5.2 Air Quality

This section addresses the air quality impacts from construction and operation of the Ridgecrest Solar Power Project (RSPP or Project). The air quality assessment covers the specific air quality information required by the California Energy Commission (CEC) guidelines for an AFC, including: applicable Laws, Ordinances, Regulations and Standards (LORS); baseline conditions with respect to climate and ambient concentration; quantification of emissions from Project construction and operation activities; dispersion modeling to evaluate the impacts of Project emissions on ambient air quality; cumulative impacts of the Project together with other projects in the vicinity; and control technologies and other measures proposed to mitigate Project impacts. The assessment also provides the information required by the Kern County Air Pollution Control District (KCAPCD or District) to issue a Determination of Compliance (DOC) for the Project.

Summary

The RSPP will be a source of pollutants such as nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM10), and fine particulate matter (PM2.5) associated with the operation of the auxiliary boiler, heat transfer fluid (HTF) heater, emergency fire water pump and generator engines, auxiliary cooling tower, HTF ullage system, and maintenance vehicle traffic in the solar fields. Controlled emissions from these sources will not exceed major source thresholds for any pollutant, and are below the thresholds above which emission offsets would be required for the Project.

Project emissions were modeled to determine impacts to air quality during the construction and operations phases. The Project's modeled construction impacts (without background) showed compliance with all California Ambient Air Quality Standards (CAAQS). When background is considered, the Project showed a potential for exceedances of the CAAQS for NO_2 and PM10 at or near the facility fenceline. The Project's modeled impacts during operation, when added to background concentrations, are projected to be below the Federal and State ambient air quality standards for all criteria pollutants with the exception of the 24-hour and annual PM10 CAAQS. The 24-hour and annual PM10 impacts during operation exceed the State standards because the background 24-hour and annual PM10 concentrations by themselves exceed the applicable standards, even though Project contributions to the total were about 15 % of the daily standard and 4 % of the annual CAAQS.

The modeled worst-case pollutant concentrations during construction and operation occur at or near the Project fenceline, so any potential impact will be localized. The modeling analysis is conservative, the site is remote, and feasible mitigation measures such as Best Available Control Technology (BACT) and dust control plan will be applied. By its nature, a solar energy project must keep dust to a minimum through the use of dust control measures because a film of dust on the mirrors will reduce their efficiency for power production, so regionally, fugitive dust should decrease after the Project is built. In addition, the Project will have a long term benefit of reducing greenhouse gas (GHG) and other pollutant emissions over the long term compared to conventional fossil-fueled power plants.

With respect to cumulative impacts, it is expected that the other cumulative projects will be required to undergo a separate environmental review process and each project will address its own emissions and impacts on ambient air quality standards. The potential for cumulative effects during construction depends on how many of the proposed projects actually are constructed, whether projects in proximity to each other are constructed on overlapping schedules so that peak construction emissions and impacts coincide. The proposed transportation, residential, retail and hotel projects are expected to have negligible operating emissions. Therefore, the potential for significant adverse cumulative impacts during construction and operations is considered to be minimal.

The Air Quality discussion presented in the following pages is intended to support compliance by the CEC with the requirements of the California Environmental Quality Act (CEQA), and by the Bureau of Land Management (BLM) with the requirements of the National Environmental Policy Act (NEPA). The two agencies are conducting a joint review of the Project and a combined CEQA/NEPA document will be prepared.

This section focuses on criteria pollutant emissions, i.e., those pollutants for which ambient air quality standards have been established to protect human health and the environment. There are seven primary criteria pollutants: ozone (O_3), NO_2, CO, SO_2, PM10, PM2.5, and lead. The Project will emit insignificant amounts of lead, and hence it is not discussed further. This Section also provides emission estimates of Greenhouse Gas (GHG) emissions from the combustion of fuels in RSPP sources. Project emissions of Toxic Air Contaminants (TAC) and their potential impacts on public health are addressed in Section 5.10, Public Health.

5.2.1 LORS Compliance

Construction and operation of the Project will be conducted in accordance with the applicable LORS. A summary of the applicable Federal, State, and local air quality LORS are presented in Table 5.2-1, and the potentially applicable LORS are discussed following the table.

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

LORS	Description	Where Discussed in AFC
Federal:		
Determining Conformity of General Federal Actions to State or Federal Implementation Plans: Title 40 Code of Federal Regulations (CFR) Part 51, Subpart W	Conformity determinations for Federal actions not related to Federal transportation projects are required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a non-attainment or maintenance area caused by a Federal action would equal or exceed any of the emission rates specified in the rule.	Section 5.2.1.1
Title 40 CFR Part 60 – New Source Performance Standards (NSPS), Subpart A General Provisions	Establishes standards for notifications, performance testing, recordkeeping and reporting for new sources subject to NSPS standards.	Section 5.2.1.1
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 and generator engines.	Sections 5.2.1.1 and 5.2.3.2
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 for stationary compression ignition engines, including emergency fire water pump and generator engines.	Sections 5.2.1.2 and 5.2.3.2
California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32), California Health and Safety Code (HSC) section 38500 et seq.	Provides the statutory foundation for State-wide measures to reduce GHG emissions and establishes goal to reduce State-wide GHG emissions to 1990 levels by 2020.	Section 5.2.1.2

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

LORS	Description	Where Discussed in AFC
Greenhouse Gas Emissions Performance Standard: Senate Bill (SB) 1368	Sets emission performance standards for GHG emissions per unit of power output for utilities.	Section 5.2.1.2
Local (KCAPCD):		
Rule 108.2 - Emission Statement	Requires the submittal of an emissions inventory.	Section 5.2.1.3
Rule 201 - Permits Required	Establishes the requirement to obtain a Permit to Operate (PTO) for emission sources.	Section 5.2.1.3
Rule 202 - Permit Exemptions	Allows installation and operation of certain low-emitting devices at a facility without having to obtain a PTO.	Section 5.2.1.3
Rule 210.1 - New and Modified Stationary Source Review	Establishes the requirements that must be met to obtain a PTO, including the requirement to comply with best available control technology (BACT), provide emission offsets for emission increase above specified thresholds, provide modeling, an alternatives analysis and compliance certification.	Sections 5.2.1.3 and 5.2.3
Rule 401 - Visible Emissions	Limits visible emissions.	Section 5.2.1.3
Rule 402 - Fugitive Dust	Limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and man-made conditions that may cause wind erosion.	Section 5.2.1.3
Rule 404.1 - Particulate Matter Concentration – Desert Basin	The rule limits particulate matter (PM) emissions to less than 0.1 grains per standard cubic foot of gas at standard conditions.	Section 5.2.1.3
Rule 405 - Particulate Matter – Emission Rate	This rule limits PM emissions. PM emission limits included in the rule are a function of exhaust flow rate from the regulated device.	Section 5.2.1.3
Rule 407 - Sulfur Compounds	Limits discharge into the atmosphere of sulfur compounds exceeding 0.2 percent by volume concentration calculated as SO_2.	Section 5.2.1.3
Rule 409 - Fuel Burning Equipment – Combustion Contaminants	Limits discharge into the atmosphere from fuel burning equipment combustion contaminants 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 410 - Organic Solvents	Limits discharge of more than 15 pounds of heated organic materials (i.e., volatile organic compounds [VOC]) in any one day unless the discharge has been reduced by at least 85 percent. Further, the rule limits discharge into the atmosphere of more than 40 pounds of photochemically-reactive organic materials in any one day.	Section 5.2.1.3

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

LORS	Description	Where Discussed in AFC
Rule 410.1 - Architectural Coatings	Limits VOC emissions from architectural coatings.	Section 5.2.1.3
Rule 410.2 - Disposal and Evaporation of Solvents	Limits daily disposal of photochemically-reactive solvent into the atmosphere.	Section 5.2.1.3
Rule 419 - 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 422 - New Source Performance Standards	Incorporates the Federal NSPS (40 CFR 60) rules by reference.	Sections 5.2.1.1 and 5.2.1.3
Rule 424 - Residential Water Heaters	Establishes NOx emission limits from residential-type water heaters.	Section 5.2.1.3
Rule 425.2 - Boilers, Steam Generators and Process Boilers (Oxides of Nitrogen)	This rule limits NOx emissions from boilers, steam generators, and process heaters to levels consistent with Reasonably Available Control Technology (RACT).	Sections 5.2.1.3 and 5.2.3.1
Rule 427 - Stationary Piston Engines (Oxides of Nitrogen)	This rule limits NOx and CO emissions from stationary piston engines to levels consistent with RACT.	Sections 5.2.1.3 and 5.2.3.2

5.2.1.1 Federal LORS

The U.S. Environmental Protection Agency (EPA) is responsible for establishing the National Ambient Air Quality Standards (NAAQS) and enforcing the Federal Clean Air Act (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 KCAPCD for implementation in the local area.

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 under Title III of the CAA Amendments of 1990, codified at 40 CFR 68. As shown in Section 5.2.4.1, the emissions from the Project are well below the thresholds for these programs, and hence these LORS are not applicable to this Project.

Determining Conformity of General Federal Actions to State or Federal Implementation Plans

Conformity determinations for Federal actions not related to Federal transportation projects are required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria

pollutant or precursor in a non-attainment or maintenance area caused by a Federal action would equal or exceed any of the emission rates specified in the rule. As discussed in detail in Section 5.2.2.3, the Project site is in an area that is in attainment or unclassified with respect to all NAAQS, thus the Project is not subject to this rule and is not required to develop a conformity determination.

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 technology-based 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 specific categories of 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 a NSPS may differ depending on the source category. 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 applicable to the Project are summarized below. Enforcement of the NSPS has been delegated to the KCAPCD.

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 Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, the requirements of Subpart A also will apply. The Project 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 emergency fire water pump and generator CI engines as follows:

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

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

(iii) Fire water 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 2010.

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 NOx combined, and 0.15 g/hp-hr for PM. In model years 2009 through 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 a fire water pump engine meeting these standards.

Owners and operators of non-fire water pump engines must comply with the emission standards listed for all pollutants. For a model year 2006 or later engine with 300 to 600 hp, the limits are 2.6 g/hp-hr for CO, 3.0 g/hp-hr for NMHC and NOx combined, and 0.15 g/hp-hr for PM. The Project will install an emergency generator engine that meets these standards.

Although the Project facility is subject to NSPS Subpart IIII, pursuant to 40 CFR Section 60.4200(c) an owner or operator of an area source (i.e., not a major source) subject to Subpart IIII is exempt from the requirement to obtain a Title V permit under 40 CFR Parts 70 or 71, provided a Title V permit is not required for another reason. As stated above, Project emissions are below Title V emission thresholds; therefore, a Title V permit is not required for the Project.

5.2.1.2 State LORS

The California Air Resources Board (ARB) became part of the California Environmental Protection Agency (CalEPA) in 1991. ARB 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 ATCMs promulgated under AB 1807 (Tanner process) and other air toxics programs, as discussed in detail in Section 5.10, Public Health.

California Global Warming Solutions Act of 2006 (AB 32)

California's major initiatives for reducing GHG emissions to combat climate change are outlined in AB 32 (signed into law 2006), a 2005 Executive Order (S-3-05), and a 2004 ARB regulation to reduce passenger car GHG emissions. These efforts aim at reducing statewide GHG emissions to 1990 levels by 2020 - a reduction of about 25 percent over business as usual emissions - and then by 80 percent below 1990 levels by 2050. The strategies for making these reductions are outlined in the “Climate Change Proposed Scoping Plan,” approved by ARB in December 2008, and include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. The Governor’s Office of Planning and Research has developed proposed amendments to the CEQA Guidelines to provide guidance on analysis and mitigation of the potential effects of GHG emissions under CEQA. These proposed guideline amendments are scheduled to be adopted by January 1, 2010. The Project will comply with applicable requirements of rules and regulations developed to implement AB 32.

GHG Emissions Performance Standard (SB 1368)

On January 25, 2007, the California Public Utilities Commission (PUC) adopted an interim GHG Emissions Performance Standard to implement the requirements of SB 1368. 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 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 SB 1368, which prohibits load-serving entities (LSEs), including investor-owned utilities, energy service providers, and community choice aggregators, from entering into a long-term financial commitment for baseload generation unless they comply with a GHG EPS. 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.

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 power plants. As a solar energy generating facility with minimal combustion sources, the Project will be significantly below the baseline requirement, emitting approximately 21 pounds per megawatt-hour.

Airborne Toxic Control Measure for Stationary Compression Ignition Engines

The California ATCM for CI engines specifies operating requirements and exhaust emission standards for stationary CI engines. In California, diesel particulate matter is considered a TAC. The ATCM for CI engines requires the use of ARB diesel fuel (15 parts per million [ppm] sulfur by weight) and also includes emission standards for criteria pollutants.

The Project 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 NFPA 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2002 edition as required by the ATCM (CCR Section 93115.6(a)(4)(A)(1)). The facility 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 3 emissions standards for off-road engines. The Project 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 facility will use only ARB diesel fuel in the emergency fire water pump and generator engines and retain purchase records and Material Safety Data Sheets (MSDS) to substantiate compliance with the fuel sulfur requirement.

5.2.1.3 Local LORS

The local air quality LORS applicable to the Project are administered by the KCAPCD.

KCAPCD Rule 108 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 million British thermal units per hour (MMBtu/hr), or more. The boiler and heater proposed for this Project are each rated at 35 MMBtu/hr and, therefore, are not subject to the requirements of this rule.

KCAPCD Rule 108.1 Source Sampling

Upon the request of the Air Pollution Control Officer (APCO), and as directed by him, the owner of any source operation which emits or may emit air contaminants, for which emission limits have been established, shall provide the following facilities, constructed in accordance with the general industry safety orders of the State of California:

a. Sampling ports,
b. Sampling platforms,
c. Access to sampling platforms, and
d. Utilities for sampling equipment.

Sampling port locations must be determined according to criteria in the ARB Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Emission Monitoring and Testing. The Project will comply with the requirements of this rule by providing the specified sampling facilities on Project facilities, if requested.

KCAPCD Rule 108.2 Emission Statement

Upon request of the APCO, an owner or operator of any source operation emitting or with the potential to emit NOx or VOC shall provide the District with a written statement, in such form as prescribed, showing actual emissions of NOx and VOC from such source. The Project will comply with the requirements of this rule by providing the specified emission report in a timely manner.

KCAPCD Rule 202 Permit Exemptions

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 202, including a 300-gallon diesel fuel storage tank, 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.

Rule 210.7 – Federal General Conformity Rule

This rule adopts the provisions of 40 CFR, Chapter I, Subchapter C, Parts 6 and 51 by reference and made a part of the KCAPCD rules and regulations. As discussed in detail in Section 5.2.2.3, the Project site is in an area that is in attainment or unclassified with respect to all NAAQS, thus the Project is not subject to this rule and is not required to develop a conformity determination.

KCAPCD Rule 210.1 New and Modified Stationary Source Review

This rule provides for preconstruction review of new and modified stationary sources of affected pollutants to ensure emissions will not interfere with attainment of ambient air quality standards; 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 nonattainment pollutants and their precursors.

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 the Control Technology Assessment located in Section 5.2.3.

Offsets

An applicant must provide offsets for new or modified stationary sources of PM10, SOx, NOx, 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 not required for the RSPP because Project emissions do not exceed the applicable thresholds, which are shown in Table 5.2-2.

Table 5.2-2 Offset Thresholds

Pollutant	Offset Threshold tons per year (tpy)
PM10	15
SOx (as SO_2)	27
VOC	25
NOx	25

Additional Requirements

Alternative Sitting: 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. Although not required for the Project, an alternatives analysis is contained in Section 4.0 of this AFC.

Visibility Impacts Analysis: Any new major source or major modification is 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 neither a major source nor a major modification; thus a visibility analysis is not required for the Project.

Modeling: Emissions from a new or modified stationary source shall not make worse an exceedance of an ambient air quality standard. In making this determination, the APCO will take into account increases in cargo carrier and secondary emissions and offsets provided pursuant to this rule. The Project emissions do not exceed the offset trigger levels and, therefore, modeling is not required for the Project. However, modeling has been conducted to satisfy the CEC AFC requirements. As shown in Section 5.2.4.2 the modeling demonstrates that the Project will not cause or contribute to a violation of the NAAQS or CAAQS.

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 facility is not a major source of air pollutants, the compliance certification is not required for the Project.

KCAPCD Rule 401 Visible Emissions

A person is not allowed to discharge into the atmosphere, from any single source of emissions whatsoever, any air contaminant for a period or periods aggregating more than three 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 boiler, heater, and emergency engines will be equipped with BACT and combust clean fuels and, consequently, will operate in compliance with this rule.

KCAPCD Rule 402 Fugitive Dust

The purpose of this rule is to reduce the amount of PM10 emitted from significant man-made fugitive dust sources to an amount sufficiently low to maintain NAAQS. The provisions of this rule apply to specified bulk storage, earthmoving, construction and demolition, and man-made conditions resulting in wind erosion. It also applies to unpaved roadways located in the Kern County portion of the Searles Valley Planning Area.

Project construction is considered a large operation that will involve bulk storage of soils, earthmoving, construction and demolition, and man-made conditions that have the potential for fugitive dust emissions. The Applicant or its contractors will follow the fugitive dust control strategy outlined in a Construction Dust Control Plan that will be prepared for the Project (see AQ-SC3 in Section 5.2.6).

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 of any HTF spills. These operations have the potential for fugitive dust emissions. The Applicant or its contractors will follow the fugitive dust control strategy outlined in the Operations Dust Control Plan that will be prepared for the Project (see AQ-SC7 in Section 5.2.6).

KCAPCD Rule 404.1 Particulate Matter Concentration – Desert Basin

Rule 404.1 applies to any person who discharges PM emissions into the atmosphere from any single source operation. The rule limits PM emissions to less than 0.1 grains per standard cubic foot of gas at standard conditions. The requirements of this rule do not apply to boilers provided they combust only liquid fuels, gaseous fuels, or waste gases, and only emit combustion contaminants. The Project boiler and heater will combust only propane and, therefore, the limit does not apply to the boiler or heater. The emergency fire water pump and generator engines are subject to and will comply with this rule by using only ultra-low sulfur diesel fuel.

KCAPCD Rule 405 Particulate Matter – Emission Rate

A person shall not discharge into the atmosphere from any source operation, PM in excess of the limits shown in the rule. The particulate matter emission limits are a function of exhaust flow rate from the device. The boiler, heater, emergency fire water pump and generator engines, and cooling tower will emit particulate matter, and are subject to and will comply with this rule.

KCAPCD Rule 407 Sulfur Compounds

A person shall not discharge into the atmosphere sulfur compounds, which would exist as a liquid or gas at standard conditions, exceeding in concentration at the point of discharge 0.2 percent by volume calculated as SO_2. The use of propane for the boiler and heater, and ultra-low sulfur diesel fuel in the emergency fire water pump and generator engines, ensures compliance with this rule.

KCAPCD Rule 409 Fuel Burning Equipment – Combustion Contaminants

Fuel burning equipment, the construction or modification of which commenced after August 17, 1971, shall not discharge into the atmosphere PM, SO_2 or NOx in excess of the EPA Standards of Performance (see KCAPCD Rule 422). In addition, a person shall not discharge into the atmosphere from any other fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12 percent of CO_2 at standard conditions. The boiler and heater proposed for the Project will burn propane and use state-of-the-art emission controls, and thus will operate in compliance with this rule. Likewise, the emergency fire water pump and generator engines proposed for the Project will burn ultra-low sulfur diesel fuel in new Tier 3 compliant engines, and thus will operate in compliance with this rule.

KCAPCD Rule 410 Organic Solvents

A person shall not discharge into the atmosphere more than 15 pounds of organic materials (i.e., VOC) in any one day from any article, machine, equipment, or other contrivance in which any organic solvent, or any material containing organic solvent, comes into contact with flame or is baked, heat-cured, or heat-polymerized in the presence of oxygen, unless said discharge has been reduced by a least 85 percent. Further, a person shall not discharge into the atmosphere more than 40 pounds of organic materials in any one day from any article, machine, equipment or other contrivance used under conditions other than those described above. The Project's normal operations will not involve the routine use of organic solvents. To the extent the Project would use organic solvents, such as for maintenance activities including thinning paint or wipe cleaning, the Project will comply with the rule limits.

KCAPCD Rule 410.1 Architectural Coatings

The purpose of this rule is to limit VOC emissions from architectural coatings. This rule specifies VOC content of 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 of Standards (in the rule) after January 1, 2007. The Project will comply with the requirements of this rule to the extent that architectural coatings are applied at the facility during construction or subsequent maintenance activities.

KCAPCD Rule 410.2 Disposal and Evaporation of Solvents

A person shall not, during any one day, dispose of a total of more than 1.5 gallons of any photochemically-reactive solvent, or of any material containing more than 1.5 gallons of any such photochemically-reactive solvent into the atmosphere. The Project will comply with the requirements of this rule to the extent that organic solvents are disposed from the facility during construction or subsequent maintenance activities.

KCAPCD Rule 410.3 Organic Solvent Degreasing Operations

Organic solvent degreasing operations are not planned for the Project, and thus this rule will not apply.

KCAPCD Rule 411 Storage of Organic Liquids

This rule applies to equipment used to store organic liquids and petroleum distillates, with a true vapor pressure of greater than 1.5 pounds per square inch-atmospheric (psia). The Project will have insulating mineral oil (transformers), hydraulic oil (steam turbine and other equipment), and lubricating oil on site, all of which have a true vapor pressure less than 1 psia at 68 degrees Fahrenheit (^{o}F) stored at the facility. Diesel fuel also will be stored at the facility. It has a vapor pressure of 0.008 psia (0.40 mm of mercury). Therefore, this rule will not apply to the Project.

KCAPCD Rule 414.2 Soil Decontamination (Volatile Organic Compounds)

The purpose of this rule is to limit VOC emissions from excavation and aeration, or treatment of soil that has been contaminated by organic compounds. This rule applies to excavation and aeration, or treatment of VOC-contaminated soil. The requirements of this rule do not apply to:

- Decontamination of less than one cubic yard of contaminated soil;
- Contaminated soil exposed for the sole purpose of sampling;
- Soil contaminated solely by an organic liquid having an initial boiling point of 302°F, or higher, as determined by American Society of Testing Materials (ASTM) D86-78, provided such soil is not heated above ambient temperature and samples of the contaminating liquid can be obtained; or

- Emergency excavation and/or decontamination of soil performed by, under jurisdiction of, or pursuant to requirements of, an authorized health officer, agricultural commissioner, fire protection officer, or other authorized agency officer. The APCO must be notified prior to commencing such excavation.

The soil decontamination planned for the facility is bioremediation or landfarming of HTF-contaminated soils (due to equipment leaks or spills). HTF has an initial boiling point of 495°F and, therefore, the Project bioremediation unit is exempt from the requirements of this rule.

KCAPCD Rule 419 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 at the Project, and the distance from the emission sources to any potential receptors, the Project will comply with this rule.

KCAPCD Rule 422 New Source Performance Standards

Provisions of 40 CFR Part 60, in effect November 7, 2002, are adopted by reference into the KCAPCD rules. Compliance with NSPS is discussed in Section 5.2.1.1.

KCAPCD Rule 424 Residential Water Heaters

A person shall not sell, offer for sale, or install any residential water heater within the KCAPCD emitting NOx in excess of 40 nanograms of NOx (calculated as NO_2) per joule (70 pounds per billion Btu) of heat output, or not certified in accordance with rule-specified procedures. A residential-type water heater will be installed in the Project's office building to meet domestic (employee) needs. The water heater will comply with the rule requirements.

KCAPCD Rule 425.2 Boilers, Steam Generators and Process Boilers (Oxides of Nitrogen)

The purpose of this rule is to limit NOx emissions from boilers, steam generators, and process heaters to levels consistent with RACT to satisfy HSC Section 40918(b) and 1990 Federal CAA Amendments, Section 182(f). CO emissions are also limited to ensure efficient combustion at reduced NOx levels. This rule applies to any boiler, steam generator or process heater with a rated heat input of five MMBtu/hr or more and fired with gaseous and/or liquid fuels, and specifies a NOx emissions limit of 70 parts per million by volume (ppmv) during normal operations with gaseous fuel.

In addition, an owner/operator of any unit subject to this rule must submit to KCAPCD an Emission Control Plan that includes:

1. List of units subject to rule, including rated heat inputs, anticipated annual heat input, applicable NOx or CO emission requirements, and control option chosen, if applicable;
2. Description of actions to be taken to satisfy rule requirements. The plan shall identify actions to be taken to comply, including any type of emissions control to be applied to each unit and construction schedule, or shall include test results to demonstrate that the unit already complies with applicable requirements; and
3. Specification of proposed test methods.

All compliance demonstrations must be performed using applicable test method(s) specified in the rule, and the methods selected to demonstrate compliance must be specified in the Emission Control Plan. All emission measurements shall be made with a unit operating at conditions as close as physically

possible to the maximum firing rate allowed by the KCAPCD PTO. Any unit subject to NOx or CO emission limits shall be tested to determine compliance with applicable requirements not less than once every 12 months. An owner/operator of gaseous fuel-fired units demonstrating compliance for two consecutive years can, if desired, demonstrate compliance once every 36 months.

The expected annual fuel use of the boiler and heater will exceed 90,000 therms and, therefore, this rule will apply. The boiler and heater will burn propane exclusively; ultra-low- NOx burners will limit NOx emissions to less than 70 ppmv, and good combustion practices will limit CO emissions to less than 400 ppmv. An Emission Control Plan will be prepared that will describe the nature and frequency of NOx and CO emission tests that will be performed to verify compliance with this rule.

KCAPCD Rule 427 Stationary Piston Engines (Oxides of Nitrogen)

The purpose of this rule is to limit NOx emissions from existing stationary piston engines to levels consistent with RACT to satisfy HSC Section 40918 (b) and 1990 Federal CAA Amendments, Section 182(f). CO emissions are also limited to ensure maintenance of efficient combustion at reduced NOx levels. This rule applies to all rich-burn, lean-burn, and diesel engines of more than 50 hp, except for emergency standby, and low-use-rate engines operating less than 200 hours per year as documented by an elapsed operating time meter, and engines used exclusively for firefighting purposes or flood control.

The diesel engines proposed for this Project are low-use-rate engines which will each operate less than 200 hours per year. The fire water pump engine will operate less than 50 hours per year unless operating for emergency firefighting purposes, and the emergency generator engine will operate for less than 50 hours per year unless operating under emergency conditions. The Project will install and maintain an elapsed operating time meters on both engines to substantiate compliance.

5.2.1.4 Involved Agencies

Under the AFC process, the Project must obtain a Determination of Compliance (DOC) from the KCAPCD. Contact information for this agency is provided in Table 5.2-3.

Table 5.2-3 Agency and Agency Contacts

Agency Contact	Phone/E-mail	Permits/Issue
Glen Stephens KCAPCD 2700 "M" Street, Suite 302 Bakersfield, CA 93301-2370	(661) 862-5250 GlenS@co.kern.ca.us	DOC/ATC/PTO

5.2.1.5 Required Permits and Permit Schedule

Table 5.2-4 lists the air quality-related permits that are required for the Project. As noted above, under the CEC licensing process, the KCAPCD will issue a DOC; a DOC is equivalent to the Authority to Construct (ATC) issued by the KCAPCD for other sources. Once the project is built, the KCAPCD will issue a PTO in conjunction with the CEC. Additional applications are not required. This table also provides the schedule for when applications for these permits are needed.

Table 5.2-4 Permits Required and Permit Schedule

Permit/Approval	Schedule
DOC/ATC	An application will be submitted to the KCAPCD shortly after the AFC is submitted. The KCAPCD will work within the timeframes of the CEC's licensing process to issue the DOC.
PTO	Once the equipment becomes operational, a PTO must be obtained by the operator.

5.2.2 Affected Environment

The Project site is located approximately five miles south Ridgecrest, in Kern County, California directly southwest of U.S. Highway 395. Access to the site is via the Brown Road on exit I-395. The Project will be located on public land managed by the BLM and authorized by BLM right-of-way (ROW) #CACA – 49016 (revision pending), consisting of approximately 3,920 acres of flat, desert terrain. The Project site is within the jurisdiction of the KCAPCD.

5.2.2.1 Climate and Topography

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 July and August exceeding 100°F. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s. Minimum temperatures below freezing (32°F) occur on an average of about one day per year.

The average annual precipitation is less than five inches with over 77 percent of the precipitation occurring between November and March. There is, however, a summer thunderstorm season from July to September with violent heavy precipitation that occasionally produces flash flooding. May and June are usually the driest months.

Large-scale weather patterns in the area are generally influenced by moderately intense anticyclonic circulation (i.e., 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 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 southwest. These winds are responsible for bringing ozone and other pollutants through the Cajon Pass from the Los Angeles Basin. 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 National and California ozone standard violations.

5.2.2.2 Meteorological Data

For air quality impact analyses, hourly meteorological data are used for modeling purposes. Hourly surface meteorological data that are characteristic of the Project site are available from the Ridgecrest Meteorological and Air Quality Monitoring Station located approximately five miles northeast of the Project site and operated by the KCAPCD, and from the Trona monitoring station, approximately 25 miles northeast of the Project site. The Trona station is operated by the Mojave Desert Air Quality Management District (MDAQMD).

Winds

The two closest meteorological monitoring stations to the project site are the Ridgecrest monitoring station approximately five miles northeast of the site and the Trona monitoring station approximately 25 miles east of the site. The Ridgecrest and Trona monitoring stations have similar windflow patterns based on their wind roses and locations. A wind rose for the Ridgecrest monitoring station for 2003 to 2007 is presented in Figure 5.2-1.

Temperature

As noted earlier, temperatures in the Project area can be very hot during the summer months and moderately cold during the winter months. The closest weather monitoring station to the project is located in Inyokern, California; Table 5.2-5 summarizes daily maximum and minimum temperatures and extreme high and low temperatures by month from the years 1940 to 2008.

Precipitation

Average annual precipitation in the Project area based on the Inyokern data record for the period of 1940 to 2008 is less than five inches. Table 5.2-6 summarizes precipitation data (rainfall) for the area. The annual average snowfall for Inyokern is 0.05 inches per year between the years of 1940 to 2008.

Table 5.2-5 Temperature Data for Inyokern, California

Month	Temperatures (1940 – 2008) (°F)					Number of Days			
	Monthly Averages			Record Extremes		Max. Temp.		Min. Temp.	
	Daily Max.	Daily Min.	Monthly	Record High	Record Low	90°F & Above	32°F & Below	32°F & Below	0°F & Below
Jan	59.6	30.7	45.2	80	1	0	0	18.5	0
Feb	64.9	34.6	49.7	86	9	0	0	11.4	0
Mar	70.4	38.8	54.6	93	15	0.1	0	5.5	0
Apr	77.8	44.5	61.2	100	24	2.9	0	1.6	0
May	87	52.9	69.9	108	26	13.3	0	0.1	0
Jun	96.8	60.5	78.6	117	38	25	0	0	0
Jul	102.7	66.2	84.5	119	46	30.8	0	0	0
Aug	101.3	64.6	82.9	114	45	30.2	0	0	0
Sep	94.2	58.1	76.2	110	35	22.9	0	0	0
Oct	83.3	48.2	65.8	105	20	7.8	0	0.4	0
Nov	69	37.3	53.1	88	14	0	0	7.8	0
Dec	59.7	30.3	45	84	5	0	0	20.3	0
Year[1]	80.6	47.2	63.9	119	1	1.77	0	0.87	0

1. Totals may not match the data in the columns due to rounding errors.
Source: WRCC 2009

Table 5.2-6 Precipitation Data for Inyokern, California

Month	Rainfall (1940 – 2008) (Inches)				Mean Number of Days				Snowfall (Inches)	
	Mean	Highest Monthly	Lowest Monthly	Highest Daily	0.01" or more	0.10" or more	0.50" or more	1.0" or more	Mean	One-Day Max.
Jan	0.74	4.55	0	1.53	3	2	1	0	0.3	4.5
Feb	0.97	4.52	0	2.13	3	2	1	0	0	1.5
Mar	0.57	3.77	0	2.01	3	1	0	0	0.1	2.8
Apr	0.17	1.81	0	1.11	1	1	0	0	0	0
May	0.07	0.79	0	0.65	1	0	0	0	0	0
Jun	0.02	0.4	0	0.2	0	0	0	0	0	0
Jul	0.17	1.54	0	1.1	1	0	0	0	0	0
Aug	0.23	2.91	0	2.39	1	0	0	0	0	0
Sep	0.21	1.71	0	1.25	1	1	0	0	0	0
Oct	0.1	0.78	0	0.7	1	0	0	0	0	0
Nov	0.39	2.47	0	1.04	2	1	0	0	0	0
Dec	0.59	3.08	0	1.76	2	1	0	0	0.2	4
Year[1]	4.22	4.55	0.59	2.39	1.58	0.75	0.16	1	0.05	1.07

1. Totals may not match the data in the columns due to rounding errors.
Source: WRCC 2009.

5.2.2.3 Ambient Air Quality Data

As previously noted, the Project site is located in the MDAB and is under the jurisdiction of the KCAPCD. NAAQS and CAAQS are shown in Figure 5.2-1. The attainment status of the Project area with respect to the NAAQS and CAAQS is summarized in Table 5.2-7.

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

Pollutant	Attainment Status	
	Federal Standards	California Standards
Ozone – 1-Hour	Attainment/Maintenance	Moderate Non-attainment
Ozone – 8-Hour	Attainment	Not yet designated
CO – 8-Hour	Unclassifiable / Attainment	Unclassified
NO_2	Unclassified	Attainment
SO_2	Unclassified	Attainment
PM10	Unclassifiable / Attainment	Non-attainment
PM2.5	Unclassifiable / Attainment	Unclassified
Lead Particulates	No Designation	Attainment
Source: ARB 2008		

The three closest air quality monitoring stations to the Project site are located in Ridgecrest (101 W. California Street), Trona (Corner of Athol and Telescope), and Mojave (923 Poole Street). However, none of these stations monitors CO, and the closest location for that pollutant is in Lancaster (43301 Division Street). The KCAPCD operates the Ridgecrest and Mojave Stations; MDAQMD operates the Trona Station; and Antelope Valley Air Quality Management District (AVAQMD) operates the Lancaster Station. Table 5.2-8 summarizes 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	Pollutant						Distance Away		Agency
	CO	NO_2	O_3	PM10	PM2.5	SO_2	Miles	Direction	
Ridgecrest				X	X		5	NE	KCAPCD
Trona		X	X	X		X	25	NE	MDAQMD
Mojave			X	X	X		41	SW	ARB
Lancaster	X	X	X	X	X		65	S	AVAQMD

Due to its location and similarity of terrain, the Ridgecrest monitoring site is expected to provide data that are most representative of the Project site. However, only PM10 and PM2.5 are monitored at this location. As discussed in Section 5.2.4.2, since Ridgecrest does not monitor the other pollutants, the next closest stations, i.e., NO_2 and SO_2 data from Trona, CO data from Lancaster, and ozone data from Mojave, were chosen to be used for the air quality impact assessment.

Tables 5.2-9 through 5.2-14 provide summaries of air quality data collected by the air quality monitoring stations and the number of times that the NAAQS and CAAQS were exceeded for each parameter for the years 2006 through 2008. These data were obtained from ARB Air Quality Statistics.

The Project will be a source of ozone precursor pollutant emissions (i.e., NOx and VOC). The Project site is in an area that is in attainment with the national 8-hour ozone standard, and moderate non-attainment and not yet designated for the California 1-hour and 8-hour ozone standards, respectively. Information related to ambient monitoring data for ozone from the monitoring stations in the vicinity of the Project site are presented in Table 5.2-9.

Table 5.2-10 provides PM10 data in the region. The Project area is classified as unclassifiable / attainment of the national 24-hour PM10 standard and non-attainment for the California 24-hour PM10 standard. The California standard was exceeded 8 days at Ridgecrest, 4 days at Trona and 7 days at Mojave during the 2006 to 2008 period.

Table 5.2-11 provides PM2.5 data in the region. The Project area is unclassified for the California 24-hour PM2.5 standard and is classified as unclassifiable / attainment for the national PM2.5 standard. The national PM2.5 standard was not exceeded at these sites during the 2006 to 2008 period.

Available NO_2, CO and SO_2 data are presented in Tables 5.2-12, 5.2-13, and 5.2-14, respectively. The Project area is classified as in attainment for the applicable California and national standards for these pollutants. The data presented in each of the tables are for the closest monitoring stations to the Project location of the four stations that monitor these pollutants. Only one of the four stations monitors CO (Lancaster), as reported in Table 5.2-13, and one monitoring station (Trona) in the region measure SO_2, as reported in Table 5.2-14.

Table 5.2-9 Ozone Data for Stations Nearest to the Project Site

Site	# Days > 1- Hour CAAQS	Highest 1- Hour Obs (ppm)	# Days > 8-Hour NAAQS	Highest 8-Hour Obs (ppm)
Calendar Year 2008				
Trona	3	0.100	7	0.094
Mojave	10	0.112	41	0.102
Calendar Year 2007				
Trona	0	0.094	7	0.084
Mojave	0	0.092	6	0.084
Calendar Year 2006				
Trona	0	0.091	9	0.084
Mojave	10	0.109	27	0.101
Reference: ARB 2009c.				

Table 5.2-10 PM10 Data for Stations Nearest to the Project Site

Site	# Days > 24-Hour NAAQS	# Days > 24-Hour CAAQS	National Annual Average ($\mu g/m^3$)	Highest 24-Hour National Average ($\mu g/m^3$)
Calendar Year 2008				
Ridgecrest	1	6.1	22.1	53.5
Trona	0	1	ND[1]	107.0
Mojave	0	2	22.4	144.8
Calendar Year 2007				
Ridgecrest	1	1	ND	68.0
Trona	0	1	ND	80.0
Mojave	0	3	ND	70.0
Calendar Year 2006				
Ridgecrest	1	1	ND	65.0
Trona	0	2	19.3	77.0
Mojave	0	2	19.5	58.0

Reference: ARB 2009c.
[1]ND – Insufficient data to determine valid value, so value not reported by ARB.

Table 5.2-11 PM2.5 Data for Stations Nearest to the Project Site

Site	# Days > 24-Hour NAAQS	National Annual Average ($\mu g/m^3$)	National Highest 24-Hr Average ($\mu g/m^3$)
Calendar Year 2008			
Ridgecrest	0	7.1	26.8
Mojave	0	6.8	19.1
Lancaster	0	ND[1]	24.0
Calendar Year 2007			
Ridgecrest	0	ND	22.4
Mojave	0	6.2	21.1
Lancaster	0	8.0	25.0
Calendar Year 2006			
Ridgecrest	0	6.2	14.9
Mojave	0	ND	21.3
Lancaster	0	7.4	18.0
ND – Insufficient data to determine valid value, so value not reported by ARB. Reference: ARB 2009c.			

Table 5.2-12 NO_2 Data for Stations Nearest to the Project Site

Site	Highest 1-Hr Observation (ppm)	# Days >1-Hour CAAQS	Annual Average (ppm)
Calendar Year 2008			
Trona	0.062	0	0.004
Lancaster	0.062	0	0.013
Calendar Year 2007			
Trona	0.055	0	0.004
Lancaster	0.064	0	0.015
Calendar Year 2006			
Trona	0.050	0	0.005
Lancaster	0.066	0	0.015
Reference: ARB 2009c.			

Table 5.2-13 CO Data for Station Nearest to the Project Site

Site	Highest 8-Hr Observation (ppm)	# Days > 1- or 8-Hour NAAQS	# Days > 1- or 8-Hour CAAQS
Calendar Year 2008			
Lancaster	1.04	0	0
Calendar Year 2007			
Lancaster	1.16	0	0
Calendar Year 2006			
Lancaster	1.60	0	0
Reference: ARB 2009c.			

Table 5.2-14 SO_2 Data for Station Nearest to the Project Site

Site	Highest 1-Hr Observation (ppm)	# Days >1-Hour CAAQS	Annual Average (ppm)
Calendar Year 2008			
Trona	0.005	ND	0.001
Calendar Year 2007			
Trona	0.005	ND	0.001
Calendar Year 2006			
Trona	0.004	ND	0.001
ND – Insufficient data to determine valid value, so value not reported by ARB. Reference: ARB 2009c.			

5.2.3 Control Technology Assessment

KCAPCD Rule 210.1 requires an applicant for an ATC or PTO to apply BACT to any new or modified source which results in an emission increase of NOx, SOx, PM10, or VOC. BACT is applied on a pollutant-specific basis.

KCAPCD's NSR program establishes pre-construction permit review requirements for equipment or processes subject to permit requirements. Under NSR, applicants are required to incorporate BACT when new equipment is installed, existing stationary permitted equipment is relocated, or existing permitted equipment is modified such that there is an emissions increase of NOx, SOx, PM10 or VOC. BACT is applied on a pollutant-specific basis. BACT means the most stringent emission limitation or control technique which:

- Has been achieved in practice for such category or class of source; or
- Is contained in any State Implementation Plan (SIP) approved by the EPA for such category or class of source (unless demonstrated to the satisfaction of the APCO or designee to be not presently achievable); or

- Is any other emission limitation or control technique, found by the APCO or designee to be technologically feasible for such class or category of sources or for a specific source and cost-effective as compared to measures listed in the SIP.

The process for determining BACT differs between major and non-major (i.e., minor source) polluting facilities. Major polluting facilities that are subject to NSR are required by the Federal CAA to have the Lowest Achievable Emission Rate (LAER), with little or no regard for cost, and consistent with the United States Environmental Protection Agency's (EPA's) LAER policy as to what is achieved in practice.

For non-major polluting facilities, economic and technical feasibility are considered when establishing the class or category of sources and the applicable BACT requirements. Further, the permitting staff may consider unusual equipment-specific and site-specific characteristics of the proposed project that would warrant reconsideration of the minor source BACT requirement for the new equipment. Some examples include:

- Technical infeasibility of the control technology: a particular control technology may not be required as BACT if the applicant demonstrates that it is not technically feasible to install and operate it to meet a specific BACT emission limitation in a specific situation.
- Operating schedule and project length: if the equipment will operate much fewer hours per year than what is typical, or for a much shorter project length, it can affect what is considered "Achieved in Practice".
- Availability of fuel or electricity: some BACT determinations may not be feasible if a project will be located in an area where natural gas or electricity is not available.
- Process requirements: some BACT determinations specify a particular type of process equipment. KCAPCD staff may consider requirements of the proposed process equipment that would make the BACT determination not technically feasible.

EPA guidance for a "top-down" BACT analysis requires reviewing all 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 recommended 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 South Coast Air Quality Management District's (SCAQMD) Major Source BACT Guidelines, the SCAQMD's Non-Major Source Guidelines, the Bay Area Air Quality Management District (BAAQMD) BACT Guidelines, the ARB's BACT database, and EPA's RACT/BACT/LAER Clearinghouse (RBLC) were reviewed to determine BACT for each source. These guidelines are examples of past determinations that help in determining BACT for new permit applications. The EPA recommended five-step process was used to select BACT for the RSPP.

5.2.3.1 BACT Determination for Boilers and Heaters

The Project will utilize one 35 MMBtu/hr auxiliary boiler and one 35 MMBtu/hr HTF heater. These units will be used to assist in start up of the facility and to provide freeze protection for the HTF. The boiler and heater both emit criteria pollutants (NOx, SOx, CO, VOC and PM10) due to the combustion of propane. This Section contains BACT determinations for NOx, SOx, CO, PM10, and VOC for the auxiliary boiler and the HTF heater. Because the auxiliary boiler and the HTF heater are similar processes and have similar emissions, the BACT analyses for those units were combined. Air pollution reduction efforts within the past several years have resulted in lower emission standards for boilers and heaters; therefore, the database review was focused only on determinations from 2003 and later. Also, propane is not commonly used in stationary industrial boilers or heaters, so limited data were available for BACT determinations for propane -fired boilers and heaters. Where propane data were not available, BACT determinations for natural gas-fired units were substituted.

NOx

The technologies employed for NOx emissions control are listed below in descending order of effectiveness:

- Selective Catalytic Reduction (SCR)
- Ultra-low- NOx burners
- Low- NOx burners with flue gas circulation
- Flue gas circulation
- Good combustion practice

SCR was mentioned as an alternative control technology for boilers by the BAAQMD in their BACT guidance document. SCR is known to successfully control NOx 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 boiler is that the temperature of the exhaust gas (~300°F) will be below the low end of the proper temperature range for the SCR catalyst (~500°F). 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 NOx control on boilers in the size range of the proposed units, as evidenced by the large number of applications cited that use low-NOx or ultra-low-NOx 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 NOx control option is the use of ultra-low NOx burners. The auxiliary boiler will be equipped with ultra-low NOx burners with a stack NOx concentration of 9 ppm at three percent oxygen with a recommended averaging period of 15 minutes. The HTF heater will also emit 9 ppm NOx, or less. The use of ultra-low-NOx burners and the emission limit of 9 ppm represent BACT for the proposed auxiliary boiler and HTF heater.

CO and VOC

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

- Oxidation catalyst
- Good combustion practice

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/hr). 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 boilers and heaters, 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 oxygen with a 15-minute averaging period. The facility was recently granted a permit, in March of 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 oxygen is recommended as BACT for CO emissions. A one hour averaging period is recommended. Both units, the auxiliary boiler and HTF heater, will burn only propane and will achieve BACT using good combustion practices during normal operation as well as during startup and shutdown. Good combustion practice is recommended as BACT for VOC, with no specific concentration recommended for either pollutant.

PM10 and SOx

The technologies employed for PM10 and SOx emissions control for boilers are listed below in descending order of effectiveness:

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

The use of pipeline-quality natural gas in not a realistic option for the Project because this would require the construction of a lengthy natural gas pipeline. The use of low-sulfur propane fuel in conjunction with good combustion practice is recommended for the control of PM10 and SOx emissions. A specific emission limit or concentration is not recommended.

Summary of Proposed BACT for the Boiler and HTF Heater

Based on this review, the proposed BACT for the boiler and HTF heater is presented in Table 5.2-15.

Table 5.2-15 Proposed BACT for the Boiler and HTF Heater

Pollutant	Emission Limit[1]	Technology	Reference
NOx	9.0 ppm at 3 percent O_2, 15-min avg.	Ultra low-NOx burner	SCAQMD Part D BACT for Non-major polluting facilities
CO	50 ppm at 3 percent O_2, 1-hr avg.	Ultra low-NOx burner, good combustion practice	SCAQMD Part D BACT for Non-major polluting facilities
VOC	None	Propane and good combustion practice	Various
PM10	None	Propane	Various
SOx	None	Propane	Various
1. The emission limits for NOx and CO would not apply during start up, shutdown or malfunction.			

5.2.3.2 BACT Determination for Emergency Diesel Generator and Fire Water Pump Engine

The Project will operate one emergency diesel generator engine and one diesel fire water pump engine, both rated at 300 hp. These emergency diesel engines will each operate for a maximum of 50 hours per year for maintenance and testing.

NOx, VOC, and CO

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

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

Catalytic converters and oxidation catalysts have been proposed and used on a limited number of diesel engines in California; however, neither have 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.

NSPS Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, has been adopted for non-road engines that limit emissions of NOx, VOC and CO. The specific limits vary depending upon the size, intended use, and date of manufacture of the engine. A review of the RBLC indicates that compliance with the NSPS is BACT. Compliance with the applicable NSPS is feasible and has been achieved in practice. The fire water pump engines fits into the fire water pump engine category for engines constructed 2009 and later, with hp greater than or equal to 300 and less than 600. The emergency generator engine fits into the stationary, non-fire water pump engine category for engines constructed 2009 and later, with hp greater than or equal to 300 and less than 600.

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 Title 13 CCR Section 2423 and the PM emission limits specified in Title 17 CCR Section 93115 are at least as stringent as the requirements for a NSPS-compliant engine. Therefore, compliance with the California ATCM emission standards and limits constitutes BACT for the emergency diesel generator and fire water pump engines.

The NSPS emission limits for the emergency fire water pump and generator engines are presented in Table 5.2-16.

PM10

The technologies employed for PM10 emissions control for internal combustion engines are listed below in descending order of effectiveness:

- Diesel particulate trap
- NSPS- or ATCM-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 NSPS-compliant engine is recommended as BACT for this application.

SOx

Emissions of SOx are dependent upon the amount of sulfur in the fuel. A review of the EPA RBLC indicates that the lowest sulfur content fuel available contains 15 ppm sulfur (S). The use of diesel fuel with a sulfur content of 15 ppm is recommended as BACT for this application.

Summary of BACT for Emergency Engines

Based on this review, the proposed BACT for the emergency fire water pump engine and the emergency generator engine are presented in Table 5.2-16.

Table 5.2-16 Proposed BACT for the Emergency Engines

Description	CO (g/bhp-hr)	NMHC + NOx (g/bhp-hr)	PM (g/bhp-hr)	SOx
Fire Pump (300 $\leq$ hp < 600)	2.6	3.0	0.15	15 ppm S fuel
Emergency Generator (300 $\leq$ hp < 600)	2.6	3.0	0.15	15 ppm S fuel

5.2.3.3 BACT Determination for Auxiliary Cooling Tower

The Project will utilize dry cooling for the primary steam cycle, but will employ an auxiliary cooling tower to remove residual heat from balance-of-plant (BOP) equipment. Because cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and be carried out of the tower as "drift" droplets. PM10 is generated when the drift droplets evaporate and leave particulate matter (PM10/PM2.5) formed by precipitation/crystallization of dissolved solids. Emissions from the cooling tower, and hence the BACT determination, are limited to PM10/PM2.5. The technology available for control of PM10/PM2.5 from cooling towers is a high-efficiency drift eliminator.

The use of a high-efficiency drift eliminator on a wet cooling tower is BACT. The drift elimination efficiency level that a supplier is willing to guarantee differs depending on the type of cooling tower involved, which in turn is dictated by the specific requirements of the application for which cooling is required. For the cooling tower, drift eliminators with a vendor-guaranteed efficiency of 0.0005 percent represents BACT for PM10 for a vertically-oriented cooling tower proposed for the Project facility.

5.2.3.4 BACT Determination for HTF Ullage System Vent

The HTF expansion tanks will be 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. When the HTF heats and expands, the nitrogen gas, which is potentially saturated with VOC must be vented to atmosphere through the ullage system. VOCs can generally be controlled through the use of the following technologies, depending on a number of factors, including flow rate, VOC concentration, moisture content, and the specific properties of the VOC involved. These technologies are not listed in order of control efficiency.

- Closed Vapor System
- Thermal oxidation
- Regenerative thermal oxidation (RTO)
- Carbon adsorption
- Catalytic oxidation
- Refrigerated condenser
- A combination of technologies, such as a carbon adsorber concentrator followed by an oxidation technology

In a closed vapor 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. Ideally, this design serves to conserve nitrogen and completely eliminates VOC emissions from the ullage system. There have been some concerns raised by some engineering contractors regarding the safety of a closed vapor system such as this. While this approach almost completely eliminates VOC emissions and has been proposed at other solar thermal facilities, this technology has not been applied to full-scale facility, and hence, not achieved in practice. Therefore, a closed vapor system cannot be considered BACT.

Thermal oxidation uses high temperature combustion (1,200 °F – 2,400 °F) to control air pollutants in vapor streams. Capital equipment costs vary according to system size. Fuel requirements (costs) are generally higher than other oxidation technologies. Thermal oxidation usually works best when operated continuously; intermittent operation is impractical due to long heat up times for the combustion chamber, and frequent thermal cycling stresses the refractory and shortens equipment life. Thermal oxidation is assumed to have a control efficiency of 95 or greater, but requires the combustion of fuel and will thus be a source of secondary (combustion) pollutants. Because the HTF venting is not a continuous process, thermal oxidation is not well suited to the process and has been eliminated from further consideration as BACT.

RTO uses two or more heat exchangers to carry out oxidation and heat recovery. RTOs typically consume less energy than other oxidation processes and can recover 90 to 95 percent of the heat generated by oxidation. RTO control efficiencies are typically greater than 95 percent and can exceed 99 percent in some installations. RTOs are ideal for low- to moderate-VOC concentrations, high gas volume, continuous operations. Because the HTF venting is not a continuous process, the RTO is not well suited to the process and has been eliminated from further consideration as BACT.

Carbon adsorption is a process where an activated carbon with high surface area is used to capture air pollutants. Single carbon beds typically are designed for 95 percent control, and multiple beds in series can achieve control efficiencies of 99 percent or more. Adsorption of the hydrocarbons proceeds until the carbon is saturated or spent. Then the carbon must either be regenerated or replaced. Carbon adsorption can be an expensive control technology for high concentration and/or high volume vapor streams.

Catalytic oxidation uses a metal catalyst to lower the temperature range for oxidation of VOC to 550°F - 650°F. Therefore, catalytic oxidation can be more cost-effective for vapor streams with low heat content. Control efficiencies are comparable to thermal oxidation. Similar to thermal oxidation, catalytic oxidation requires the combustion of fuel and thus would be a source of secondary (combustion) pollutants. The catalyst bed is prone to poisoning under certain circumstances.

The combination of carbon adsorption followed by an oxidation technology is ideally suited to a vent stream with high gas volumes and low VOC concentrations, which matches the source parameters of the HTF ullage system. Because the principle mechanism for emissions control is carbon adsorption, the control efficiency is expected to be the same as carbon adsorption alone. The difference between this alternative and carbon alone is the manner in which the carbon is regenerated. With the combination technology, the carbon is regenerated on site with hot air and the resulting air/vapor stream processed in a thermal oxidizer to destroy VOC. Like all other thermal oxidizers, this technology causes emissions of secondary pollutants from the combustion of fuel and VOC. Typically, the selection of this technology over carbon alone is due to an economic advantage of onsite regeneration (as opposed to offsite regeneration for a fee that is typical of carbon alone).

A refrigerated or water-cooled condenser is a control option that can be used to condense the VOC vapors leaving the ullage system. The control efficiency of a refrigerated or water-cooled condenser depends on the vapor pressure of the VOC and the temperature of the coolant. Control efficiencies are typically lower than other VOC control technologies. Due to the very low vapor pressure of HTF at ambient temperature, the control efficiency of a water-cooled condenser is expected to exceed 99 percent for HTF; however, byproducts of thermal degradation of the HTF may include benzene and other light hydrocarbons. The control efficiency of a water-cooled condenser for benzene and other light hydrocarbons will be substantially lower. Because the control efficiency of the water-cooled condenser for benzene is substantially lower than either the carbon adsorption or the oxidation technologies, the water-cooled condenser doesn't satisfy BACT and is rejected for this application.

The Project is proposing to use a two-stage condensing system to reclaim usable HTF liquids followed by carbon adsorption to control VOC emissions to a maximum of 1.5 lb/day. The mixture of gas containing VOCs from the expansion vessel enters the ullage system, which contains a certain level of HTF at any time. The HTF vapor within the gas mixture condenses and is returned to the HTF cycle. If necessary, the HTF content of the first ullage vessel is cooled by circulation in an air cooler. Leaving the first ullage vessel, residual mixture of gas enters the second ullage vessel, where it will be further condensed. The content of the second ullage vessel is cooled by circulation through a second air cooler. By cooling, the hydrocarbons within the gaseous mixture condense to a large extent and are collected in the ullage drain vessel. Residual gaseous components are vented to the vessel pit through a series of two active carbon beds, which are expected to reduce VOC emissions by at least 98 percent. The volume of collected liquid residuals and vented gas will depend upon the final operating temperature during the previous day's operation and the temperature of the system overnight.

5.2.4 Environmental Impacts

This section provides a discussion of air quality impacts from criteria pollutant and greenhouse gas emissions from the Project. Section 5.10, Public Heath, provides a discussion of the impacts to public health from potential Project emissions of TAC and hazardous air pollutants.

5.2.4.1 Emissions

This section provides the criteria pollutant emissions estimates for the proposed Project emission sources. Emissions have been estimated for the two phases of the Project: construction and operation, each of which is discussed below. Commissioning of Project emission sources is not expected to cause emissions that are higher than or different from normal operating emissions; therefore, commissioning is not considered as a separate phase of Project development.

Construction

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

The Project will include construction of the solar facility (power block and solar array, as well as other ancillary facilities such as the administration buildings, and re-routed drainage channel) and the electric transmission line.

Construction of the Project will require approximately 28 months. Transmission line construction will occur over a three-month period. Construction of Project elements will occur concurrently.

Table 5.2-17 summarizes maximum daily and annual onsite emissions during construction of the solar facility. These emissions were modeled and the results are provided in Section 5.2.4.4. Table 5.2-18 summarizes maximum daily offsite emissions from vehicles traveling to the site and from equipment used in the construction of the propane supply line and the 3.5-mile transmission line. Details of the construction emission calculations are in Appendix E.1.

Table 5.2-17 Maximum Daily Solar Facility Construction Emissions

Phase of Construction	NOx (lb/day)	VOC (lb/day)	CO (lb/day)	SO_2 (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Power Plant (onsite)	780	88	426	1.70	466	116
Power Plant (offsite)	494	57	432	0.82	80	45
Roadway (offsite)	271	29.9	140.4	0.57	75.5	31.3
Transmission Line (offsite)	12.64	1.61	16.56	0.03	8.07	3.03
Water Pipeline (offsite)	3.95	0.41	4.65	0.01	0.45	0.31

Table 5.2-18 Maximum Annual Construction Emissions

Phase of Construction	NOx (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM10 (tpy)	PM2.5 (tpy)
Power Plant (onsite)	90	10.3	49	0.20	54.7	13.7
Power Plant (offsite)	50.4	6.5	51	0.09	9.4	5.2

Operations

Criteria pollutant emissions (i.e., NOx, SOx, CO, VOC, PM10 and PM2.5) are expected from each of the devices at the facility, including:

- One 35 MMBtu/hr propane-fired auxiliary boiler used for start up;
- One 35 MMBtu/hr propane-fired HTF heater used for freeze protection;
- One 300-hp diesel-fired emergency fire water pump engine;
- One 300-hp diesel-fired emergency generator engine;
- One two-cell wet cooling tower;
- One HTF expansion/ullage system; and
- Maintenance vehicles.

Summaries of emission calculation methodologies and emission estimates are provided in this section. Detailed emission calculations are provided in Appendix E.2. The emissions were summed to estimate emissions for the Project.

Auxiliary Boiler Emissions

Combustion of propane results in the emissions of NOx, SOx, CO, VOC, PM10, and PM2.5. The assumptions made regarding auxiliary boiler operation used as the basis for emission calculations include:

- One 35 MMBtu/hr boiler for the Project;
- Propane will be the only fuel used in the boiler;
- The boiler will be equipped with an ultra-low-NOx burner;
- Daily operation of the boiler is limited to 15 hours per day at 25 percent load and two hours per day at full load;
- Annual operation of the boiler is limited to 5,000 hours per year with a duty cycle of 10 percent at full load and 90 percent at 25 percent load; and
- 100 percent of the PM10 emissions are PM2.5.

The criteria pollutant emission factors used for the NOx and CO emission estimates are based on the Control Technology Assessment (see Section 5.2.3); the PM10 and VOC emission factors are taken from EPA AP-42 emissions factors for propane combustion, and the SOx emission factor was taken from the SCAQMD 2008 Annual Emission Report General Instruction Book for external propane combustion. Boiler criteria pollutant emissions for the auxiliary boiler are shown in Table 5.2-19. A complete discussion of the methods and assumptions used to estimate boiler emissions, along with calculations, is provided in Appendix E.2. Based on maximum annual operation, the boiler will operate at an average capacity factor of 18.6 percent.

Table 5.2-19 Auxiliary Boiler Criteria Pollutant Emissions

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
NOx	0.39	2.24	0.32
VOC	0.18	1.01	0.14
CO	1.31	7.56	1.07
PM10	0.35	2.01	0.28
PM2.5	0.35	2.01	0.28
SOx	0.40	2.27	0.32

HTF Heater Emissions

The assumptions made regarding the HTF heater operation used as the basis for emission calculations include:

- One 35 MMBtu/hr HTF heater for the Project;
- Propane will be the only fuel used in the HTF heaters;
- The HTF heater will be equipped with an ultra-low- NOx burner;
- Operation of the HTF heater is limited to 10 hours per day and 500 hours per year; and
- 100 percent of the PM10 emissions are PM2.5.

Similar to the auxiliary boiler, the criteria pollutant emission factors used for the NOx and CO emission estimates are based on the Control Technology Assessment (see Section 5.2.3); the PM10 and VOC emission factors are taken from EPA AP-42 emissions factors for propane combustion, and the SOx emission factor was taken from the SCAQMD 2008 Annual Emission Report General Instruction Book for external propane combustion. The criteria pollutant emissions for one HTF heater are shown in Table 5.2-20. A complete discussion of the methods and assumptions used to estimate HTF heater emissions, along with the calculations, are provided in Appendix E.2. Based on 500 hours per year of operation at full load, the heater will operate at an average capacity factor of 5.7 percent.

Table 5.2-20 HTF Heater Criteria Pollutant Emissions

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
NOx	0.39	3.89	0.10
VOC	0.18	1.75	0.04
CO	1.31	13.15	0.33
PM10	0.35	3.50	0.09
PM2.5	0.35	3.50	0.09
SOx	0.40	3.96	0.10

Emergency Diesel-Fired Engine Emissions

Combustion of diesel fuel results in the emissions of criteria pollutants. The assumptions made regarding emergency engine operation for the Project used as the basis for emission calculations include:

- One 300-hp diesel-fired fire water pump engine for the Project;
- One 300-hp diesel-fired emergency generator engine for the Project;
- Engines will use ultra-low sulfur (15 ppm) diesel fuel;
- Engines have Tier 3 Certification;
- The diesel fire water pump engine hours are based on one one-hour test per week, not to exceed 50 hours per year per engine, and do not reflect emergency use;
- The diesel fire emergency generator engine hours are based on one one-hour test per week per engine, not to exceed 50 hours per year, and do not reflect emergency use; and
- 100 percent of the PM10 emissions are PM2.5.

Emission estimates for NOx, CO, VOC and PM10/PM2.5 are based on emission factors for EPA Tier 3 certified engines, as determined by the Control Technology Assessment (see Section 5.2.3). Note that under Tier 3, the emission standard for NMHC is combined with NOx. For these emission estimates, the NOx fraction is assumed to be 95 percent of the combined emissions with the balance NMHC. NMHC is assumed to be equivalent to VOC. Emission estimates for SOx are based on estimated fuel use and fuel sulfur content of 15 ppm. The criteria pollutant emissions for one fire water pump engine are shown in Table 5.2-21 and the criteria pollutant emissions for one emergency generator are shown in Table 5.2-22. A discussion of the methods and assumptions used to estimate emergency fire water pump and generator engine emissions are provided in Appendix E.2.

Table 5.2-21 Emergency Fire Water Pump Engine Emissions

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
NOx	1.88	1.88	0.05
VOC	0.10	0.10	0.002
CO	1.72	1.72	0.04
SOx	0.10	0.10	0.002
PM10	0.10	0.10	0.002
PM2.5	0.003	0.003	0.0001

Table 5.2-22 Emergency Generator Engine Criteria Pollutant Emissions

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
NOx	1.88	1.88	0.05
VOC	0.10	0.10	0.002
CO	1.72	1.72	0.04
SOx	0.10	0.10	0.002
PM10	0.10	0.10	0.002
PM2.5	0.003	0.003	0.0001

Cooling Tower PM10/PM2.5 Emissions

The Project will utilize dry cooling for the primary steam cycle, but will employ an auxiliary cooling tower to remove residual heat from BOP equipment. Because cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and be carried out of the tower as "drift" droplets. PM10/PM2.5 is generated when the drift droplets evaporate and leave fine particulate matter formed by precipitation/crystallization of dissolved solids. Dissolved solids found in cooling tower drift can consist of mineral matter, chemicals used for corrosion inhibition, etc. The assumptions made regarding cooling tower operation that were used as the basis for the emission calculations include:

- One cooling tower unit for the Project;
- Circulation rate of 6,034 gallons per minute;
- Cooling tower blowdown will contain a maximum of 2,000 milligrams per liter (mg/L) Total Dissolved Solids (TDS);
- The cooling tower will be equipped with a drift eliminator with drift losses of less than or equal to 0.0005 percent by weight based on circulation flow rate;
- The cooling tower will have a maximum run time of 16 hours per day and 3,700 hours per year; and
- 100 percent of the PM formed is PM10/PM2.5 emissions.

Particulate matter emissions are calculated according to the method described in EPA's Compilation of Air Pollutant Emission Factors (AP-42), Section 13.4 Wet Cooling Towers. Cooling tower PM10 and PM2.5 emissions are shown in Table 5.2-23. A discussion of the methods and assumptions used to estimate cooling tower emissions is provided in Appendix E.2.

Table 5.2-23 Cooling Tower Emissions

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
PM10	0.03	0.48	0.06
PM2.5	0.03	0.48	0.06

HTF Ullage System Vent Emissions

The VOC emissions from the HTF ullage system vent emissions were estimated based on data provided by an existing solar plant (Kramer Junction Solar Energy Generating System [SEGS] facility), extrapolated to account for HTF system size. The assumptions made regarding HTF ullage system operation that were used as the basis for the emission calculations include:

- One HTF ullage system for the Project, where all of the HTF expansion tanks are connected to the same system;
- The VOC emissions are controlled with two carbon adsorption canisters in series with an overall control efficiency of 98 percent;
- VOC emissions would be limited to a maximum 0.75 lb/hr and 1.5 lb/day after pollution control;
- The HTF ullage system would be vented two hours per day maximum; and
- The maximum annual operation would be limited to 400 hours per year.

The controlled ullage system vent emissions are presented in Table 5.2-24. A more detailed explanation of the emissions calculations is provided in Appendix E.2. For these emission estimates, it is assumed that there will no VOC emissions from waste load out of heavy ends from the ullage system as the heavy ends are expected to have a vapor pressure that is substantially lower than the HTF fluid itself, and the vapor pressure of HTF at ambient conditions is negligible.

Table 5.2-24 HTF Ullage System Vent VOC Emissions

Pollutant	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (tpy)
VOC	0.75	1.50	0.15

Fugitive VOC Emissions

Fugitive VOC emissions may occur in the HTF piping in the solar field from fugitive components such as pumps, seals, flanges and valves. The fugitive VOC emissions expected are low due to the very low vapor pressure of the HTF; these emissions are based on component count data from the Beacon Solar Energy Project extrapolated to account for the relative difference in project (HTF system) size. The assumptions made for the fugitive emission calculations include:

- Fugitive emissions can occur 24 hours per day, 365 days per year; and
- Fugitive emissions consist only of VOCs.

The fugitive pollutant emission factors were taken from the EPA 1995 Protocol for Equipment Leak Emission Estimates for Oil and Gas Production. Since the HTF has a very low vapor pressure, the values for Heavy Oil were used to calculate the emissions. The fugitive emissions are presented in Table 5.2-25. A more detailed explanation of the emissions calculations is provided in Appendix E.2.

Table 5.2-25 Fugitive VOC Emissions

Pollutant	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (tpy)
Fugitive VOC	0.18	4.38	0.80

VOC Emissions from Land Treatment

The facility will use either landfarming or bioremediation in an onsite land treatment unit to remediate HTF-contaminated soils. Land treatment will be conducted at ambient temperatures. At ambient temperatures, the vapor pressure of the HTF is negligible and, therefore, the expected VOC emissions are negligible. However, KCAPCD reviewed a similar process proposed for the Beacon Solar Energy Plant and concluded that emissions may be as high as 0.10 lb/day and 0.02 tpy. The Applicant expects that a similar emission limit would be imposed on the RSPP land treatment operation.

Maintenance Vehicle Emissions

The facility 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 particulate matter (PM) emissions are expected from vehicle traffic in the solar fields. PM emissions are minimized through the implementation of an Operations Dust Control Plan, including the periodic application of a polymer-type dust suppressant.

The emissions were calculated as the anticipated miles traveled multiplied by an emission factor for each pollutant. The fugitive PM10 and PM2.5 emission factors take into account unpaved road dust. Vehicle emissions are shown in Table 5.2-26; and more detailed calculations are provided in Appendix E.2.

Offsite Delivery Vehicle Emissions

The Project will require deliveries of various supplies, materials, and services to the facility on a regular basis. For example, the Project will require water treatment chemicals, HTF fluid, lube oil, weed abatement chemicals, worker uniforms, replacement parts, and other items delivered to the facility to conduct normal operations. These deliveries will result in truck travel on paved roads.

The combustion of fuel in offsite delivery vehicle engines results in the generation of CO, VOC NOx, SOx, PM10, and PM2.5 emissions. Motor vehicle brake and tire wear and travel on paved roads with entrained road dust results in fugitive PM10 and PM2.5 emissions. The assumptions made regarding the emissions from offsite delivery vehicles for the Project used as the basis for emission calculations include:

- The Project will have 10 miscellaneous deliveries to the facility per month (120 trips per year);
- Propane delivery is based on maximum boiler and HTF heater usage;
- A propane delivery truck can hold 8,000 gallons of propane;

- The propane and other miscellaneous suppliers are located in Lancaster, California (162 miles round trip); and
- The delivery trucks are heavy-duty diesel-fueled vehicles.

Offsite delivery vehicle criteria pollutant emissions are shown in Table 5.2-27.

Table 5.2-26 Onsite Motor Vehicle Combustion Criteria and Fugitive Pollutant Emissions

Vehicle	Hourly Emissions (lb/hr)								
	CO	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Fug. PM10**	**Diesel PM**	**Exh. PM2.5**	**Fug. PM2.5**
Mirror Wash Truck[1]	0.11	0.01	0.03	0.00	0.00	2.23	0.00	0.00	0.22
Soil Stabilizer Application[1]	0.11	0.01	0.03	0.00	0.00	2.23	0.00	0.00	0.22
Weed Abatement[1]	0.11	0.01	0.03	0.00	0.00	2.23	0.00	0.00	0.22
Water Trucks	0.05	0.00	0.01	0.00	0.00	1.08	0.00	0.00	0.11
Maintenance Vehicles	0.00	0.00	0.04	0.00	0.00	1.27	0.00	0.00	0.27
Total	**0.16**	**0.01**	**0.08**	**0.00**	**0.01**	**4.57**	**0.01**	**0.01**	**0.60**
Vehicle	**Daily Emissions (lb/day)**								
	CO	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Fug. PM10**	**Diesel PM**	**Exh. PM2.5**	**Fug. PM2.5**
Mirror Wash Truck[1]	0.85	0.06	0.24	0.00	0.04	17.84	0.04	0.03	1.78
Soil Stabilizer Application[1]	0.85	0.06	0.24	0.00	0.00	17.84	0.04	0.03	1.78
Weed Abatement[1]	0.85	0.06	0.24	0.00	0.04	17.84	0.04	0.03	1.78
Water Trucks	0.05	0.00	0.01	0.00	0.00	1.08	0.00	0.00	0.11
Maintenance Vehicles	0.08	0.05	0.63	0.00	0.00	20.26	0.00	0.00	4.30
Total	**0.98**	**0.11**	**0.88**	**0.00**	**0.04**	**39.18**	**0.04**	**0.04**	**6.19**
Vehicle	**Annual Emissions (tpy)**								
	CO	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Fug. PM10**	**Diesel PM**	**Exh. PM2.5**	**Fug. PM2.5**
Mirror Wash Truck[1]	0.008	0.001	0.002	0.000	0.000	0.161	0.000	0.000	0.016
Soil Stabilizer Application[1]	0.002	0.000	0.000	0.000	0.000	0.036	0.000	0.000	0.004
Weed Abatement[1]	0.002	0.000	0.000	0.000	0.000	0.036	0.000	0.000	0.004
Water Trucks	0.009	0.001	0.003	0.000	0.000	0.196	0.000	0.000	0.020
Maintenance Vehicles	0.014	0.009	0.115	0.000	0.001	3.698	0.000	0.001	0.784
Total	**0.035**	**0.010**	**0.120**	**0.000**	**0.002**	**4.126**	**0.001**	**0.002**	**0.827**

1. Mirror washing, soil stabilizer application and weed abatement will each occur during an 8-hour day, but will not be conducted on the same day. Hourly and daily emissions therefore account for only one of these activities.

Table 5.2-27 Offsite Delivery Truck Criteria Pollutant Emissions for the Project

Emissions	CO	VOC	NOx	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
Daily (lb/day)	4.75	1.25	16.99	0.02	0.73	0.53	0.73	0.67	0.23
Annual (tpy)	0.13	0.03	0.46	0.00	0.02	0.01	0.02	0.02	0.01

Summary of Operational Criteria Pollutant Emissions

The criteria pollutant emissions for the Project are summarized in Table 5.2-28. Detailed emissions breakdowns are provided in Appendix E.2.

Table 5.2-28 Summary of Project Criteria Pollutant Emissions

Source	Emissions (tpy)					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	0.32	0.14	1.07	0.28	0.28	0.32
HTF Heater	0.10	0.04	0.33	0.09	0.09	0.10
Emergency Fire Pump Engine	0.05	0.00	0.04	0.00	0.00	0.00
Emergency Generator	0.05	0.00	0.04	0.00	0.00	0.00
Cooling Tower	--	--	--	0.06	0.06	--
HTF Vent	--	0.15	--	--	--	--
HTF Fugitives	--	0.80	--	--	--	--
Land Treatment Unit	--	0.02	--	--	--	--
Onsite Maintenance Vehicles	0.03	0.01	0.12	4.13	0.83	0.00
Offsite Delivery Vehicles	0.46	0.03	0.13	0.03	0.02	0.00
Total	**1.00**	**1.19**	**1.73**	**4.59**	**1.29**	**0.42**

Although new particulate emissions are predicted from the operation of this Project according to the calculations and assumptions provided herein, the Project may potentially reduce overall PM10 emissions in this region. Currently, the BLM allows the use of off-road vehicles on BLM land in the vicinity of the project site. As off-road vehicle use will be excluded from the RSPP plant site in the future, PM10 concentrations near the RSPP site would also be reduced without that type of activity. By its nature, a solar energy project must keep dust to a minimum through the use of dust control measures, as a film of dust on the mirrors will reduce their efficiency for power production. Experience at the existing solar thermal facilities has been that PM10 emissions from driving in the solar field are (as it must be) negligible. Dust control is achieved by a combination of soil stabilizers, water from the mirror washing, and compaction of the driving surface over time. These control measures will be utilized by the proposed Project. Therefore, the emission estimates and impact analyses for PM10 and PM2.5 should be considered very conservative.

Greenhouse Gas Emissions

The Project auxiliary boiler, HTF heater, emergency fire water pump and emergency generator engines may emit greenhouse gases (GHG). The methodology used to calculate GHG emissions from each of these sources is explained below. The total GHG emissions for the Project are shown in Table 5.2-29. Additional details of the calculations are provided in Appendix E.2.

Auxiliary Boiler and HTF Heater

GHG emissions from operation of the auxiliary boiler and the HTF heater are based on the maximum predicted equipment fuel usage and the emission factors listed in Tables C.6 and C.7 of the California Climate Action Registry General Reporting Protocol, Version 3.1.

Fire Water Pump and Emergency Generator Engines

GHG emissions from operation of the emergency diesel-fueled fire water pump and emergency generator engines are based on the estimated fuel consumption for each engine and the emission factors listed in Tables C.6 and C.7 of the GRP. Emissions do not reflect emergency use.

Onsite and Offsite Vehicles

GHG emissions from the onsite maintenance trucks, mirror wash trucks, weed abatement, watering for dust suppression, and soil stabilizer application trucks are based on the calculated distance traveled per day, fuel mileage estimates for each vehicle type and the emission factors for gasoline and diesel combustion listed in Tables C.3 and C.4 of the GRP. GHG emissions from the offsite delivery trucks are based on the round-trip distance from the suppliers (assumed to be Lancaster, California), the estimated fuel usage for heavy-duty diesel vehicles, and the emission factors for diesel combustion listed in Tables C.3 and C.4 of the GRP. CO2 emissions are based on the emission factor in Table C.3 of the GRP and the estimated fuel consumption.

CO_2 Equivalents

CO_2 equivalents (CO_2e) are calculated using the global warming potential (GWP) provided in Appendix C, Table C.1 of the GRP in the column labeled GWP. The GWP of methane is 21 times that of CO_2 and the GWP of nitrous oxide is 310 times that of CO_2.

Table 5.2-29 Project GHG Summary

Source	Emissions (Metric Tons/year CO_2e)
Auxiliary Boiler	3,631
HTF Heater	1,117
Fire Water Pump Engine	8
Emergency Generator Engine	8
Maintenance Vehicles	15
Delivery Vehicles	49
Project Total	**4,780**

As a comparison, a new 250 MW gas-fired combustion turbine-based power plant would have the potential to emit on the order of one million metric tons of CO_2e per year. Hence, the development of new renewable energy projects will assist the State of California to meet the GHG reduction goals provided in AB 32 while still providing the power needs of all Californians.

5.2.4.2 Air Quality Impacts Analysis

The air dispersion modeling analysis was conducted in accordance with the EPA Guideline on Air Quality Models (GAQM; as incorporated in Appendix W of 40 CFR Part 51). Background information on the use of the model, a description of the setup of the model for construction activities, construction

modeling results, a description of the setup of the model for operational activities, operational modeling results, cumulative modeling results and an evaluation of Project impacts on soils and vegetation are provided in this Section.

Note, KCAPCD does not require modeling for minor sources such as those proposed for RSPP, nor is there any EPA requirement for modeling for this Project.

AERMOD Application Methodology

Meteorological Input Data

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. Three years (2002 - 2004) of wind speed, wind direction and temperature data from the Mojave ARB meteorological monitoring station located near Mojave Airport were obtained from EPA Air Quality System (AQS). The meteorological tower has an anemometer height of 10.0 meters (m). The tower data were supplemented with National Weather Service (NWS) data from General William J. Fox Field in Lancaster, California to fill in missing data and to provide cloud cover and cloud ceiling height data also required for the modeling. Concurrent upper air sounding data were obtained for the Mercury Desert Rock Airport in Mercury, Nevada. The meteorological data were processed into AERMOD-ready format using the AERMOD meteorological processor, AERMET (version 06341). Note that although more recent meteorological data were available (i.e., 2005 – 2008), these years were not used because of the poor data recovery of the upper air data at Mercury Desert Rock Airport. 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 the three years for the pertinent averaging periods.

Receptor Locations

A comprehensive Cartesian receptor grid extending to approximately 10 kilometers (km) from the center of the Project site was used in the AERMOD modeling to assess maximum ground-level pollutant concentrations. Based on preliminary modeling, the 10-km receptor grid was found to be sufficient to resolve the maximum impacts and any significant impact area(s).

The Cartesian receptor grid consisted of the following receptor spacing from the Project fence line:

- 100 to 3,000 m at 100-m increments;
- Beyond 3,000 m to 5,000 m at 200-m increments; and
- Beyond 5 km to 10 km at 500-m increments.

Discrete receptors were placed approximately every 50 m along the facility fence line for increased resolution of impacts along this boundary. Note that this fence line is within the property boundary.

The AERMAP receptor locations (operation emissions) and the AERMAP domain are shown in Figure 5.2-2 (near-field portion of the receptor grid) and Figure 5.2-3 (far-field receptors). Terrain elevations from the National Elevation Dataset (NED) acquired from the United States Geological Service (USGS) National Map Seamless Server were processed with AERMAP to develop the receptor terrain elevations and corresponding hill height scale required by AERMOD. The NED file used was from Universal Transverse Mercator (UTM) Zone 11 and referenced to North American Datum (NAD) 83. All receptors were also referenced to NAD83. The NED file is included in the modeling archive in Appendix E.3 of this AFC.

Meteorological Data and Terrain Processing

AERMET was applied to create the two meteorological data files for each modeling year required for input to AERMOD. The two files created by AERMET are:

- SURFACE: a file with boundary layer parameters such as sensible heat flux, surface friction velocity, convective velocity scale, vertical potential temperature gradient in the 500-m layer above the planetary boundary layer, and convective and mechanical mixing heights. Also provided are values of Monin-Obukhov length, surface roughness (z_o), albedo (r), Bowen ratio (B_o), wind speed, wind direction, temperature, and heights at which measurements were taken.
- PROFILE: a file containing multi-level meteorological data with wind speed, wind direction, temperature, sigma-theta (σ_θ) and sigma-w (σ_w). Not all data need to be available at all levels. For this application involving Mercury Desert Rock Airport upper air data, the profile file contains a single level of wind data (10 m) and multiple levels of aloft temperature data.

AERMET requires specification of site surface characteristics including surface roughness, albedo, and Bowen ratio. The required surface parameters for input to AERMET were developed in accordance with the guidance provided by EPA in the recently revised AERMOD Implementation Guide (AIG) using the EPA AERSURFACE preprocessing program following instructions provided in the *AERSURFACE User's Guide*.

AERSURFACE incorporates algorithms to compute site surface characteristics from digital land cover data compliant with AIG recommendations using the following methodology:

1. The determination of the surface roughness length should be based on an inverse distance-weighted geometric mean for a default upwind distance of one km relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees. As discussed below, three sectors were used in this analysis.
2. The determination of the Bowen ratio should be based on a simple unweighted geometric mean (i.e., no direction or distance dependency) for a representative domain, with a default domain defined by a 10 km by 10 km region centered on the measurement site.
3. The determination of the albedo should be based on a simple unweighted arithmetic mean (i.e., no direction or distance dependency) for the same representative domain as defined for Bowen ratio, with a default domain defined by a 10 km by 10 km region centered on the measurement site.

In addition, the AIG specifies that the determination of the representativeness of meteorological data for a particular application also depends on a comparison of the surface characteristics (z_o, r, and B_o) between the meteorological monitoring site and the project site, coupled with a determination of the importance of any differences relative to predicted concentrations. Given the paucity of meteorological sites within the high desert region of California acceptable for modeling purposes and the gross similarity between the two sites (nearby terrain in similar orientation and similar high desert surface characteristics, the best meteorological data set available for modeling the RSPP was selected. However, it is unlikely that the Mojave Airport will fully represent conditions at the Project site due to local differences in terrain location and orientation. Any uncertainty introduced into the modeling due to minor surface characteristics differences between the Mojave Airport and the Project site are likely to be much less than the uncertainty introduced by differences in wind flow or terrain influences between the two areas.

Three meteorological sites were considered for use in the RSPP modeling analysis: China Lake Air Naval Facility in Ridgecrest, Trona Air Monitoring Station in Trona, and Mojave ARB Station, sited at the Mojave Airport in Mojave, all in California. A review of the available data at China Lake and Trona revealed that the data capture at both sites was below the acceptable limits for dispersion modeling. Mojave Poole Street Station, having been used for the Beacon Solar Power Project (Application for Certification Docket # 08-AFC-2) was known to have acceptable data capture and was sited with similar orientation as the project site relative to the mountains to the west and northwest. Glen Stephens of KCAPCD was consulted regarding the three possible meteorological data sets and he stated that Mojave would be acceptable if neither China Lake nor Trona had the required data capture. A copy of that e-mail correspondence between AECOM and KCAPCD regarding meteorological site selection is included in the modeling archive in Appendix E.3 of this AFC. The relative locations of the project site and the Mojave ARB Meteorological Station are shown in Figure 5.2-4.

The current version of AERSURFACE (Version 08009) supports the use of land cover data from the USGS National Land Cover Data 1992 archives (NLCD92). The NLCD92 archive provides data at a spatial resolution of 30 m based on a 21-category classification scheme applied over the continental U.S. Visual inspection of recent satellite images in the area of Mojave Airport (see Figure 5.2-5), compared to the 1992 land cover images (Figure 5.2-6) indicate that there have been no significant changes in land use cover, confirming that the use of the 1992 data was reasonable.

As recommended in the AIG for surface roughness, the 1-km area was broken down into sectors for the analysis. Three sectors were identified for this analysis based upon visual observation of the land-use surrounding the airport as shown on aerial photographs (see Figure 5.2-7).

In AERSURFACE, the various land cover categories are linked to a set of seasonal surface characteristics. As such, AERSURFACE requires specification of the seasonal category for each month of the year. The following five seasonal categories are offered by AERSURFACE:

1. Midsummer with lush vegetation;
2. Autumn with unharvested cropland;
3. Late autumn after frost and harvest, or winter with no snow;
4. Winter with continuous snow on ground; and
5. Transitional spring with partial green coverage or short annuals.

The designations used in this AFC are summarized in Table 5.2-30.

In addition, for the Bowen ratio, the land use values are linked to three categories of surface moisture corresponding to average, wet and dry conditions. The surface moisture condition for the site may vary depending on the meteorological data period for which the surface characteristics will be applied. AERSURFACE applies the surface moisture condition for the entire data period. Therefore, if the surface moisture condition varies significantly across the data period, then AERSURFACE can be applied multiple times to account for those variations. As recommended in the AERSURFACE User's Guide, the surface moisture condition for each month was determined by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting "wet" conditions if precipitation was in the upper 30th-percentile, "dry" conditions if precipitation was in the lower 30th-percentile, and "average" conditions if precipitation was in the middle 40th-percentile. The monthly designations of surface moisture input to AERSURFACE are also summarized in Table 5.2-30.

The base elevation used for the Mojave ARB Meteorological Station is 845 m (2,772 feet) above sea level. A three-year wind rose is provided as Figure 5.2-8.

Table 5.2-30 AERSURFACE Season and Bowen Ratio Condition Designations

Month	Season	Bowen Ratio Category		
		2002	2003	2004
January	Autumn	Average	Dry	Dry
February	Autumn	Dry	Dry	Wet
March	Autumn	Average	Average	Average
April	Autumn	Average	Wet	Average
May	Summer	Average	Wet	Average
June	Summer	Average	Average	Average
July	Summer	Average	Average	Average
August	Summer	Average	Wet	Average
September	Summer	Average	Wet	Average
October	Summer	Average	Average	Wet
November	Autumn	Average	Average	Average
December	Autumn	Wet	Average	Wet

Ambient Background Concentrations Used in the AERMOD Analysis

The background air quality concentrations used in the NAAQS/CAAQS analysis are listed in Table 5.2-31.

The following monitors were selected as the most appropriate for use with developing representative background concentrations for this analysis:

- Ridgecrest is the closest monitor to the Project site and thus is the most representative for PM10 and PM2.5. This site only monitors PM10 and PM2.5.
- Lancaster was used for CO background data and the Trona Station was used for SO_2 data, as they are the closest monitoring stations to the Project site that monitor these pollutants.
- While Mojave, Trona, and Lancaster monitoring stations all monitor NO_2, data from Trona was used since it was the closest of the three stations to the Project site.

While these monitoring stations are situated in populated areas, and reflect the urban/industrial locations, they were the closest monitoring stations to the Project site. By contrast, the Project site is located in open desert six miles southwest of the town of Ridgecrest. As a result, these data will likely produce conservative estimates (i.e., overestimates) of background air quality concentrations. The background data used in the modeling analysis is shown in Table 5.2-31.

Table 5.2-31 Maximum Yearly Monitored Background Concentrations 2005-2007

Pollutant	Period	Measure	Value ($\mu g/m^3$)				Monitor Location
			2005	2006	2007	Max.	
SO_2	1-hour	1st-high	47.16	86.46	36.7	86.5	Corner Of Athol And Telescope, Trona, CA
		2nd-high	39.3	44.54	28.8	44.5	
	3-hour	1st-high	28.82	44.54	23.6	44.5	
		2nd-high	23.58	18.34	23.6	23.6	
	24-hour	1st-high	10.48	10.48	13.1	13.1	
		2nd-high	10.48	10.48	13.1	13.1	
	Annual	Mean	2.62	2.62	2.6	2.6	
CO	1-hour	1st-high	3,335	3,680	2,875	3,680	43301 Division St., Lancaster, CA
		2nd-high	2,875	3,220	2,645	3,220	
	8-hour	1st-high	1,725	1,840	1,495	1,840	
		2nd-high	1,725	1,840	1,380	1,840	
NO_2	1-hour	1st-high	99.7	94.1	103.5	103.5	
	Annual	Mean	9.4	9.4	9.4	9.4	
PM10	24-hour	1st-high	55	65	72	72	Corner Of Athol And Telescope, Trona, CA
		2nd-high	40	43	41	43	
	Annual	Mean	22	21	23	23.0	
PM2.5	24-hour	1st-high	26.1	14.9	22.4	26.1	100 West California Ave, Ridgecrest, CA
		2nd-high	16.2	13	15.8	16.2	
		98th%	16.2	13	22.4	22.4	
	Annual	Mean	7.01	6.25	6.18	7.0	

NO_2 Modeling with the Ozone Limiting Method (OLM)

To complete the Ambient Air Quality Impacts Analysis (AQIA) for NO_2, the modeled ground-level concentrations resulting from NOx emissions must be converted to NO_2. For the RSPP AQIA, the ozone limiting method (OLM) was applied as implemented in AERMOD with the use of hourly ozone concentrations from the most representative monitor. In using the OLM in AERMOD, conversion of NOx emissions to NO_2 concentrations are limited based on the availability of ozone as determined by the ambient background levels.

Monitoring data for ozone are available at the Mojave monitoring station. All missing hourly ozone data were filled using the average hourly concentration over the three years of data. Figure 5.2-9 shows the background monitor locations relative to the Project site.

<u>Impacts from RSPP Construction</u>

This section provides a description of how the construction activities are modeled and provides the modeling results.

Construction of RSPP is expected to require 28 months and will include the construction of the solar field and one power block. Due to the very large area involved in construction that will be disturbed (approximately 1,760 acres), the construction activities will be staged to minimize the generation of fugitive dust from exposed bare land during Project construction. Specifically, a "just in time" construction approach will be taken in which the amount of bare ground disturbed at any given time due to grubbing, scraping, and grading will be limited by the rate at which the solar mirror troughs can be assembled at an onsite manufacturing facility and installed.

Construction Source Configuration and Model Setup

Construction-related air emissions will include exhaust and fugitive dust from vehicle and construction equipment, windblown fugitive dust from grading and other soil disturbing activities, emplacement of foundations, and the installation of the solar panels. Criteria pollutant emissions were modeled to determine maximum air quality impacts. The maximum modeled concentrations were then added to ambient 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 using multiple area sources (shown in Figure 5.2-10). The area sources represented:

- Power block construction;
- Surveying and grubbing activities (i.e., brush removal and coarse grading);
- Scraping, grading, and foundation emplacement;
- Solar panel installation; and
- Traffic to and from the laydown area to the various construction sites.

Because of the "just in time" construction approach, only a limited area of the Project site would be undergoing construction activities on a given day. A worst-case modeling scenario was developed involving construction in Solar Field 1 and the power block, as shown in Figure 5.2-10. The modeling scenario selected is conservative for several reasons:

1. The grubbing, scraping and grading, and mirror installation modeling sources are aligned west to east along the eastern property fence line downwind of and parallel to the prevailing wind direction. These sources are also located close to the power block construction source providing the maximum overlap of impacts between the construction sources.
2. Brown Road bisects the project site producing ambient air receptors within the project site. Construction traffic from the laydown area traffic to the power block will cross Brown Road and, therefore, several model receptors are physically located within the area source representing the construction vehicle traffic.
3. The compactness of the modeling sources will maximize the local emission flux from the individual sources.
4. The maximum construction emissions associated with the power block are assumed to occur concurrently with the construction of the solar array field in the area most likely to cause the worst case impacts.

The power block construction emission source was represented by a rectangular area source 150 m by 470 m (71,250 square meters [m^2]). This area source represents the entire power block area. The construction emission flux for this source was calculated based on the equipment and operations on a typical day during the month with peak construction emissions. The area source represents emissions from construction equipment with vertical exhaust pipes. For fugitive dust emissions, the power block

emission source had a second overlaid area source representing low-level emissions from paved and unpaved roadway travel and other construction activities that produces fugitive emissions (e.g., scraping, grading and vehicular traffic in unpaved areas).

The grubbing, scraping and grading, and solar panel installation emission sources were each represented by adjoining square area sources 200 m by 200 m (40,000 m^2). The three area sources represent the typical area that would be under construction during any given 24-hour period. The construction emission flux was calculated based on the equipment and operations in an area of this size on a typical day during the month with peak construction emissions. As with the power block construction source, each area source represents emissions from construction equipment with vertical exhaust pipes. For fugitive dust sources, each area source had a second overlaid area source representing fugitive dust generated from vehicle travel on the paved and unpaved roads and other construction activities that would produce fugitive dust emissions (e.g. scraping, grading and wind-blown fugitives from storage piles). As shown in Figure 5.2-10, the three area sources representing the solar field construction were placed in an east-west orientation along the eastern fenceline downwind of and parallel to the predominant wind direction, which maximizes the cumulative impacts of the three sources.

Vehicular traffic to and from the laydown area was represented by a polygon area source with a total area of approximately 271,095 m^2. This area source represents emissions from haul trucks and construction equipment with vertical exhaust pipes travelling to and from the laydown/manufacturing area at the southern end of the Project property to and from the various construction areas. For fugitive emissions, the roadways emission source had a second overlaid area source representing fugitive dust generated from vehicle traffic on the paved and unpaved roadways. As shown in Figure 5.2-10, the poly-area source covers the roadway area from the laydown area across Brown Road to the assumed construction area in Solar Field 2, and to the power block construction area. The base elevation chosen for this source was the elevation at the mid-point of the entire source (830.6 m).

Buoyancy and mechanical turbulence from the hot exhaust and mobility of the construction equipment and haul trucks was simulated by use of a constant initial vertical dimension in the area source algorithm. Fugitive dust emissions from onsite motor vehicles were modeled as low-level area sources since these emissions would almost all occur near ground level.

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 being 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, consistent with EPA modeling guidance for AERMOD.

A release height of 2.0 m was assumed for the fugitive emissions from onsite vehicle sources, with an initial plume height of 15 feet (4.57 m). Following EPA AERMOD guidance, the initial area source vertical standard deviation for construction combustion emissions is estimated as the plume depth divided by 2.15, or 2.13 m.

Construction Modeling Results and Conclusions

The results of the construction modeling are provided in Table 5.2-32. All impacts, when added to the appropriate ambient backgrounds, are below their respective NAAQS and CAAQS with the exception of the one-hour NO_2 and 24-hour and annual PM10. For these three pollutants and averaging times, Project impacts alone are below their respective CAAQS with maximum project impacts of 314.5 micrograms per cubic meter (µg/m^3) for one-hour NO_2, 43.8 µg/m^3 for 24-hour PM10, and 9.4 µg/m^3 for annual PM10.

Table 5.2-32 NAAQS/CAAQS Analysis for Project Construction

Pollutant	Averaging Period	Concentrations (μg/m³)				
		AERMOD Result	Ambient Background[2]	Total [3,4]	CAAQS	NAAQS
NO_2 [1]	1-hr	314.5	103.5	418	339	--
	Annual	8.7	9.4	18.1	57	100
CO	1-hr	569	3680	4249	23,000	40,000
	8-hr	95	1840	1935	10,000	10,000
PM10	24-hr	43.8	72.0	115.8	50	150
	Annual	9.4	23.0	32.4	20	--
PM2.5	24-hr	7.4	26.1	33.5	--	35
	Annual	1.3	7.0	8.3	12	15
SO_2	1-hr	2.5	86.5	89.0	665	--
	3-hr	0.8	44.5	45.3	--	1,300
	24-hr	0.1	13.1	13.2	105	365
	Annual	0.02	2.6	2.6	--	80

1. Modeled NO_2 concentrations as determined with the OLM.
2. From Table 5.2-31. These values correspond to the highest monitored values from 2005 – 2007.
3. Modeled concentration plus ambient background. All totals rounded to three or fewer significant figures.
4. Result reflects 10-hour days from March through September and eight-hour days from October through February.

In the case of PM10 impacts, the maximum modeled 24-hour average for PM10 exceeds the CAAQS when background concentrations are added because the background PM10 data used imply that the CAAQS are already exceeded in this area. The monitoring data used to represent background concentrations is conservative because the Ridgecrest monitoring station is likely to experience higher PM10 concentrations than the Project area because of it's location in downtown Ridgecrest.

In the initial modeling runs for one-hour NO_2, multiple hours were modeled to exceed the CAAQS 1-hour NO_2 concentration of 339 μg/m³. Upon investigation, the vast majority of the NO_2 construction impacts exceeding the CAAQS were found to occur during the first and last hour of the modeled construction day (ending hours 8 A.M. and 5 P.M.), when low mechanical mixing heights, low dispersion potential, and low wind speed produce high modeled concentrations. This was found to be especially true during the winter months when there are fewer daylight hours.

To evaluate the effectiveness of limiting construction operating hours, AERMOD was rerun limiting the hours of construction to 10-hour days (7 A.M. through 5 P.M.) during the non-winter months (March through September), and eight-hour days (8 A.M. through 4 P.M.) during the winter months (October through February). The AERMOD "maxifile" option was used to identify each hour in which the construction impacts, when added to the ambient background, exceeded the CAAQS for one-hour NO_2. In these sensitivity runs, over the 3-year period modeled, only 10 hours (0.04 percent of the total hours modeled) were found to exceed the one-hour NO_2 CAAQS when ambient background was added to the modeled impacts. All of these impacts occur either on the fence line, just across the fence line but

within the RSPP ROW, or in the barren area just to the west of the Project site. Additionally, these modeled impacts occur either during the first or last hour of the construction day, during which time it is unlikely that all of the equipment represented in the modeling would be operating. Because of the success in reducing peak impacts by limiting construction activities to daylight hours, the RSPP is proposing mitigation measure AQ-SC5(H).

The construction modeling is highly conservative for a number of reasons and likely substantially overestimates the actual worst-case impacts that will occur during construction for the reasons listed below.

1. The emissions scenario assumes all equipment identified in the preliminary construction plan for the worst-case month operate for all construction hours during the day. In reality, it is likely that only a portion of the specified equipment would be operating at any given time, particularly for the first and last hours of the construction day when the worst-case impacts occur.

2. The actual construction schedule is unknown and it is unlikely that the construction activities represented in the modeling scenario would occur in such a compact fashion with alignment of the sources parallel to the wind direction during worst-case meteorological conditions.

3. Given the size of the Project area and the duration of the construction (28 months), it is highly improbable that the worst-case emissions will coincide with the worst-case meteorological conditions while construction activities occur at the property fenceline.

The assumed background concentrations may not be representative of the ambient concentrations at the Project site, and are likely to overestimate background pollutant concentrations at the site. Therefore, the construction emissions are not likely to cause a significant adverse impact due to the reasons listed below.

- The conservativeness of the modeling assumptions listed above;
- The limited number of hours in which exceedences occur (less than one percent of the hours modeled),
- The location of the peak impacts along the eastern and western fenceline of the Project, generally on Project property and away from areas of general public access; and
- The limited duration of the worst-case construction activities that would produce the peak impacts during construction.

Impacts from RSPP Operation

This section provides a description of how the operational activities were modeled and provides the modeling results.

Significance Criteria

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 ancillary combustion equipment, cooling tower, and maintenance vehicle emissions) 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 and CAAQS. 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	Class II SILs	CAAQS	NAAQS	
				Primary	Secondary
NO_2	One-hour	--	339	--	--
	Annual	1	57	100	100
CO	One-hour	2,000	23,000	40,000	NA
	Eight-hour	500	10,000	10,000	NA
PM10	24-hour	5	50	150	150
	Annual	1	20	--	--
PM2.5	24-hour	--	--	35	35
	Annual	--	12	15	15
SO_2	One-hour	--	655	--	--
	Three-hour	25	--	NA	1,300
	24-hour	5	105	365	NA
	Annual	1	--	80	NA

Source Configuration

Air quality modeling from Project operation was conducted using AERMOD to demonstrate compliance with the NAAQS and CAAQS and in the local (Class II) area. The RSPP includes one power block which has the following air emission sources that were included in the modeling analysis:

- Auxiliary boiler;
- HTF heater;
- Emergency generator engine;
- Emergency fire water pump engine; and
- One 2-cell cooling tower.

The stack parameters and emissions data for the power block equipment are listed in Table 5.2-34. The stack parameters used in the modeling are based on operation of the ancillary equipment at 100 percent load with the exception of the auxiliary boiler. The auxiliary boiler will often operate in a low-load (25 percent) capacity. A conservative “envelope” approach was used to model this source, using the maximum emission rate over all loads coupled with the source parameters for the boiler at 25 percent load.

Table 5.2-34 Stack Parameters for RSPP Ancillary Equipment

Parameter	Auxiliary Boiler	Emergency Generator	Fire-Water Pump	HTF Heater	Cooling Tower [2]
Stack Coordinates(m)[1]	431,923; 3,934,868	431,912; 3,934,790	431,767; 3,934,854	432,043; 3,934,885	431,876; 3,934,804
Stack Base Elevation (ft)	2,710	2,710	2,710	2,710	2,710
Stack Height (ft)	50	10	10	80	22.4
Stack Diameter (ft)	3	0.5	0.5	3	12
Exit Temperature (^{o}F)	300	770	770	300	90.4
Exit Velocity (ft/sec)	5.9	107	107	5.9	27.0

1. Coordinates for UTM Zone 11 referenced to Datum NAD83.
2. Each auxiliary cooling tower has two cells and each was modeled as a single stack. Coordinate provided is the westernmost of the two cells.

A Good Engineering Practice (GEP) stack height analysis was conducted to evaluate the potential for building downwash from the power block sources. Point sources 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. The stack locations and building included in the GEP analysis for the power block are shown in Figure 5.2-11. A summary of the GEP analysis is provided in Table 5.2-35. The stack heights of the Project ancillary equipment will be less than their respective GEP formula heights and thus 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 E.3.

In addition to the emission sources associated with the power block, 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, soil stabilizer application and water application for dust suppression. Criteria pollutant emissions from the combustion of fuels in the vehicles and fugitive PM10 and PM2.5 emissions are expected from vehicle traffic in the solar field. The emissions are included in the modeling in the form of four area sources laid over the solar arrays. Each of the two solar fields contains two large rectangular areas of solar arrays. One area source was placed over each of these four large array areas for the purpose of modeling vehicular emissions within the arrays.

A release height of 2.0 m was assumed for the fugitive/onsite vehicles sources, with an initial plume height of 15 feet (4.57 m). Following EPA guidance, 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. Each area source represents a solar array area of between approximately 1,134,000 m^2 and 1,304,600 m^2. The total combined area covered by the area sources is approximately 4,765,715 m^2. The release parameters for the solar field maintenance vehicle area sources are listed in Table 5.2-36.

Table 5.2-35 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)
Auxiliary Boiler	AUXBOIL_1	15.24	Air Cooled Condenser	36.6	74.7	91.4
Emergency Generator	EMERGEN_1	3.05	Air Cooled Condenser	36.6	94.0	91.4
Fire-Water Pump	FIRPUMP_1	3.05	Air Cooled Condenser	36.6	74.7	91.4
HTF Heater	HTFHEAT_1	24.38	Air Cooled Condenser	36.6	74.7	91.4
Cooling Tower	COOL1_1-COOL2_1	6.84	Air Cooled Condenser	36.6	85.1 - 89.9	91.4

Table 5.2-36 Source Parameters for the Maintenance Vehicle Area Sources

Source Description	Source Name in AERMOD	Release Height (m)	Initial Dispersion (m)	Area (m^2)
Solar Field 1 North Maintenance Vehicles	MAIN_1N	2.00	2.13	1,166,119
Solar Field 1 South Maintenance Vehicles	MAIN_1S	2.00	2.13	1,304,599
Solar Field 2 North Maintenance Vehicles	MAIN_2N	2.00	2.13	1,160,998
Solar Field 2 South Maintenance Vehicles	MAIN_2S	2.00	2.13	1,134,000

Modeled Impacts from Normal Operations

The worst-case normal operations emissions from the Project were modeled along with vehicular emissions from the solar field maintenance vehicles. The maximum air quality impacts due to emissions from the Project sources are summarized in Table 5.2-37. The maxima over the three years modeled is noted and compared to the EPA SILs. Hourly OLM was used to represent more accurately the conversion of NOx to NO_2 for comparison to the California one-hour NO_2 standard. As shown in Table 5.2-38, all maximum modeled pollutant concentrations are less than their respective SILs except 24-hour PM10.

Table 5.2-37 Maximum Modeled Concentrations for RSPP Normal Operations

Pollutant	Averaging Period	Maximum AERMOD Concentration[1] ($\mu g/m^3$)			Overall Maximum ($\mu g/m^3$)	EPA SIL ($\mu g/m^3$)
		2002	2003	2004		
NO_2 [2]	1-hr	210	216	193	216	--
	Annual	0.17	0.17	0.19	0.19	1
CO	1-hr	281	285	287	287	2,000
	8-hr	75.6	77.7	72.1	77.7	500
PM10	24-hr	7.72	6.65	6.66	7.72	5
	Annual	0.74	0.72	0.68	0.74	1
PM2.5	24-hr	1.16	1.02	1.02	1.16	N/A
	Annual	0.19	0.19	0.20	0.20	N/A
SO_2	1-hr	15.6	17.3	16.3	17.3	--
	3-hr	8.88	11.2	9.44	11.2	25
	24-hr	0.85	0.86	0.79	0.86	5
	Annual	0.14	0.14	0.16	0.16	1

1. All concentrations rounded to three or fewer significant figures.
2. Modeled NO_2 concentrations as determined with the OLM.

The maximum modeled concentrations for Project emissions are summed with ambient background concentrations for comparison to the CAAQS. As shown in Table 5.2-38, the total concentrations comprised of maximum modeled plus maximum background are below the CAAQS for all pollutants with the exception of the 24-hour and annual PM10 CAAQS, for which the ambient background already exceeds the standard. Project PM10 contributions are relatively small (15.4 percent of the 24-hour CAAQS and 3.7 percent of the annual PM10 standard).

Table 5.2-38 CAAQS Modeling Results for Project Normal Operations

Pollutant	Averaging Period	Concentrations[1] (μg/m³)			
		AERMOD Result	Ambient Background [2]	Total [3]	CAAQS/NAAQS
NO_2 [1]	1-hr	216	104	319	339
	Annual	0.19	9.4	9.6	57
CO	1-hr	287	3,680	3,967	23,000
	8-hr	77.7	1,840	1,918	10,000
PM10	24-hr	7.72	72.0	79.7	50
	Annual	0.74	23.0	23.7	20
PM2.5	24-hr	1.16	26.1	27.3	35
	Annual	0.20	7.0	7.2	12
SO_2	1-hr	17.3	86.5	104	655
	3-hr	11.2	44.5	55.7	1,300
	24-hr	0.86	13.1	14.0	105
	Annual	0.16	2.6	2.8	80

1. All concentrations rounded to three or fewer significant figures.
2. Modeled NO_2 concentrations as determined with the OLM.
3. Highest value from Table 5.2-31.
4. Modeled concentration plus ambient background, rounded to one significant figure.

Other Related Analyses - Vegetation and Soils

The Project site is in an area consisting of primarily 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”. Table 5.2-39 lists the EPA-recommended 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 5.2-39, the total modeled air concentrations for the proposed Project summed with ambient background concentrations are compared to these criteria to evaluate impacts on soils and vegetation. All total concentrations are well below the recommended significance criteria. Therefore, the potential for adverse impacts to either soils or vegetation is negligible.

Table 5.2-39 Soils and Vegetation Analysis

Pollutant	Averaging Period	AERMOD Predicted Concentrations (mg/m^3)				Background Value ($\mu g/m^3$)	Max Plus Background[3] ($\mu g/m^3$)	Significance Level for Impacts to Soil and Vegetation ($\mu g/m^3$)
		2002	2003	2004	Max.			
SO_2	1-hour	15.6	17.3	16.3	17.3	86.5	104	917
	3-hour	8.88	11.2	9.44	11.2	44.5	55.7	786
	Annual	0.14	0.14	0.16	0.16	2.6	2.8	18
CO	1-week[1]	75.6	77.7	72.1	77.7	1,840	1,920	1,800,000
NO_2	4-hour[2]	210	216	193	216	104	319	3,760
	8-hour[2]	210	216	193	216	104	319	3,760
	1-month[2]	210	216	193	216	104	319	564
	Annual	0.17	0.17	0.19	0.19	9.4	9.6	94

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

1. Used eight-hour CO runs for this period.
2. Used one-hour NOx runs for these periods.
3. All concentrations rounded to three or fewer significant figures.

5.2.4.3 Cumulative Impacts

Section 5.1.3, Cumulative Evaluation Approach, presents cumulative projects that may contribute to adverse impacts on air quality. As required per CEC guidelines, the impacts of the Project 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 is the six-mile radius around the site. Past and present projects, because they already exist, are inherently part of the environmental baseline or “affected environment” discussed in detail in Section 5.2.2 of this AFC. Therefore, past and present projects are assumed to be represented by the background value for purposes of determining the Project’s cumulative impacts and represent the starting point to which impacts from the proposed Project are added.

As shown in Section 5.1.3, Cumulative Evaluation Approach, there have been 66 projects for which applications for renewable energy projects have been filed with BLM in the Western Mohave (WEMO) area, including 32 solar power projects and 34 wind energy projects.. Several power projects have been proposed in the general vicinity of the Project on private lands which fall under the jurisdiction of the CEC for licensing. There are also several projects identified in the vicinity of the Project, including residential developments, retail developments and hotels associated with anticipated changes in employment at the China Lake Navel Weapons Station. Finally, there is a long-term plan to widen U.S. Highway 395. According to available information, the construction schedule for most or all of these projects will overlap for at least some period of the construction schedule proposed for the Project, and the operation schedule would overlap as well.

While there are multiple applications with BLM for solar and wind power projects in the general vicinity of the Project, it is unlikely that all of these projects will be constructed for the several reasons, including: the difficultly in obtaining permits for such projects, many of the projects are proposing power generation technologies that have not been implemented on a large scale, permitting challenges related to endangered species mitigation requirements, and the uncertainty in the availability of construction financing. See also Section 5.1.3, Cumulative Evaluation Approach. Because it is impossible to predict which projects will be developed, all of the identified projects must be considered. However, the fact that many of these projects may not be constructed should be considered when evaluating the potential cumulative impacts.

Cumulative Impacts During Construction

As shown in Section 5.2.4.2, the proposed Project may cause short-term localized air quality impacts associated with NOx emissions from heavy duty construction equipment and PM10 emissions associated with soil handling. These potential impacts are due to construction activities, including grading near the Project fenceline. As discussed in more detail in Section 5.2.5, the Applicant has proposed five mitigation measures (AQ-SC1 through AQ-SC5) to minimize and control emissions from the equipment and activities during the Project construction period. The use of these mitigation measures will reduce the NO_2 and PM10 impacts during the construction period to a less than significant level.

There are 66 energy-related projects proposed in the WEMO area; 32 of these projects are solar energy projects which would require large tracts of land. For pollutants that have potential localized impacts, such as NOx and PM10, the size of the projects themselves and the distance between the projects and RSPP suggests that the localized impacts during construction would not be cumulatively significant.

Most of the 34 wind energy project currently proposed in the WEMO area are in preliminary evaluation phases, during which time the projects consist of minimal construction activities associated with the installation of a limited number of meteorological monitoring towers. With minimal construction emissions, the potential for cumulatively significant impacts is small.

There are five power plants proposed in the greater vicinity of the Project; however, the closest one is the Beacon Solar Energy Project located approximately 25 miles from the Project site. As explained above, the potential RSPP impacts are localized; they occur at or near to the Project fenceline. The five power plants are expected to have similar construction impacts and issues as the proposed Project, as all are solar, or a hybrid of solar and conventional power generation. It is assumed that these five proposed projects would also employ mitigation to the extent practical to minimize their impacts during construction. With the application of appropriate mitigation measures, the localized nature of the potential fugitive dust impacts, and the distance between RSPP and these five power projects, the potential for cumulatively significant impacts is low.

The Wal-Mart project located approximately five miles to the northeast of the Project site is predicted to have significant adverse impacts to air quality associated with PM10 and ozone precursors. However, the impacts are predicted to occur very close to its project boundary. As shown in Section 5.2.4.2, the RSPP impacts will also occur in the vicinity of the Project fenceline. Because of the five-mile distance between the project sites, there will be no measureable overlap of impacts between the two projects, and thus cumulative impacts are expected to be less than significant.

The U.S. Highway 395 widening project is not expected to be constructed for at least 10 years and, therefore, construction periods would not overlap. The hotel construction in Ridgecrest is already underway. The grading activities required for hotel construction that would cause NOx and PM10 emissions have already occurred and, therefore, would not overlap the similar construction activities of RSPP. Thus, these projects are not expected to have a cumulatively significant impact with RSPP.

Because the timing of residential construction that is proposed for the Ridgecrest area is unknown, it is not possible to determine if the construction schedules would overlap. However, given the relatively small project sizes (acreage, compared to a solar power project), it is unlikely that the activities that would cause NOx and PM10 impacts, such as grading, would be significant individually or cumulatively with RSPP.

Cumulative Impacts During Operation

During operation, the RSPP is modeled to have impacts below the applicable CAAQS for all criteria pollutants except PM10. While modeled 24-hour and annual PM10 impacts are above the CAAQS, the exceedance is primarily due to the background concentration of PM10, which already exceeds the standards. Project impacts are approximately 15 percent or less of the CAAQS for PM10.

As discussed above, there are many energy projects proposed in the general region (WEMO area). Due to the large geographic area these projects occupy and the minimal emissions, each of these projects is expected to have insignificant impacts individually and cumulatively with the Project during operations.

Two of the power projects proposed on private land under CEC licensing jurisdiction are hybrid technologies with a solar component combined with a conventional combined-cycle power plant. The air emissions from these hybrid projects may be substantial for several pollutants. Project of this size (emissions) would be required to provide emissions offsets pursuant to non-attainment NSR rules and the Acid Rain rules, and would be required to obtain a PSD permit that would require the applicants demonstrate through modeling that the projects will not cause or contribute to a violation of NAAQS. Given that these two projects are at least 70 miles from the Project site, and considering that these projects will both provide offsets and demonstrate attainment with NAAQS, it is unlikely that these projects would be cumulatively significant with the Project during operations.

To determine which, if any, sources would be required to be modeled along with RSPP impacts for the cumulative study, Mr. Glen Stephens of KCAPCD was contacted via telephone. During the telephone conversation and later confirmed via e-mail exchange, Mr. Stephens indicated that due to the remoteness of the Project site, adding the appropriate ambient background would be sufficient to complete the cumulative analysis. Therefore, the results provided in Table 5.2-38 above for the Project contribution added to background, are considered to represent the cumulative impacts as well.

The proposed transportation, residential, retail and hotel projects are expected to have negligible operating emissions, and thus each of these projects is expected to have insignificant impacts individually and cumulatively with RSPP during operations.

5.2.5 Mitigation Measures

The Applicant proposes the following measures to mitigate potential air quality impacts to less than significant.

5.2.5.1 Construction Phase Mitigation Measures

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner will designate and retain an onsite AQCMM who will be responsible for directing and documenting compliance with Mitigation Measures **AQ-SC3**, **AQ-SC4,** and **AQ-SC5** for the entire Project site and linear facility construction. The onsite AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates will have full access to all areas of construction on the Project site and linear facilities, and will 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 will not be terminated without written consent of the Compliance Project Manager (CPM).

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

AQ-SC3 Construction Fugitive Dust Control: The AQCMM will submit documentation to the CPM in each Monthly Compliance Report 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 will require prior CPM notification and approval.

A. All unpaved roads and disturbed areas in the Project and linear construction sites will 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 will exceed 10 miles per hour within the construction site.

C. Visible speed limit signs will be posted at the construction site entrances.

D. All construction equipment vehicle tires will 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 will be graveled or treated to prevent track-out to public roadways.

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

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

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

J. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas will be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

K. All soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or will 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 will be provided with a cover or the materials will 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) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will 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 will monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to 1) impact an actual non-project structure; 2) be transported 200 feet beyond the centerline of the construction of linear facilities; or 3) be transported 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 will include a section in the AQCMP detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate will implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

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

Step 2: The AQCMM or Delegate will 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 will direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity will 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, if the shutdown will go into effect within one hour of the original determination, unless overruled by the CPM before that time.

AQ-SC5 Diesel-Fueled Engines Control: The AQCMM will submit to the CPM, in the Monthly Compliance Report, 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 will require prior CPM notification and approval.

A. All diesel-fueled engines used in the construction of the facility will 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 will have clearly visible tags issued by the onsite AQCMM showing that the engine meets the conditions set forth herein.

C. A good faith effort will be made to find and use off-road construction diesel equipment that has a rating of 100 hp to 750 hp and that meets the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines as specified in Title 13 CCR Section 2423(b)(1). This good faith effort will be documented with signed written correspondence by the appropriate construction contractors along with documented correspondence with at least two construction equipment rental firms.

D. All construction diesel engines, which have a rating of 50 hp or more, will meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in Title 13 CCR Section 2423(b)(1). The following exceptions for specific construction equipment items may be made on a case-by-case basis.

1. Equipment with non-Tier 2 engines that have tailpipe retrofit controls that reduce exhaust emissions of NOx and PM to no more than Tier 2 levels.

2. Tier 1 equipment will be allowed on a case-by-case basis only when the project owner has documented that no Tier 2 equipment or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete the project's construction. This will be documented with signed written correspondence by the appropriate construction contractors along with documented correspondence with at least two construction equipment rental firms.

3. The construction equipment item is intended to be on site for five days or less.

4. Equipment owned by specialty subcontractors may be granted an exemption, for single equipment items on a case-by-case basis, if it can be demonstrated that extreme financial hardship would occur if the specialty subcontractor had to rent replacement equipment, or if it can be demonstrated that a specialized equipment item is not available by rental.

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

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

G. Construction equipment will employ electric motors when feasible.

H. Except for limited activities such as cement pours, construction activities will be limited to daylight hours.

5.2.5.2 Operating Phase Mitigation Measures

The Project impacts analysis shows that the Project contributions to air quality during normal operations will be minimal and are well below the significant impact levels defined by the relevant agencies, with the possible exception of PM10 impacts. The background values from the closest air quality monitoring site in the Project area show that background PM10 already exceeds both the 24-hour and annual CAAQS. However, the Project can reasonably be assumed to reduce PM10 emissions in the region by applying an effective dust suppressant on the solar field where there currently is a large open field subject to disturbance from off-road vehicles and wind erosion.

Besides the ATC/DOC conditions that will be recommended by the KCAPCD, the following mitigation measures are proposed by the Applicant to be implemented during Project operations.

AQ-SC6 The project owner will use gasoline powered light trucks, equivalent of the Ford F150 model, for facility maintenance, except for mirror washing, welding rigs, or other specific activities which requires a larger vehicle. Only new trucks meeting California on-road vehicle emission standards will be purchased for use at the site. In addition, only electrical powered all-terrain vehicles or other low-emission vehicles will be used to support the maintenance crew within the facility.

AQ-SC7 The project owner will provide a site operations dust control plan that:

A. Describes the wind erosion control techniques such as windbreaks, water, and chemical dust suppressants that will be used on areas that could be disturbed by vehicles or wind; and

B. Identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed will be limited to no more than 10 miles per hour on these unpaved roadways.

AQ-SC8 The project owner will provide the CPM copies of all District-issued ATC and PTO for the facility. The project owner will submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner will submit to the CPM any modification to any permit proposed by the District and any revised permit issued by the District for the Project.

AQ-SC9 Operation of the auxiliary boiler will not exceed 5,000 hours per year; 500 hours at full load and 4,500 hours at 25 percent load.

AQ-SC10 Operation of the HTF heater will not exceed 500 hours per year.

AQ-SC11 Auxiliary cooling tower total dissolved solids (TDS) will not exceed 2,000 ppm.

AQ-SC12 Auxiliary cooling water circulation flow rate will not exceed 6,100 gallons per minute.

5.2.6 References

Beacon Solar, LLC, 2008. Application for Certification for the Beacon Solar Energy Project – Docket # 08-AFC-02 (http://www.energy.ca.gov/sitingcases/beacon/documents/applicant/afc/), March.

California Air Resources Board (ARB), 2009a. Sacramento, CA, website at http://www.arb.ca.gov/aqd/aqdpage.htm.

ARB, 2009b. California Air Resources Board Quality Assurance website (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=36306).

ARB, 2009c. California Air Resources Board Top 4 Summary website (http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start).

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Figure 5.2-1 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	15.0 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
	Rolling 3-Month Average[9]	—		0.15 µg/m^3		
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 (11/17/08)

Figure 5.2-1 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.

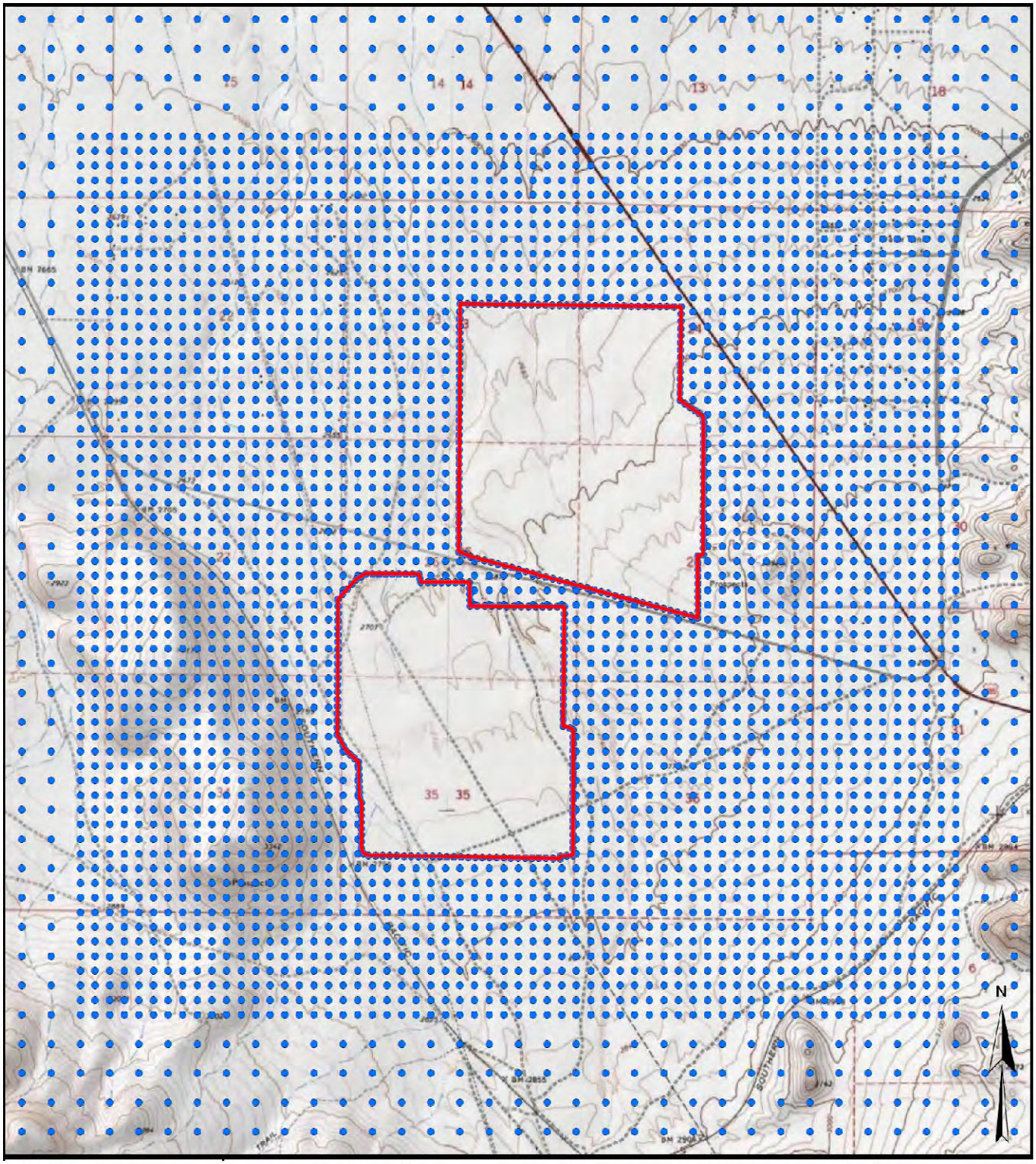
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

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.

9. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (11/17/08)**



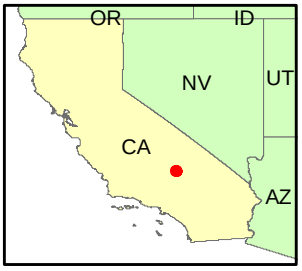
Legend

Fenceline

Receptor

Scale 0 0.5 1 2 3 4 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-2
Near Field Cartesion Receptor
Field Used as Input to AERMOD

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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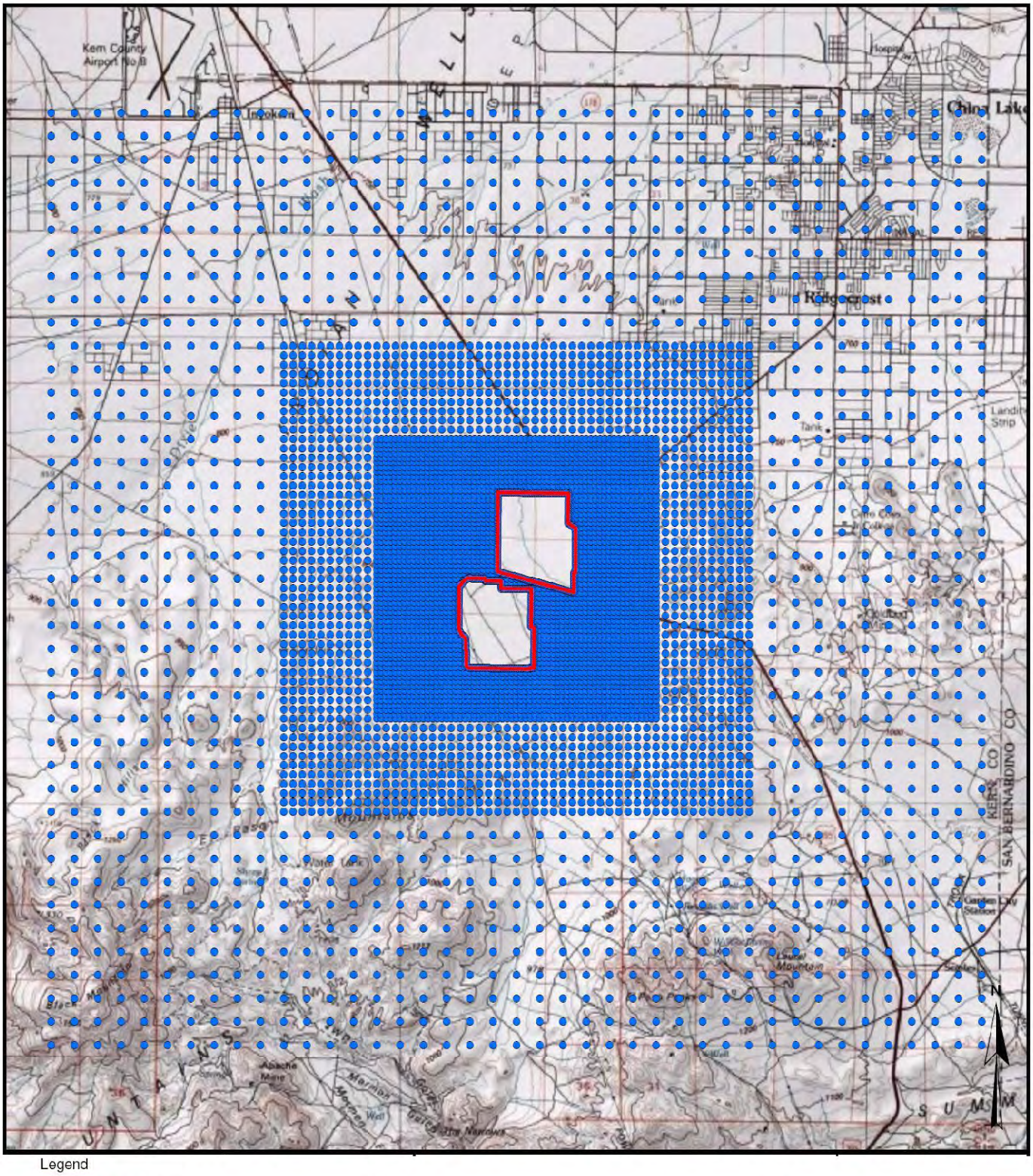


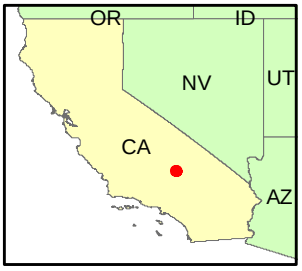
Legend

Fenceline

Receptor

Scale 0 1.25 2.5 5 7.5 10 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-3
Far Field Cartesion Receptor
Field Used as Input to AERMOD

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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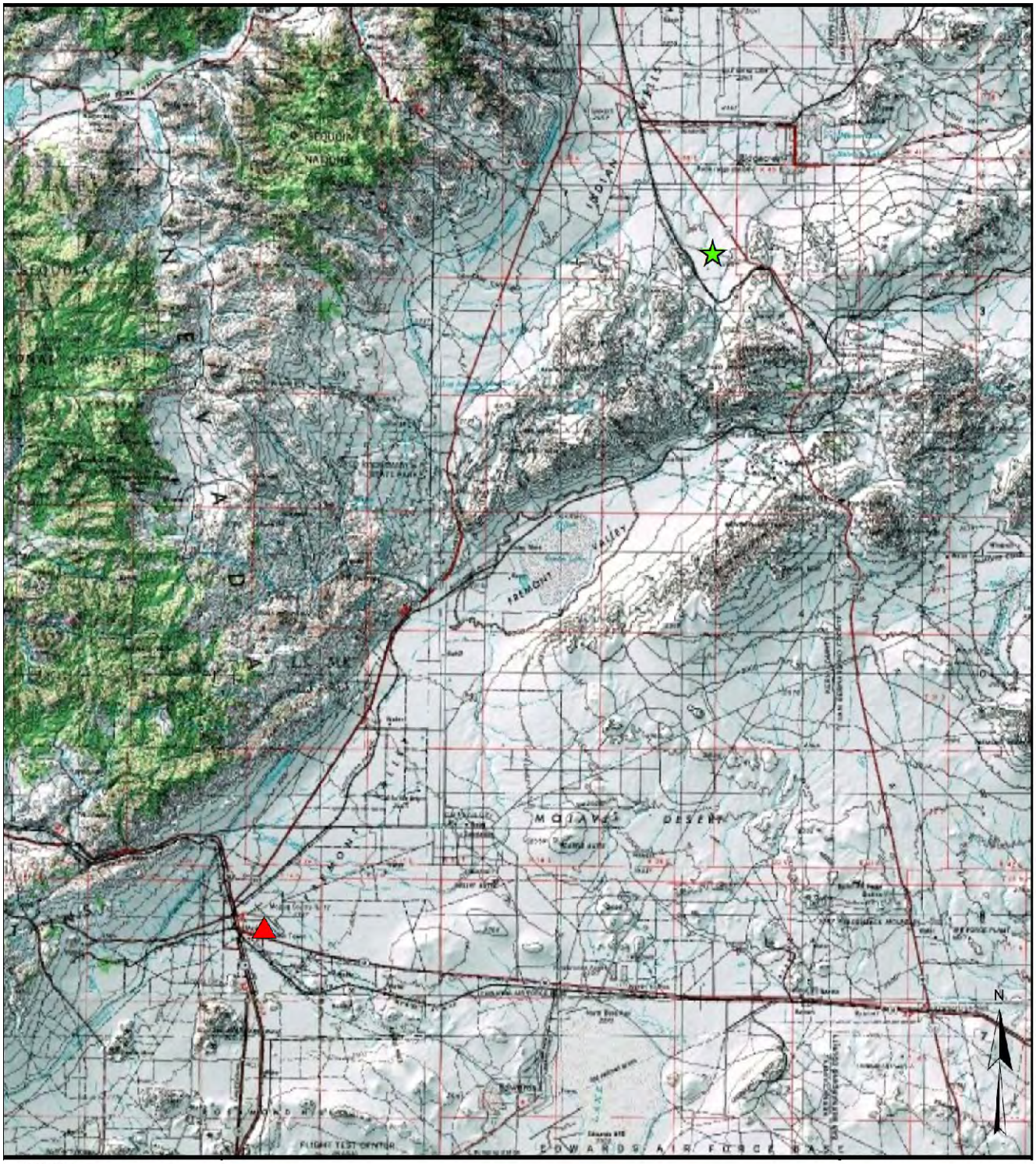


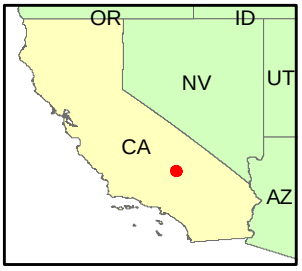
Legend

RSPP Site Location

Mojave ARB Meteorological Site

Scale 0 5 10 20 30 40 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-4
Location of Mojave ARB Meteorological Site Relative to the Proposed Ridgecrest Solar Power Plant

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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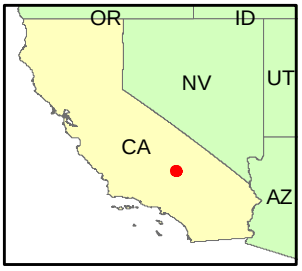
Legend

Mojave ARB Meteorological Site

1km Circle

Scale 0 1 2 4 6 8 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-5
Satellite Image of the Region Surrounding Mojave ARB Meteorological Site

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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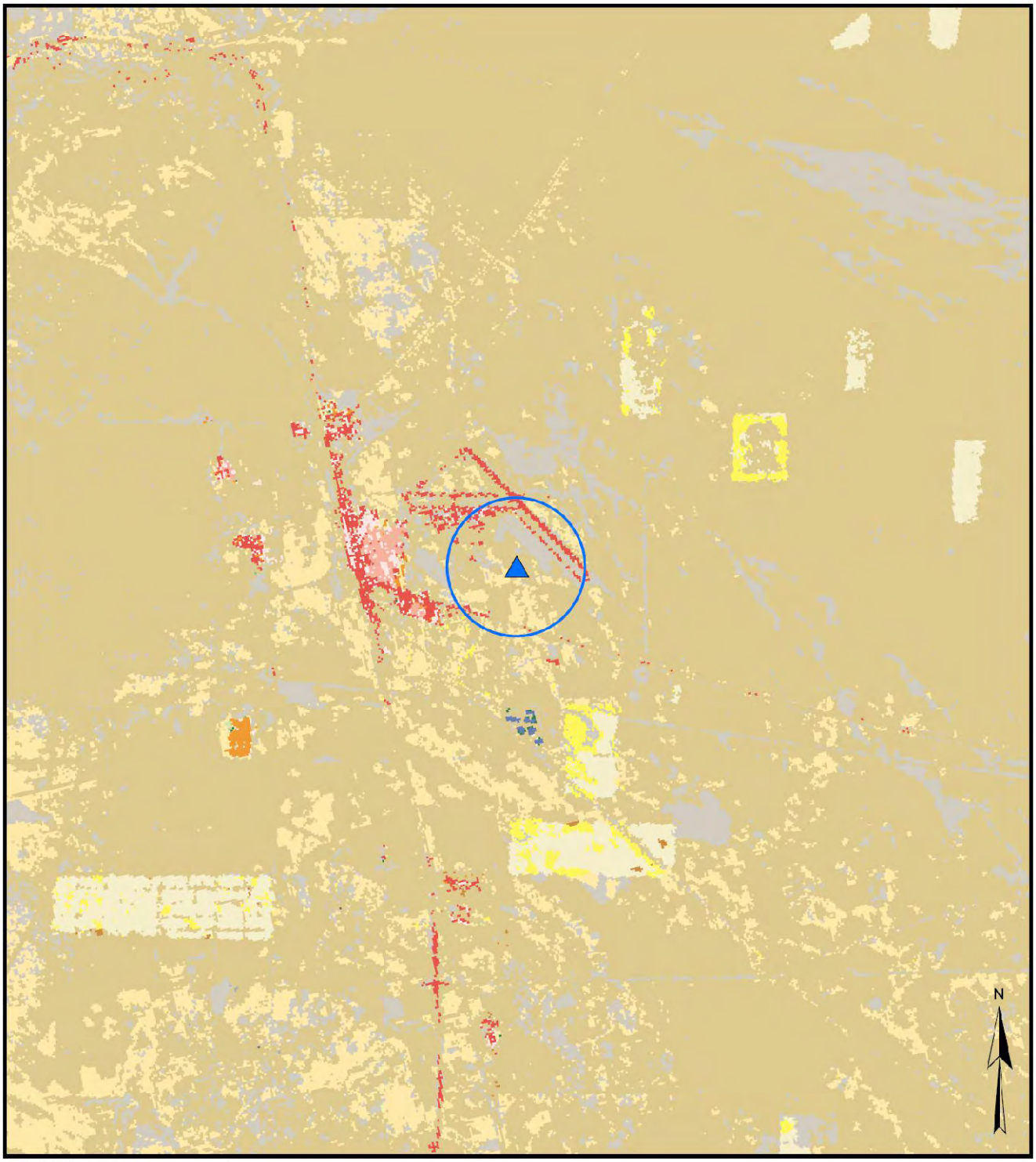


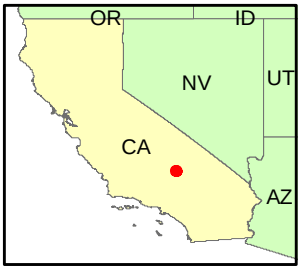
Legend

Mojave ARB Meteorological Site

1km Circle

Scale 0 1 2 4 6 8 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-6
1992 NLCD Image of the Area Surrounding Mojave ARB Meteorological Site

Solar Millennium

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Date: September 2009

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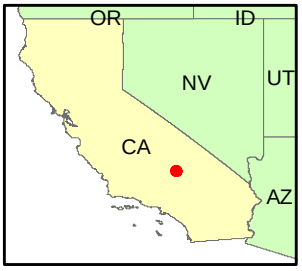
Legend

Mojave ARB Meteorological Site

1km Circle

Scale 0 0.125 0.25 0.5 0.75 1 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-7
1km Radius Around the Mojave ARB Meteorological Site with Surface Roughness Sectors

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Date: September 2009

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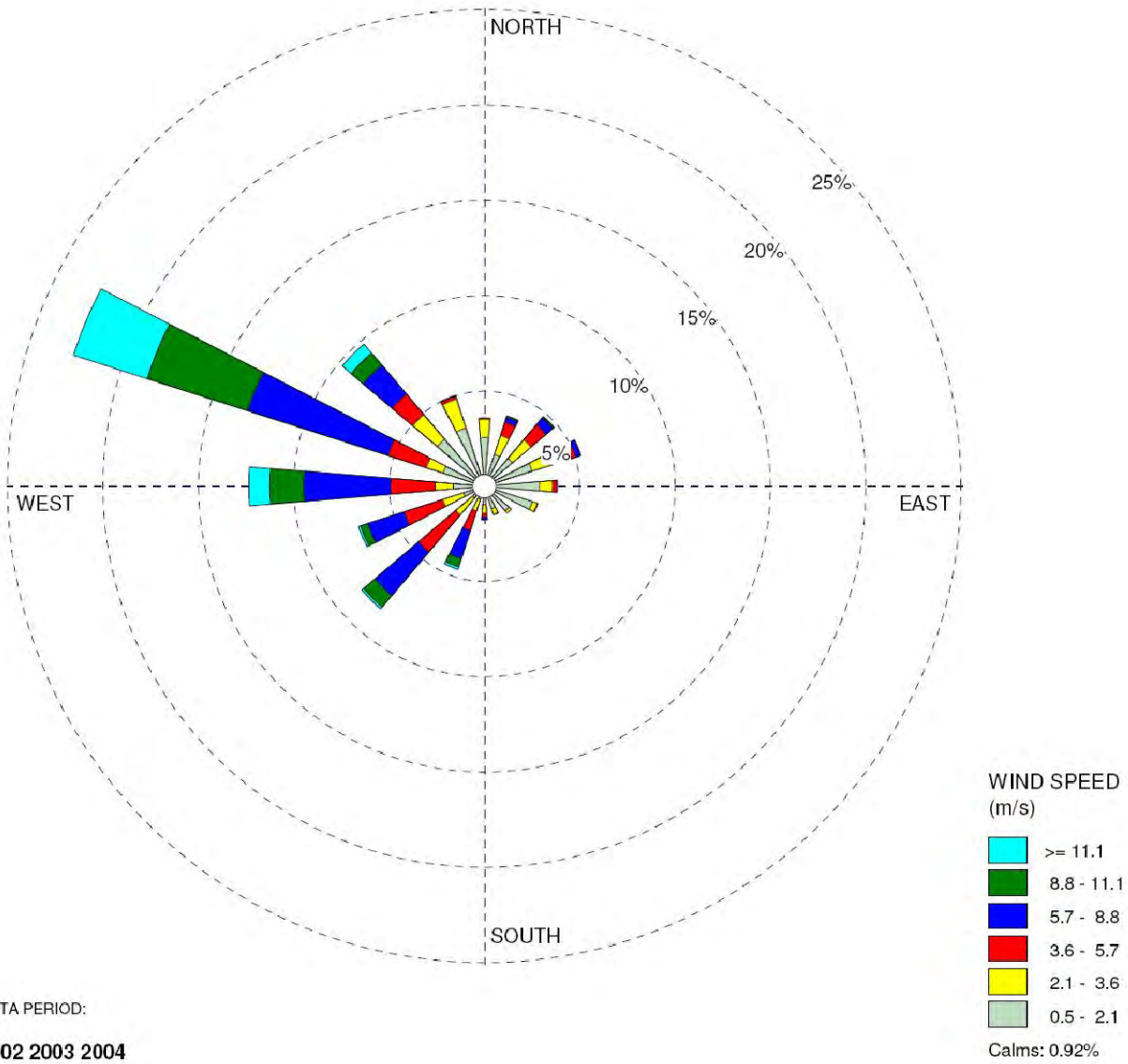
WIND ROSE PLOT:

Mojave ARB Monitoring Station, Mojave, CA
2002-2004 Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)

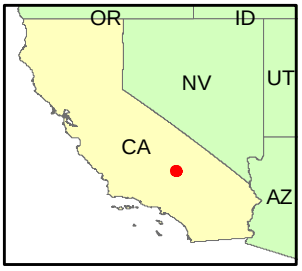


DATA PERIOD:

2002 2003 2004
Jan 1 - Dec 31
00:00 - 23:00

CALM WINDS:	TOTAL COUNT:
0.92%	**26304 hrs.**
AVG. WIND SPEED:	DATE:
5.03 m/s	**8/24/2009**

Project Location



Ridgecrest Solar Power Project

Figure 5.2-8
Wind Rose Plot
Mojave ARB Monitoring Station, Mojave, CA

Solar Millennium

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Date: September 2009

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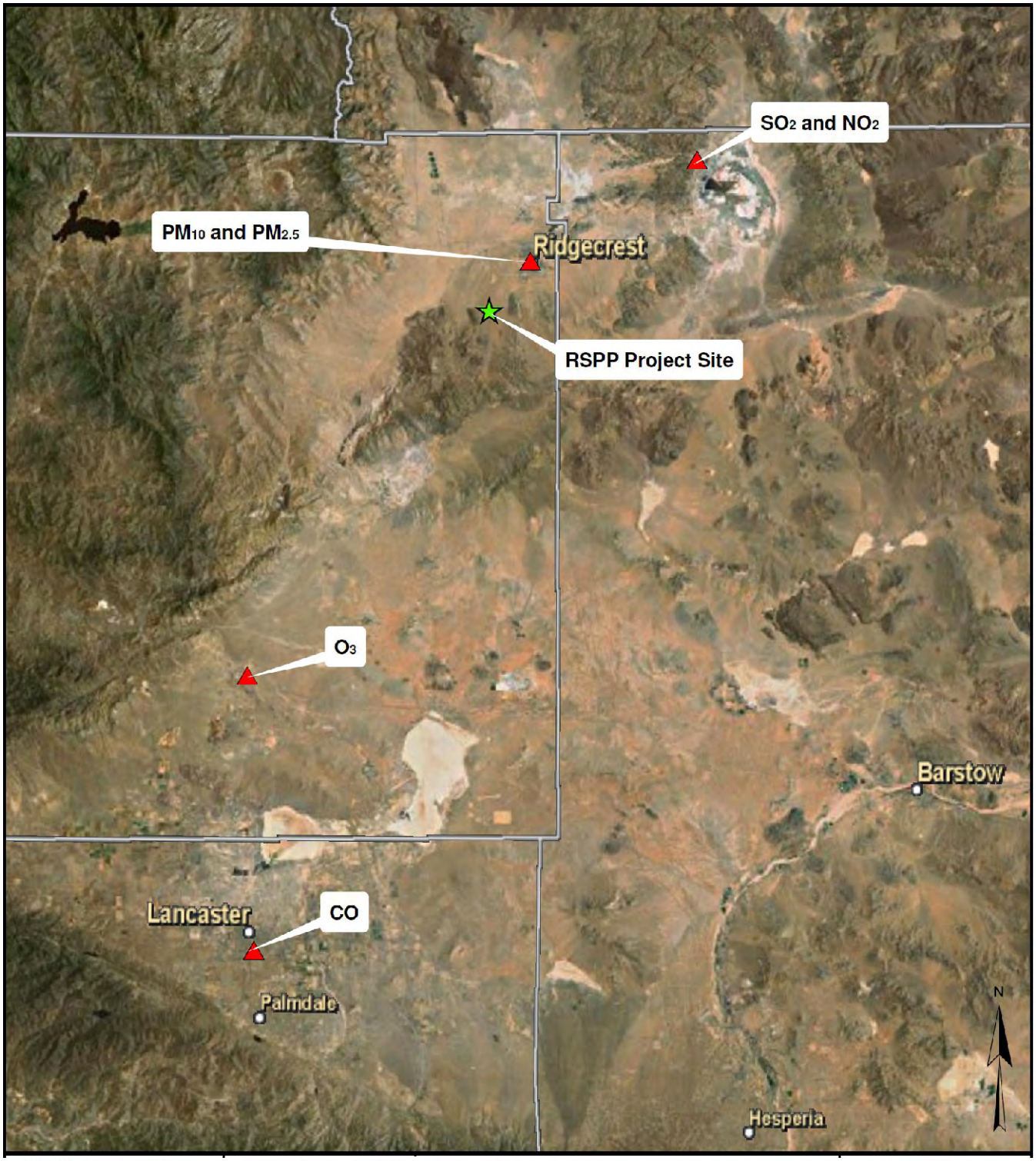


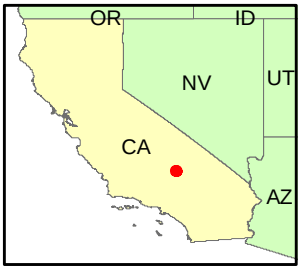
Legend

Proposed Site Location

Monitor Location

Scale 0 10 20 40 60 80 Kilometers

Project Location



Ridgecrest Solar Power Project

Figure 5.2-9
Location of the Ambient Monitoring Stations Relative to the Proposed Ridgecrest Solar Power Project

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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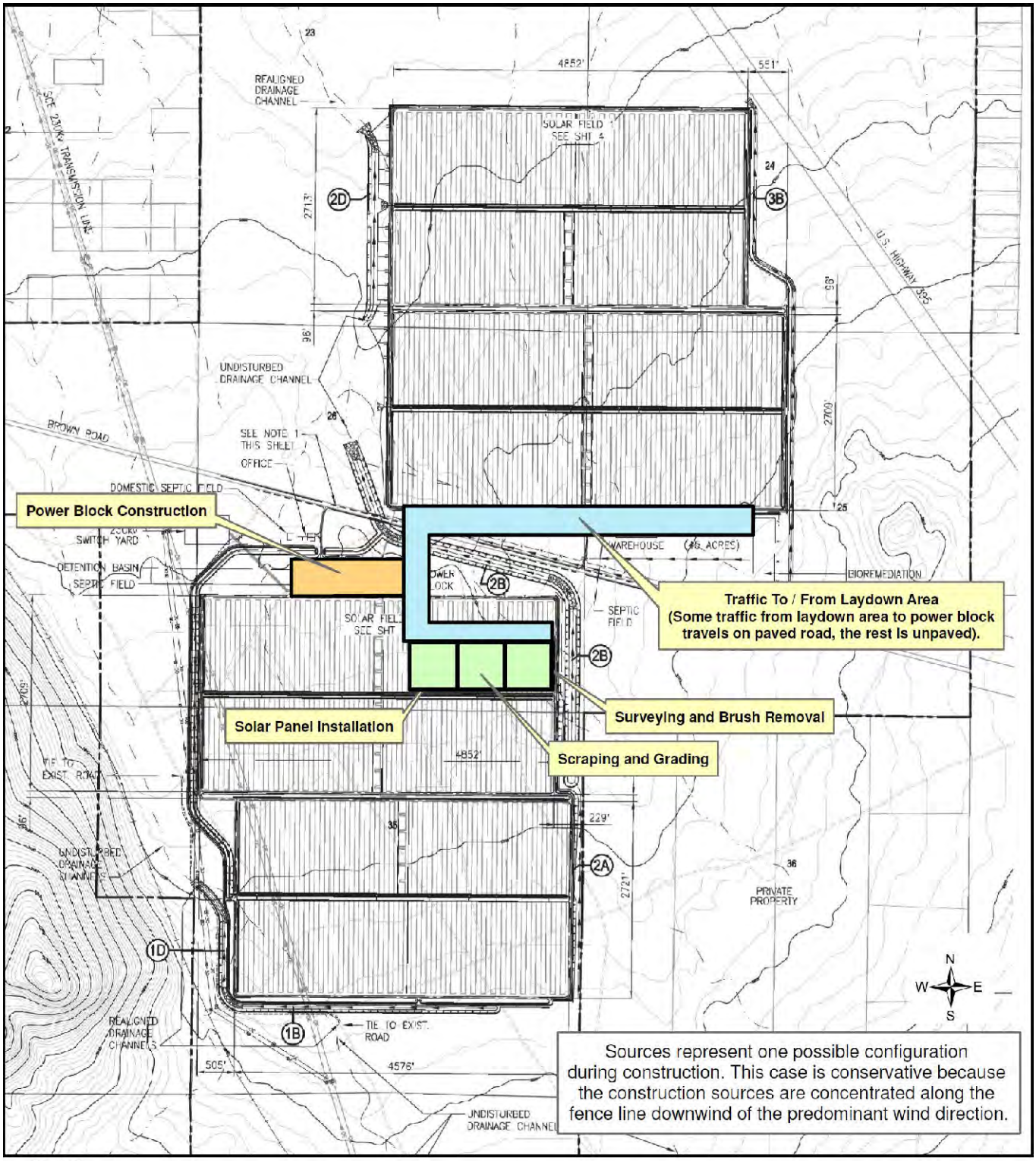
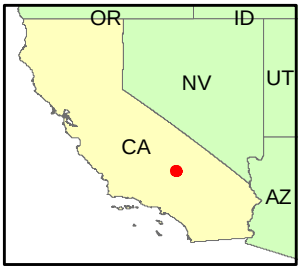


Legend

- Solar Array Construction
- Power Block Construction
- Laydown Area Traffic

Scale 0 0.5 1 2 3 Km

Project Location



Ridgecrest Solar Power Project

Figure 5.2-10
Representative Construction Modeling Sources, Ridgecrest Solar Power Project
Ridgecrest, CA

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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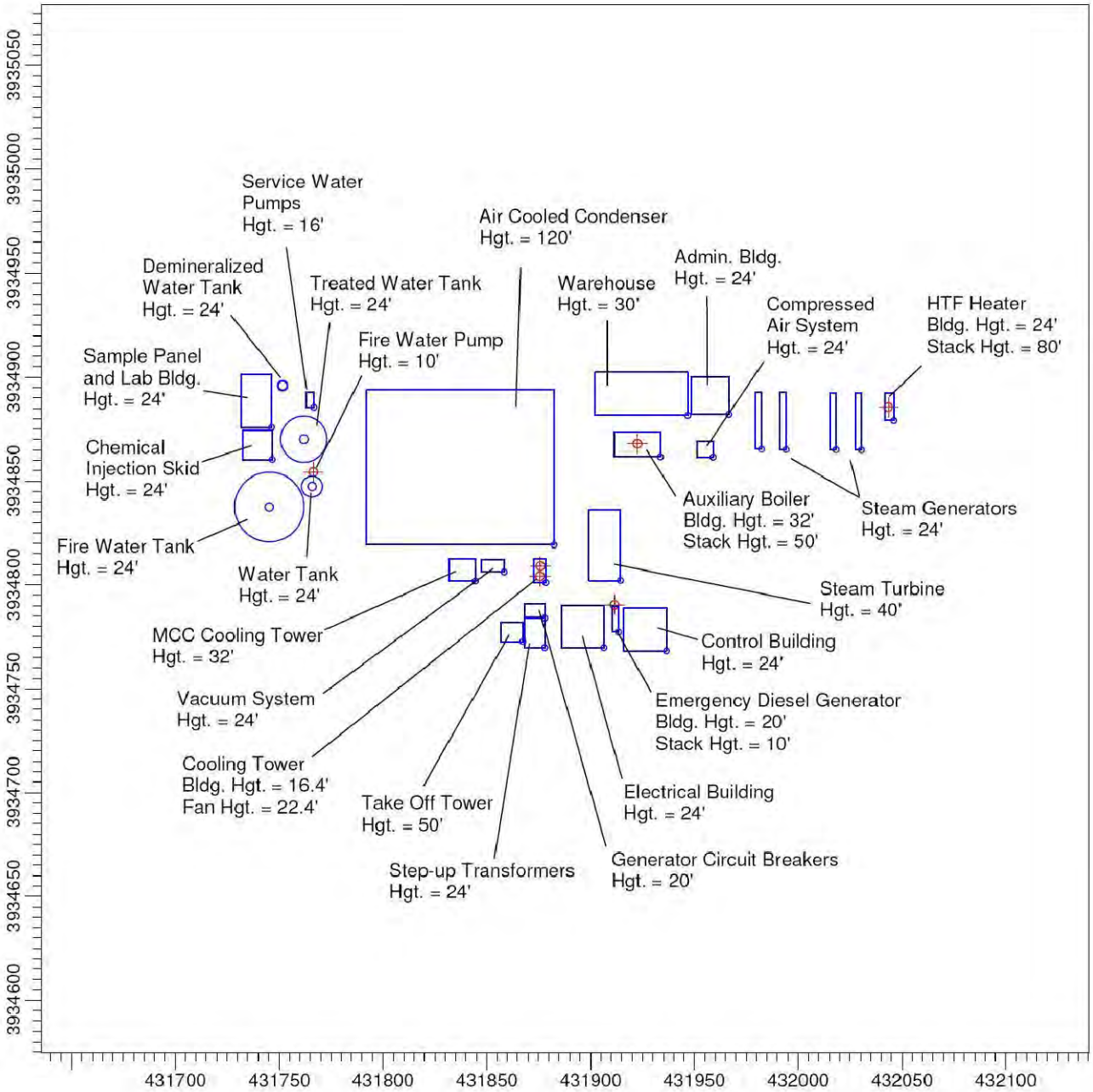
PROJECT TITLE:

Structures Evaluated in GEP Analysis
Ridgecrest Solar Power Project



SOURCES: **11**

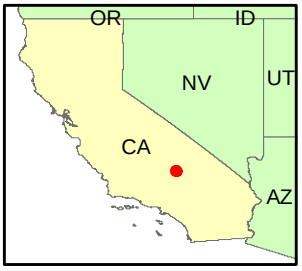
RECEPTORS: **6302**

SCALE: 1:3,079

0 0.1 km

DATE: **8/25/2009**

Project Location



Ridgecrest Solar Power Project

Figure 5.2-11
Structures Evaluated in GEP Analysis

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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