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5.15 Public Health

This section presents the methodology and results of a human health risk assessment (HRA) performed to assess potential impacts and public exposure associated with airborne emissions from the routine operation of the Mojave Solar Project ("MSP or Project"). Mojave Solar LLC (the "Applicant") is proposing to construct and operate a nominal 250 megawatt (MW) solar power generation facility located in San Bernardino County, California, as follows.

The site is largely fallow agricultural land specifically sited and configured to minimize biological impacts. This land was originally sited as SEGS XII and XIII and is located next to the existing SEGS VIII and IX facilities.

The Project would use well-established parabolic trough solar thermal technology to produce electrical power, which uses a steam turbine generator (STG) fed from a solar steam generator (SSG). SSGs receive heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. Station processes are as follows:

- Installation of nominal 250 MW solar power generation equipment, consisting of two (2) 125 MW solar fields and centralized power blocks.
- Installation of two (2) auxiliary boilers, one per power block, each rated at ~21.5 MMBtu/hr, fired on natural gas.
- Installation of two (2) emergency fire pump systems, one per power block, each consisting of a 346 horsepower (hp) diesel-fired engine coupled to a pump assembly capable of delivering sufficient water for fire suppression purposes.
- Installation of two (2) emergency generator systems, one per power block, each consisting of a 4160 hp (2500 kW) diesel fired engine coupled to an electrical generation assembly for emergency power purposes.
- Installation of two (2) wet-cooling towers, one per power block, each to provide cooling and heat rejection from a single power block process.
- Installation of all required auxiliary support systems.

Air will be the dominant pathway for public exposure to chemical substances released by the Project. Emissions to the air will consist primarily of combustion by-products produced by the diesel-fired emergency fire pump engine. Potential health risks from combustion emissions will occur almost entirely by direct inhalation. To be conservative, additional pathways were included in the health risk modeling, i.e., soil ingestion, dermal exposure, mother's milk exposure, however, direct inhalation is considered the most likely exposure pathway. The HRA was conducted in accordance with guidance established by the

California Office of Environmental Health Hazard Assessment (OEHHA) and the California Air Resources Board (CARB).

Combustion byproducts with established California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS), including nitrogen oxides (NO_x), carbon monoxide (CO), and fine particulate matter (PM_{10}/$PM_{2.5}$) are addressed in Section 5.2, Air Quality. However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks associated with the potential accidental release of stored acutely hazardous materials are discussed in Section 5.6, Hazardous Materials Handling.

5.15.1 Affected Environment

The proposed Project site is located in western San Bernardino County, east of the Kern County line, approximately 18 miles west-northwest of Barstow, California. The site is a mix of open desert and agricultural land, located in the western desert region of the county. The Four Corners area (intersection of Hwy 58 and Hwy 395) lies approximately 11 miles south-southwest of the project site. The site is flat, gently rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level (amsl). Terrain heights in excess of the site elevation are encountered within one mile to the south and west, and within two to three miles to the north and east. The site lies adjacent to and on the southwest side of the Harper Lake depression which has a mean elevation of approximately 2,017 feet amsl.

The site is situated in census tract 0116.00. Figure K-4-1 (Appendix C.4) shows the site and surrounding census tracts. The Census Findings table (Appendix C.4) presents a summary of data for each identified census tract adjacent to the site.

According to the Auer land use classification scheme, a three-kilometer radius boundary around the proposed site yields a predominantly rural classification. This is consistent with the current land use and zoning designation for the site.

Sensitive receptors are defined as groups of individuals that may be more susceptible to health risks due to chemical exposure. Schools, both public and private, day care facilities, convalescent homes, and hospitals are of particular concern. The nearest sensitive receptors within the anticipated impact radius of the Project site are listed in Table 5.10-1. Appendix C.4 delineates data on the population by census tract.

Table 5.10-1. Sensitive Receptors in the Project Region

Receptor ID	Receptor Type	UTM Coordinates (E/N), m
Sen1	Potential Worker	468476, 3876642
Sen2	Potential Residence	470898, 3874312
Sen3	Potential Residence	469851, 3874709

Sen4	Potential Residence	468814, 3875875
Sen5	Potential Residence	470485, 3874014
Sen6	Potential Residence	469756, 3874097
Sen7	Potential Residence	469950, 3873864
Sen8	Potential Residence	469880, 3872450
Sen9	Potential Residence	469820, 3872176
Sen10	Potential Residence	471749, 3874320

All coordinates from Google Earth (center location of each receptor location), converted to NAD27.

Anticipated impact area is ~2 mile radius from site center.

Air quality and health risk data presented by CARB in the 2008 Almanac of Emissions and Air Quality for the State shows that over the period from 1990 through 2008, the average concentrations for the top ten toxic air contaminants (TACs) have been substantially reduced, and the associated health risks for the state are showing a steady downward trend as well. This same trend is expected to have occurred in the Mojave Desert Air Quality Management District (MDAQMD) as well as the Mojave Desert Air Basin (MDAB). CARB-estimated emissions inventory values for the top ten TACs for 2008 are presented in Table 5.10-2 for the air basin and the State. The Applicant is not aware of any public health studies related to respiratory illnesses, cancers or related diseases concerning the local area within a six-mile radius of the proposed Project site.

Table 5.10-2. Top Ten Toxic Air Contaminants

TAC	Statewide Year 2008 Emissions (tons/yr)	MDAB Year 2008 Emissions (tons/yr)	Predicted Cancer Risk, per 10^6
Acetaldehyde	9103	349	ND
Benzene	10794	397	ND
1,3 Butadiene	3754	111	ND
Carbon tetrachloride	4.04	0.07	ND
Chromium 6	0.61	0.02	ND

Para-Dichlorobenzene	1508	-	ND
Formaldehyde	20951	799	ND
Methylene Chloride	6436	-	ND
Perchloroethylene	4982	-	ND
Diesel PM	35884	1450	ND

ND = no data

5.15.2 Environmental Consequences

5.15.2.1 Significance Criteria

5.15.2.1.1 Cancer Risk

Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 70 years). 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). Under various state and local regulations, an incremental cancer risk greater than 10 in a million due to a project is considered to be a significant impact on public health. For example, the 10 in a million risk level is used by the Air Toxics Hot Spots (California Health and Safe Code [CHSC] 44300 et seq.) program and California's Proposition 65 as the public notification level for air toxic emissions from existing sources.

5.15.2.1.2 Non-Cancer Risk

Non-cancer health effects can be classified as either chronic or acute. In determining the potential health risks of non-cancerous air toxics, it is assumed 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 quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is considered to be an insignificant health risk. For this HRA, all hazard quotients were summed regardless of target organ. This method leads to a conservative, upper-bound assessment. RELs used in the hazard index calculations were those published in the CARB/OEHHA listings dated 2/2009 (see Appendix C.4).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, caused by chemicals accumulating in the body for greater than 12 percent of a lifetime of seventy years. 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-carcinogenic air toxic is the chronic REL. Below this threshold, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation. The chronic hazard index was calculated using the hazard quotients calculated with annual concentrations.

Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of less than or equal to one hour. For most chemicals, the air concentration required to produce acute effects is higher than the level required to produce chronic effects because the exposure duration is shorter. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard quotients are typically summed to calculate the acute hazard index. One-hour average concentrations are divided by acute RELs to obtain a hazard index for health effects caused by relatively high, short-term exposure to air toxics.

5.15.2.2 Construction Phase Impacts

The construction phase of the Project is expected to take approximately 26 months. No significant public health effects are expected during the construction phase. Strict construction practices that incorporate safety and compliance with applicable LORS will be followed (see Section 5.18, Workers Safety). In addition, mitigation measures to reduce air emissions from construction impacts will be implemented as described in Section 5.2, Air Quality.

Temporary emissions from construction-related activities are discussed in Section 5.2. Ambient air modeling for particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), CO, sulfur dioxide (SO_2), and NO_x was performed as described in Section 5.2. Construction-related emissions are temporary and localized, resulting in no long-term impacts to the public.

Small quantities of hazardous waste may be generated during the construction phase of the Project. Hazardous waste management plans will be in place so the potential for public exposure is minimal. Refer to Section 5.16, Waste Management, for more information. No acutely hazardous materials (AHMs) will be used or stored on-site during construction (see Section 5.6, Hazardous Materials Handling). To ensure worker safety during construction, safe work practices will be followed (see Section 5.18, Worker Safety).

5.15.2.3 Operational Phase Impacts

Environmental consequences potentially associated with the operation of the Project are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in a HRA. The chemical substances potentially emitted to the air from the proposed Project boilers, diesel engines, cooling towers, and HTF fugitives are listed in Table 5.10-3.

Table 5.10-3. Chemical Substances Potentially Emitted to the Air From the Project

Criteria Pollutants
Particulate Matter
Carbon Monoxide
Sulfur Oxides
Nitrogen Oxides
Volatile Organic Compounds
Lead
Noncriteria Pollutants (Toxic Pollutants)
Diesel Particulate Matter
Acetaldehyde
Acrolein
Benzene
1-3 Butadiene
Ethylbenzene
Formaldehyde
Hexane
Naphthalene
PAHs
Propylene
Propylene Oxide
Toluene
Xylene
Arsenic
Cadmium
Chromium
Copper
Nickel
Manganese
Selenium
Mercury
Zinc
Biphenyl

Emissions of criteria pollutants will adhere to NAAQS and CAAQS as discussed in Section 5.2, Air Quality. The proposed Project also will include emission control technologies necessary to meet the required emission standards specified for criteria pollutants under Mojave Desert Air Quality Management District (MDAQMD) rules. Offsets will not be required because the proposed Project will not be major source. Finally, air dispersion modeling results (presented in Section 5.2, Air Quality) show that emissions will not result in concentrations of criteria pollutants in air that exceed ambient air quality

standards (either NAAQS or CAAQS). These standards are intended to protect the general public with a wide margin of safety. Therefore, the Project is not anticipated to have a significant impact on public health from emissions of criteria pollutants.

Potential impacts associated with emissions of toxic pollutants to the air from the proposed Project were addressed in a HRA, presented in Appendix C.4. The HRA was prepared using guidelines developed by OEHHA and CARB, as implemented in the latest version of the Hotspots Analysis and Reporting Program (HARP) model (Version 1.4a).

5.15.2.4 Public Health Impact Study Methods

Emissions of toxic pollutants potentially associated with the Project were estimated using emission factors approved by CARB and the U.S. Environmental Protection Agency (USEPA). Concentrations of these pollutants in air potentially associated with Project emissions were estimated using the HARP dispersion modeling module. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in a HRA, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels for non-cancer health effects (for non-carcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the maximum impact receptor (MIR). The hypothetical MEI is an individual assumed to be located at the MIR location, which is a residential receptor where the highest concentrations of air pollutants associated with Project emissions are predicted to occur, based on the air dispersion modeling. Human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely that there would be significant impacts in any location in the vicinity of the Project. The highest concentration location represents the MIR.

Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a 70-year lifetime. In other words, it represents the increased cancer risk associated with continuous exposure to a concentration in air over a 70-year lifetime. Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in air was performed by comparing modeled concentrations in air with the RELs. An REL is a concentration in air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in air were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health*

Values (CARB, 2/2009), and are presented in Appendix C.4. Emissions of toxic and/or hazardous pollutants for the various processes are presented in Appendix C.1.

5.15.2.5 Characterization of Risks from Toxic Air Pollutants

The excess lifetime cancer risk associated with concentrations in air estimated for the Project MIR location is estimated to be 2.59 x 10^{-7}. Excess lifetime cancer risks less than 10 x 10^{-6} (with T-BACT) are unlikely to represent significant public health impacts that require additional controls of facility emissions. Risks higher than 1 x 10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Health effects risk thresholds are listed in Table 5.10-4. Risks associated with pollutants potentially emitted from the Project are presented in Table 5.10-5. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix C.4. As described previously, human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely that there would be significant impacts in any other location in the vicinity of the Project.

Table 5.10-4. Significant Health Effect Threshold Levels for MDAQMD

Risk Category	Risk Threshold
Moderate Risk	>1 x 10^{-6}
Significant Risk	>=100 X 10^{-6} HI >= 10
Significant Health Risk	>=10 x 10^{-6} HI >= 1

Per Rule 1320 MDAQMD

Table 5.10-5. Project HRA Summary

	Boilers, Engines, Cooling Towers, HTF	
Risk Category	MIR Project Values	Applicable Significance Threshold
Cancer Risk	2.59 E-7	See Table 5.10-4.
Chronic Hazard Index	0.00208	
Acute Hazard Index	0.0101	
Cancer Burden	0.0[1]	
MIR Receptor #: 130, and location 469945mE, 3874500mN.		

* No acute REL has been established for diesel PM.

[1] The MIR is located <500 ft. from the site center. There are no populated areas within this radius; therefore the cancer burden is 0.0.

Cancer risks potentially associated with facility emissions also were 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 Project. Cancer burden is calculated as the worst-case product of excess lifetime cancer risk (at the 1×10^{-6} cancer risk level and isopleth distance) and the number of individuals at that risk level. A worst-case estimate of cancer burden was calculated based on the following assumptions.

The 1×10^{-6} isopleth was not reached for the project, i.e., the highest predicted cancer risk was 2.59×10^{-7}. The calculated cancer burden for the Project is therefore 0.

As described previously, human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. Therefore, the risks for all of these individuals would be lower (and in most cases, substantially lower) than 2.59×10^{-7}. The estimated cancer burden was 0.0, indicating that emissions from the Project would not be associated with any increase in cancer cases in the previously defined population. In addition, the cancer burden is less than the Rule 1320 threshold values. As stated previously, the methods used in this calculation considerably overstate the potential cancer burden, further suggesting that Project emissions are unlikely to represent a significant public health impact in terms of cancer risk.

The acute and chronic non-cancer hazard quotients associated with concentrations in air is shown in Table 5.10-5. The acute and chronic non-cancer hazard quotients for all target organs fall below 1.0. As described previously, a hazard quotient less than 1.0 is unlikely to represent significant impact to public health. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix C.4. As described previously, human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely that there would be significant impacts in any other location in the vicinity of the Project.

Detailed risk and hazard values are provided in the HARP output presented in Appendix C.4 (electronic files on CD). No specific health related studies were identified which pertain to the local project area for any identified toxic air pollutant or identified specific population.

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic or acute exposures fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory

animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

An excess lifetime cancer risk of 1×10^{-6} is typically used as a screening threshold of significance for potential exposure to carcinogenic substances in air. The excess cancer risk level of 1×10^{-6}, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration (FDA) to use quantitative HRA for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt, 1985). The associated dose, known as a "virtually safe dose," has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions, found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one in a million), which are called de minimis risks. De minimis risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (four in ten thousand), called "de manifestis" risks, were consistently regulated. "De manifestis" risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis et al, 1987).

The estimated lifetime cancer risks to the maximally exposed individual located at the Project MIR are well below the 10×10^{-6} significance level (with T-BACT), and the aggregated cancer burden associated this risk level is less than 1.0 excess cancer case. These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the Project emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstate the risks from Project emissions. Based on the results of this HRA, there are no significant public health impacts anticipated from emissions of toxic pollutant to the air from the proposed Project.

5.15.2.6 Hazardous Materials

Hazardous materials will be used and stored at the Project site. The hazardous materials stored in significant quantities on-site and descriptions of their uses are presented in Section 5.6, Hazardous Materials Handling. Use of chemicals at the proposed Project will be in accordance with standard practices for storage and management of hazardous materials. Normal use of hazardous materials, therefore, will not pose significant impacts to public health. While mitigation measures will be in place to prevent releases, accidental releases that migrate off-site could result in potential impacts to the public.

The California Accidental Release Program regulations (CalARP) and Code of Federal Regulations (CFR) Title 40 Part 68 under the Clean Air Act (CAA) establish emergency response planning requirements for acutely hazardous materials. These regulations require preparation of a Risk Management Plan (RMP), which is a comprehensive program to identify hazards and predict the areas that may be affected by a release of a program listed hazardous material.

5.15.2.7 Operation Odors

The proposed Project is not expected to emit any substances that could cause odors.

5.15.2.8 Electromagnetic Field Exposure

Because the electric transmission line (required for the project interconnect) does not travel through residential areas, and based on recent findings of the National Institute of Environmental Health Sciences (NIEHS 1999), electromagnetic field (EMF) exposures are not expected to result in a significant impact on public health. The NIEHS report to the U.S. Congress found that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm" (NIEHS, 1999).

5.15.2.9 Legionella

In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the cooling towers, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not, at this time, apply to the Proposed Project since it intends to use well water (not reclaimed water) for cooling purposes.

The EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). The EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. The EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore,

sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk – however small – of disease in humans.

In 2000 the Cooling Tower Institute (CTI) issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested were found to contain Legionella. To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling towers, and the overall general control of microbiological populations. Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). 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 efficacy of any biocide in ensuring that bacteria and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, an appropriate biocide program and anti-biofilm agent monitoring program would be prepared and implemented for this project. These programs would ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. The mitigation measure which is presented in Section 5.10.4.6 would reduce the chances of Legionella growing and dispersing to insignificant (RSA 2008).

5.15.2.10 Summary of Impacts

Results from the air toxics HRA based on emissions modeling indicate that there will be no significant incremental public health risks from construction or operation of the proposed Project. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of NO_2, carbon monoxide, SO_2, and PM_{10} will not significantly impact air quality (see Section 5.2, Air Quality). Potential concentrations are below the federal and California standards established to protect public health, including the more sensitive members of the population.

5.15.3 Cumulative Impacts

The HRA for the proposed Project indicates that the maximum cancer risk will be approximately 2.59×10^{-7}, versus a "moderate" significance threshold of >1 in one million with Toxic Best Available Control Technology (T-BACT) at the point of maximum exposure to air toxics from power plant emissions. This risk level is considered to be insignificant.

Non-cancer chronic and acute effects are also less than significant. A cumulative impact analysis is not proposed at this time due to the following:

- Low project operational emissions levels of air toxic substances.
- Insignificant risk resulting from project operations.
- Lack of an established background or baseline risk value for the project impact area. The toxics monitoring data compiled by CARB is designed to provide air quality data in support of general population exposures. The data do not provide information on localized impacts, often referred to as near-source or neighborhood exposures.
- The CARB toxics air contaminant monitoring network does not include any monitoring sites within the MDAQMD, i.e., the sites currently operating in the recent 3-5 period are confined to the major urban areas. The closest monitoring sites would be those located in the South Coast AQMD or the site located in the Bakersfield area (San Joaquin Valley APCD). These sites would not represent ambient concentrations of toxic substances in remote desert areas such as the project site.
- A search of existing facilities in the project region derived from the CARB Air Toxics website (AB2588 database) showed only three facilities in the project region. Two of the facilities are well outside of the standard 8-mile analysis radius. One facility, Luz SEGS VIII is located to the north of the proposed site (within 1 mile). This facility has a low risk prioritization score indicating that facility risk is either "insignificant" or below the levels which would require a formal risk assessment.

5.15.4 Mitigation Measures

5.15.2.1 Criteria Pollutants

Emissions of criteria pollutants will be minimized by applying Best Available Control Technology (BACT) to the Project. BACT for the boilers, fire pumps, emergency generator engines, HTF system, and cooling towers is delineated in Appendix C.6.

The proposed Project location is in an area that is designated by the federal air agencies as non-attainment for ozone and unclassifiable for particulate matter. Pursuant to MDAQMD New Source Review (NSR) Rule, offsets are not required for the proposed Project. Therefore, further mitigation of emissions is not required to protect public health.

5.15.2.2 Toxic Pollutants

Emissions of toxic pollutants to the air will be minimized through the use of T-BACT at the proposed Project. Emissions from tanks storing liquid organic chemicals will be minimized through the use of one or a combination of the following:

- Use of small-capacity, fixed roof tanks

- Use of low vapor pressure organic substances
- Use of exempt compounds
- Use of vapor balance and/or vapor recovery systems on a case-by-case basis as deemed appropriate

Legionella Mitigation Measure: The proposed Project will develop and implement a Cooling Water Management Plan (CWMP) to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The CWMP will be consistent with the Cooling Technology Institute's "Best Practices for Control of Legionella" guidelines and will include periodic sampling and testing for the presence of Legionella bacteria in the cooling tower water (RSA 2008).

5.15.2.3 Hazardous Materials

Mitigation measures for hazardous materials are presented below and discussed in more detail in Section 5.6, Hazardous Materials Handling. Potential public health impacts from the use of hazardous materials are only expected to occur as a result of an accidental release. The plant has many safety features designed to prevent and minimize impacts from the use and accidental release of hazardous materials. The Project site will include the following design features:

- Curbs, berms, and/or secondary containment structures will be provided where accidental release of chemicals may occur.
- A fire-protection system will be included to detect, alarm, and suppress a fire, in accordance with applicable LORS.
- Construction of all storage systems will be in accordance with applicable construction standards and LORS.

If required, a RMP for the Project will be prepared prior to commencement of Project operations. The RMP will estimate the risk presented by handling affected materials at the Project site. The RMP will include a hazard analysis, off-site consequence analysis, seismic assessment, emergency response plan, and training procedures. The RMP process will accurately identify and propose adequate mitigation measures to reduce the risk to the lowest possible level.

A safety program will be implemented and will include safety training programs for contractors and operations personnel, including instructions on: (1) the proper use of personal protective equipment (PPE), (2) safety operating procedures, (3) fire safety, and (4) emergency response actions. The safety program will also include programs on safely operating and maintaining systems that use hazardous materials. Emergency procedures for Project personnel include power plant evacuation, hazardous material spill cleanup, fire prevention, and emergency response.

Areas subject to potential leaks of hazardous materials will be paved and bermed. Incompatible materials will be stored in separate containment areas. Containment areas will be drained to either a collection sump or to holding or neutralization tanks. Also, piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

5.15.5 Laws, Ordinances, Regulations, and Standards

An overview of the regulatory process for public health issues is presented in this section. The relevant LORS that affect public health and are applicable to the Project are identified in Table 5.10-6. The conformity of the Project to each of the LORS applicable to public health is also presented in this table. Table 5.10-7 summarizes the primary agencies responsible for public health, as well as the general category of the public health concern regulated by each of these agencies.

Table 5.10-6 Laws, Ordinances, Regulations, and Standards for Public Health

LORS	Public Health Concern	Primary Regulatory Agency	Project Conformance
Federal Clean Air Act Title III	Public exposure to air pollutants	USEPA Region 9 CARB MDAQMD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels. Emissions of criteria pollutants will be minimized by applying BACT to the Project. Minor Increases in emissions of criteria pollutants are not required to be offset.
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986— Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed thresholds that require exposure warnings.

LORS	Public Health Concern	Primary Regulatory Agency	Project Conformance
40 CFR Part 68 (Risk Management Plan) and CalARP Program Title 19	Public exposure to acutely hazardous materials	USEPA Region 9 San Bernardino County Department of Health Services San Bernardino County Fire Department	An offsite consequence analysis will be performed to assess potential exposures from RMP regulated substances for spills or ruptures from any affected storage tank or process system. An RMP (if required) will be prepared prior to commencement of Project operations.
Health and Safety Code Sections 25531 to 25541	Public exposure to acutely hazardous materials	San Bernardino County Department of Health Services CARB MDAQMD	An offsite consequence analysis will be performed to assess potential exposures from RMP regulated substances for spills or ruptures from any affected storage tank or process system.
CHSC 25500-25542	Hazmat Inventory	State Office of Emergency Services and San Bernardino County Department of Environmental Health	Prepare all required HazMat plans and inventories, distribute to affected agencies
CHSC 44300 et seq.	Air Toxics Hot Spots Program	MDAQMD	Participate in the inventory and reporting program at the District level.
MDAQMD Rule 1320	Toxics NSR	MDAQMD	Application of BACT and T-BACT, preparation of HRA
CHSC 25249.5	Proposition 65	OEHHA	Comply with all signage and notification requirements.

LORS	Public Health Concern	Primary Regulatory Agency	Project Conformance
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Public exposure to toxic air contaminants	CARB MDAQMD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels.

5.15.6 Permits Required and Schedule

Agency-required permits or submittals related to public health include an RMP and MDAQMD Permit to Construct/Permit to Operate. These requirements are discussed in detail in Sections 5.6 (Hazardous Materials Handling) and 5.2 (Air Quality), respectively.

5.15.7 Agencies Involved and Agency Contacts

Table 5.10-7 provides contact information for agencies involved with Public Health.

Table 5.10-7 Summary of Agency Contacts for Public Health

Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Public exposure to hazardous or toxic air pollutants	EPA Region 9	Gerardo Rios Chief, Permits Section EPA-Region 9 75 Hawthorne St. San Francisco, CA. 94105 (415) 947-3974
	CARB	Mike Tollstrup 1001 1 Street. 19th Floor Sacramento, CA 95814 (916) 322-6026
	MDAQMD	Eldon Easton, APCO 14306 Park Ave. Victorville, CA. 92392 (760) 245-1661
Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Cynthia Oshita or Susan Long P.O. Box 4010 Sacramento, CA 95812-4010 (916) 445-6900

Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Public exposure to acutely hazardous materials	EPA Region 9	Gerardo Rios Chief, Permits Section EPA-Region 9 75 Hawthorne St. San Francisco, CA. 94105 (415) 947-3974
	San Bernardino County Fire Dept. Hazmat Division	Doug Snyder Fire Marshal 620 South E St. San Bernardino, CA. 92415 (909) 386-8401

5.15.8 References

California Air Resources Board (CARB). 2009. Consolidated table of OEHHA/ARB approved risk assessment health values. (http://arbis.arb.ca.gov/toxics/healthval/contable.pdf)

HARP Express User Manual. Dillingham Software Engineering, Inc., Version 2.07, September 2004.

HARP User Guide, Version 1.4a. CalEPA-Air Resources Board, December 2003.

Hutt. P.B. 1985. Use of quantitative risk assessment in regulatory decision making under federal health and safety statutes, in Risk Quantitation and Regulatory Policy. Eds. D.G. Hoel, R.A. Merrill and F.P. Perera. Banbury Report 19, Cold Springs Harbor Laboratory.

National Institute of Environmental Health Sciences (NIEHS). 1999. Environmental Health Institute report concludes evidence is 'weak' that EMFs cause cancer. Press release. National Institute of Environmental Health Sciences, National Institutes of Health.

OEHHA/CARB. 2003. Air Toxics Hot Spots Program Risk Assessment Guidelines, CalEPA, August 2003. HARP Model, Version 1.4a, Updated July/08.

SCAQMD. 2005. Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics Hot Spots Information and Assessment Act (AB2588). July 2005.

Travis, C.C., E.A.C. Crouch, R. Wilson and E.D. Klema. 1987. Cancer risk management: A review of 132 federal regulatory cases. Environ. Sci. Technol. 21:415-420.

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