5.10 Public Health

This section addresses potential public health issues related to the Ridgecrest Solar Power Project (RSPP or Project). These issues include the potential for health risks from the emissions of toxic air contaminants (TACs). A discussion of unexploded ordnance (UXO) is provided in Section 5.18, Worker Safety. This section presents the methodology and results of a human health risk assessment (HRA) performed to evaluate potential impacts and public exposure associated with airborne emissions from Project operation.

For public health, the term “chemical substances” refers to chemical substances in ambient air that are regulated by either the U.S. Environmental Protection Agency (EPA) and/or the State of California. The California Office of Environmental Health Hazard Assessment (OEHHA) and the California Air Resources Board (ARB) use the term “toxic air contaminants” (TACs), which currently includes over 244 chemical substances. The EPA uses the term Hazardous Air Pollutants (HAPs), and has currently identified 188 substances as HAPs, all of which are presently included in California’s list of TACs. TAC emissions from various operating units of the Project, including an auxiliary boiler, a cooling tower, a firewater pump, an emergency generator, and one heat transfer fluid (HTF) expansion (i.e., ullage) tank, are analyzed for public health impacts.

The public health evaluation in this section is intended to support California Energy Commission (CEC) compliance with the requirements of the California Environmental Quality Act (CEQA) and Bureau of Land Management’s (BLM) compliance with the requirements of the National Environmental Policy Act (NEPA). These agencies are conducting a joint review of the Project, and a combined NEPA/CEQA document will be prepared.

Summary

Public health impacts would be less than significant. The focus of the analysis is human exposure to the TAC emissions associated with Project operation. There are a total of 74 residential, 18 worker, and 4 sensitive receptors within a 3-mile radius of the Project right of way. Project emissions of toxic air contaminants are expected to be minimal. Estimated cancer risks at all receptors in the health risk analysis were very low, with a worst-case cancer risk of 0.09-in-one-million at the maximum exposed individual at an existing residential receptor (MEIR), which is significantly lower than the Kern County Air Pollution Control District (KCAPCD) CEQA significance criteria of 10-in-one-million. Based on results of the risk assessment, the operation of the Project poses an insignificant incremental cancer and non-cancer health risk.

5.10.1 LORS Compliance

The Federal, State, and local public health laws, ordinances, regulations, and standards (LORS) that are applicable to the Project are summarized in Table 5.10-1 and briefly discussed below. The RSSP will comply with all applicable public health LORS.

Table 5.10-1 Federal, State, and Local LORS Applicable to Public Health

LORS	Applicability	Where Discussed in AFC
Federal		
None Applicable	Not Applicable	Section 5.10.1.1
State		
Health and Safety Code (HSC) Section 41700	Prohibits odors and emissions from causing injury, detriment, nuisance, or annoyance to any considerable number of people.	Section 5.10.1.2
Air Toxics “Hot Spots” Information and Assessment Act – Assembly Bill (AB) 2588: HSC Sections 44360 to 44366	Regulates public exposure to TACs from existing and new sources. Requires the preparation of a HRA for facilities that are determined to be high risk by the local administering agency.	Sections 5.10.1 and 5.10.3
Safe Drinking Water and Toxic Enforcement Act of 1986 – Proposition 65: HSC Section 25249.5 et seq.	Requires notification to public exposure to chemicals known to cause cancer or reproductive toxicity.	Section 5.10.1.2
Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition (CI) Engines: Title 17 California Code of Regulations (CCR), Section 93115 et seq.	Establishes emission limits, operating limits, fuel use restrictions, monitoring and recordkeeping requirements for stationary compression ignition engines.	Section 5.10.1.2
Local (KCAPCD)		
KCAPCD Rule 419 Nuisance	Prohibits the discharge of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to the public or which endangers the comfort, repose, health or safety of the public or which causes injury or damage to business or property.	Section 5.10.1.3
KCAPCD CEQA Implementation Guidelines	Provides significance thresholds under CEQA for exposure of sensitive receptors to cancer and non-cancer public health risk impacts (Article V, Section E).	Sections 5.10.1.3 and 5.10.3

* The LORS in this table relate only to public health concerns due to the emissions of TACs and other air contaminants. See other sections of this Application for Certification (AFC)for LORS related to other public health topics such as air quality, electric and magnetic fields, hazardous materials, hazardous wastes, etc.

5.10.1.1 Federal LORS

National Emissions Standards for Hazardous Air Pollutants (NESHAPs), Title 40 Code of Federal Regulations (CFR) Parts 61 and 63

EPA regulations related to HAPs will not have applicability to the Project. None of the 40 CFR Part 61 NESHAPs regulations address activities that apply to the Project. In addition, the Project is not a major source of HAP emissions, thus none of the 40 CFR Part 63 Maximum Achievable Control Technology (MACT) standards will apply.

5.10.1.2 State LORS

Health and Safety Code (HSC) Section 39650 et seq.

These sections of the California HSC establish a broad statewide program of public protection against exposure to TACs determined to be carcinogenic, teratogenic, mutagenic, or otherwise toxic or injurious to humans. The sections also include control technology requirements and cumulative impact analysis guidelines. The Project will meet all applicable measures to control and minimize TAC emissions. As shown in the HRA (see Section 5.10.3, Environmental Impacts), the TAC emissions from the project will not have any significant public health impacts.

HSC Section 39666

This section of the HSC delegates the enforceability of California Air Toxics Control Measures (ATCMs) to local air districts. The ATCMs have been adopted to reduce emissions of TACs from non-vehicular sources with the goal to limit the TAC emissions to the maximum extent possible. As discussed below, the Project will not be a major source of HAP emissions. Further, the Project will employ a diesel-fueled firewater pump and an emergency generator, and an ATCM has been adopted to control diesel particulate matter (DPM) emissions from these stationary compression ignition (CI) engines. The firewater pump and emergency diesel engine at the Project will be limited to an annual non-emergency (e.g., testing and maintenance) operating time of 50 hours per year for each unit to minimize DPM emissions.

HSC Section 41700

This section of the HSC prohibits the discharge of air pollutants that cause injury, detriment, nuisance, or annoyance to the public. This requirement is implemented through KCAPCD Rule 419.

HSC Sections 44360-44366 – Air Toxic "Hot Spots" Information and Assessment

HSC Sections 44360-44366 regulate public exposure to TACs from existing sources and require submission of a HRA for facilities that are determined to be high risk by the local administering agency. The Project will file the required TAC emissions information. This filing requirement applies after the start of operations. Assessments provided in this Application for Certification (AFC) Public Health section indicate that the Project will have insignificant impacts from TAC emissions. The administering agency for the Air Toxics "Hot Spots" program for the Project site is the KCAPCD.

HSC Sections 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65)

Under this Act, also known as Proposition 65, facilities that expose persons to listed carcinogenic substances and reproductive toxins are required to notify the public and provide warnings. The Project's TAC emission rates and resulting cancer risks do not exceed significance thresholds that require Proposition 65 warnings (see HRA results).

Title 17 CCR, Section 93115 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. Although this is an ATCM, it contains emission standards for criteria pollutants as well as diesel particulate matter. In addition, it requires the use of ARB diesel fuel (15 parts per million sulfur by weight).

The Project will install new stationary CI engines that will meet the Tier 3 emissions standards for off-road engines and will limit the non-emergency hours of operation to the number of hours necessary to comply with the testing requirements of National Fire Protection Agency (NFPA) 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2002 edition as required by the ATCM (17 CCR Section 93115.6(a)(4)(A)(1)). The facility will limit the hours of operation of the firewater pump engine and emergency generator engine to a maximum of 1 hour per week for each unit, not to exceed 50 hours per year for each unit, as recommended by NFPA 25, and will install totalizing hour meters to substantiate compliance with the use limitation.

The facility will use only ARB diesel fuel in the firewater pump engine and emergency generators and retain purchase records and Material Safety Data Sheets (MSDS) to substantiate compliance with the fuel sulfur requirement.

5.10.1.3 Local LORS

The local LORS are administered by Kern County Air Pollution Control District (KCAPCD).

KCAPCD Rule 210.9 Construction or Reconstruction of Major Stationary Sources of Hazardous Air Pollutants

This rule requires all new and reconstructed major sources of HAPs to utilize Best Available Control Technology for air toxics (T-BACT), which at a minimum should be no less stringent than the Federal new source MACT. The Project will not be a major source of HAP emissions and therefore is not subject to the requirements of this rule. Further, an ATCM will be adopted to control DPM emissions from new stationary CI engines proposed to operate at the Project, and only ARB diesel fuel will be used in the engines. The emergency diesel-fueled firewater pump and emergency generator will be limited to an annual non-emergency (e.g., testing and maintenance) operation of 50 hours per year for each unit to minimize DPM emissions.

KCAPCD Rule 419 Nuisance

HSC Section 41700 (see above) is implemented locally through this rule, which prohibits a source from discharging quantities of air contaminants or other material that may cause injury, detriment, nuisance or annoyance to a considerable number of persons or to the public. The provisions of this rule will be met through air pollution emission controls and operational limits established for the Project.

KCAPCD Rule 423 National Emission Standards for Hazardous Air Pollutants (NESHAPS)

The provisions of 40 CFR Part 61, NESHAPS, and 40 CFR Part 63, MACT standards, are adopted by reference in this rule and apply to the owner or operator of any source that contains an affected facility for which a standard is prescribed under this rule. None of the 40 CFR Part 61 NESHAPS regulations apply to the Project, and the 40 CFR Part 63 MACT standards are inapplicable because the Project will not be a major source of HAP emissions.

KCAPCD CEQA Implementation Guidelines

Under CEQA, the KCAPCD is the responsible agency for its discretionary activities on air quality and related matters within its jurisdiction or impacting on its jurisdiction. The KCAPCD has developed its own guidelines (amended July 1, 1999) for implementation of CEQA for projects within its jurisdiction. The KCAPCD Guidelines state that the health risk public notification thresholds adopted by the District's Board of Directors for evaluating impact from proposed projects will be applied. The District's Board has adopted significance thresholds for public notification that are set at a cancer risk greater than 10-in-one-million and/or a non-cancer Hazard Index (HI) greater than one.

5.10.1.4 Involved Agencies

The primary agency responsible for public health in the vicinity of the Project site is the KCAPCD. Agencies and agency contacts relevant to public health issues analyzed in this section are provided in Table 5.10-2. Agency contacts for air quality and hazardous materials handling are provided in AFC Sections 5.2 and 5.6 respectively.

Table 5.10-2 Agency and Agency Contacts

Agency Contact	Phone/E-mail	Permits/Issue
Glen E. Stephens Kern County APCD 2700 "M" Street, Suite 302 Bakersfield, CA 93301-2370	(661) 862-5250 GlenS@co.kern.ca.us	Implementation of AB 2588, ATCMs, review of HRAs

5.10.1.5 Required Permits and Permit Schedule

No permits are specifically required to address regulatory requirements for public health. Instead, the permits required for air quality (see Section 5.2, Air Quality) will restrict the TAC emissions as well as criteria pollutants. The Project will be required to receive a Determination of Compliance (DOC) issued by the KCAPCD. The analyses prepared for the AFC will serve as the basis for the application for the DOC with minimal additional work. The DOC will include requirements related to the control of TAC emissions from this facility.

5.10.2 Affected Environment

The Project site is located in the Kern County portion of the Mojave Desert on lands administered by the BLM. The proposed 3,920-acre site is located approximately five miles southwest of Ridgecrest, California, southwest of U.S. Highway 395, and north and south of Brown Road. The site is located in the high desert portion of Kern County, which is under the jurisdiction of the KCAPCD.

The area immediately around the site is undeveloped and sparsely populated. The nearest developed area with community services is the City of Ridgecrest. Figure 5.10-1 presents the distribution of the population (population density) within a three-mile radius of the plant site boundary, which is considered inclusive of the area of potential exposure to TAC emissions from Project operations. According to the CEC, “sensitive receptors” are defined as groups of individuals that may be more susceptible to health risks upon TAC exposure. Such groups include infants and children, the elderly, the chronically ill, and any other member of the general population who is more susceptible to the effects of the exposure than the population at large. Sensitive receptors also typically include facilities where these groups are found, such as schools, day care facilities, convalescent homes, and hospitals.

Four sensitive receptors were identified within a three -mile radius of the Project site boundary. The nearest sensitive receptor (Mountain View Christian Academy) is located approximately 1.6 miles northeast of the Project. The other sensitive receptors are: Faller Elementary School (2.8 miles), Sanderson's Residential Care Home (2.8 miles), and Cerro Coso Childhood Development Center (3 miles). The nearest residential receptor is located approximately 3,200 feet west of the northwestern boundary of the northern solar field. For the purposes of the HRA, residential and worker receptors within a three-mile radius of Project site boundary were modeled to determine the maximum individual cancer risk (MICR) and non-cancer hazards. There are a total of 74 residential, 18 worker, and 4 sensitive receptors modeled in the HRA (Figure 5.10-2).

The Kern County Department of Environmental Health Services and the KCAPCD were consulted to determine if any public health studies related to respiratory illness, cancers, or related illnesses have been conducted within a six-mile radius of the Project site. Representatives of these organizations indicated that they were not aware of any such studies in the area. According to the KCAPCD’s 2008 Annual AB2588 Air Toxics Report, there currently are no facilities within the District’s jurisdiction that have TAC emissions that cause an exceedance of significance thresholds adopted by the KCAPCD for cancer and non-cancer health impacts.

5.10.3 Environmental Impacts (Health Risk Assessment)

Potential environmental impacts addressed in the following pages are limited to human exposure to the TAC emissions associated with Project operation. The method used to assess potential human health risks are consistent with those proposed by the OEHHA Air Toxics “Hot Spots” Program Guidance Manual for Preparation of Health Risk Assessments, referred to as the “Guidance Manual” hereafter. The Guidance Manual describes algorithms, exposure methods, and cancer and non-cancer health values needed to perform a HRA under AB2588 and is generally considered the best available reference for conducting a human HRA in California.

A list of TACs emitted by the Project under normal operating conditions that may cause an adverse public health impact is presented in Table 5.10-3. The human health risks associated with these substances are evaluated in the HRA. No appreciable quantity of TACs is expected to be emitted from the solar fields or diesel fuel tank. Since construction impacts are temporary, no significant impacts to public health are expected to occur from construction, and thus this HRA does not quantify risks from construction activities. Air Quality impacts from construction of the Project are discussed in Section 5.2, Air Quality.

5.10.3.1 Risk Definitions and Significance Criteria

Cancer Risk

Cancer risk is the probability or chance of contracting cancer over a human life span, which is assumed to be 70 years for this analysis. Carcinogens are not assumed to have a threshold below which there would be no human health impact. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no-threshold model). In assessing public health impacts, cancer risk is the expected incremental increase in cancer cases based on an equally exposed population of individuals, typically expressed as excess cancer cases per million exposed individuals.

State and local regulations have developed cancer risk levels above which a project is considered to have a potential significant impact on public health. California’s AB 2588 Air Toxic “Hot Spots” Program and California’s Proposition 65, for example, have developed a significance level for incremental cancer risk of 10-in-one-million as the public notification level for TAC emissions from existing sources. The KCAPCD CEQA Guidelines state that health risk public notification thresholds adopted by the District’s Board of Directors for evaluating impacts from proposed projects be used. The adopted significance thresholds for public notification are those recommended by the California Air Pollution Control Officers Association (CAPCOA) and are set at a cancer risk greater than 10-in-one-million (1×10^{-5}).

Non-Cancer Health Hazard

Non-cancer health effects are characterized as either chronic or acute. In determining potential non-cancer health risks from TAC emissions, it is assumed that there is a dose of the chemical of concern below which there would be no impact on human health. The air concentration corresponding to this dose is called the reference exposure level (REL). Non-cancer health risks are measured in terms of a hazard index (HI), which is the calculated exposure of each contaminant divided by its REL. HIs for those pollutants affecting the same target organ are typically summed, with the resulting totals expressed as HIs for each organ system.

Similar to cancer risk, non-cancer impacts also have determined significance thresholds based on the estimated HI for the project. RELs used in the HI calculations were those published in the CAPCOA AB 2588 Risk Assessment Guidelines, as updated by the OEHHA in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*.

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure. Chronic exposure is one which occurs over a period exceeding 12 percent of a 70-year lifetime. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure commences. The lowest no-effect chronic exposure level for a non-cancer TAC is referred to as the chronic REL. Below this threshold, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation.

Acute toxicity is defined as adverse health effects caused by a short-term chemical exposure of less than or equal to 1 hour. For most chemicals, the multi-pathway exposure required to produce acute effects is higher than levels required to cause chronic effects because of the shorter exposure period. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard indices are typically summed to calculate the total acute HI.

State and local regulations have developed chronic and acute risk levels above which a project is considered to have a potential significant impact on public health. For health risk, a chronic or acute HI exceeding one is considered significant.

Table 5.10-3 TACs Potentially Emitted from the Project

Benzene Biphenyl Chloroform Dichlorobenzene Diesel Particulate Matter Formaldehyde Hexane Naphthalene Toluene	Polycyclic aromatic hydrocarbons (PAHs): 7, 12-Dimethylbenz(a)anthracene Acenapthene Acenapthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene [B(a)P] Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Fluoranthene Indeno(1,2,3-cd)pyrene Phenanthrene Pyrene

Diesel Particulate Matter (DPM) Risk

In 1990, the State of California administratively listed under Proposition 65 the particulates formed in the exhaust of diesel-powered equipment as a chemical known to the State to cause cancer. For estimating risks due to such so-called diesel particulate matter (DPM) emissions, the risk assessment methodology used was consistent with that employed by the ARB in the document entitled *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*.

OEHHA has estimated that 130 to 2,400 excess cancer cases would be expected to occur in a population of one million people breathing an average concentration of DPM of one microgram per cubic meter ($\mu g/m^3$) over a 70-year lifetime. These excess cancer cases are beyond what would be expected to occur if there were no DPM in the air. An independent review by the ARB Scientific Review Panel (SRP) derived a best-estimate of the cancer unit risk factor as 300 excess cancer cases per million people breathing 1 $\mu g/m^3$ of DPM over a lifetime.

Significance Thresholds for Health Impacts

California has not established statewide significance thresholds for cancer and non-cancer health risk impacts under CEQA. However, most air districts in California have adopted local significance thresholds for health risks in their policy guidance for project proponents. The KCAPCD CEQA Guidelines (amended July 1, 1999) state that the public notification thresholds adopted by the District's Board of Directors be applied for evaluating health risk impacts from proposed projects. The District's Board has adopted significance thresholds for public notification set at a cancer risk greater than 10-in-one-million (1×10^{-5}) and/or a non-cancer Hazard Index (HI) greater than one.

5.10.3.2 Health Risk Assessment

The HRA contains three quantitative determinations: emission estimation, air dispersion analysis, and health risk characterization. With limited exceptions, source emissions of TAC from the Project were estimated based on EPA emission factors and quantification methods for facility operations. Exposure calculations were performed using air dispersion modeling analysis to predict ground-level air concentrations, by source. Results of the air modeling exposure predictions were then applied to the emission estimates and, along with the respective cancer health risk factors and chronic and acute non-cancer reference exposure levels for each toxic substance, a health risk characterization was performed that quantified individual health risks associated with predicted levels of exposure.

The Project HRA was performed using the Hotspots Analysis and Reporting Program (HARP) software package (Version 1.4a) developed by the ARB for conducting health risk assessments in California under the Air Toxics "Hot Spots" Program. Dispersion modeling was performed using the EPA guideline model AERMOD (version 07026). The Project HRA is a multi-pathway risk analysis. Air contaminant inhalation and plant ingestion are the dominant pathways for public exposure to chemical substances released by the Project. The multi-pathway assessment also includes an evaluation of soil ingestion, dermal absorption, and mother's milk ingestion.

Health Risk Factors

Chemical substances were evaluated in this analysis using health values that have been approved by OEHHA and ARB for use in facility HRAs conducted for the AB 2588 Air Toxics "Hot Spots" Program. The chemical substances of concern that are addressed in this HRA are listed in Table 5.10-4, along with their respective published OEHHA health effect values. The table lists the OEHHA-adopted inhalation and oral cancer slope factors, non-cancer acute RELs, and inhalation and oral non-cancer chronic RELs. The cancer potency factors and RELs used are consistent with the current values as determined by OEHHA.

Table 5.10-4 OEHHA Risk Assessment Health Values for TACs of Concern

Compound	Inhalation Unit Risk Factor $(\mu g/m^3)^{-1}$	Cancer Risk		Non-cancer Effects	
		Inhalation Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(\mu g/m^3)^{-1}$	Chronic Inhalation REL $(\mu g/m^3)$	Acute Inhalation REL $(\mu g/m^3)$
Benzene	2.90E-05	1.0E-01	--	6.0E+01	1.3E+03
Biphenyl	--	--	--	--	--
Chloroform	5.3E-06	1.9E-02	--	3.0E+02	1.5E+02
Dichlorobenzene	1.1E-05	4.0E-02	--	8.0E+02	--
Diesel Particulate Matter	3.0E-04	1.1E+00	--	5.0 E+00	--
Formaldehyde	6.00E-06	2.1E-02	--	9.0E+00	5.5E+01
Hexane	--	--	--	7.0E+03	--
Naphthalene	3.40E-05	1.2E-01	--	9.0E+00	--
PAHs					
7,12-DimethylBenz(a)anthracene	7.1E-02	2.5E+02	2.5E+02	--	--
Acenapthene	--	--	--	--	--
Acenapthylene	--	--	--	--	--
Anthracene	--	--	--	--	--
Benzo(a)anthracene	1.1E-04	3.9E-01	1.2E+00	--	--
Benzo(a)pyrene [B(a)P]	1.10E-03	3.9E+00	1.2E+01	--	--
Benzo(b)fluoranthene	1.1E-04	3.9E-01	1.2E+00	--	--
Benzo(g,h,i)perylene	--	--	--	--	--
Benzo(k)fluoranthene	1.1E-04	3.9E-01	1.2E+00	--	--
Chrysene	1.1E-05	3.9E-02	1.2E-01	--	--
Dibenz(a,h)anthracene	1.2E-03	4.1E+00	4.1E+00	--	--
Fluoranthene	--	--	--	--	--
Indeno(1,2,3-cd) pyrene	1.1E-04	3.9E-01	1.2E+00	--	--
Phenanthrene	--	--	--	--	--
Pyrene	--	--	--	--	--
Toluene	--	--	--	3.0E+02	3.7E+04
Xylenes	--	--	--	7.0E+02	2.2E+04

Biphenyl and some individual PAH species are recognized TACs but do not have quantified health values. Total PAH emissions were modeled in the HRA using health values for Benzo(a)pyrene per OEHHA guidance.
Source: Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, OEHHA 2009.

Project-Related TAC Emissions

Emission sources of TAC that may be associated with the Project include an auxiliary boiler, an HTF heater, one cooling tower, one diesel-fueled emergency generators, one emergency fire-water pump engine, and an ullage tank vent. No appreciable quantities of TACs are expected to be emitted from operation of the solar field collectors or diesel fuel tanks. Detailed calculations in support of TAC emissions discussed below and are provided in Appendix E.

The Project will not be a major source of Federal hazardous air pollutant (HAP) emissions. The emissions inventory shows total Federal HAP emissions of 0.29 tons per year (tpy). The primary contributor to the total HAP emissions is benzene at 51 percent (0.15 tpy), followed by chloroform at 24 percent (0.069 tpy) and hexane at 22 percent (0.066 tpy). Regulatory major source thresholds are 10 tpy for any single HAP and 25 tpy for total HAP emissions. The Project therefore accounts for 1.5 percent of the major source thresholds for any single HAP, and approximately 1.0 percent of the major source threshold for total HAP emissions. The total HAP emissions from the Project are summarized in Appendix E.

Auxiliary Boiler and HTF Heater. The Project will operate one propane fired auxiliary boiler and HTF heater. The auxiliary boiler will be used to provide sealing steam earlier in the start process and the HTF heater will be used to increase the temperature of the HTF received from the solar field during those periods when the ambient temperature during non-generation periods (i.e., at night) is so low that HTF freezing is possible (an undesirable operating scenario). Emissions for these units were based on operating conditions that represent the maximum emissions profile (being permitted) for the Project. The emissions from each boiler were based on an assumed maximum operation of 5,000 hours per year, with a duty cycle of 10 percent at full load and 90 percent at one quarter load. The emissions from the HTF heaters were based on 500 hours per year of operation for each heater. Table 5.10-5 summarizes TACs potentially emitted from one propane fired auxiliary boiler and HTF heater.

Table 5.10-5 TAC Emissions for One Auxiliary Boiler and One HTF Heater

Toxic Air Contaminant	Emission Factor (lb/MMscf)	Auxiliary Boiler		HTF Heater	
		Max Hourly (lb/hr)	Annual (lb/yr)	Max Hourly (lb/hr)	Annual (lb/yr)
Benzene	2.10E-03	7.21E-05	1.17E-01	7.21E-05	3.60E-02
Dichlorobenzene	1.20E-03	4.12E-05	6.69E-02	4.12E-05	2.06E-02
Formaldehyde	7.50E-02	2.57E-03	4.18E+00	2.57E-03	1.29E+00
Hexane	1.80E+00	6.18E-02	1.00E+02	6.18E-02	3.09E+01
Naphthalene	6.10E-04	2.09E-05	3.40E-02	2.09E-05	1.05E-02
PAHs (Total)	--	2.05E-06	3.32E-03	2.05E-06	1.02E-03
7,12-DimethylBenz(a)anthracene	1.60E-05	5.49E-07	8.92E-04	5.49E-07	2.75E-04
Acenapthene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Acenapthylene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Anthracene	2.40E-06	8.24E-08	1.34E-04	8.24E-08	4.12E-05
Benzo(a)anthracene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Benzo(a)pyrene [B(a)P]	1.20E-06	4.12E-08	6.69E-05	4.12E-08	2.06E-05
Benzo(b)fluoranthene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Benzo(g,h,i)perylene	1.20E-06	4.12E-08	6.69E-05	4.12E-08	2.06E-05
Benzo(k)fluoranthene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Chrysene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Dibenz(a,h)anthracene	1.20E-06	4.12E-08	6.69E-05	4.12E-08	2.06E-05
Fluoranthene	3.00E-06	1.03E-07	1.67E-04	1.03E-07	5.15E-05
Indeno(1,2,3-cd) pyrene	1.80E-06	6.18E-08	1.00E-04	6.18E-08	3.09E-05
Phenanthrene	1.70E-05	5.83E-07	9.48E-04	5.83E-07	2.92E-04
Pyrene	0.0046	1.72E-07	2.79E-04	1.72E-07	8.58E-05
Toluene	3.40E-03	1.17E-04	1.90E-01	1.17E-04	5.83E-02

Total PAH emissions are considered in the HRA. Benzo(a)pyrene was modeled as the surrogate carcinogen for all PAH emissions.

Cooling Tower. The Project will utilize dry cooling; however an auxiliary cooling tower will also be employed to remove residual heat. Water for cooling tower makeup will be supplied from the water provided by IWVWD. The cooling tower will be source for chloroform emissions from the application of sodium hypochlorite as a biocide for cooling tower maintenance. The chloroform emissions were estimated for an annual cooling tower operation of 3,700 hours and a biocide usage of 2,865 gallons per month (see Table 5.10-6).

Table 5.10-6 TAC Emissions from One Cooling Tower

Toxic Air Contaminant	Emission Factor [1] (lb chloroform/lb chlorine)	Maximum Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)
Chloroform	0.0034	0.038	138.8
[1] Rogozen, M. B., et al, 1988			

Emergency Generator and Firewater Pump Engines. Other Project combustion sources include one emergency power generator and one emergency fire-water pump engine. Emissions for these units were based on operating conditions that represent the maximum emissions profile (being permitted) for the Project. The emissions from the emergency generator and the emergency fire-water pump engines were quantified for routine testing and maintenance operation only, and these activities will be limited to no more than 50 hours per year. The Project will operate one diesel-fired emergency generator engine and one diesel-fired firewater pump (300 brake horsepower each). TAC emissions were characterized as aggregate particulate emissions from diesel-fired engines and DPM is assumed to be equal to the PM_{10} emissions (Table 5.10-7).

Table 5.10-7 TAC Emissions from Emergency Internal Combustion Engines

Source	Emission Factor (g/kWh) [1]	Maximum Emissions	
		(lb/hr)	(lb/yr)[2]
Emergency Generator	0.15	9.91E-02	4.96
Fire-water Pump	0.15	9.91E-02	4.96

[1]Emission Factor based on Tier 3 certified engines. g/kWh = grams per kilowatt hour
[2]Annual estimates based on 50 hours of engine operation and do not include emergency operation. lb/yr = pounds per year

HTF Expansion Tank Vent and Waste Loadout. The total uncontrolled emissions from the HTF expansion tank (also known as ullage tank) vent were estimated based on data provided by an existing solar plant (Kramer Junction Solar Energy Generating System Facility), extrapolated to account for HTF system size. Controlled emissions were calculated based on the use of two carbon adsorption canisters in series, with an overall control efficiency of 98 percent. Waste loadout of spent HTF will not generate any appreciable level of TAC emissions because virtually all the organic components will have been removed during the process and vented from the HTF tank through the carbon units. The total TAC emissions from the HTF vent were calculated as 99.99 percent of the total emissions for benzene, and 0.01 percent of the total emissions for biphenyl (Table 5.10-8). Phenol emissions were considered negligible. Biphenyl is a recognized TAC, but has not been assigned risk factors to allow calculation of the health risk impacts and hence was not included in the HRA study.

Table 5.10-8 TAC Emissions from One Ullage Vent

Toxic Air Contaminant	Maximum Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)
Benzene	0.75	299.7
Biphenyl	0.0001	0.03
Benzene is 99.99% of total volatile organic compound (VOC) emissions and Biphenyl is 0.01 % of total VOC emissions.		

Dispersion Modeling Methodology

The methods and requirements used to conduct the air dispersion modeling analysis for estimating concentrations of TAC are presented below.

Air Dispersion Model. The dispersion analysis was performed outside the HARP modeling system using EPA regulatory model AERMOD (version 07026), which estimates both short-term and long-term average ambient concentrations at receptor locations to produce exposure estimates. AERMOD was used in the rural mode with all model option switches set to regulatory-default settings. Modeling was performed using a Universal Transverse Mercator (UTM), zone 11, North American Datum 83 coordinate system. AERMOD accounts for site-specific terrain, meteorological conditions, and emissions parameters such as stack exit velocities and temperatures in order to estimate ambient concentrations. The emissions from the Project sources were modeled in AERMOD using a normalized ("unit") emission rate to later use with the actual emission rates for risk characterization in HARP. HARP On-Ramp (version 1), which allows use of AERMOD modeling files with HARP, was used to develop HARP required files from AERMOD dispersion modeling files to conduct the risk analysis in HARP.

Meteorological Data. Air dispersion analysis was conducted using three consecutive years (2002-2004) of sequential hourly meteorological data. Upon concurrence with the KCAPCD for representativeness of the Project site, the surface data were obtained from the meteorological station at the Mojave Airport. These 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 data were obtained from Mercury Desert Rock Airport in Mercury, Nevada. The surface and upper air data were processed with the AERMOD meteorological processor, AERMET (06341). Meteorological data for the year 2003 was determined through modeling analysis to produce worst-case (highest) annual air toxic concentrations and risks from the proposed Project.

Modeled Source Release Parameters. Sources of TAC emissions from the operation of the auxiliary boiler, cooling tower, fire-water pump, emergency generator, HTF heater, and ullage tank vent were modeled as point sources with release parameters consistent with those used for modeling air quality impact analysis of criteria pollutants (see Section 5.2, Air Quality).

Building Downwash. The latest version of the EPA's Building Profile Input Program (BPIP-PRIME) was run to determine dominant structures for building downwash in AERMOD for the point sources. Direction-specific building heights and widths of the dominant downwash structure(s) were included in the AERMOD model data input file directly from BPIP-PRIME results.

Terrain. Terrain elevations were included in the dispersion modeling analysis to evaluate receptors above stack height and above final plume height for point source releases. Terrain elevations from the United States Geological Service (USGS) National Elevation Dataset (NED) were processed with AERMAP (version 09040) to develop the terrain elevations and corresponding hill height scale required by AERMOD.

Receptors. A network of residential and occupational receptors was also developed to identify the locations of the maximum exposed individual at an existing residential receptor (MEIR), and the maximum exposed individual at an existing occupational worker receptor (MEIW). Four sensitive receptors (i.e., locations where a sensitive population segment such as children, elderly, or the infirmed may be exposed to TACs from the Project) were identified within a three-mile radius of the Project. Figure 5.10-2 shows the residential, worker, and sensitive receptor locations within a three-mile radius of the Project. A list of these receptors is provided in Appendix E.

Health Risk Characterization

The Project HRA evaluated the facility for cancer risk and non-cancer health hazards. The health risk methodology is based on the OEHHA Guidance Manual. Carcinogenic risks and potential non-carcinogenic chronic health effects were calculated using the annual ground level concentrations while the acute non-cancer health hazards were determined using the predicted maximum one-hour ground level concentrations. The latest OEHHA cancer potency factors, and chronic and acute RELs for each TAC were used. The approved health values are incorporated into HARP Version 1.4a. The HARP software performs the necessary risk calculations following the OEHHA risk assessment guidelines and the ARB Interim Risk Management Policy for risk management decisions.

The following HARP modeling options were used for the risk analysis to estimate cancer and non-cancer impacts at the MEIR and the MEIW.

- 70-year Resident Cancer Risk – Derived (Adjusted) Method
- 9-year (Child Resident) Cancer Risk – Derived (OEHHA) Method
- 40-year Worker Cancer Risk – Point Estimate
- Chronic Hazard Index – Derived (OEHHA) Method
- Acute Hazard Index – Simple Acute HI

The Derived (OEHHA) risk analysis method uses the high-end point-estimates of exposure for the two dominant (driving) exposure pathways, while the remaining exposure pathways use average point estimates. The Derived (Adjusted) method is identical to the Derived (OEHHA) method but uses the breathing rate at the 80th percentile of exposure rather than the high-end point-estimate when the inhalation pathway is one of the dominant exposure pathways. The cancer risk estimates using the Derived equations/methods are based on a 70-year exposure (resident receptors). The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway. The off-site worker exposure duration assumed a standard work schedule since the facility will operate full time, per OEHHA guidance. For the cancer and chronic HI impacts at the MEIW, the HARP modeling option "modeled GLC and default exposure assumptions" was used. This includes the highly conservative 40-year exposure duration for the worker receptors along with an OEHHA-defined 95th percentile breathing rate of 393 liters of air per kilogram-day (L/kg-day). Child cancer risk was evaluated for a 9-year exposure scenario. The simple acute HI method is a conservative approach where the maximum concentrations from each emission source are superimposed to impact receptors at the same time, irrespective of wind direction and/ or atmospheric stability, and is a health protective approach to assess acute impacts.

The modeled exposure pathways consisted of all pathways recommended for a health risk assessment. Exposure pathways that were enabled include homegrown produce (using urban default ingestion fractions), dermal absorption, soil ingestion, and mother's milk in addition to the inhalation pathway. Exposure routes for the ingestion of local fish, poultry, or livestock, and drinking water were not considered in this risk analysis because there are no such areas within the Project's area of influence. Long-term risks (i.e., cancer and chronic non-carcinogenic hazard index) and short-term risk (acute hazard index) were calculated at the identified offsite receptors.

Exposure Assumptions. The chief exposure assumption is one of continuous exposure to the TAC concentrations produced by continuous emissions at the maximum emission rates over a 70-year period at each receptor location. The actual risks are not expected to be any higher than the predicted risks and are likely to be substantially lower. The cancer risk for an inhaled TAC is estimated by multiplying the exposure concentration by the breathing rate (L/kg-day) times the inhalation cancer potency factor $(mg/kg\text{-}day)^{-1}$. The averaging time for the cancer risk estimate is usually 70 years, which is used to represent a lifetime exposure.

5.10.3.3 Health Risk Assessment Analytical Uncertainties

Sources of uncertainty in the assessment of risks to public health include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans used to develop unit risk factors (cancer) and RELs (non-cancer). To address this uncertainty, highly conservative assumptions were used in this HRA, as discussed below. In the aggregate, these assumptions overestimate the predicted risks such that actual risks are unlikely to be higher, and could be considerably lower or non-existent.

Air Dispersion Modeling

In general, EPA dispersion models such as AERMOD (used in this HRA) are designed to over-predict concentrations rather than under-predict. For example, the model algorithms assume chemical emissions are not transformed in the atmosphere into other chemical compounds (e.g., photochemical reactions). For certain pollutants, conversion may occur quickly enough to reduce concentrations substantially.

Exposure Assessment

Important uncertainties related to exposure include the identification of exposed populations and their exposure characteristics. The choice of a "residential" MEI is very conservative in the sense that no real person is likely to spend 24 hours a day, 365 days a year over a 70-year period at exactly the point of highest toxicity-weighted annual average air concentration.

Toxicity Assessment

Another area of uncertainty is in the use of toxicity data in risk estimation. Estimates of toxicity for the HRA obtained from OEHHA are conservative compilations of toxicity information. Toxicity estimates are derived either from observations in humans or from projections derived from experiments with laboratory animals. When toxicity estimates are derived from animal data, they usually involve extra safety factors to account for possibly greater sensitivity in humans, and the less-than-human-lifetime observations in animals. Overall, the chemical toxicity factors (e.g., unit risk factors and RELs) used in the Project HRA are biased toward over-estimating risk. The amount of the bias is unknown, but could be substantial.

DPM Unit Risk Factor

The DPM inhalation potency factor is a best-estimate value established by the ARB SRP based on review of more than 30 DPM exposure studies. The established potency risk factor is a 95th percentile upper confidence limit value, meaning that there is only a 5 percent chance that the value is underestimated (too low). The most significant of these studies reviewed by the SRP are occupational studies of exposure to DPM by railroad workers. The occupational results were then extrapolated to the general population, which may include more sensitive individuals than the railroad workers evaluated in the study.

5.10.3.4 Health Risk Assessment Results

As noted above, the HRA provides results for the maximum exposed residential and worker receptors. Four sensitive receptors were also identified within a three-mile radius of the project. The MEIR and MEIW were identified based on locations of residential and occupational receptors within a three-mile radius of the proposed Project site. A summary of cancer risk and non-cancer health impacts values at the MEIR and the MEIW from the operation of the Project is presented in Table 5.10-9. The MEIR was a residential receptor located approximately 375 feet west of the site boundary. Cancer risk at the MEIR was determined to be 0.09-in-one-million. Non-cancer chronic and acute health impacts at the MEIR were determined to be negligible. The MEIW was located approximately 2.9 miles to the east. Cancer risk at the MEIW, based on a worker exposure, was determined to be 0.003-in-one million. Non-cancer chronic and acute health impacts at the MEIW were also determined to be very negligible.

Table 5.10-9 Summary of Maximum Impacts

Receptor Type		Maximum Cancer Risk (per million)	Maximum Acute Hazard Index	Maximum Chronic Hazard Index
MEIR[1]	Adult	0.09	0.0007	0.0001
	Child	0.02	--	--
MEIW[2]		0.003	0.0002	0.00004
Significance Criteria		**10**	**1**	**1**

[1] MEIR: Maximum exposed individual at an existing residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk

[2] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario

The maximum cancer risk among all the receptors evaluated in this HRA occurs at the MEIR. Tables 5.10-10 and 5.10-11 present the source and pollutant contribution to the 70-year cancer risk at this residential receptor. As seen in Table 5.10-10, benzene emissions from ullage vents are the primary contributor to cancer risk impacts, accounting for approximately 81 percent of the total cancer risk at the MEIR. Risk analysis by individual TAC supports this conclusion, showing that approximately 81 percent of the cancer risk at the MEIR is due to benzene emissions, which are primarily emitted from the ullage tank vents (Table 5.10-11). DPM emissions from the IC engines account for approximately 9 percent of the total risk at the MEIR and PAHs from natural gas combustion accounted for another 9 percent. All other cancer risk exposures evaluated show lower risks and have a similar breakdown of contribution by source and TAC. HARP modeling results are presented in Appendix E.

Table 5.10-10 Summary of Cancer Risk at MEIR by Source and Pathway

Emission Source	Inhalation Pathway	Non-Inhalation Pathway					Total	Source Contribution
		Dermal	Soil	Mother's Milk	Home-grown Produce	Oral		
Ullage Tank Vent	7.04E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-08	80.6%
Auxiliary Boiler	1.84E-10	1.31E-09	1.96E-10	0.00E+00	4.79E-09	6.29E-09	6.47E-09	7.4%
Firewater Pump	4.32E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-09	4.9%
Emergency Generator	3.62E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-09	4.1%
HTF Heater	3.49E-11	2.48E-10	3.71E-11	0.00E+00	9.07E-10	1.19E-09	1.23E-09	1.4%
Cooling Tower 1	6.33E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.33E-10	0.7%
Cooling Tower 2	6.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-10	0.7%
Total	**7.98E-08**	**1.56E-09**	**2.33E-10**	**0.00E+00**	**5.697E-09**	**7.48E-09**	**8.73E-08**	**100.0%**

Table 5.10-11 Summary of Cancer Risk at MEIR by TAC and Pathway

Pollutant	Inhalation Pathway	Non-Inhalation Pathway					Total	Chemical Contribution
		Dermal	Soil	Mother's Milk	Home-grown Produce	Oral		
Benzene	7.04E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-08	80.64%
Diesel	7.94E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.94E-09	9.09%
Total PAHs	1.43E-10	1.55E-09	2.33E-10	0.00E+00	5.69E-09	7.48E-09	7.63E-09	8.74%
Chloroform	1.26E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-09	1.45%
Formaldehyde	6.27E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-11	0.07%
Naphthalene	2.92E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-12	0.00%
Dichlorobenzene	1.91E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-12	0.00%
Biphenyl	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%

Cancer risks potentially associated with facility emissions were also assessed in terms of cancer burden. Cancer burden is a hypothetical upper-bound estimate of the additional number of cancer cases that could be associated with emissions from the facility. Cancer burden is calculated as the worst-case product of any potential carcinogenic risk greater than one-in-one-million and the number of individuals at that risk level. Because the maximum individual cancer risk is less than one-in-one million, the potential cancer burden is zero.

In conclusion, estimated cancer risks at all receptors in the health risk analysis were very low, with a worst-case cancer risk of 0.09-in-one-million at the MEIR. All estimated health impacts were below the KCAPCD significance criteria of 10-in-one-million for cancer risk and HI of one for non-cancer chronic and acute health impacts. Based on results of the risk assessment, the operation of the Project poses insignificant incremental cancer risk and non-cancer health risk impacts, according to established regulatory guidelines.

5.10.3.5 Non Chemical Substances of Potential Concern

Along with the TAC emissions, water systems such as cooling towers can also be sources of bacteria growth, including *Legionella*. *Legionella* is the bacterium that can cause Legionellosis, otherwise known as Legionnaires' disease. Outbreaks of Legionellosis have been linked to untreated or inadequately treated cooling water systems in the United States, including in Texas and Wisconsin. The EPA has investigated and published about the presence of *Legionella* in cooling water systems and its possible transmission in air. In most cases the EPA has determined that disease outbreaks from *Legionella* have involved indoor exposure or outdoor exposure within 200 meters of the source. The most prevalent transmission was found to be through the heating, ventilation, and air conditioning (HVAC) systems in older buildings but it is possible for growth to occur in industrial cooling towers. The EPA has not developed a dose-response threshold due to inadequate quantitative data on the infectivity of *Legionella* in humans. However it is known that normally functioning immune systems would have antibodies to *Legionella* and would be able to defend against infection. Individuals susceptible to *Legionella* typically have a compromised immunization system, including some of the elderly.

The Cooling Technology Institute (CTI), an industry consortium, has issued guidelines for best practices to control *Legionella*. To minimize risks from *Legionella*, the CTI recommends eliminating to the maximum extent possible water stagnation and nutrient sources that lead into the cooling system, and to maintain the overall system cleanliness which includes the application of corrosion inhibitors, microbiological disinfectants, and the use of high efficiency mist eliminators. Good preventative maintenance is very important in the efficient operation of cooling towers and other evaporative equipment. Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. The following management strategies are directed at minimizing colonization/amplification within the cooling tower system:

- Avoid piping that is capped and has no flow (dead legs).
- Control input water temperature to avoid temperature ranges where *Legionella* grow. Keep cold water below 25° C (77° F) and hot water above 55° C (131° F).
- Apply biocides in accordance with label dosages to control growth of other bacteria, algae, and protozoa that may contribute to nutritional needs of *Legionella*. Rotating biocides and using different control methods is recommended. These include thermal shock, oxidizing biocides, chlorine-based oxidants, and ozone treatment.
- Conduct routine periodic "back-flushes" to remove bio-film buildup on the inside walls of the pipes.

Regulatory agencies have addressed the question of controlling bacteria levels in water systems. The EPA also published a *Legionella* Drinking Water Health Advisory, which suggests control measures for disinfecting water in cooling systems, including thermal, hyperchlorination, copper-silver ionization, ultraviolet light sterilization, ozonation, and instantaneous steam heating systems.

The California Department of Health Services regulates microbial growth and reduction of the potential for *Legionella* in the Title 22 California Code of Regulations Section 60306. The section states, in part, that whenever a cooling system, using recycled water in conjunction with an air conditioning facility, utilizes a cooling tower or otherwise creates a mist that could come into contact with employees or members of the public, the cooling system will operate a drift eliminator whenever the cooling system is in operation and that chlorine or another biocide will be used to treat the cooling system recirculating water to minimize the growth of *Legionella* and other microorganisms. The Project currently does not propose to use reclaimed water and thus is not a Title 22-applicable facility. However, the Section provides guidance on the operation and maintenance of cooling water systems that may be used in the development of a cooling water management plan.

Cooling tower maintenance will help to prevent and reduce the chances of any growth or emissions of biological nature (e.g., mold and bacteria). To control bacteria levels in cooling water, the Project will ensure that the potential for bacterial growth is kept to a minimum by establishing and implementing a cooling tower biocide use, biofilm prevention, and a monitoring program. The details of a cooling tower management plan are discussed in Section 5.10.4, Mitigation Measures.

5.10.3.6 Cumulative Impacts

Cumulative public health impacts are typically evaluated within a six-mile radius of a project site. The cumulative project list for the proposed Project includes a proposed Super Wal-Mart store and wind monitoring projects on BLM lands with a six-mile radius of the Project. As shown by the HRA results, Project public health impacts are negligible and occur close to the facility. The RSPP's contribution to any potential significant cumulative impacts would be less than considerable. Further, the significance thresholds developed for TACs are sufficiently stringent to preclude the potential for significant cumulative impacts.

5.10.4 Mitigation Measures

Emissions of criteria pollutants will be minimized by applying BACT to the emission sources, which will include the use of propane as fuel in the auxiliary boiler and HTF heater, and low-sulfur diesel fuel in the firewater pump and emergency generator engines. These measures also effectively minimize TAC emissions. Power generation with solar energy will also result in lower health risks per unit of energy generated when compared to conventional fossil-fueled power projects. As demonstrated in the HRA presented in this section, no significant public health impact is expected from the operation of the Project. Therefore, no TAC emission mitigation beyond that proposed for air quality is needed to protect public health.

To control bacteria levels in cooling water, the Project operators will accept a condition of certification to ensure that the potential for bacterial growth is kept to a minimum by establishing and implementing a cooling tower program covering Biocide Use, Biofilm Prevention, and *Legionella* Monitoring.

To minimize cooling tower drift from the auxiliary cooling tower, the Project will install a high efficiency drift eliminator and implement a drift eliminator inspection and maintenance program. Drift eliminators on the cooling tower will control misting and significantly reduce non-criteria emissions from the cooling tower by minimizing cooling tower drift, mist, water aerosolization, and emission of contaminants that may be present in the cooling tower make-up water that may become entrained in liquid water droplets. The drift eliminators must be properly installed and maintained in order to achieve efficient operation over the life of the facility. Following installation, proper maintenance includes periodic inspection and repair or replacement of any components found to be broken or missing.

Although impacts are expected to be less than significant, the measure listed below will be implemented to further mitigate any potential adverse impacts to public health from the cooling tower recirculation water.

PH-1 The Project owner shall develop and implement a Cooling Water Management Plan that is consistent with either the CEC Staff's Cooling Water Management Program Guidelines or the Cooling Technology Institute's Best Practices for Control of *Legionella* guidelines.

5.10.5 References

California Air Pollution Control Officers Association (CAPCOA). 1993. Air Toxics *"Hot* Spots" Program: *Revised 1992 Risk Assessment Guidelines.*

California Air Resources Board (ARB). 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.

California ARB. 2004. Roseville Rail Yard Study. October.

California Energy Commission (CEC). 2007. Rules of Practice and Procedure & Power Plant Site Certification Regulations (CEC-140-2006-002). April.

CEC. 2004. California Energy Commission Staff Cooling Water Management Program Guidelines for Wet and Hybrid Cooling Towers at Power Plants, (CEC-700-2005-025). May.

Canas, Joe. 2009. Hazmat Program Supervisor, County of Kern, Department of Environmental Health. Telephone conversation with Charanya Varadarajan (AECOM). May 20.

Cooling Technology Institute (CTI). 2000. Legionellosis: Guideline: Best Practices for Control of *Legionella*. February.

Office of Environmental Health Hazard Assessment (OEHHA). 2009. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. February.

OEHHA. 2005. Technical Support Document for Describing Available Cancer Potency Factors, Appendix A: Hot Spots Unit Risk and Cancer Potency Values. May.

OEHHA. 2003. Air Toxics Hotspots Program Guidance Manual for Preparation of Health Risk Assessments. August.

OEHHA. 2000. Fact Sheet on Health Effects of Diesel Exhaust. August.

Rogozen, M, B., Harvey E. Ritch, Michael A. Guttman, Daniel Grosjean and Edwin L. Williams II. 1988. Sources and Concentrations of Chloroform, Emissions in the South Coast Air Basin, Final Report, prepared by Science Applications International Corporation, Manhattan Beach, CA, for the California Air Resources Board, Sacramento, CA, April 8. Accessed February 23, 2008, at http://www.arb.ca.gov/research/apr/past/statnry.htm#Toxic%20Air%20Contaminants.

Kern County Air Pollution Control District (KCAPCD). 2009. Rules & Regulations, as of May 2009.

KCAPCD. 1999. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) of 1970, as Amended. Adopted by the KCAPCD Board of Directors July 1996. Amended July 1, 1999.

Mojave Airport. 2009. Meteorological Data, 2002-2004.

Mercury Desert Rock Airport. Meteorological Data. 2002-2004.

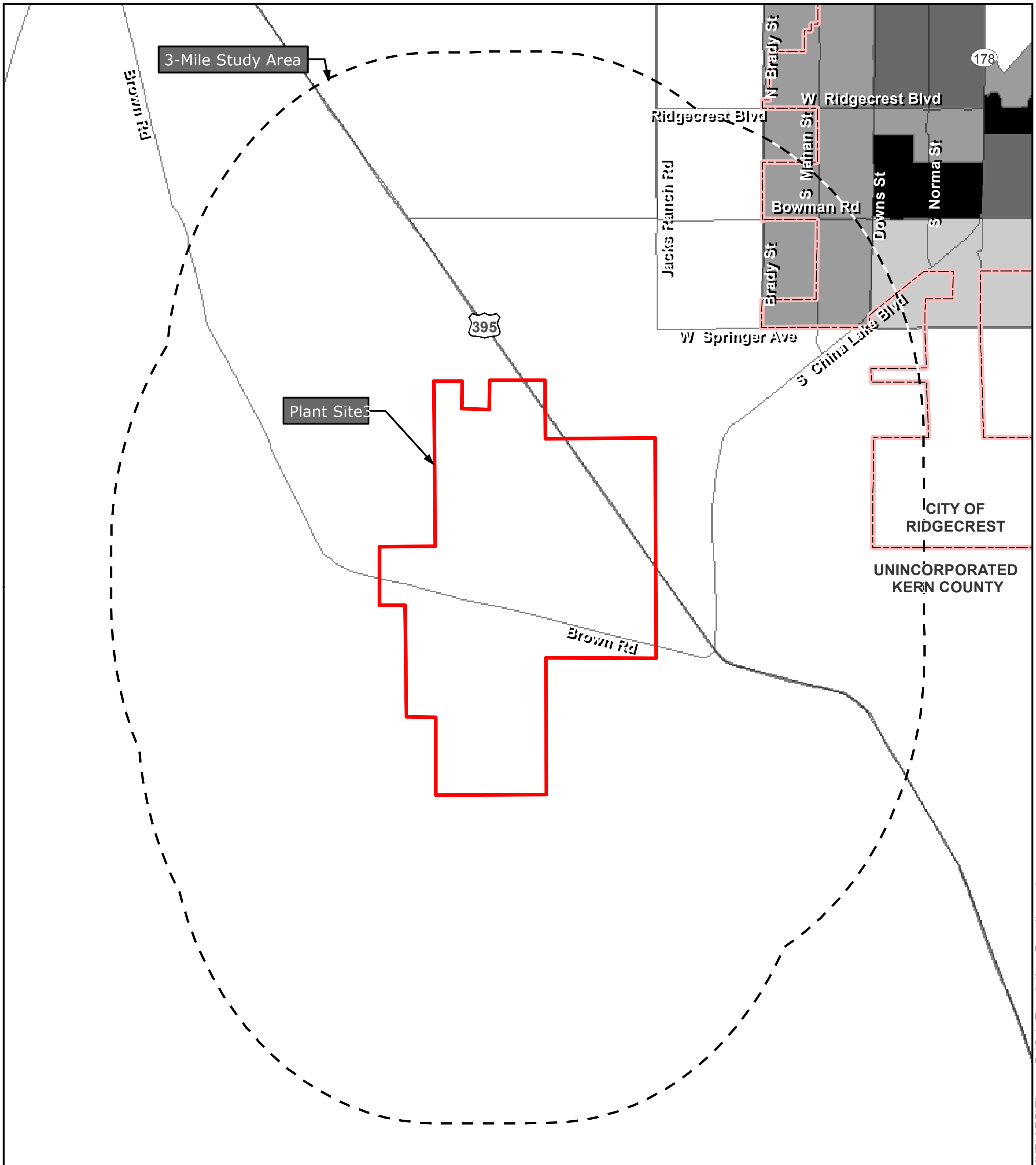
Stephens, G. 2009. Air Quality Engineer, KCAPCD. Telephone conversation with Charanya Varadarajan (AECOM). May 20.

Stephens, G. and D. L. Jones. 2009. 2008 Annual AB2588 Air Toxics Report. March 12.

U.S. Environmental Protection Agency (EPA). 2001. *Legionella*: Drinking Water Health Advisory, EPA-822-B-01-005. March.

U.S. EPA. 2002. Health Assessment Document for Diesel Engine Exhaust (600/8-90/057F). May.

U.S. EPA. 2005. Guidelines for Carcinogenic Risk Assessment, Office of Health and Environmental Assessment. EPA/600/P-92/003C.



Map Location

Legend

- Plant Site
- 3 Mile Study Area
- City Limits

Population Density

- 0 - 120
- 120 - 1200
- 1200.- 2400
- 2400 - 3600
- 3600 - 6000

State of CA - 214

1 inch = 1.25 miles

0 1.25 2.5 Miles

Ridgecrest Solar Power Project

Figure 5.10-1 Population Density Within 3 Miles of the Plant Site

Solar Millennium

AECOM

Date: September 2009

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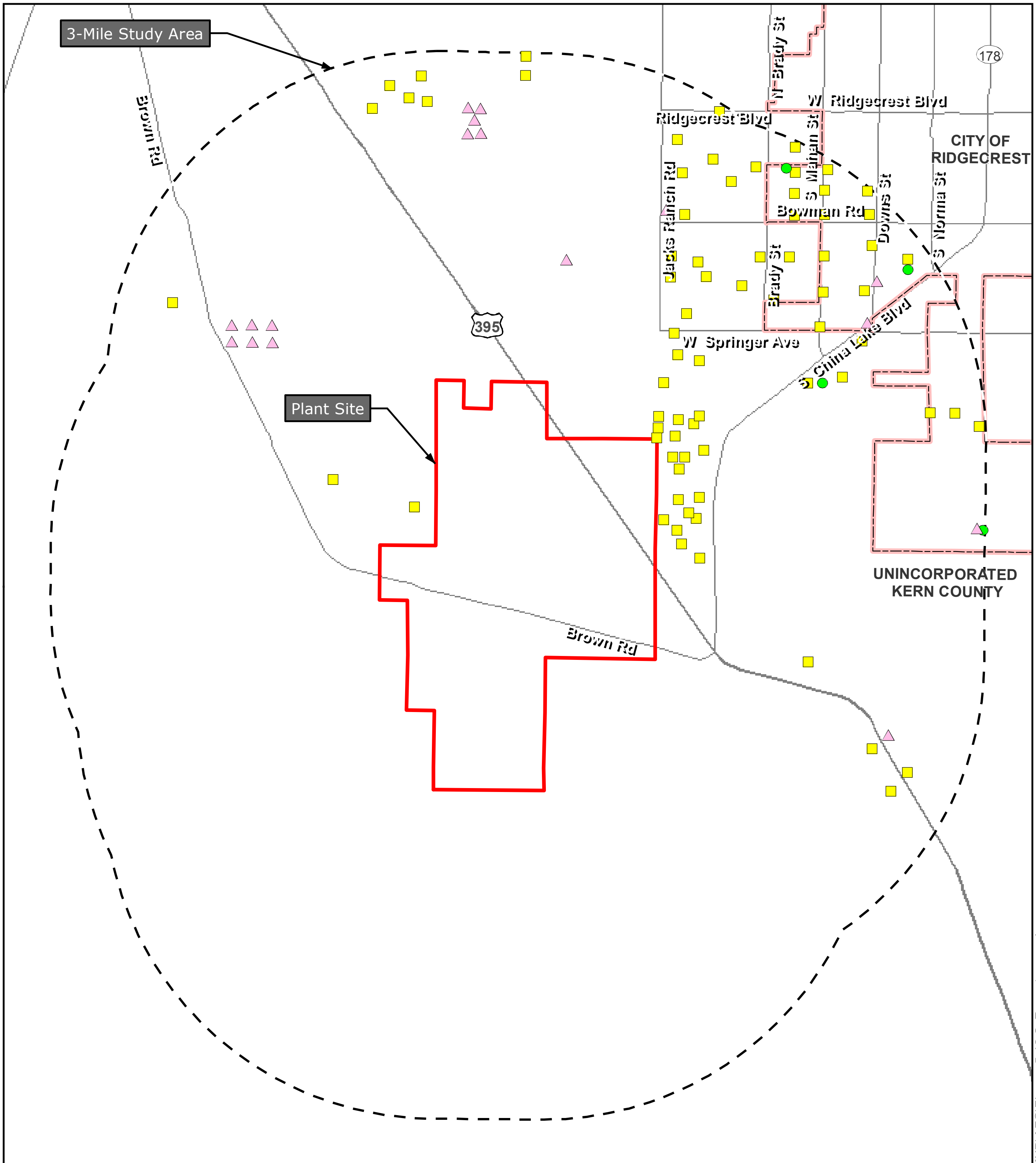

Map Location

Legend

- Residential
- Sensitive
- Worker
- Plant Site
- 3 Mile Study Area
- City Limits

1 inch = 1.25 miles

0 — 1.25 — 2.5 Miles

Ridgecrest Solar Power Project

Figure 5.10-2
Residential, Worker and Sensitive Receptors Within 3 Miles of the Plant Site

Solar Millennium

AECOM

Date: September 2009

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