---	923,643
Auxiliary Boiler	2,653	0.30	5.00E-03	---	2,661
HTF Heater	2,122	0.24	4.00E-03	---	2,129
Emergency Generator	25	2.63E-04	2.63E-04	---	25
Fire Water Pump	4	3.90E-05	3.90E-05	---	4
Circuit Breakers	---	---	---	3.63E-04	8.67
Maintenance Vehicles	10	1.00E-03	1.19E-03	---	10.33
Total	1,846,722	205	3.48	3.63E-04	1,852,123

5.2.4.2 Air Quality Impact Assessment

5.2.4.2.1 Class II Area Air Quality Impact Assessment

The detailed methodology for the Class II area AQIA is documented in the modeling protocol, “Class II Area Dispersion Modeling Protocol for the Proposed Palmdale Hybrid Power Project”. A copy of this protocol is provided in Appendix G.4. The analyses were conducted in accordance with the EPA Guideline on Air Quality Models (GAQM; as incorporated in Appendix W of 40 CFR Part 51; EPA, 2005).

The AERMOD model (version 07026) was applied with a three-year sequential hourly meteorological data set, consistent with Appendix B of the CEC’s Guidelines (CEC, 2000). Three years of surface observations (2002-2004) from the nearby Palmdale Regional Airport along with concurrent upper air data from Mercury Desert Rock Airport in Mercury, Nevada were used as required for the dispersion modeling. The Palmdale Regional Airport meteorological tower has an anemometer height of 10 meters. Note that although 2005-2007 meteorological data were available, these years were not used because of the poor data recovery of the upper air data at Mercury Desert Rock Airport during that period. As discussed in the Class II area modeling protocol, the surface and upper air data were processed with the AERMOD meteorological processor, AERMET (version 06341).

A comprehensive Cartesian receptor grid extending to approximately 20 kilometers (km) from the proposed combustion turbine stacks was used in the AERMOD modeling to assess maximum ground-level pollutant concentrations. The 20-km receptor grid was more than sufficient to resolve the maximum impacts. The Cartesian receptor grid consisted of the following receptor spacing:

- Fence line to 3,000 meters (m) at 100-m increments
- Beyond 3,000 m to 5,000 m at 200-m increments
- Beyond 5 km to 10 km at 500-m increments
- Beyond 10 km to 20 km at 1,000-m increments

Discrete receptors were placed approximately every 50 m along the plant fence line for increased resolution of impacts along this boundary. Figures that illustrate the receptors are provided in the modeling protocol. Terrain elevations from Digital Elevation Model (DEM) data acquired from United States Geologic Service (USGS) were processed with AERMAP (version 06341) to develop the receptor terrain elevations and corresponding hill height scale required by AERMOD. All of the DEM files were for Universal Transverse Mercator (UTM) Zone 11 and are referenced to Datum NAD27. The DEM files are included on the modeling archive CD (Appendix G.6).

The background air quality concentrations used in the NAAQS/CAAQS analysis are listed in Table 5.2-29. In all cases except the 24-hour PM2.5, the 1-hour CO, and 24-hour and annual PM10, the maximum concentrations were monitored in 2005. The maximum 24-hour PM2.5 and 24-hour and annual PM10 were monitored in 2007 and the maximum 1-hour CO was monitored in 2006.

Table 5.2-29 Maximum Yearly Monitored Background Concentrations 2005-2007

Pollutant	Averaging Period	Yearly Monitored Concentration (µg/m^3)		
		2005	2006	2007
NO_2	1-hour	139.2	124.1	120.4
	Annual	28.2	28.2	26.3
CO	1-hour	3335	3680	2875
	8-hour	1725	1840	1495
PM10	24-hour	55	65	86
	Annual	22	23	25
PM2.5 [1]	24-hour	16	13	20
	Annual	8.9	7.4	8
SO_2	1-hour	34.06	23.58	21.0
	3-hour	23.58	13.1	13.1
	24-hour	15.72	10.48	7.9
	Annual	5.24	2.62	2.6

[1.] Per the form of the PM2.5 standard, the background used will be the average of the 98th percentiles recorded over the three-year period. The data given in the table represent the 98th percentile for the given year. The average over three years is 17 µg/m^3.

AERMOD was applied with the EPA recommended default options. Model iterations were conducted for each year of meteorological data to identify the maximum impacts over all three years for the pertinent averaging periods.

Impacts from Project Construction

Construction of the PHPP is anticipated to take 27 months. Construction-related air emissions include exhaust and fugitive dust from vehicle and construction equipment and windblown fugitive dust. All criteria pollutants were modeled to determine maximum air quality impacts. The maximum modeled concentrations were added to background concentrations and compared to the applicable standards.

Construction-related emissions were modeled using the AERMOD model (version 07026). Emissions of criteria pollutants for the construction sources were modeled as layered area sources. Buoyancy and mechanical turbulence from the hot exhaust and mobility of the construction equipment was included as an initial vertical dimension in the area source algorithm. Fugitive dust emissions and on-site motor vehicles were modeled as a single low-level area source, since these emissions would almost all occur near ground level. Construction activities were assumed to occur for 10 hours beginning at 7:00 am and ending at 5:00 pm, and were modeled using the HROFDY option in AERMOD. Emissions were assumed to occur uniformly through the 10 hours of assumed construction activity each day.

For the emission source associated with the power block construction, an area polygon source with a total area of 95,258.5 square meters (m^2) was used. This area represents the size of the power block and was used to compute the emission flux for the power block area. For the construction sources associated with the solar array construction, a rectangular area source with an area of 100,694 m^2 was used. The modeled solar array area represents the largest area that will be under construction at a given time; the solar array construction emission flux is calculated based on this area. The power block sources were located over the proposed footprint for the power block equipment, while the solar array construction sources were placed just to the north of the power block to allow for potential interaction of plumes from both area sources. Each of these two locations had two overlaid area sources, one for the windblown fugitive and on-site vehicle emissions, and a second for the construction equipment with vertical exhaust pipes.

A release height of 2.0 m was assumed for the fugitive / on-site vehicles sources, with an initial plume height of 15 feet (4.57 m). Following EPA guidance (EPA, 2004), the initial area source vertical standard deviation for construction combustion emissions was estimated as the plume depth divided by 2.15, or 2.13 m.

The large construction equipment was assumed to have a release height of 3.7 m. The initial vertical depth of the diesel exhaust plume for construction activities was estimated as four times the release (exhaust) height. This height (14.8 m) takes into account the plume rise of the hot diesel exhaust, mechanical mixing on the site introduced by the movement of heavy equipment, and structure wake turbulence introduced by buildings and structures on the Project site. The initial area source vertical standard deviation for the construction equipment is calculated by taking this vertical depth and dividing by 2.15 for an initial sigma-z of 6.88 m. The emissions data used in the modeling were summarized in Section 5.2.4.1.

Modeling to determine the potential Project impact during construction was performed in two steps:
1) modeling a typical 10-hour construction day and 2) determining if a shorter work day would mitigate the Project's air quality impacts. To determine maximum impacts, the maximum measured ambient concentrations for each pollutant and time period are summed with the highest concentration modeled over

the three years for comparison to the NAAQS/CAAQS. Initially, an assumption of the EPA national default conversion factor of 75 percent (EPA, 1997) was applied to the modeled 1-hour NO_X concentrations to estimate peak 1-hour NO_2 during construction. However, the use of the default conversion factor yielded results that were overly conservative. Further refinement of the modeled NO_2 concentrations was necessary and was performed using the OLM option in AERMOD. Hourly background ozone concentrations for input to the AERMOD OLM modeling, concurrent with the three years of meteorological data used in the modeling, were obtained from the ARB for the Lancaster Division Street monitoring station.

Concentrations of CO and SO_2 were found to be below the NAAQS/CAAQS, but concentrations of 1-hour NO_2, and 24-hour and annual PM10 were shown to exceed the CAAQS. The 1-hour NO_2 concentrations exceeded the CAAQS without background, while 24-hour and annual PM10 are over the CAAQS only with the addition of the background values, which exceed the CAAQS independent of the Project.

Multiple hours were modeled to exceed the CAAQS 1-hour NO_2 concentration of 339 µg/m^3. The highest modeled value was found to be 349.7 µg/m^3 (without background). The area where Project impacts alone were over the standards extends along a 200-meter stretch of the fence line immediately to the east of the power block. No impacts exceeded the standard at receptors located beyond the fence line. Upon investigation, all the maximum NO_2 construction impacts exceeding the CAAQS were found to occur during the first and last hour of construction (ending hours 8 am and 5 pm) when low mechanical mixing heights and low wind speed typically occur, are computed by AERMET, and result in high modeled concentrations using AERMOD.

As mitigation of these high modeled NO_2 impacts, AERMOD was rerun to identify those months where morning and/or evening hours could potentially produce exceedances of the NO_2 CAAQS. For each of the three years modeled, an AERMOD “maxifile” was created that identified all hours in each year between the hours beginning at 7:00 am and ending at 5:00 pm where the average hourly concentration (without background) exceeded 199.8 µg/m^3. This concentration, when added to the highest observed NO_2 background concentration produces a modeled impact equal to the 1-hour NO_2 CAAQS of 339 µg/m^3. Once the list of potential problem hours was identified, it was determined that only during the winter months would there be a potential problem during the first and last hours of the work day. An additional set of AERMOD runs were then performed assuming a 10-hour work day (7 am through 5 pm) from March through October, and an 8-hour work day (8 am through 4 pm) from November through February. The maximum modeled impact for 1-hour NO_2 from these runs was 190.9 µg/m^3, which when added to the ambient background is below the 1-hour NO_2 CAAQS. As a result, construction can be done during the regular 10-hour or more work day from the beginning of March though the end of October. By limiting the work day during the winter months (early November through mid-February) to 8-hour work days, Project construction impacts, when added to the ambient background, comply with the 1-hour NO_2 CAAQS. The construction modeling results are summarized in Table 5.2-30 for criteria pollutants. An electronic copy of the files containing the NO_2 construction analysis is included in the modeling archive CD (Appendix G.6).

The maximum modeled 24-hour average for PM10 exceeds the CAAQS when background concentrations are added, because the PM10 air quality monitoring station data show that the CAAQS are already exceeded in this area. The same is true for annual PM10, as the Project impacts represent only 17 percent of the total impact to the annual PM10 concentrations. The same meteorological conditions leading to high early morning and evening NO_2 concentrations will also produce high PM10 concentrations. Thus, the NO_2 mitigation strategy of limiting hours of construction during the winter in order to reduce the NO_2 concentrations also has a positive impact on reducing modeled particulate concentrations. Table

5.2-30 reflects the mitigated impacts for the 1-hour NO_2, and 24-hour and annual PM10 and PM2.5 averaging periods.

Table 5.2-30 NAAQS/CAAQS Analysis for Project Construction

Pollutant	Averaging Period	Concentrations (μg/m³)				
		AERMOD Result	Ambient Background [2]	Total [3]	CAAQS	NAAQS
NO_2 [1]	1-hr	190.9	139.2	330[4]	339	--
	Annual	5.9	28.2	34	57	100
CO	1-hr	3,359.0	3,680	7,039	23,000	40,000
	8-hr	550.0	1,840	2,390	10,000	10,000
PM10	24-hr	20.7	86	106.7[4]	50	150
	Annual	3.4	25	28.4[4]	20	--
PM2.5	24-hr	5.6	20	22.6[4]	--	35
	Annual	1.0	8.9	9.9[4]	12	15
SO_2	1-hr	2.1	34.1	36.2	665	--
	3-hr	0.8	23.6	24.4	--	1,300
	24-hr	0.1	15.7	15.8	105	365
	Annual	0.01	5.2	5.2	--	80

[1] Modeled NO_2 concentrations as determined with the OLM.

[2] From Table 5.2-29, these data were collected at the Lancaster Division Street monitor for all pollutants except SO_2 which was collected at the W. Palm Ave monitor in Burbank, CA. These values correspond to the highest monitored values from 2005 – 2007, except for PM2.5, which is the 98th percentile value over three years.

[3] Modeled concentration plus ambient background.

[4] Result reflects 10-hour day from March through October and 8-hour day from November 5 through February 15.

Impacts from Combustion Turbine Commissioning

Maximum short-term emissions of NO_X and CO during the initial tuning and testing of the combustion turbines at the end of construction of the Project will be higher than normal operations. As such, short-term commissioning conditions were modeled with AERMOD for comparison to the 1-hour NO_2 and 1-hour and 8-hour CO CAAQS and NAAQS. The stack parameters and emissions data used for this modeling are provided in Table 5.2-31.

Table 5.2-31 Combustion Turbine Commissioning Modeling Stack and Emissions Data

Parameter		Value
Exit Temperature (°F) [1]		173.5
Exit Velocity (ft/sec) [1]		31.76
Pollutant Emissions Per Combustion Turbine (lb/hr)	NO_X	197
	CO	467

[1] Based on 20 percent load.

Although the commissioning of the PHPP will be conducted over loads varying from zero to 100 percent, stack parameters at loads less than 50 percent will be transient and highly variable. As indicated by manufacturer's data, the worst-case emissions for NO_X would most likely occur at about 49 percent load when the combustors are switching from pre-mix modes to add another stage of combustors. However, worst-case CO emissions will occur at very low loads. Since GE only provides performance data for the turbines down to about 20 percent load, this load was used in the analysis.

The modeling was conducted with the three years of meteorological data and assumed simultaneous commissioning of both turbines. Hourly ozone limiting was used to more accurately represent the conversion of NO_X to NO_2 for comparison to the California 1-hour NO_2 standard.

The commissioning modeling results are summarized in Table 5.2-32. Ambient background concentrations were summed with the maxima modeled over the three years to yield total concentrations for comparison to the NAAQS/CAAQS. Concentrations of CO and were found to be below the CAAQS, and concentrations of 1-hour NO_2 were found to be below the CAAQS prior to adding in the ambient background. When background was added to the maximum modeled 1-hour NO_2 concentration, the impacts were shown to exceed the standard. However, this analysis is quite conservative since it is unlikely that the combustion turbines would both be operating at the same time, at peak emissions levels and at the time of day when background level is at its peak. Again, these tests are short-term and transient, and hence the analysis is likely to be overly conservative.

Table 5.2-32 Maximum Modeled Concentrations for Project Combustion Turbine Commissioning

Pollutant	Averaging Period	Maximum AERMOD Concentration ($\mu g/m^3$)	Background Value ($\mu g/m^3$)	Max Plus Background ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)
NO_2	1-hour	331.67[1]	139.20	470.87[2]	339
CO	1-hour	856.01	3,680	4536.01	23,000
	8-hour	650.42	1,840	2490.42	10,000

[1] Modeled NO_2 concentrations as determined with the OLM.
[2] Exceeds 1-hour NO_2 CAAQS

Impacts From PHPP Operation

Air quality modeling during operation was conducted with the AERMOD to demonstrate compliance with the NAAQS and CAAQS and PSD increments in the local (Class II) area. The PHPP includes the following air emission sources that were included in the modeling analysis:

- Two combined-cycle combustion turbines, each with HRSG and duct burners
- Auxiliary boiler
- HTF heater
- Emergency generator engine
- Fire-water pump engine
- Cooling tower

EPA has established Significant Impact Levels (SILs) for air quality impacts analyses. A SIL for a given pollutant and averaging period is defined as an ambient concentration produced by a source below which the source is assumed to have an insignificant impact. In accordance with standard modeling procedures for ambient air quality standards compliance analyses, if modeling of Project sources alone (proposed combustion turbines, cooling tower, and ancillary combustion equipment) indicates that the maximum modeled concentrations for a specific pollutant are below the SILs, no further analysis is required for that pollutant. If modeling indicates that the SIL for any pollutant / averaging period is exceeded, then a cumulative modeling study is required to determine the combined impact of the Project sources plus other major nearby background sources for compliance with the NAAQS/CAAQS and PSD increments. Additionally, the CEC requires that cumulative modeling be performed for all criteria pollutants against their respective CAAQS. The maximum concentrations determined through cumulative modeling are then summed with representative background concentrations to account for non-modeled source contributions for NAAQS/CAAQS compliance. These criteria for the impact analyses are shown in Table 5.2-33.

Table 5.2-33 Ambient Air Quality Impact Criteria (µg/m^3)

Pollutant	Averaging Period	PSD Class II SILs	PSD Class II Increments	CAAQS	NAAQS	
					Primary	Secondary
NO_2	1-hour	--	--	339[1]	--	--
	Annual	1	25	57	100	100
CO	1-hour	2,000	--	23,000	40,000	NA
	8-hour	500	--	10,000	10,000	NA
PM10	24-hour	5	30	50	150	150
	Annual	1	17	20	--	--
PM2.5	24-hour	--	--	--	35	35
	Annual	--	--	12	15	15
SO_2	1-hour	--	--	655	--	--
	3-hour	25	512	--	NA	1,300
	24-hour	5	91	105	365	NA
	Annual	1	20	--	80	NA

[1] The California Office of Administrative Law approved the rulemaking on February 19, 2008 and the revised NO_2 standard became March 20, 2008.

In addition to addressing air quality impacts associated with normal facility operations, modeling was conducted to assess the maximum air quality impacts during startup/shutdown and commissioning of the combustion turbines. Maximum air quality impacts associated with construction-related air emissions were also assessed for exhaust and fugitive dust from vehicle and construction equipment and windblown fugitive dust.

AERMOD Application Methodology

Air quality modeling for NAAQS/CAAQS and PSD increment compliance during operation was conducted using the AERMOD model (version 07026). The stack parameters and emission rates input to AERMOD for

the combustion turbines for normal operations are summarized in Table 5.2-34. Combustion turbine emission rates and flue gas characteristics were derived for a range of ambient temperatures for natural gas fuel for four operating load points (100 percent with duct burners, 100 percent without duct burners, 75 percent without duct burners and 50 percent without duct burners) that included variable operating factors such as evaporative cooling and solar energy input (see Appendix G.3). For the dispersion modeling, a worst-case composite of emissions and stack data were developed for each of the four load cases to add a measure of conservatism to the analysis. That is, for each load, the highest emission rate and lowest exhaust parameters were identified for the expected range of ambient temperatures and operational cases. Each load was modeled to determine the worst-case for each pollutant to define the turbine stack parameters and emission rates for all Project sources for modeling maximum short-term (≤ 24-hour) impacts. For modeling annual average impacts for the combustion turbines, stack parameters based on 100 percent load and temperatures closest to the representative annual average temperature at 64°F. As noted earlier, because the emissions are estimated at a temperature that is lower than the annual average temperature for the Project area, the predicted annual emissions are higher than may be actually emitted, yielding a conservative impact analysis.

Table 5.2-34 Stack Parameters and Emissions Data for the Combustion Turbines

Parameter		Value				
		North Stack			South Stack	
UTM Coordinate East (m) [1]		398678.6			398677.9	
UTM Coordinate North (m) [1]		3833524.4			3833484.1	
Stack Base Elevation (ft)		2,513			2,513	
Stack Height (ft)		145			145	
Stack Diameter (inches)		216			216	
		Load				
		100% w/DB	**100%**	**75%**	**50%**	**Annual Avg.[2]**
Exit Temperature (^{o}F)		172.9	176.5	166.7	166.9	174.1
Exit Velocity (ft/sec)		62.01	61.98	46.26	39.7	64.9
Pollutant Emissions Per Combustion Turbine (lb/hr)	NO_X	16.60	13.47	10.97	8.73	13.0
	CO	15.16	8.20	6.68	5.31	28.8
	PM/PM10/PM2.5	18	12	12	12	13.4
	SO_2	1.29	1.05	0.685	0.68	1.01

[1] Coordinates for UTM Zone 11 referenced to Datum NAD27.

[2] Annual average emissions include normal operations as well as start-up / shutdown. Exit temperature and velocity are the 100 percent load case at 64° F.

The stack parameters and emissions data for the ancillary equipment are listed in Table 5.2-35. These stack parameters are based on operation of the ancillary equipment at 100 percent load.

Table 5.2-35 Stack Parameters and Emissions Data for the Ancillary Equipment

Parameter	Auxiliary Boiler	Emergency Generator	Fire-Water Pump	HTF Heater	Cooling Tower [2]
UTM Coordinate East (m)[1]	398718.0	398807.5	398595.4	398540.7	398801.0
UTM Coordinate North (m)[1]	3833546.1	3833497.9	3833598.5	3833640.7	3833645.8
Stack Base Elevation (ft)	2513	2513	2513	2513	2513
Stack Height (ft)	30	30	30	30	62.34
Stack Diameter (inches)	20.87	21.65	5.51	20.87	336
Exit Temperature (^oF)	300	761.7	761.7	300	98
Exit Velocity (ft/sec)	66.6	100	100	74.38	41.37
Short term / Annual Emissions (lb/hr / tpy)					
NO_X	1.10 / 0.275	26.80 / 0.67	1.14 / 0.03	0.44 / 0.22	--
CO	3.68 / 0.920	15.43 / 0.39	1.05 / 0.03	1.47 / 0.736	--
PM/PM10/PM2.5	0.74 / 0.186	0.88 / 0.02	0.06 / 0.0015	0.297 / 0.148	1.63 / 7.13[3]
SO_2	0.059 / 0.015	0.029 / 0.0007	0.002 / 4.9E-5	0.023 / 0.012	--

1 Coordinates for UTM Zone 11 referenced to Datum NAD27

2 The cooling tower has 10 cells and each was modeled as a single stack. Coordinate provided is the center point of the tower.

3 Cooling tower emissions reflect the entire cooling tower (10 cells).

A Good Engineering Practice (GEP) stack height analysis was conducted to evaluate the potential for building downwash. Stacks with heights below GEP are considered to be subject to building downwash and require building dimensions to be input to AERMOD. The GEP stack height analysis was conducted using the EPA Building Profile Input Program (BPIP) (version 04274) that performs the GEP calculation for a multi-building complex on a stack-by-stack basis. A map showing the terrain elevations is provided as Figure 5.2-2. The stack locations and building included in the GEP analysis are shown in Figure 5.2-3. A summary of the GEP analysis is provided in Table 5.2-36. The projected combustion turbine stack height of 145 feet (44 m) is less than GEP, but is more than sufficient to demonstrate compliance with air quality standards as shown below. The stack heights of the ancillary equipment will also be less than their respective GEP formula heights and subject to building downwash. Therefore, building dimensions developed by BPIP for all stacks were input to the dispersion model. The BPIP input and output files are provided on the modeling archive CD in Appendix G.6.

Table 5.2-36 Summary of GEP Analysis

Emission Source	Model Source Name	Stack Height (m)	Controlling Buildings or Structures	Building Height (m)	Projected Width (m)	GEP Formula Height (m)
HRSG Stack (North)	CTN	44.2	North and South HRSG's	33.53	33.56	83.82
HRSG Stack (South)	CTS	44.2	North and South HRSG's	33.53	33.60	83.82
Auxiliary Boiler	AUXBOIL	9.14	North and South HRSG's	33.53	34.51	83.82
Fire-Water Pump Module	FIREPMP	9.14	North and South HRSG's	33.53	54.99	83.82
Gas-Fired HTF Heater	GASHTR	9.14	Fire Water Pump Housing	12.19	14.97	30.48
Emergency Generator	EMGEN	9.14	South HRSG and South CT	27.43	27.59	68.58
Cooling Tower	COOL_01–COOL_10	19.0	North and South HRSG's, STG	21.34 - 33.53	33.58 – 58.42	65.00 - 83.82

Class II Impacts from Project Normal Operations

The modeling of normal PHPP operations using AERMOD was done as a multi-step process. First, the worst-case impacts for the combustion turbines (based on different load and temperatures) were identified. The detailed results for the combustion turbine load analysis are provided in Appendix G.3. The following worst-cases were identified for the pollutants and short-term averaging periods:

- 100 percent with duct firing - CO (1-hr and 8-hr), SO_2 (1-hr, 3-hr and 24-hr), NO_X (1-hr)
- 50 percent - PM/PM10/PM2.5 (24-hr)

As indicated, modeling of pollutants for annual averages was conducted with the load closest to the annual average operating scenario for the turbines (100 percent load / 64°F ambient temperature).

In the next modeling step, the worst-case combustion turbine operating parameters and emissions were combined with normal operations of the facility ancillary sources. The maximum air quality impacts due to emissions from the Project sources are summarized in Table 5.2-37. Table 5.2-37 lists the maximum modeled concentrations for the Project sources for each year of meteorology. The maxima over the three years modeled is noted and compared to the EPA SILs. Hourly ozone limiting (Ozone Limiting Method [OLM]) was used to more accurately represent the conversion of NO_X to NO_2 for comparison to the California 1-hour NO_2 standard. In using the OLM option in AERMOD, conversion of NO_X emissions to NO_2 concentrations are limited based on the availability of ozone as determined by the ambient background levels. Background ozone levels were obtained from the EPA for the Lancaster Division Street monitoring station (EPA, 2008). As shown in Table 5.2-37, all maximum modeled pollutant concentrations are less than their respective SILs with the exception of 24-hour and annual PM10; the maximum 24-hour PM10 result is 13.3 micrograms per cubic meter ($\mu g/m^3$) versus the SIL of 5.0 $\mu g/m^3$, and the annual result was 14

µg/m^3 compared to the SIL of 1.0 µg/m^3. Therefore, no further modeling was required under EPA Guidelines for the other pollutants, but cumulative modeling is required for PM10 to demonstrate compliance with the NAAQS/CAAQS[1]. Additionally, the CEC requires cumulative modeling for all criteria pollutants against their respective CAAQS. Therefore, cumulative modeling was performed for all criteria pollutants and is presented in Section 5.2.4.3.

Table 5.2-37 Maximum Modeled Concentrations for PHPP Normal Operations

Pollutant	Averaging Period	Maximum AERMOD Concentration (µg/m^3)			Overall Maximum (µg/m^3)	EPA SIL (µg/m^3)
		2002	2003	2004		
NO_2 [1]	1-hr	195.17	184.80	189.13	195.17	--
	Annual	0.98	0.85	0.83	0.98	1
CO	1-hr	249.7	246.0	251.8	251.8	2,000
	8-hr	40.60	28.70	32.33	40.60	500
PM10	24-hr	13.27	12.71	12,96	13.3	5
	Annual	1.40	1.21	1.26	1.4	1
SO_2	1-hr	1.48	1.59	1.53	1.6	--
	3-hr	1.34	1.28	1.31	1.3	25
	24-hr	0.87	0.75	0.85	0.9	5
	Annual	0.07	0.06	0.06	0.07	1

[1] Modeled NO_2 concentrations as determined with the OLM.

Because the emergency generator and fire pump will not be operated for more than one hour at a time, it was assumed that these two sources will operated only from 8 am to 9 am in order to model the likely worst-case meteorological conditions (morning stable layer).

Impacts from Combustion Turbine Start-up/Shutdown

During startup and shutdown of the combustion turbines, emissions of NO_X and CO will be higher than normal operations. As such, worst-case startup and shutdown conditions were modeled with AERMOD for comparison to the 1-hour NO_2 and 1-hour and 8-hour CO CAAQS and NAAQS. The stack parameters and emissions data required for modeling short-term startup/shutdown are provided in Table 5.2-38. The stack exhaust parameters correspond to a 20 percent load, assumed to be representative of this operating mode.

Worst-case startup/shutdown emissions for modeling were derived from the emissions data in Appendix G.3. Cold starts, warm starts, hot starts and shutdowns were considered. Based on this analysis the worst-case or maximum emissions are associated with shutdown events. Because shutdowns only

[1] No PSD increment analysis is required under EPA regulations because PM10 is a non-attainment pollutant in this area. No PM2.5 increment analysis is required because there are no PM2.5 increments yet defined.

require one-half hour, maximum one-hour emissions are conservatively based on one-half hour at the maximum normal emission rate plus one-half hour in the shutdown mode as shown below:

- Maximum NO_X emissions = 0.5 x 16.6 lb/hr + 57 lb/event = 65.3 lb/hr per turbine
- Maximum CO emissions = 0.5 x 15.16 lb/hr + 337 lb/event = 344.6 lb/hr per turbine

Table 5.2-38 Stack Parameters and Emissions Data for the Combustion Turbines Start-up/Shutdown Modeling

Parameter		Value
Exit Temperature (°F) [1]		173.5
Exit Velocity (ft/sec) [1]		31.76
Pollutant Emissions Per Combustion Turbine (lb/hr)	NO_X	65.3
	CO	344.6
[1] Based on 20 percent load.		

The modeling was conducted for the three years of meteorological data and assumed simultaneous operation of all ancillary equipment with the two combustion turbines. Hourly ozone limiting was used to more accurately represent the conversion of NO_X to NO_2 for comparison to the California 1-hour NO_2 standard. The results are summarized in Table 5.2-39. Ambient concentrations are summed with the maxima modeled over the three years for comparison to the NAAQS/CAAQS. As shown on the table, all modeled concentrations are below the CAAQS/NAAQS.

Table 5.2-39 Maximum Modeled Concentrations for Project Startup/Shutdown Operations

Pollutant	Averaging Period	Maximum AERMOD Concentration ($\mu g/m^3$)	Background Value ($\mu g/m3$)	Max Plus Background ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)
NO_2	1-hour	143.5[1]	139.2	282.7	339
CO	1-hour	693.3	3,680	4,373.3	23,000
	8-hour	487.9	1840	2,327.9	10,000
[1] Modeled NO_2 concentrations as determined with the OLM.					

As with the normal operations modeling, because the emergency generator and fire pump will not be operated for more than one hour at a time, it was assumed that these two sources will operate only from 8 am to 9 am in order to model the likely worst-case meteorological conditions (morning stable layer).

5.2.4.2.2 Class I Area Air Quality Impact Assessment

PSD Class I Analysis

PSD regulations require that facilities within 100 km of a PSD Class I area perform a modeling evaluation of the ambient air quality in terms of Class I PSD Increments and Air Quality Related Values (AQRVs). For the PHPP, potential air impacts were addressed at the following Class I areas within 100 km:

- Cucamonga Wilderness Area (WA),
- San Gabriel WA

The detailed methodology for the Class I area impact assessment is documented in the modeling protocol, "PHPP Class I Modeling Protocol". A copy of this protocol is contained in Appendix G.5. The U.S. Dept. of Agriculture, Forest Service (USFS) is the Federal Land Manager (FLM) for the two Wilderness Areas.

Figure 5.2-5 shows the location of the PHPP relative to the nearest PSD Class I areas.

The PHPP is located in a federal designated attainment or unclassified area for NO_2, PM10, and PM2.5. Additionally, the combined cycle units will result in emission increases of NO_2, PM10, and PM2.5 above the PSD thresholds. The PHPP is not a significant source for SO_2 or sulfuric acid (H_2SO_4). As a result, Class I increment analysis was conducted only for NO_2 and PM10. Although PM2.5 PSD increments have yet to be established for Class I areas, PM2.5 modeled concentrations are provided in the air permit application for informational purposes based on comments received from EPA Region IX on another recent similar project. Regional haze modeling for Cucamonga WA considered the two combustion turbine emissions of SO_2, H_2SO_4, NO_X, PM10, and PM2.5. Visibility impacts due to emissions from the combustion turbines were assessed at San Gabriel WA using VISCREEN. Additionally, a deposition analysis was conducted only for nitrogen compounds which considered primary emissions of NO_X and conversion of NO_X to nitrate and nitric acid. However, combustion turbine emissions of SO_2, H_2SO_4, NO_X, PM10, and PM2.5 were all included in the regional haze analysis for the Class I areas noted above.

CALPUFF PSD Class I Increment and Regional Haze Analyses

A refined modeling assessment of PSD Class I increment consumption, regional haze, and acid deposition was conducted with the CALPUFF model (Version 5.8) and utilized detailed meteorological data prepared with CALMET, the CALPUFF meteorological pre-processor. The modeling approach is based on requirements outlined in the IWAQM Phase II report (EPA, 1998), as well as the FLMs' Air Quality Related Values Workgroup Phase I Report (FLM, 2000). In addition, the modeling methods and procedures will adhere to applicable guidance provided in the CALPUFF Reviewer's Guide (Gebhart, 2005) prepared for the USFS and National Park Service (NPS). These guidance documents are provided for suggested modeling approaches by EPA and the FLMs.

Class I Area Increment Analysis

The Class I increment modeling results for Cucamonga and San Gabriel WA are summarized in Table 5.2-40. The maximum NO_2 and PM10 concentrations for each area are below the Class I SIL and, therefore, also well below the Class I PSD increments. Even though PM2.5 Class I SIL values or PSD increments have yet to be established, the maximum PM2.5 concentrations are shown herein for informational purposes. As can be seen in Table 5.2-40, they are well below the proposed Class I PSD increments.

Table 5.2-40 Class I Area PM10, PM2.5, and NO_2 PSD Increment CALPUFF Modeling Result

Pollutant	Class I Area	Averaging Period	2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Class I SIL ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)
PM10	Cucamonga WA	24-hr	0.049	0.059	0.055	0.3	8
		Annual	0.003	0.003	0.003	0.2	4
PM10	San Gabriel WA	24-hr	0.122	0.041	0.112	0.3	8
		Annual	0.004	0.002	0.003	0.2	4
PM2.5	Cucamonga WA	24-hr	0.051	0.062	0.057	---	---
		Annual	0.003	0.003	0.003	---	---
PM2.5	San Gabriel WA	24-hr	0.127	0.043	0.116	---	---
		Annual	0.004	0.003	0.004	---	---
NO_X	Cucamonga WA	Annual	0.0010	0.0008	0.0009	0.1	2.5
NO_X	San Gabriel WA	Annual	0.0017	0.0005	0.0015	0.1	2.5

Class I Area Regional Haze Analysis

The Class I regional haze modeling results for Cucamonga WA is summarized in Table 5.2-41 for the three years modeled. According to FLAG guidance (FLM, 2000), when a project-related change in extinction is less than five percent of the background extinction, then the project's regional haze impact is defined by EPA to be insignificant and no further modeling is required to demonstrate no adverse impact. As shown in Table 5.2-41, the maximum modeled change in extinction (ΔB_{ext}) for all years is less than five percent.

Table 5.2-41 Class I Area Regional Haze CALPUFF Modeling Results

Class I Area	Maximum % ΔB_{ext}			Significance Threshold (Percent Change in Extinction Coefficient)
	2001	2002	2003	
Cucamonga WA	1.77	2.14	1.92	5%

Class I Area Deposition Analysis

The Class I Area deposition modeling results for Cucamonga and San Gabriel WAs are summarized in Table 5.2-42 for the three years modeled. The maximum modeled deposition rates for all years modeled are below the Class I Area Deposition Analysis Thresholds.

Table 5.2-42 Class I Area Nitrogen Deposition CALPUFF Modeling Results

Class I Area	Averaging Period	Maximum Modeled Deposition Results (kg/ha/yr)			Class I Area Nitrogen Deposition Analysis Threshold (kg/ha/yr)
		2001	2002	2003	
Cucamonga WA	Annual	4.96E-04	5.21E-04	4.58E-04	0.005
San Gabriel WA	Annual	7.18E-04	3.96E-04	6.07E-04	0.005

VISCREEN Plume Blight Impact Analysis

PSD regulations require an analysis of visibility impairment (i.e., plume blight) at Class I areas within 50 km of a proposed PSD project. San Gabriel WA is located within 50 km of the PHPP. Therefore, an analysis of the potential PHPP visible plume impacts were addressed for this Class I area.

The plume visibility analysis was conducted with the most current version of EPA's screening model VISCREEN to determine if Project emissions will impair visibility at the San Gabriel WA. VISCREEN was applied with the guidance provided in EPA's Workbook for Plume Visual Impact Screening and Analysis (EPA, 1992) ("Workbook"). As such, the VISCREEN model was applied to estimate two visual impact parameters, plume perceptibility (ΔE) and plume contrast (Cp). Screening-level guidance indicates that values above 2.0 for ΔE and +/- 0.05 for Cp are considered perceptible. The Workbook offers two levels of analyses. A Level 1 screening analysis is the most simplified and conservative approach employing default meteorological data with no site-specific conditions. A Level 2 analysis takes into account representative meteorological data and site-specific conditions such as complex terrain. Initially, the Level 1 analysis was conducted that indicated ΔE and Cp values above the screening thresholds. Therefore, a Level 2 analysis was conducted.

A Level 2 analysis was conducted with the same three years of meteorological data used in the Class II air quality analysis. In addition, per Workbook guidance, the stability class was reduced by one class (less stable) because the terrain elevation differences between the facility (stack-top) location and San Gabriel WA is more than 500 m. The maximum elevation at San Gabriel WA of 2,216 m amsl is based on the receptor elevations used for the Class I modeling provided by NPS. The stack-top elevation of the source is 810.2 m amsl. This results in a difference in elevation of 1,405.8 m.

The source data required by VISCREEN are total NO_X emissions (33.20 lb/hr) and particulate emissions (36.00 lb/hr) for the combustion turbines. Included in the particulate emissions were emissions of elemental carbon (EC) (9.00 lb/hr) and sulfate (SO_4) (0.99 lb/hr) emissions. The speciated PM10 emissions where derived according to procedures referenced in the PHPP Class I modeling protocol and conform to recommendations by the NPS. The NPS guidance specifies that of the total PM10, 25 percent in considered filterable PM10 and 75 percent in considered condensable PM10. The filterable PM10 is conservatively assumed to be elemental carbon, while the condensable PM10 (minus the primary sulfate) is conservatively assumed to be organic aerosols. It was assumed that all NO_X is present as NO_2. The closest distance from the Project to the San Gabriel WA is 34.57 km. In addition, the 22.5 degree (°) wind direction sectors that would transport emissions from the PHPP toward the San Gabriel WA are 303.75º – 326.25º, 326.25º – 348.75º, and 348.75º – 11.25º as seen in Figure 5.2-6. Based on this information, and

the three years of meteorological data, a table of joint frequency of occurrence of wind speed, wind direction, and stability class was developed as outlined in the Workbook. The dispersion conditions, defined by wind speed and stability class, were ranked by evaluating the product of $\sigma_y\sigma_z u$, where σ_y and σ_z are the Pasquill-Gifford horizontal and vertical diffusion coefficients for the given stability class and downwind distance (i.e., 34.57 km), and u is the wind speed. The dispersion conditions were then ranked in ascending order according to the value of $\sigma_y\sigma_z u$ as shown in Table 5.2-43.

According to the Workbook, VISCREEN is to be applied with the worst-case meteorological conditions that have a $\sigma_y\sigma_z u$ product with a cumulative probability of one percent. That is, the dispersion condition is selected such that the sum of all frequencies of occurrence of conditions worse than this condition totals one percent. Note that as recommended by the Workbook, dispersion conditions that result in greater than 12 hours of plume transport time are discounted from the analysis, since it is unlikely that steady-state plume conditions would persist for more than 12 hours.

According to Tables 5.2-43 through 5.2-45, the worst-case dispersion conditions with cumulative frequency of one percent are E stability, four meters per second (m/sec) (Sector 303.75º – 326.25º - Table 5.2-43) and occur during nighttime hours between 12:00 am and 6:00 am. Therefore, VISCREEN was applied with D stability, 4 m/sec to account for the complex terrain. As discussed previously, the stability class was reduced from E to D (slightly less stable), as recommended by Workbook, for cases when the terrain relief is greater than 500 meters as compared from stack top to elevations in the Class I area. As recommended by the FLAG guidance (FLM, 2000), a visual range of 246 km was used.

The VISCREEN results are summarized in Table 5.2-46. VISCREEN provides results of plume perceptibility (ΔE) and plume contrast (C_p) for both sky and terrain backgrounds. The results are below the significance criteria and, therefore, indicate that the plume would not be perceptible against a sky or terrain background.

Table 5.2-43 Dispersion Condition Frequency Analysis – Sector 303.75º – 326.25º

Dispersion Condition		$\sigma_y\sigma_z u$	Transport Time	Frequency By Time of Day				Cumulative Frequency By Time of Day			
Stability Class	Wind Speed (m/sec)	m^3/sec	(hours)	0-6	6-12	12-18	18-24	0-6	6-12	12-18	18-24
F	1	57,980	19	0.335	0.046	0.000	0.319	0.000	0.000	0.000	0.000
F	2	115,960	6	0.289	0.030	0.000	0.213	0.289	0.030	0.000	0.213
E	1	163,359	19	0.030	0.122	0.030	0.122	0.289	0.030	0.000	0.213
F	3	173,940	4	0.502	0.076	0.000	0.578	0.791	0.106	0.000	0.791
E	2	326,718	6	0.015	0.106	0.000	0.046	0.806	0.213	0.000	0.836
D	1	438,694	19	0.076	0.137	0.076	0.046	0.806	0.213	0.000	0.836
E	3	490,077	4	0.091	0.122	0.030	0.152	0.897	0.335	0.030	0.988
E	4	653,437	3	0.122	0.046	0.030	0.304	1.019	0.380	0.061	1.293
E	5	816,796	2	0.061	0.000	0.091	0.228	1.080	0.380	0.152	1.521
D	2	877,389	6	0.030	0.198	0.015	0.000	1.110	0.578	0.167	1.521
D	3	1,316,083	4	0.030	0.228	0.106	0.030	1.141	0.806	0.274	1.551
D	4	1,754,777	3	0.122	0.122	0.106	0.030	1.262	0.928	0.380	1.582
D	5	2,193,472	2	0.046	0.046	0.030	0.030	1.308	0.973	0.411	1.612
D	6	2,632,166	2	0.046	0.061	0.137	0.152	1.353	1.034	0.547	1.764
D	7	3,070,860	1	0.000	0.274	0.213	0.137	1.353	1.308	0.760	1.901
D	8	3,509,554	1	0.030	0.152	0.259	0.015	1.384	1.460	1.019	1.916

Table 5.2-44 Dispersion Condition Frequency Analysis – Sector 326.25º – 348.75º

Dispersion Condition		$\sigma_y\sigma_z u$	Transport Time	Frequency By Time of Day				Cumulative Frequency By Time of Day			
Stability Class	Wind Speed (m/sec)	m^3/sec	(hours)	0-6	6-12	12-18	18-24	0-6	6-12	12-18	18-24
F	1	57980	19	0.182	0.061	0.015	0.137	0.000	0.000	0.000	0.000
F	2	115960	6	0.182	0.030	0.000	0.167	0.182	0.030	0.000	0.167
E	1	163359	19	0.000	0.030	0.046	0.015	0.182	0.030	0.000	0.167
F	3	173940	4	0.289	0.030	0.015	0.304	0.471	0.061	0.015	0.471
E	2	326718	6	0.000	0.091	0.061	0.015	0.471	0.152	0.076	0.487
D	1	438694	19	0.000	0.137	0.122	0.000	0.471	0.152	0.076	0.487
E	3	490077	4	0.000	0.076	0.106	0.015	0.471	0.228	0.182	0.502
E	4	653437	3	0.061	0.015	0.061	0.137	0.532	0.243	0.243	0.639
E	5	816796	2	0.015	0.000	0.000	0.061	0.547	0.243	0.243	0.700
D	2	877389	6	0.030	0.122	0.076	0.015	0.578	0.365	0.319	0.715
D	3	1316083	4	0.046	0.395	0.167	0.015	0.623	0.760	0.487	0.730
D	4	1754777	3	0.061	0.091	0.030	0.000	0.684	0.852	0.517	0.730
D	5	2193472	2	0.000	0.030	0.000	0.000	0.684	0.882	0.517	0.730
D	6	2632166	2	0.000	0.015	0.046	0.015	0.684	0.897	0.563	0.745
D	7	3070860	1	0.000	0.015	0.015	0.000	0.684	0.912	0.578	0.745
D	8	3509555	1	0.000	0.030	0.030	0.000	0.684	0.943	0.608	0.745

Table 5.2-45 Dispersion Condition Frequency Analysis – Sector 348.75º – 11.25º

Dispersion Condition		$\sigma_y\sigma_z u$	Transport Time	Frequency By Time of Day				Cumulative Frequency By Time of Day			
Stability Class	Wind Speed (m/sec)	m^3/sec	(hours)	0-6	6-12	12-18	18-24	0-6	6-12	12-18	18-24
F	1	57980	19	0.137	0.030	0.030	0.091	0.000	0.000	0.000	0.000
F	2	115960	6	0.091	0.030	0.015	0.030	0.091	0.030	0.015	0.030
E	1	163359	19	0.000	0.046	0.046	0.046	0.091	0.030	0.015	0.030
F	3	173940	4	0.198	0.030	0.030	0.243	0.289	0.061	0.046	0.274
E	2	326718	6	0.000	0.015	0.046	0.000	0.289	0.076	0.091	0.274
D	1	438694	19	0.000	0.076	0.030	0.015	0.289	0.076	0.091	0.274
E	3	490077	4	0.015	0.046	0.182	0.061	0.304	0.122	0.274	0.335
E	4	653437	3	0.000	0.000	0.015	0.046	0.304	0.122	0.289	0.380
E	5	816796	2	0.015	0.000	0.015	0.015	0.319	0.122	0.304	0.395
D	2	877389	6	0.030	0.243	0.046	0.000	0.350	0.365	0.350	0.395
D	3	1316083	4	0.076	0.289	0.243	0.061	0.426	0.654	0.593	0.456
D	4	1754777	3	0.015	0.076	0.091	0.015	0.441	0.730	0.684	0.471
D	5	2193472	2	0.000	0.030	0.061	0.015	0.441	0.760	0.745	0.487
D	6	2632166	2	0.000	0.061	0.000	0.000	0.441	0.821	0.745	0.487
D	7	3070860	1	0.000	0.000	0.000	0.000	0.441	0.821	0.745	0.487
D	8	3509555	1	0.000	0.000	0.015	0.000	0.441	0.821	0.760	0.487

Table 5.2-46 VISCREEN Model Results

Background	Distance	Plume Perceptibility (ΔE)			Plume Contrast (C_p)		
		VISCREEN[1]		Criteria	VISCREEN[1]		Criteria
		Theta 10	Theta 140		Theta 10	Theta 140	
Sky	47.4	0.135	0.261	2.00	0.001	-0.009[2]	0.05
Terrain	34.6	0.806	0.072	2.00	0.005	0.001	0.05

[1] VISCREEN results are provided for the two VISCREEN default worst-case theta angles. The two theta angles represent the sun being in front of the observer (theta = 10 degrees) or behind the observer (theta = 140 degrees).

[2] A negative Cp means the plume has a darker contrast than the background sky.

Other Related Analyses

Vegetation and Soils

The Project site is in an area consisting of desert and desert shrub-land. Criteria for evaluating impacts on soils and vegetation are provided in EPA's A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals (EPA 1980). Table 5.2-47 lists the EPA suggested criteria for the gaseous pollutants emitted directly from the proposed Project. These criteria are established for sensitive vegetation and crops exposed to the effects of the gaseous pollutants through direct exposure. Adverse impacts on soil systems result more readily from the secondary effects of these pollutants' impacts on the stability of the soil system. These impacts could include increased soil temperature and moisture stress and/or increased runoff and erosion resulting from damage to vegetative cover. In Table 5.2-47, the total modeled air concentrations for the proposed Project plus ambient background concentrations are compared to these criteria to evaluate impacts on both soils and vegetation. All total concentrations are well below all of the significance criteria. Therefore, the potential for adverse impacts to either soils or vegetation is negligible.

Table 5.2-47 Soils and Vegetation Analysis

Pollutant	Averaging Period	AERMOD Predicted Concentrations (mg/m^3)				Background Value ($\mu g/m^3$)	Max Plus Background ($\mu g/m^3$)	Significance Level for Impacts to Soil and Vegetation ($\mu g/m^3$)
		2002	2003	2004	Max.			
SO_2	1-hour	1.48	1.59	1.53	1.59	34.06	35.65	917
	3-hour	1.34	1.28	1.31	1.34	23.58	24.92	786
	Annual	0.07	0.06	0.06	0.07	5.24	5.31	18
CO	1-week[1]	40.60	28.70	32.33	40.60	1,840.00	1,880.60	1,800,000
NO_2	4-hour[2]	195.17	184.80	189.13	195.17	139.19	334.37	3,760
	8-hour[2]	195.17	184.80	189.13	195.17	139.19	334.37	3,760
	1-month[2]	195.17	184.80	189.13	195.17	139.19	334.37	564
	Annual	0.98	0.85	0.83	0.98	28.2	29.19	94

Short-term numbers based on maximum concentration, annual concentrations are highest annual average concentration.

[1] Used 8-hour CO runs for this period.

[2] Used 1-hour NO_X runs for these periods.

Growth Analysis

PSD requires an assessment of the secondary impacts from applicable projects. There will be minimal associated growth expected during Project construction due to the relatively short-term (29 months) duration and the existence of a large construction labor force in the southern California region. Additionally, no long-term growth (i.e., general commercial, residential, industrial or other secondary growth in the area) is expected during Project operations due to the small labor force (36 employees) that will be required to operate this Project. Therefore, no analysis of secondary impacts from associated growth is needed for this Project.

5.2.4.3 Cumulative Impacts

As required under CEQA, the impacts of the PHPP must be considered together with those of other past, present, and reasonably foreseeable future projects in the area that may produce related or cumulative impacts. The area of interest for potential cumulative projects includes the City of Palmdale and the City of Lancaster.

Past and present projects, because they already exist, are inherently part of the environmental baseline or “affected environment” discussed in detail in this AFC for each environmental area. For purposes of determining the PHPP’s cumulative impacts, the impacts associated with past and present projects are inherent in the affected environment and represent the starting point to which impacts from the proposed Project is added.

Based on verbal communication with Mr. Chris Anderson of the AVAQMD, the only nearby background sources that the agency required be included in the cumulative modeling analysis were the nearby Lockheed Martin Aeronautics and Northrop Grumman facilities, both located within five miles of the Project site at or around the Palmdale Regional Airport. These are existing sources and the potential cumulative impacts are related to operational emissions. A cumulative modeling analysis is presented below.

In addition to the existing projects, reasonably foreseeable future projects within a three-mile radius around the plant site were examined in this analysis. The future projects are listed below; a brief description of each of these projects is provided in Section 5.1 of this AFC, Projects Considered in Cumulative Impacts Analysis. The four future projects, along with the approximate distance from PHPP are:

- Fairway Business Park, 1.3 miles southwest;
- Palmdale Transit Village Specific Plan, 2.5 miles southwest;
- Amargosa Creek Specific Plan, 2 miles northwest; and
- 30th St. W and Avenue K Projects, 3 miles northwest.

Cumulative Impacts During Construction

Construction of the four future projects listed above may involve some activities similar to those required for PHPP, including grading, soil handling, and delivery truck traffic. Construction impacts for these projects, including the PHPP, are expected to be temporary. Of the four projects listed above, none have identified construction schedules that would overlap PHPP construction, although several of the projects currently do not have defined construction schedules. In addition, construction equipment and soil disturbing activities tend to have low release heights of air emissions leading to localized impacts, i.e., impacts that would not influence air quality several miles away. Finally, as discussed in Section 5.2.5.1, PHPP will provide mitigation to minimize its impacts during construction. Cumulative impacts from construction are not considered to be significant because of the limited horizontal extent of impacts from construction activities and temporary nature of the activities.

Cumulative Impacts During Operation

As noted above, cumulative modeling for PM10 is needed for the EPA's PSD analysis and to satisfy the CEC's requirements. The 24-hour PM10 impacts that were greater than the SIL due to the Project alone were very limited and occurred along the fence line and extended to 350 m at the farthest point to the east of the Project site. All other impacts were below the SIL in all other directions. In order to perform the cumulative analysis against the NAAQS and CAAQS for all pollutants, an inventory of background sources was requested from the AVAQMD. The letter requesting the inventory from AVAQMD is provided in Appendix G.4. Based on verbal correspondence with Mr. Chris Anderson of the AVAQMD, the only nearby background sources that the agency required be included in the cumulative modeling analysis were the nearby Lockheed Martin Aeronautics and Northrop Grumman facilities, both located at or around the Palmdale Regional Airport and within five miles of the Project site. Because of the large number of sources at each facility, the vast majority of which had very low emissions, it was agreed with the agency to model all of the sources that included five percent or more of the emissions for each given pollutant, and then add the remainder of the total emissions to the source that emitted the highest percentage of the emissions in order to have a representative mix of source parameters, and to ensure that all criteria pollutant emissions from the two facilities were included in the modeling. Figure 5.2-4 shows the locations of the two facilities and the sources that were included in the cumulative modeling.

The NAAQS/CAAQS analysis is summarized in Table 5.2-48. The Project maximum modeled concentrations for all pollutants are summed with ambient background concentrations for comparison to the air standards. Note that for pollutant impacts less than the SILs (all but 24-hour and annual PM10), compliance is already demonstrated with the NAAQS. The cumulative modeled concentrations are summed with ambient concentrations for comparison with the CAAQS. For pollutants with CAAQS and no SILs (i.e., 1-hour SO_2 and 1-hour NO_2), compliance with the CAAQS is based on the cumulative modeled concentrations plus ambient background concentrations.

Initial modeling of annual NO_2 and annual and 24-hour PM10 and PM2.5 showed abnormally high impacts from some Lockheed and Northrop sources that were located directly adjacent to model receptors on the Lockheed and Northrop properties. In air dispersion modeling against the NAAQS and CAAQS, a source's impact is only counted in "ambient air", i.e. air that is off that facility's property and, therefore, accessible to the public. Since the Lockheed and Northrop sources do not contribute to the concentration against the NAAQS/CAAQS on their own property, two sets of runs were done for each pollutant and period. The first was with all sources included but the receptors that occurred on facility property removed in order to determine the maximum impact cause by those sources away from their own properties. The second contained the entire receptor grid but did not include the source causing abnormally high impacts on its own property in order to determine the maximum Project impacts on that property as well. The maximum impacts given in the table represent the highest value recorded between two sets of runs for each pollutant.

Table 5.2-48 NAAQS/CAAQS Cumulative Modeling Results for Project Normal Operations

Pollutant	Averaging Period	Concentrations ($\mu g/m^3$)				
		AERMOD Result	Ambient Background [2]	Total [3]	CAAQS	NAAQS
NO_2 [1]	1-hr	195.2	139.2	334.4	339	--
	Annual[6]	6.6	28.2	34.8	57	100
CO	1-hr	251.8	3,680	3,931.8	23,000	40,000
	8-hr	40.6	1,840	1,880.6	10,000	10,000
PM10	24-hr[6]	13.3	86	99.3	50	150
	Annual[6]	1.5	25	26.6	20	--[4]
PM2.5	24-hr	13.3[5]	17	30.3	--	35
	Annual[6]	1.5[5]	8.9	10.4	12	15
SO_2	1-hr	1.6	34.1	35.7	665	--
	3-hr	1.3	23.6	24.9	--	1,300
	24-hr	0.9	15.7	16.6	105	365
	Annual	0.2	5.2	5.4	--	80

[1] Modeled NO_2 concentrations as determined with the OLM.
[2] Highest value from Table 5.2-29
[3] Modeled concentration plus ambient background.
[4] The annual PM10 NAAQS of 50 $\mu g/m^3$ was revoked by EPA on September 21st, 2006. Federal Register Vol. 71 Number 200 10/17/2006.
[5] PM2.5 Project maximum modeled concentration assumed equal to PM10 concentrations.
[6] See modeling discussion for how these values were determined.

As shown in Table 5.2-48, the total concentrations comprised of maximum modeled plus maximum background are below the NAAQS and CAAQS for all pollutants with the exception of the 24-hour and annual PM10 CAAQS, for which the ambient background already exceeds the standard and Project contributions are relatively small (27 percent and 8 percent of the 24-hour and annual PM10 CAAQS, respectively). Since the Project exceeds the AVAQMD offset thresholds, and will be required to secure emission offsets in order to obtain an operating permit (see Section 5.2.1.3), the Project will result in a net air quality benefit for PM10 in the region.

Based on the activities planned during operation of the four future projects identified in the area of the plant site, there appears to be a very low probability for a cumulatively significant air quality impact to occur.

The future commercial and industrial uses of the Fairway Business Park are not known at this time, and it is possible that one or more businesses could locate in the development that could have large emission sources, or an existing business could expand with the addition of a large emission source. However, if such emission sources were to be installed in the development, those sources would have to be permitted through the AVAQMD. AVAQMD rules and regulations have been developed to maintain air quality for attainment pollutants, and make progress towards attainment for those pollutants that are not currently in attainment. Compliance with AVAQMD rules and regulations would ensure that new emission sources in this development would not contribute to a cumulatively significant impact.

Palmdale Transit Village Specific Plan, Amargosa Creek Specific Plan, and 30th St. W and Avenue K Projects allow for the development of housing, retail, offices and mixed use (i.e., housing with retail) spaces. These property uses do not typically have large emission sources, and the EIRs for these projects do not describe the development of large emission sources. These projects may cause increases in motor vehicle traffic (and emissions) and combustion emissions from space heating and other similar uses. Emissions from these types of sources tend to have low release heights which lead to localized impacts. It is unlikely, therefore, that these future developments could have a cumulatively significant impact with the PHPP several miles away.

5.2.5 Mitigation Measures

5.2.5.1 Construction Mitigation

Modeling of construction emissions produced a number of hours during stable conditions in excess of the 1-hour NO_2 CAAQS of 339 µg/m^3. The highest modeled NO_2 value was found to be 349.7 µg/m^3 (without background) As discussed in Section 5.2.4.2.1, the maximum NO_2 construction impacts exceeding the CAAQS were found to occur in the winter during the first and last hour of construction activities when low mechanical mixing heights and low wind speeds occur.

As mitigation of these high modeled NO_2 impacts, the start and end times of the primary construction activities will be reduced by 1 hour during the winter months, as needed, to prevent construction activities during the hours where low-dispersion meteorological conditions have the potential to produce high concentrations due to emissions from construction equipment.

The Applicant proposes the following mitigation measures to be implemented during the construction phase of the Project:

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The Project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with AQ-SC3, AQ-SC4 and AQ-SC5 for the entire Project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the Project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The Project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with AQ-SC3, AQ-SC4, AQ-SC5 and AQ-SC6.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report (MCR) that demonstrates compliance with the following mitigation measures for the purposes of preventing all fugitive dust plumes from leaving the Project. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. All unpaved roads and disturbed areas in the Project and linear construction sites shall be watered as frequently as necessary to comply with the dust mitigation objectives of AQ-SC4. The frequency of watering can be reduced or eliminated during periods of precipitation.

B. No vehicle shall exceed 10 miles per hour within the construction site.

C. The construction site entrances shall be posted with visible speed limit signs.

D. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

E. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

F. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

G. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM.

H. Construction areas adjacent to any paved roadway shall be provided with sandbags or other measures as specified in the Storm Water Pollution Prevention Plan (SWPPP) to prevent run-off to roadways.

I. All paved roads within the construction site shall be swept at least twice daily (or less during periods of precipitation or on other days with the concurrence of the CPM) on days when construction activity occurs to prevent the accumulation of dirt and debris.

J. At least the first 500 feet of any public roadway exiting from the construction site shall be swept at least twice daily (or less during periods of precipitation or on other days with the

concurrence of the CPM) on days when construction activity occurs or on any other day when dirt or runoff from the construction site is visible on the public roadways.

K. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

L. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

M. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (1) off the Project site or (2) 200 feet beyond the centerline of the construction of linear facilities or (3) within 100 feet upwind of any regularly occupied structures not owned by the Project owner indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if step 1 specified above fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if step 2, specified above, fails to eliminate visible dust plume at any location 200 feet or more off the Project construction fence line within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, provided that the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM in the MCR, a construction mitigation report that demonstrates compliance with the following mitigation measures for the purposes of controlling diesel construction-related emissions. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. All diesel-fueled engines used in the construction of the facility shall be fueled only with ultra-low sulfur diesel, which contains no more than 15 ppm sulfur.

B. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

C. All construction diesel engines, which have a rating of 100 hp or more, shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, section 2423(b)(1) unless certified by the on-site AQCMM that such engine is not available for a particular item of equipment. In the event a Tier 2 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a Tier 1 engine. In the event a Tier 1 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a catalyzed diesel particulate filter (soot filter), unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" if, among other reasons:

1. There is no available soot filter that has been certified by either the California Air Resources Board (ARB) or U.S. Environmental Protection Agency (EPA) for the engine in question; or
2. The construction equipment is intended to be on-site for ten (10) days or less.
3. The CPM may grant relief from this requirement if the AQCMM can demonstrate that they have made a good faith effort to comply with this requirement and that compliance is not possible.

D. The use of a soot filter may be terminated immediately if one of the following conditions exists, provided that the CPM is informed within ten (10) working days of the termination:

1. The use of the soot filter is excessively reducing normal availability of the construction equipment due to increased downtime for maintenance, and/or reduced power output due to an excessive increase in backpressure.
2. The soot filter is causing or is reasonably expected to cause significant engine damage.
3. The soot filter is causing or is reasonably expected to cause a significant risk to workers or the public.
4. Any other seriously detrimental cause which has the approval of the CPM prior to the termination being implemented.

E. All heavy earthmoving equipment and heavy duty construction related trucks with engines meeting the requirements of (c) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

F. All diesel heavy construction equipment shall not remain running at idle for more than five minutes, to the extent practical.

AQ-SC6 Except for minor activities such as cement pours, construction activities shall be limited to the hours between one hour after sunrise and one hour before sunset from November 5 through February 15. At other times, construction activities shall be limited to the hours between sunrise and sunset.

AQ-SC7 The Project owner shall provide the CPM copies of all District issued Permit-to-Construct (PTC) and Permit-to-Operate (PTO) for the facility. The Project owner shall submit to the CPM for review and approval any modification proposed by the Project owner to any Project air permit. The Project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. EPA, and any revised permit issued by the District or U.S. EPA, for the project.

AQ-SC8 The Project owner shall pave, with asphalt concrete that meets the current county road standards, unpaved local roads to provide emission reductions of 135.0 tons per year of PM10, prior to start of construction of the project. Calculations of PM10 emission reduction credits shall be performed in accordance with Sections 13.2.1 and 13.2.2 of the U.S. EPA's AP-42 "Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources", Fifth Edition.

AQ-SC10 The Project owner shall provide signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways.

5.2.5.2 Mitigation Measures During Operation

Mitigation for the PHPP emissions during operations will include reducing the emissions to the extent feasible through control technology and good combustion practices. The emissions controls selected for this Project include the installation of SCR systems, oxidation catalysts, GE Rapid Start option, and the exclusive use of pipeline quality natural gas in the combustion turbines, HRSGs, auxiliary boiler and HTF heater. The selection of these control strategies are discussed in detail in Section 5.2.3.

In addition to minimizing emissions, the remaining emissions of NO_X, VOC, and PM10 will be offset as required by AVAQMD Rules 1303 and 1305. While AVAQMD does maintain an ERC bank, efforts to date have not located ERCs that are available to purchase within the AVAQMD.

For ozone precursors, NO_X and VOC, offsets will be obtained through interbasin, interpollutant trading. These offsets will be obtained from the SCAQMD pursuant to SCAQMD Rule 1309.1 - Priority Reserve, from purchases on the open market, or another appropriate mechanism.

For PM10 ERCs, the Project Applicant plans to work closely with the AVAQMD to develop a rule to allow for the banking of PM10 ERCs from the paving of unpaved roads. MDAQMD has developed Rule 1406, which was patterned after a similar rule that was developed by Maricopa County, Arizona Air Quality Department (MCAQD) which has been approved by EPA. The Applicant anticipates that a similar rule developed by AVAQMD will receive EPA approval.

As shown in Table 5.2-27, the PHPP has a potential to emit of 115.3 tpy of NO_X, 40.0 tpy of VOC, and 126.1 tpy of PM10 that must be offset per AVAQMD regulation. We assume that the CEC will also require that the SO_2 emissions of 8.9 tpy be offset with PM10 emissions, since SO_2 is a precursor. Note that the NO_X and VOC emissions that must be offset do not include the vehicle emissions, as vehicle tailpipe emissions are exempt from permitting, and thus exempt from the offset requirements. The PM10 emissions subject to offsetting do include fugitive dust emissions from vehicle operations because although the tailpipe emissions are not considered part of stationary source operations, fugitive dust is considered part of the stationary source operations.

The VOC emissions must be offset at a ratio of 1.3 to 1. NO_X offsets are required at a ratio of 1.3 to 1, plus an additional ratio for an interpollutant trade. The Victorville 2 Hybrid Power Project (07-AFC-1) and the High Desert Power Project (HDPP) (97-AFC-01) applied an interpollutant, interbasin trade ratio for NO_X of 2.08 to 1, which includes the 1.3 to 1 ratio. Since the ozone air quality has continued to improve in the region, this ratio should still be acceptable. Based on these VOC and NO_X ratios, and a 1 to 1 ratio for PM10, the following offsets will be provided:

- NO_X: 115.3 tpy @ 2.08 ratio ≤ 229.8 tpy
- VOC: 40 tpy @ 1.3 ratio ≤ 52 tpy
- PM10: 126.1 tpy (+ 8.9 tpy of SO_2) @ 1.0 ratio ≤ 135.0 tpy

The Applicant believes that the MDAQMD-approved offset ratios will be acceptable to AVAQMD. The total of 291.8 tpy (1,600 pounds per day) of VOC credits will be obtained from the SCAQMD.

As discussed above, the Project emissions of NO_X, VOC, and PM10 must be offset as required by AVAQMD Rule 1305. These pollutants must be offset because the Project will emit more than 25 tpy of these pollutants and the Project area is currently designated as non-attainment for ozone, for which NO_X and VOC are precursors, and for PM10. The AVAQMD is currently designated as attainment of the SO_2 and PM2.5 AAQS. Although SO_2 is considered a precursor of PM10, the AVAQMD NSR program only requires the offsetting of SO_2 (as a PM10 precursor) if project emissions are above 25 tpy. As described above, this offset threshold was determined by the District to be effective to lead to attainment of the AAQS. This may be because the NSR program requires mitigation for NO_X at a 1.3 to 1 ratio and PM10 at a 1 to 1 ratio, along with other Federal, State and local programs, which provide a programmatic net air quality benefit.

In spite of the fact that the AVAQMD considers its NSR program to be effective in mitigating the impacts of new major sources, the CEC will require the Project to provide additional emission reductions to also mitigate emissions of SO_X based on the current PM10 nonattainment status of this area. The offset/mitigation strategy for these criteria pollutant emissions for the Project is discussed below.

Offsets for Ozone Precursors (NO_X and VOC)

As shown in Table 5.2-27, the Project has a potential to emit of 115.3 tpy of NO_X and 40 tpy of VOC. According to AVAQMD Rule 1305, the VOC and NO_X emissions must be offset at ratio of 1.3 to 1, if ERC within the MDAB are used. However, it has been determined (as discussed further below) that there are insufficient banked ERC in the AVAQMD that are available for purchase. Therefore, use of interbasin VOC credits from the SCAQMD is proposed to offset both VOC and NO_X emissions for the Project. The VV2 and HDPP in Victorville also used this approach, i.e., use of SCAQMD VOC ERCs to offset both VOC and NO_X emissions from the HDPP. In fact, it was through the efforts of the HDPP proponents that the California H&S Code, AVAQMD and SCAQMD rules were modified to allow this method of offsetting project emissions.

This offset strategy/approach is considered effective for mitigating the emissions of the ozone precursors because the ozone nonattainment in the MDAB has been demonstrated to be overwhelmingly due to emissions in the SCAQMD. Ozone is produced by a complex chemical process in which emissions are mixed and converted by sunlight, often over large distances. This is the reason why the California H&S Code and both the SCAQMD and AVAQMD rules allow for this approach to be taken. Therefore, reduction of

emissions in the SCAQMD would be more effective in improving the local air quality than reducing emissions in the vicinity of the Project. The CEC, EPA and ARB also approved the approach for VV2 and HDPP.

PM10 and PM10 Precursor (SO_2)

As noted above, the MDAB is designated as non-attainment of the PM10 AAQS, but is attainment for PM2.5 and SO_2. For PM10 ERCs, the Project Applicant has been working closely with the AVAQMD to develop a rule to allow for the banking of PM10 ERCs from the paving of unpaved roads. AVAQMD is developing a draft rule which will be based on other recently adopted rules, i.e., Rule 1406 in MDAQMD and Rule 242 in Maricopa County, Arizona Air Quality Department (MCAQD). The AVAQMD expects to propose its new rule for public comments within the next month or so.

The Project will be required by AVAQMD Rule 1305 to offset 126.1 tpy of PM10 using banked ERC. These ERC must be identified prior to licensing of the Project. The City of Palmdale has provided a list of potential unpaved roads within the MDAB that could be candidates for paving. Potential PM10 ERC will be calculated based on the average daily traffic (ADT) and daily vehicle miles traveled (DVMT) provided by AVAQMD or the City of Palmdale, if necessary, for these road segments and the equations in the AVAQMD rule, when adopted.

The HDPP used road paving to create PM10 ERC for the project. Roughly one mile of Rancho Road in Adelanto was paved and created sufficient ERC for the HDPP. This method of ERC creation meets the NSR requirements and is considered effective for PM10 mitigation. As noted in Section 6.3.4.2 of the HDPP AFC, Project contribution to the PM10 concentrations in the vicinity is relatively small. The primary reason that the Project impact could be considered significant is due to the high existing PM10 background levels. The high existing background levels are most likely due to fugitive dust from low level sources. Therefore, emission reductions from paving of roads would be the most effective way to mitigate PM10 emissions in the MDAB. Further, paving of roads anywhere within the MDAB would meet the requirements for the AVAQMD NSR program, and provide an overall benefit to air quality.

The Project has a potential to emit 8.9 tpy of SO_2 (see AFC Table 5.2-27). This amount is considered conservative since the sulfur content of the natural gas is typically less than the level assumed for the emission calculations. Since SO_2 is an attainment pollutant and the predicted maximum emissions are below 25 tpy, AVAQMD Rule 1305 does not require that it be offset. However, because SO_2 is a precursor to PM10, mitigation might be required by the CEC. In that case, further reductions of PM10 would serve to provide this mitigation. The Applicant believes that sufficient road paving ERC would be both available and effective in mitigating both the PM10 and SO_2 emissions for the Project, if necessary.

PM2.5 Mitigation

The MDAB is classified as an attainment area for PM2.5. The standards for PM2.5 are relatively new, and specific offset thresholds and other implementation requirements have not yet been developed. However, because it is an attainment pollutant, it is not expected that NSR offsets would be required by the AVAQMD.

As shown in Section 5.2.4 of this AFC, the modeling for the Project demonstrated that the emissions of PM2.5 would not cause or contribute to an exceedance of the PM2.5 AAQS during normal operation. The emissions of PM2.5 were conservatively assumed to be equal to PM10, which were estimated at a conservatively high level. Therefore, since the Project does not cause or contribute to an exceedance of the

PM2.5 standards, the Project does not have a significant impact to PM2.5 and no mitigation should be required. Although mitigation is not considered necessary, the road paving ERC proposed for the Project will provide some PM2.5 reductions.

5.2.6 References

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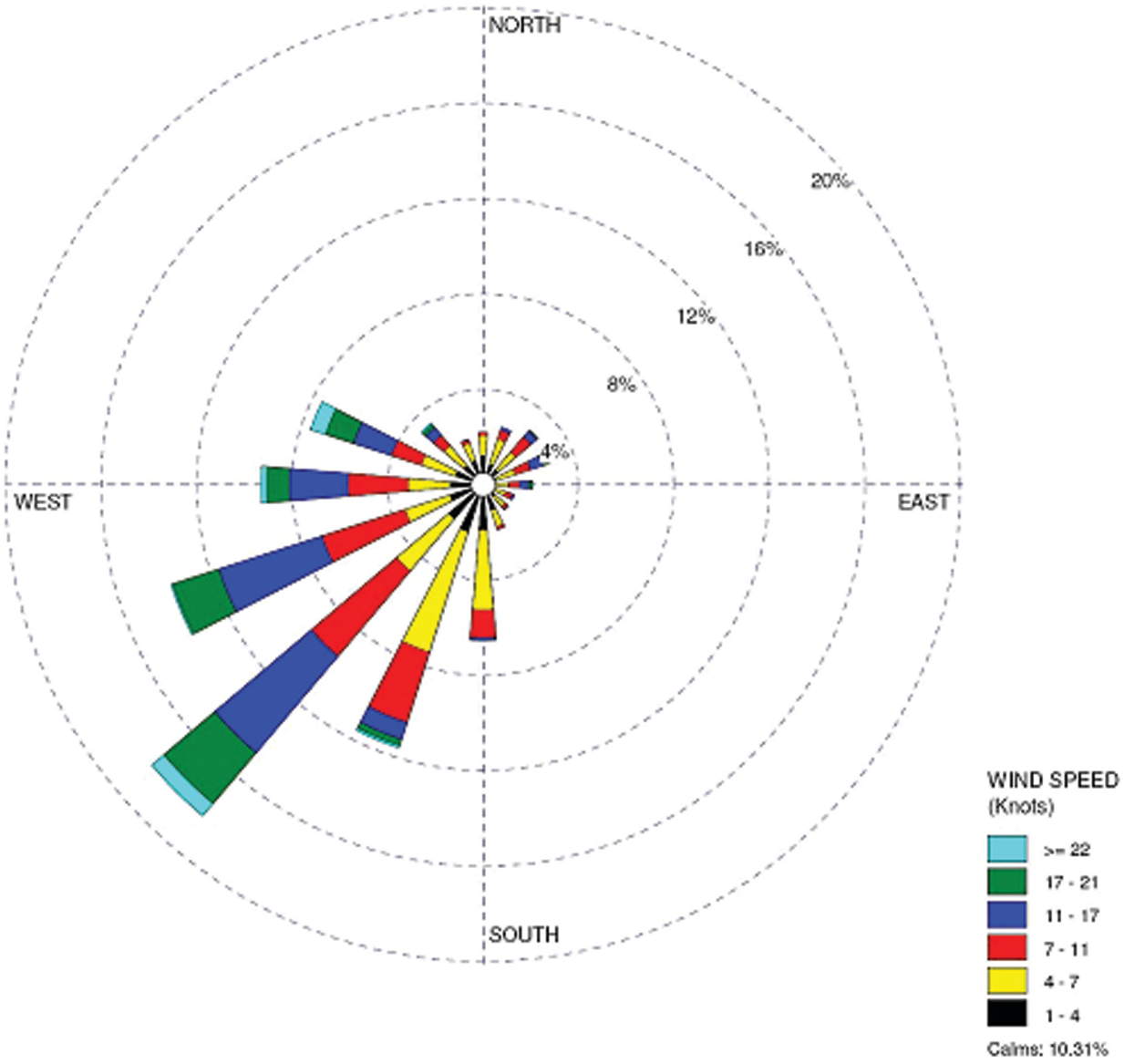

Map Location

Not to Scale

Palmdale Hybrid Power Project

Figure 5.2-1

Palmdale Regional Airport Wind Rose

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Project: 10855-002
Date: July 2008

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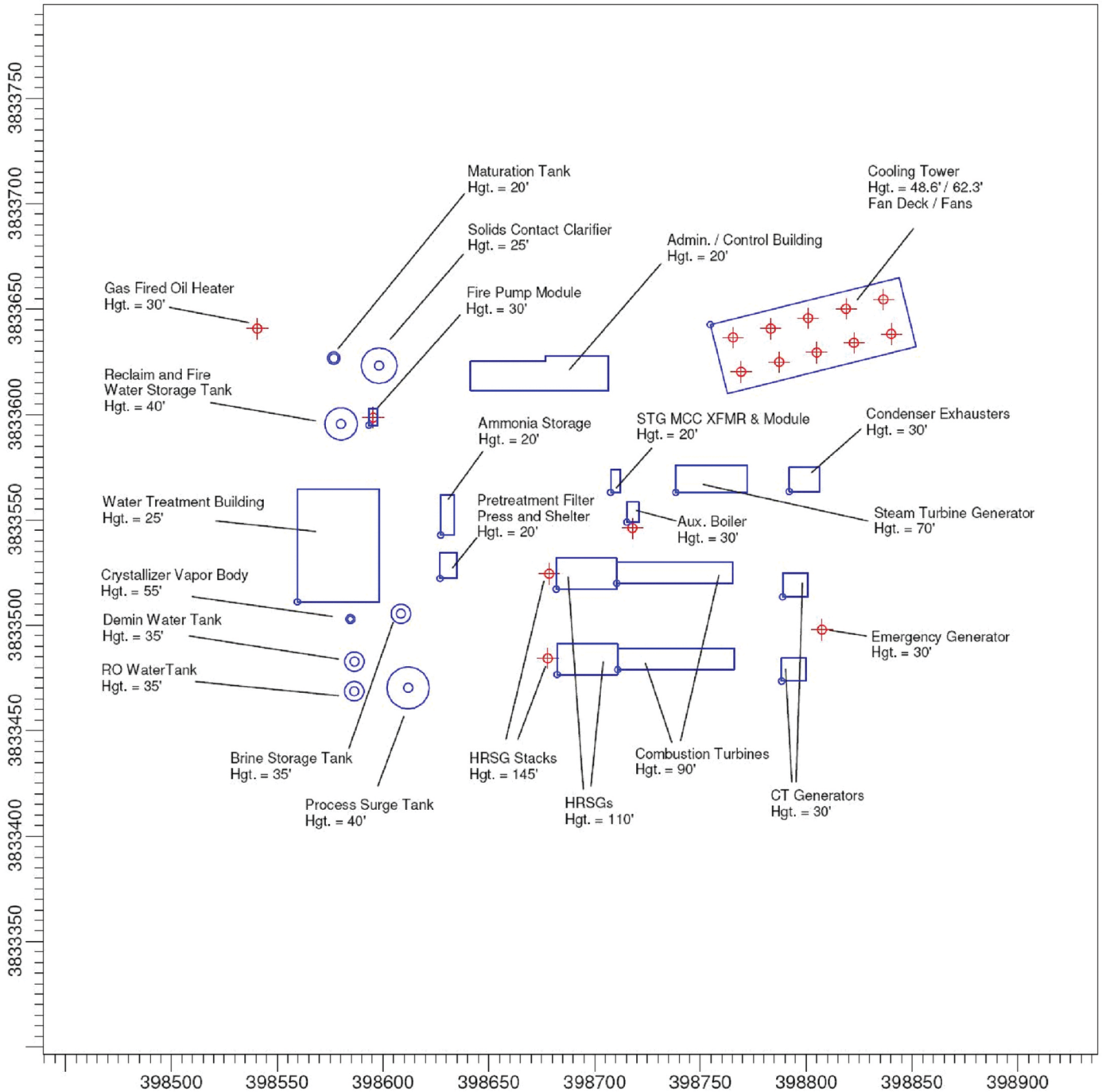

Map Location

Not to Scale

Palmdale Hybrid Power Project

Figure 5.2-2

Buildings Evaluated in GEP Analysis

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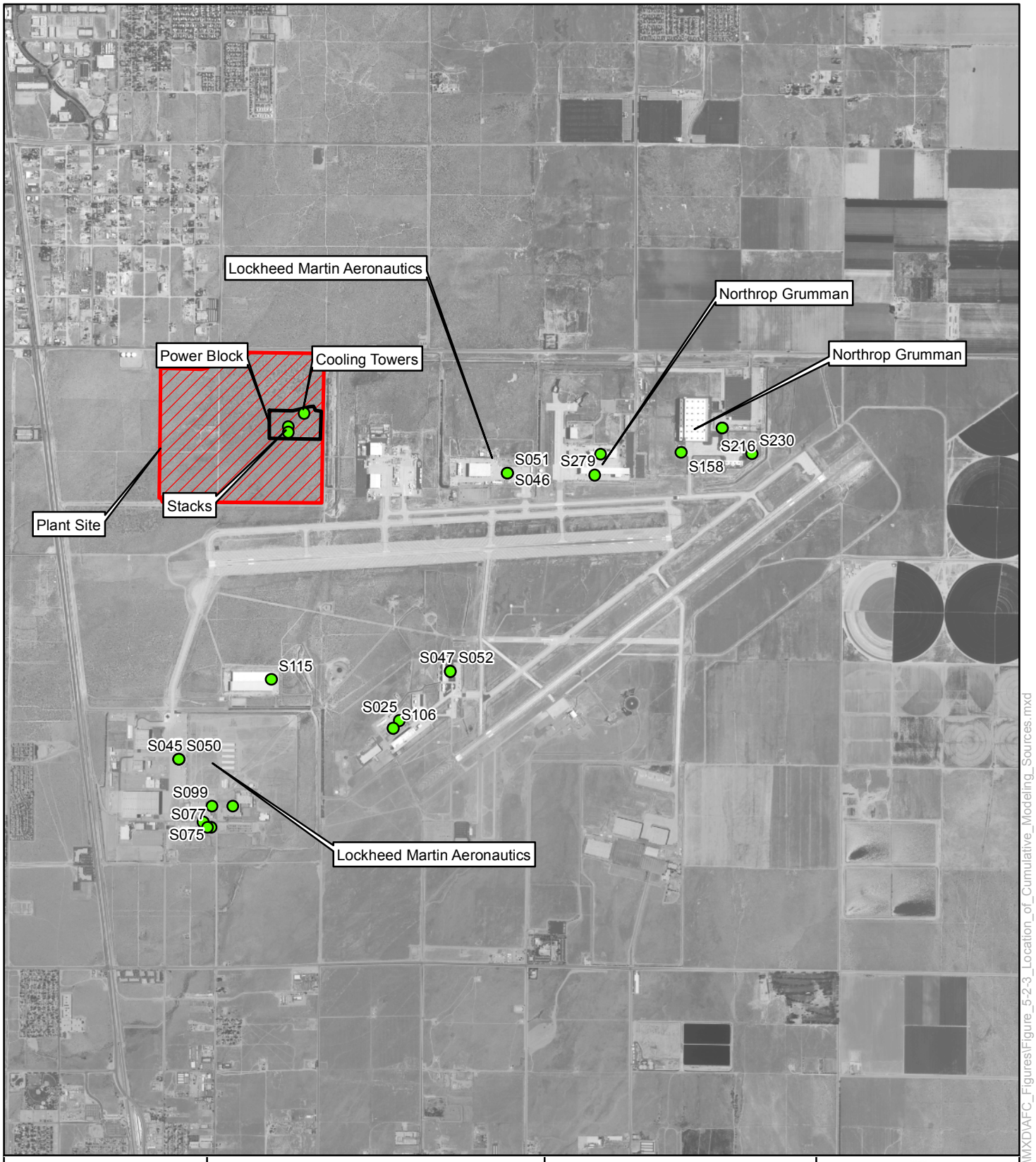

Map Location

Legend

- Plant Site
- Power_Block
- Cumulative Modeling Sources

N W E S

0 1,750 3,500 7,000 Feet

Palmdale Hybrid Power Project

Figure 5.2-3
Location of Cumulative Modeling Sources

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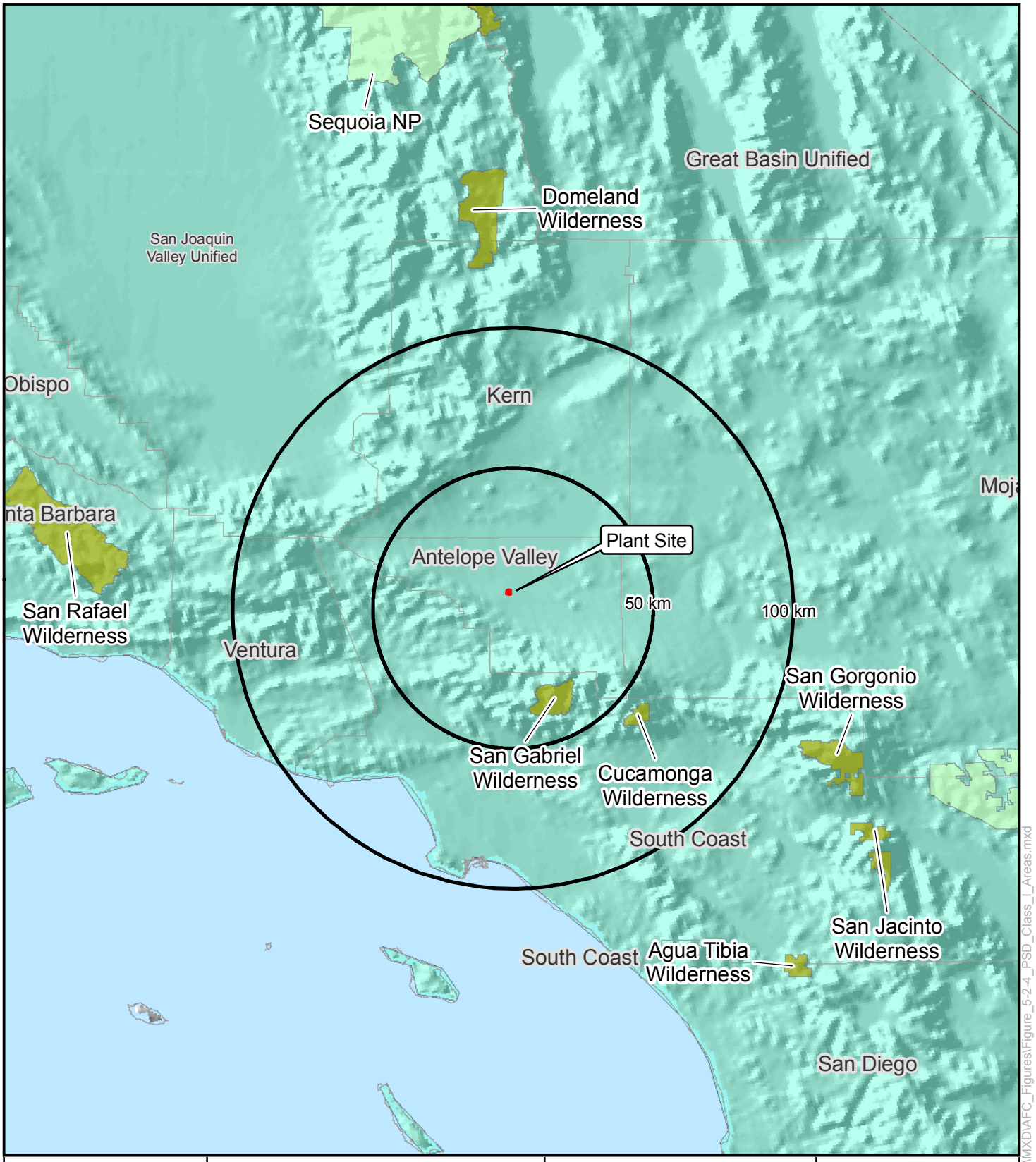

Map Location

Legend

- Plant Site
- 100 km Radius
- NPS Class I Areas
- USFS Class I Areas
- Air District Boundary

N W E S

1 inch equals 30 miles

0 15 30 60 Miles

Palmdale Hybrid Power Project

Figure 5.2-4
Location of Project Site in Relation to Nearby PSD Class I Areas

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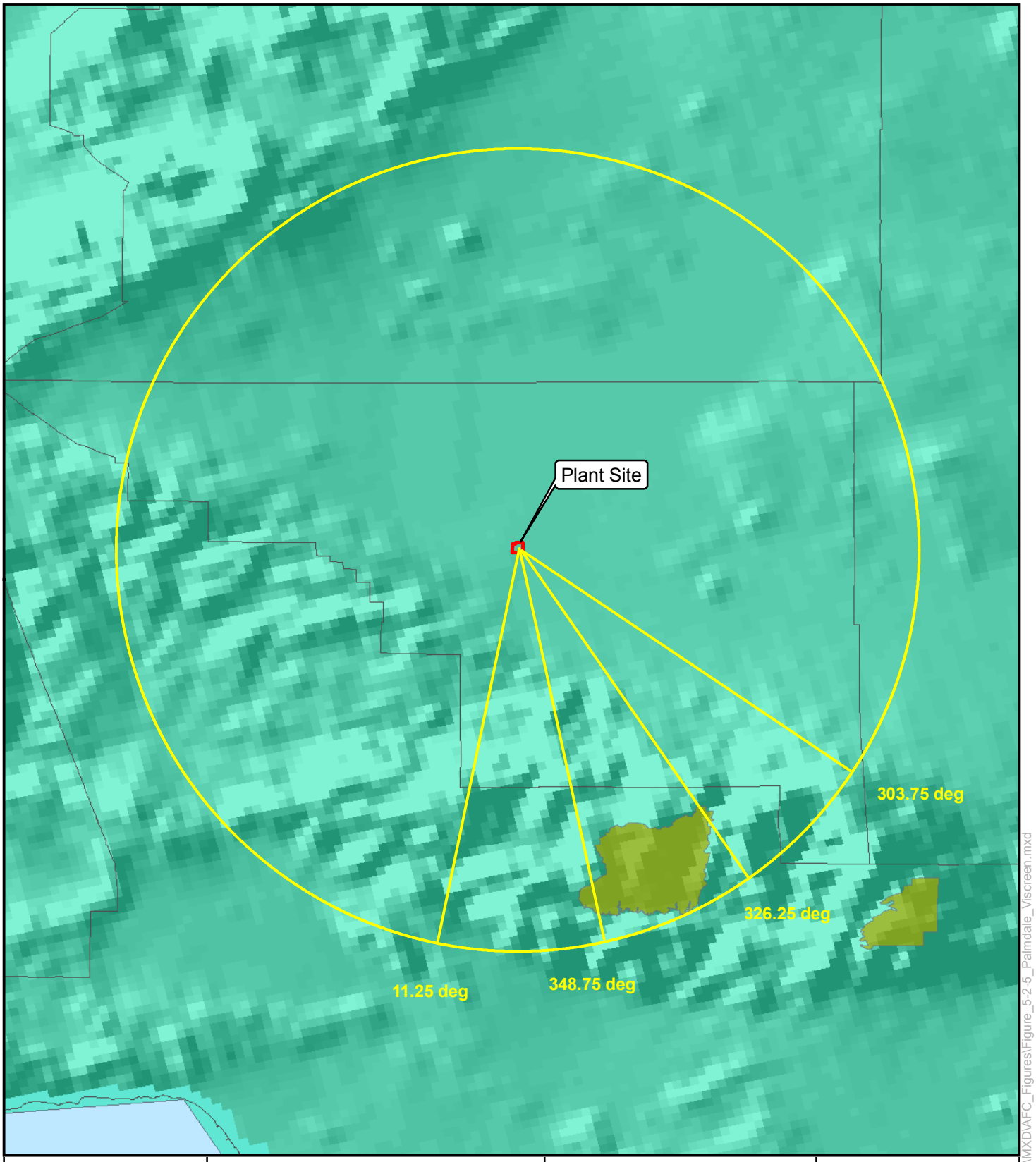

Map Location

Legend

- Plant Site
- USFS Class I Areas
- Air District Boundary

Degrees Show Direction of Winds Blowing From Source to Class I Area

N W E S

1 inch equals 10 miles

0 5 10 20 Miles

Palmdale Hybrid Power Project

Figure 5.2-5
22.5 Degree Wind Direction Sectors Encompassing San Gabriel WA

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