5.16 PUBLIC HEALTH AND SAFETY

This section describes the health risk assessment (HRA) that was conducted to assess the potential health impacts of the total SJS 1&2 site. This section describes the methodology and results of the HRA. The purpose of the HRA is to evaluate potential public exposure to emissions of toxic air contaminants (TACs) from routine operations of the Project. Exposure to criteria pollutants, NO_2, SO_2, CO, VOC, PM_{10} and $PM_{2.5}$ is examined in Section 5.2, Air Quality. A limited number of hazardous materials will be used on-site during normal operations of the SJS 1&2 site. These are discussed further in Section 5.15, Hazardous Materials Handling. Only aqueous ammonia will be stored on site in sufficient quantity to require a hazardous material offsite consequence analysis, which is also discussed in Section 5.15, Hazardous Materials Handling. The details of the Public Health analysis are contained in the following sections:

- Section 5.16.1, Affected Environment, describes the local environment surrounding the Project site. Sensitive receptors within a 3-mile radius of the Project site are identified on Figure 5.16-1.
- Section 5.16.2, Environmental Consequences, discusses the potential public health consequences of the Project. The HRA approach is described. The Project emissions of TACs are discussed, and the potential impacts of these emissions are evaluated. The results of the HRA for the total SJS 1&2 site are presented in this section.
- Section 5.16.3, Cumulative Impacts, addresses the cumulative impacts of the Project with other nearby sources of TACs.
- Section 5.16.4, Mitigation Measures, discusses mitigation measures to minimize the impacts of the Project emissions of TACs.
- Section 5.16.5, LORS, describes all applicable laws, ordinances, regulations, and standards pertaining to the public health aspects of the Project. It also lists the agency contacts consulted in conducting the HRA, lists the permits required and provides the permit schedule.
- Section 5.16.6, References, lists the references used to conduct the HRA.

5.16.1 Affected Environment

The SJS 1&2 site is located in southwestern Fresno County approximately 6 miles east of the city of Coalinga and approximately 3 miles west of the intersection of I-5 and West Jayne Avenue. The Project location is within the San Joaquin Valley surrounded by the Diablo Range to the west, and Sierra Nevada to the east.

The SJS 1&2 site will encompass approximately 640 fenced acres. The Project site is generally flat and presently zoned for agricultural use. Land use within 10 kilometers of the site is dedicated almost exclusively to the cultivation of agricultural crops and animal grazing, and the site is considered to be rural for purposes of conducting the air quality modeling within the HRA. Recent local developments include the construction of the Pleasant Valley State Prison and the Coalinga State Hospital, both located on the section of land immediately west of the Project site.

For purposes of this analysis, sensitive receptors are defined as the locations occupied by groups of individuals that may be more susceptible to health risks from a chemical exposure. Schools (public and private), day care facilities, convalescent homes, parks, and hospitals are of particular concern. Few residences exist near the Project, with the closest located approximately 1,300 feet (400 meters) northeast of the Project site boundary. Other nearby residences are also included in the sensitive receptor package. Farther residences are covered by the extensive gridded receptor package used in the HRA.

The closest existing sensitive receptor is the Coalinga State Hospital, which is immediately adjacent to the west of the SJS 1&2 site. All sensitive receptors located within a 3-mile radius of the Project site and the nearest residents are shown in Figure 5.16-1.

The Fresno County Division of Environmental Health and the SJVAPCD were consulted to determine whether any health studies related to respiratory illnesses, cancers or related diseases had been conducted within a 6-mile radius of the Project site. An extensive internet search was also conducted. No such health studies were identified within a 6-mile radius of the Project.

5.16.2 Environmental Consequences

This section describes the potential public health risks due to the construction and operation of SJS 1&2 site, and the methodology and results of the HRA that was conducted to provide quantitative estimates of these risks. A potentially significant carcinogenic risk is indicated when the predicted maximum cancer risk due to a new facility is greater than 10 in one million. Non-cancer risk is typically reported as a total hazard index or "THI", which is a ratio calculated for each target organ. Specifically, the maximum predicted acute or chronic exposure due to the Project is expressed as a fraction of the corresponding maximum acceptable exposure level for a pollutant. The acceptable exposure level is generally the level at (or below) which no adverse health effects are expected. Thus, significant non-cancer risk impacts occur when a chronic or acute THI above 1.0 is predicted.

Also, uncertainties in the HRA are discussed and other potential health impacts associated with the SJS 1&2 site are described.

5.16.2.1 Public Health Impact Assessment Approach

The potential human health risks posed by the Projects emissions were assessed using procedures consistent with the OEHHA *Air Toxics Hot Spots Program Risk Assessment Guidelines – The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2003), SJVAPCD *Guidance for Air Dispersion Modeling* (2006) and guidance from SJVAPCD staff (SJVAPCD 2008). The OEHHA and SJVAPCD guidelines were developed to provide risk assessment procedures, as required under the Air Toxics Hot Spots Information and Assessment Act of 1987, Assembly Bill 2588 (Health and Safety Code Sections 44360 *et seq.*). The Hot Spots law established a statewide program for inventorying emissions of TACs from individual facilities, as well as requirements for risk assessment and public notification of potential health risks.

As recommended by SJVAPCD staff and OEHHA Guidelines, the CARB Hotspots Analysis and Reporting Program (HARP) version 1.4a was used to perform an OEHHA Tier 1 HRA for the Project. HARP includes two modules; a dispersion module and a risk module. The HARP dispersion module

incorporates the USEPA ISCST3 air dispersion model, and the HARP risk module implements the latest Risk Assessment Guidelines developed by OEHHA. For consistency with the criteria pollutant modeling, the dispersion modeling was conducted with AERMOD. The HARP File Converter (Release date 5292008), a beta version software package created by CARB, was used to convert AERMOD dispersion results into a format that can be read into the HARP risk module. Thus, HARP with AERMOD was used for this HRA.

The HRA was conducted in four steps using HARP:

- Hazard Identification and Emission Quantification
- Exposure Assessment
- Dose-response Assessment
- Risk Characterization

First, hazard identification was performed to determine the potential health effects that could be associated with the Project emissions. The purpose of this step was to identify whether pollutants emitted from the Project operation have been characterized as potential human carcinogens or associated with other types of adverse health effects. The OEHHA guidelines provide lists of toxic pollutants that are potentially emitted by the various Project emission sources with the associated potential cancer and non-cancer health effects. Table 5.16-1 lists the TACs and the equipment that is expected to emit these TACs during the operation of the Project. This table also identified which of these pollutants are regulated under the federal clean air act as a HAP and which must be included in the HRA analysis.

Second, an exposure assessment was conducted to estimate the extent of potential public exposure to the Project emissions. Public exposure is evaluated in terms of the predicted incremental short- and long-term ground-level concentrations resulting from Project emissions, the pathway(s) of exposure, and the duration of exposure to the emissions. Dispersion modeling was performed using the AERMOD model to estimate the ground-level concentrations near the Project site. The methods used in the dispersion modeling were consistent with the approach described in Section 5.2, Air Quality, and the modeling protocol that was submitted for the Project for review by the CEC and the SJVAPCD (URS 2008).

Table 5.16-1
Toxicity Values Used To Characterize Health Risks for SJS 1&2 Emission Sources

Pollutants	Federal HAP	TAC for HRA	Sources of Emissions	Inhalation Cancer Potency Factor (mg/kg-day)	Chronic REL (µg/m^3)	Acute REL (µg/m^3)
Acetaldehyde	y	y	Biomass combustors, natural gas burners	1.00E-02	9.00E+00	--
Acrolein	y	y	Natural gas burners	--	6.00E-02	1.90E-01
Ammonia	n	y	Biomass combustors	--	2.00E+02	3.20E+03

Table 5.16-1
Toxicity Values Used To Characterize Health Risks for SJS 1&2 Emission Sources
(Continued)

Pollutants	Federal HAP	TAC for HRA	Sources of Emissions	Inhalation Cancer Potency Factor (mg/kg-day)	Chronic REL (µg/m³)	Acute REL (µg/m³)
Arsenic	y	y	Biomass combustors, cooling towers, fly ash fugitives	1.20E+01	3.00E-02	1.90E-01
Benzene	y	y	Biomass combustors, natural gas burners	1.00E-01	6.00E+01	1.30E+03
Beryllium	y	y	Fly ash fugitives	8.40E+00	7.00E-03	--
Cadmium	y	y	Biomass combustors, fly ash fugitives	1.50E+01	2.00E-02	--
Chlorine	y	y	Cooling towers	--	2.00E-01	2.10E+02
Chromium 6+	y	y	Biomass combustors, fly ash fugitives	5.10E+02	2.00E-01	--
Copper	n	y	Biomass combustors, fly ash fugitives	--	--	1.00E+02
Ethylbenzene	y	y	Natural gas burners	8.70E-03	2.00E+03	--
Fluoride	n	y	Cooling towers	--	1.30E+01	2.40E+02
Formaldehyde	y	y	Biomass combustors, natural gas burners	2.10E-02	3.00E+00	9.40E+01
Hexane	n	y	Natural gas burners	--	7.00E+03	--
Hydrogen Chloride	y	y	Biomass combustors	--	9.00E+00	2.10E+03
Lead	y	y	Biomass combustors, fly ash fugitives	4.20E-02	--	--
Manganese	y	y	Biomass combustors, fly ash fugitives	--	2.00E-01	--
Mercury	y	y	Biomass combustors, cooling towers	--	9.00E-02	1.80E+00
Nickel	y	y	Fly ash fugitives	9.10E-01	5.00E-02	6.00E+00
Propylene	n	y	Natural gas burners	--	3.00E+03	--
Selenium	y	y	Fly ash fugitives			
Silica	n	y	Cooling towers			
Sulfate	n	y	Cooling towers	--	2.50E+01	1.20E+02

Table 5.16-1
Toxicity Values Used To Characterize Health Risks for SJS 1&2 Emission Sources
(Continued)

Pollutants	Federal HAP	TAC for HRA	Sources of Emissions	Inhalation Cancer Potency Factor (mg/kg-day)	Chronic REL (µg/m³)	Acute REL (µg/m³)
Toluene	y	y	Biomass combustors, natural gas burners	--	3.00E+02	3.70E+04
Vanadium	n	y	Cooling towers			
Xylenes	y	y	Natural gas burners	--	7.00E+02	2.20E+04
Diesel Particulate (PM_{10})	n	y	Emergency generators, fire pumps, biomass mover, delivery trucks, cleaning vehicles	1.10E+00	5.00E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)						
PAHs other than naphthalene	y	y	Natural gas burners	3.90E-01	--	--
Benz [a] anthracene	n	y	Biomass combustors	3.90E-01	--	--
Benzo [b] fluoranthene	n	y	Biomass combustors	3.90E-01	--	--
Benzo [k] Fluoranthene	n	y	Biomass combustors	3.90E-01	--	--
Chrysene	n	y	Biomass combustors	3.90E-02	--	--
Indeno [1,2,3-cd] pyrene	n	y	Biomass combustors	3.90E-01	--	--
Naphthalene	y	y	Biomass combustors, natural gas burners	1.20E-01	9.00E+00	--
Dioxins						
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	n	y	Biomass combustors	1.30E+04	4.00E-04	--
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	n	y	Biomass combustors	1.30E+03	4.00E-03	--
Furans						
2,3,7,8-TETRACHLORODIBENZO FURAN	n	y	Biomass combustors	1.30E+04	4.00E-04	--
2,3,4,7,8-PENTACHLORODIBENZO FURAN	n	y	Biomass combustors	6.50E+04	8.00E-05	--

Table 5.16-1
Toxicity Values Used To Characterize Health Risks for SJS 1&2 Emission Sources
(Continued)

Pollutants	Federal HAP	TAC for HRA	Sources of Emissions	Inhalation Cancer Potency Factor (mg/kg-day)	Chronic REL (µg/m³)	Acute REL (µg/m³)
1,2,3,7,8-PENTACHLORODIBENZOFURAN	n	y	Biomass combustors	6.50E+03	8.00E-04	--
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	n	y	Biomass combustors	1.30E+04	4.00E-04	--
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	n	y	Biomass combustors	1.30E+04	4.00E-04	--
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	n	y	Biomass combustors	4.00E-03	1.30E+03	--
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	n	y	Biomass combustors	1.30E+04	4.00E-04	--
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	n	y	Biomass combustors	1.30E+04	4.00E-04	--

Notes:
-- = not applicable
mg/kg-day = milligrams per kilogram per day
µg/m³ = micrograms per cubic meter
REL = reference exposure levels
HAP =Hazardous air pollutant as defined in the federal Clean Air Act Section 112

Third, a dose-response assessment was performed in HARP, incorporating the maximum 1-hour and annual ground level concentrations predicted by AERMOD to characterize the relationship between pollutant exposure and the potential incidence of an adverse health effect in the exposed populations. The dose-response relationship is expressed in terms of potency factors for cancer risk and reference exposure levels (RELs) for acute and chronic non-cancer risks. The OEHHA guidelines provide potency factors and RELs for an extensive list of toxic TACs, including those listed in Table 5.16-1. No drinking water reservoirs, fishing rivers or feedlots are near the Project; thus the drinking water, fish and cattle/dairy consumption pathways were not included in this analysis. Per the recommendation of SJVAPCD (SJVAPCD 2008), the local pig, chicken and egg consumption pathway was not enabled. All remaining pathways were included in the HRA. Default rural values for home grown produce, dermal absorption, soil ingestion and mother's milk were used in the HRA For the calculation of cancer risk, the default duration of residential exposure to Project emissions was assumed, which is 24 hours per day, 350 days

per year, for 70 years, at all receptors, except for offsite worker receptors. The cancer risk calculation at the offsite worker locations assumes the default ground level concentration (GLC) adjustment factor of 1, and exposure for 245 days per year, for 40 years. The cancer risk was calculated in HARP using the "Derived (Adjusted) Method" and the chronic THI was calculated in HARP using the "Derived (OEHHA) Method."

Fourth, risk characterization was performed to integrate the health effects and public exposure information and provide quantitative estimates of health risks resulting from the Project emissions. Risk modeling was performed using HARP to estimate incremental cancer and non-cancer health risks due to the Project operational emissions. The HARP model utilizes OEHHA equations and algorithms to calculate health risks based on input parameters that include emission rates, "unit" ground-level concentrations, and toxicological data.

Detailed descriptions of the model input parameters and results of the HRA are presented later in this section.

5.16.2.2 Construction-phase Emissions

Due to the relatively short duration of the proposed Project construction (*i.e.,* 15 months), significant long-term public health effects are not expected to occur as a result of Project construction emissions. Diesel particulate exhaust is the air pollutant with the largest potential for human health risk emitted during the construction period. Diesel particulate has been classified by CARB and OEHHA as a TAC and a carcinogen. However, the exposure assessment conducted for carcinogens is typically 70 years. Due to the short duration of the construction effort, significant carcinogenic health risks are not predicted for the construction period.

Section 5.2, Air Quality, presents a detailed analysis of the potential environmental impacts due to criteria pollutant emissions during construction and a discussion of measures that will be implemented to control or reduce these emissions.

Valley fever is caused by the fungus coccidioides immitis, which grows in arid soil of the San Joaquin Valley and other parts of America. Infection occurs when the spores of the fungus are inhaled. Most people who breathe the spores do not become sick, although some may experience symptoms similar to a cold or flu, and in more serious cases, pneumonia-like symptoms, requiring medication and bed rest. Spores may be released when the soil containing them is disturbed, *e.g.*, during construction grading or excavation activities. Watering of the soil to reduce wind-blown dust during the Project construction will reduce the potential for wind blown spores and reduce the risk of worker exposure to Valley fever.

5.16.2.3 Operational-phase Emissions

The proposed SJS 1&2 site consists of two solar power stations, each augmented with a biomass combustion facility. Each plant is sized for a nominal 53.4 MW net of solar generation, complemented by 40 MW net of biomass generated production, to supplement solar production when not fully charged by solar input, or independently during non-solar hours. The biomass facility at each plant consists of two 20 MW combustor trains, that can be operated independently. The primary fuel source for the biomass combustors is anticipated to be 50% agricultural wood waste, comprised primarily of wastes collected

during clearing or pruning of local orchards, and 50% municipal green wastes that will be primarily in the form of clippings and collected wood materials from local municipalities. The combustion of waste wood, is expected to emit more air contaminants than the agricultural wood waste; thus emissions and heat ratine provided by EPI were for waste wood combustion were used to estimate combustor emissions. The biomass combustion equipment will consist of a fluidized bed system that is ideal for combusting a fuel such as waste wood.

The primary source of TAC emissions from the SJS 1&2 site would be the four biomass combustors, although emissions would also be expected from the ancillary project sources, including twelve natural gas burners (three burners located in each of the four biomass combustors), two 2-cell evaporative cooling towers, two diesel emergency generators, two diesel firewater pumps, as well as fugitive TAC emissions from the unloading and handling of the combustor fly ash. Additional emissions of diesel particulates are expected to occur due to fuel combustion in the biomass loader, trucks delivering biomass fuel, limestone, lime and ammonia to the site, trucks removing fly ash from the site, and one water truck per plant used for cleaning and maintenance of the solar reflector mirrors.

Emissions from the biomass combustor will be reduced by adding limestone to the fluidized bed combustor to control acid gas emissions. The following pollution control equipment will also be installed with each biomass combustor:

- An SNCR system in the combustor to reduce NO_x emissions;
- A multi-clone and baghouse for reduction of particulate emissions;
- A dry scrubber to reduce hydrogen chloride emissions;
- An SCR system to further reduce NO_x emissions; and
- A wet scrubber for additional reduction of hydrogen chloride and SO_x emissions.

TAC emissions from the biomass combustors were estimated using emission factors provided by the equipment vendor, EPI, and emission factors provided by SJVAPCD for a similar biomass facility, the Mendota Biomass Power Plant. The EPI emission factors were used for hydrogen chloride and ammonia and reflect the effects of the planned control equipment in reducing emissions of these chemicals. The emission factors provided by SJVAPCD were used for all other TACs.

Worst-case hourly emission for the biomass combustors were conservatively estimated assuming that the four combustors would each operate under full load conditions with a maximum higher heating value (HHV) fuel energy input rate of 311 million British thermal units per hour (MMBtu/hr) from burning approximately 27 tons of biomass per hour. For the annual emission calculations, it was assumed that each biomass combustor would operate for a maximum of 75 percent of all hours, or 6,570 hours per year.

The estimated maximum hourly and annual TAC emissions from each biomass combustor and all four combustors combined are summarized in Table 5.16-2. Detailed TAC emission calculations from all sources are presented in Appendix N-1.

Table 5.16-2
Toxic Air Contaminant Emission Rates From Operation of the Biomass Combustors

Pollutants	EPI Emission Factor (lb/MMBtu)	SJVAPCD Emission Factor (lb/ton)	Hourly Emissions per Combustor (lb/hour)	Annual Emissions per Combustor (lb/year)	Total SJS 1&2 Combustor Hourly Emissions (lb/hour)	Total SJS 1&2 Combustor Annual Emissions (lb/year)
Acetaldehyde		1.55E-03	4.18E-02	2.75E+02	1.67E-01	1.10E+03
Ammonia	3.03E-03		9.40E-01	6.18E+03	3.76E+00	2.47E+04
Arsenic		2.32E-06	6.26E-05	4.11E-01	2.50E-04	1.64E+00
Benzene		1.77E-03	4.77E-02	3.14E+02	1.91E-01	1.25E+03
Cadmium		2.54E-05	6.85E-04	4.50E+00	2.74E-03	1.80E+01
Chromium 6+		1.85E-06	4.99E-05	3.28E-01	2.00E-04	1.31E+00
Copper		1.93E-05	5.21E-04	3.42E+00	2.08E-03	1.37E+01
Formaldehyde		1.33E-02	3.59E-01	2.36E+03	1.44E+00	9.43E+03
Hydrogen Chloride	4.57E-03		1.42E+00	9.33E+03	5.68E+00	3.73E+04
Lead		5.54E-05	1.49E-03	9.82E+00	5.98E-03	3.93E+01
Manganese		4.99E-03	1.35E-01	8.84E+02	5.38E-01	3.54E+03
Mercury		2.87E-07	7.74E-06	5.09E-02	3.10E-05	2.03E-01
Toluene		2.93E-04	7.90E-03	5.19E+01	3.16E-02	2.08E+02
Polycyclic Aromatic Hydrocarbons (PAHs)						
Naphthalene		3.24E-03	8.74E-02	5.74E+02	3.50E-01	2.30E+03
Benz [a] anthracene		7.10E-07	1.92E-05	1.26E-01	7.66E-05	5.03E-01
Benzo [b] fluoranthene		7.59E-08	2.05E-06	1.35E-02	8.19E-06	5.38E-02
Benzo [k] Fluoranthene		3.12E-08	8.42E-07	5.53E-03	3.37E-06	2.21E-02
Chrysene		9.63E-07	2.60E-05	1.71E-01	1.04E-04	6.83E-01
Indeno [1,2,3-cd] pyrene		1.73E-08	4.67E-07	3.07E-03	1.87E-06	1.23E-02
Dioxins						
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		2.18E-11	5.88E-10	3.86E-06	2.35E-09	1.55E-05
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		1.23E-10	3.32E-09	2.18E-05	1.33E-08	8.72E-05
Furans						
2,3,7,8-TETRACHLORODIBENZOFURAN		1.28E-10	3.45E-09	2.27E-05	1.38E-08	9.07E-05
2,3,4,7,8-PENTACHLORODIBENZOFURAN		7.09E-11	1.91E-09	1.26E-05	7.65E-09	5.03E-05
1,2,3,7,8-PENTACHLORODIBENZOFURAN		4.40E-11	1.19E-09	7.80E-06	4.75E-09	3.12E-05

Table 5.16-2
Toxic Air Contaminant Emission Rates From Operation of the Biomass Combustors
(Continued)

Pollutants	EPI Emission Factor (lb/MMBtu)	SJVAPCD Emission Factor (lb/ton)	Hourly Emissions per Combustor (lb/hour)	Annual Emissions per Combustor (lb/year)	Total SJS 1&2 Combustor Hourly Emissions (lb/hour)	Total SJS 1&2 Combustor Annual Emissions (lb/year)
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		2.34E-11	6.31E-10	4.15E-06	2.52E-09	1.66E-05
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		2.74E-11	7.39E-10	4.86E-06	2.96E-09	1.94E-05
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		3.63E-11	9.79E-10	6.43E-06	3.92E-09	2.57E-05
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		2.35E-11	6.34E-10	4.16E-06	2.54E-09	1.67E-05
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		4.05E-12	1.09E-10	7.18E-07	4.37E-10	2.87E-06

Per SJVAPCD recommendations (SJVAPCD 2008), emissions from the natural gas burners within the biomass combustors were estimated using Ventura County Air Pollution Control District AB2588 combustion emission factors for natural gas fired external combustion equipment in the 10-100 MMBtu/hr size range, (VCAPCD 2001), The burners will be used only during combustor cold startup; thus it is anticipated that each burner will be operated up to 14 hours per year. Three natural gas burners are associated with each combustor train, one 15 MMBtu/hr and two 50 MMBtu/hr burners. The burner emissions will be vented out of the combustor stacks. Emission factors and estimated maximum hourly and annual emissions per three burner combination per combustor train and for the total Project are summarized in Table 5.16-3.

Table 5.16-3
Toxic Air Contaminant Emission Rates from Operation of the Combustor Natural Gas Burners

Pollutant	Emission Factor (lb/MMcf)	Hourly Emission Rate per Combustor Train (lb/hr)	Annual Emission Rate per Combustor Train (lb/yr)	Total SJS 1&2 Burner Hourly Emission Rate (lb/hr)	Total SJS 1&2 Burner Annual Emission Rate (lb/yr)
Acetaldehyde	3.10E-03	3.50E-04	3.89E-03	1.40E-03	1.56E-02
Acrolein	2.70E-03	3.04E-04	3.39E-03	1.22E-03	1.36E-02
Benzene	5.80E-03	6.54E-04	7.28E-03	2.62E-03	2.91E-02
Ethylbenzene	6.90E-03	7.78E-04	8.66E-03	3.11E-03	3.46E-02
Formaldehyde	1.23E-02	1.39E-03	1.54E-02	5.55E-03	6.17E-02
Hexane	4.60E-03	5.19E-04	5.77E-03	2.07E-03	2.31E-02
Propylene	5.30E-01	5.98E-02	6.65E-01	2.39E-01	2.66E+00
Toluene	2.65E-02	2.99E-03	3.33E-02	1.20E-02	1.33E-01
Xylenes	1.97E-02	2.22E-03	2.47E-02	8.88E-03	9.89E-02
Naphthalene	3.00E-04	3.38E-05	3.76E-04	1.35E-04	1.51E-03
PAHs other than naphthalene	1.00E-04	1.13E-05	1.25E-04	4.51E-05	5.02E-04

Trace levels of inorganic particles and metals are indicated in the analysis of the source water for the evaporative cooling towers and low-level emissions of these pollutants would therefore be contained in the particulate matter emitted in the drift droplets that escape with the plumes from the cooling towers. The TACs in the drift particulate emissions from the cooling tower emissions were calculated based on, the water circulation rate, drift elimination efficiency and the concentrations of TACs in the circulating water. These results served as the basis for estimating individual TAC emissions from the cooling towers.

An analysis of water collected from an existing onsite well was used to determine the maximum concentrations of inorganic chemicals. These values were then used to estimate the maximum TAC emissions from each cooling tower. For the annual emission calculations, it was assumed that both cooling towers would operate for a maximum of 8,760 hours per year. Emission factors and estimated maximum hourly and annual emissions per cooling tower cell are summarized in Table 5.16-4.

Table 5.16-4
Toxic Air Contaminant Emission Rates from Operation of the Cooling Towers

Toxic Air Contaminant	TAC Concentration in water[1]		Emissions per cooling tower		Total SJS 1&2 Project cooling tower emissions	
	µg/liter	lb/(1000 gallon)	lb/hr	lb/yr	lb/hr	lb/yr
1.24E-02	3.1	2.59E-05	1.09E-06	8.29E-03	2.17E-06	1.66E-02
6.46E+02	161000	1.34E+00	5.64E-02	4.31E+02	1.13E-01	8.61E+02
6.82E-01	170	1.42E-03	5.96E-05	4.55E-01	1.19E-04	9.10E-01
2.37E-03	0.59	4.92E-06	2.07E-07	1.58E-03	4.14E-07	3.16E-03
1.64E+02	40900	3.41E-01	1.43E-02	1.09E+02	2.87E-02	2.19E+02
4.82E+03	1200000	1.00E+01	4.21E-01	3.21E+03	8.41E-01	6.42E+03
2.73E-02	6.8	5.67E-05	2.38E-06	1.82E-02	4.77E-06	3.64E-02

Diesel particulate emissions from the two diesel-fired emergency generators and two firewater pump engines were estimated using the EPA stationary diesel engine Tier 2 emission limits and the maximum power rating for each engine. The diesel-fired emergency generators were each assumed to run at full rated capacity (1,000 kW) for one hour per month for testing. The diesel-fired firewater pumps were each assumed to run at full rated capacity (250 hp) for one hour per week for testing. Actual emergency use of the diesel engines was not included. Emission factors and estimated maximum hourly and annual emissions from each emergency generator and fire water pump engine and total SJS 1&2 combined engines are summarized in Table 5.16-4.

Table 5.16-4
Toxic Air Contaminant Emission Rates From Operation of the Diesel Emergency Generators and Firewater Pump Engines

Engine	Chemical Species	Emission Factor	Maximum Hourly Emissions per Engine (lb/hr)	Annual Emissions Per Engine (lb/yr)	Total SJS 1&2 Engine Hourly Emissions (lb/hr)	Total SJS 1&2 Engine Annual Emissions (lb/yr)
Emergency Generator	Diesel Particulate (PM_{10})[1]	0.20 g/kW-hr	0.44	5.29	0.88	10.57
Firewater Pump	Diesel Particulate (PM_{10})[1]	0.20 g/kW-hr	0.08	4.27	0.16	8.54

Notes:
[1] Not a CAA112 HAP.
g/kW-hr = grams per kilowatt hour.

Fugitive TAC emissions from the unloading and handling of the fly ash produced in the biomass combustors were estimated using SJVAPCD provided emission factors for a similar facility, Thermal Energy Inc., and using the design control efficiency provided by the biomass facility equipment supplier. Table 5.16-5 presents the emission factors and the hourly and annual emissions for the total SJS 1&2 site.

Table 5.16-5
Toxic Air Contaminant Emission Rates from the Handling of the Fly Ash

Pollutant	Emission Factor (lb/ton)	Total SJS 1&2 Hourly Emission Rate (lb/hr)	Total SJS 1&2 Annual Emission Rate (lb/yr)
Arsenic	5.74E-05	3.10E-06	2.03E-02
Beryllium	2.83E-07	1.53E-08	1.00E-04
Cadmium	1.63E-06	8.79E-08	5.78E-04
Hex Chrome	1.75E-06	9.44E-08	6.20E-04
Copper	2.59E-04	1.40E-05	9.18E-02
Lead	1.41E-04	7.61E-06	5.00E-02
Manganese	9.79E-05	5.28E-06	3.47E-02
Nickel	2.31E-05	1.25E-06	8.19E-03
Selenium	4.81E-07	2.60E-08	1.70E-04

To unload and move the biomass one 100 hp diesel front-end loader will be used to augment the electrical conveyor system for the SJS 1&2 site. Combustion emissions from the biomass loader were estimated using emission factors from CARB's Off-Road Model. Total SJS 1&2 biomass loader hourly and annual diesel particulate exhaust emissions from this loader were estimated to be 0.02 lb/hour and 16.89 lb/year, respectively. The emissions from the biomass loader will be emitted through the two baghouse vents on the roof of the biomass storage facility. No credit was taken for the potential reduction in the front-end loader exhaust emissions due to the baghouse controls.

Combustion emissions will occur during the regular cleaning of the solar reflector mirrors by two mobile diesel water trucks, one truck per solar field. The diesel particulate combustion emissions from these sources were estimated using the emission factor from CARB's EMFAC2007 for on-road 8,500 lb. trucks (Light-Heavy-Duty Diesel Truck). The diesel particulate emissions from the solar field cleaning trucks for the total SJS 1&2 were estimated to be 0.0004 lb/hour and 1.10 lb/year.

Onsite diesel particulate combustion emissions from the delivery trucks bringing the biomass, limestone, lime and ammonia to the site and removing the ash from the site were calculated using emission factors from CARB's EMFAC2007 for on-road Heavy-Heavy-Duty Diesel Trucks. These emissions included both emissions from travel onsite and from an assumed 15 minutes of on-site idling per truck. The on-site diesel particulate emissions from all of the delivery trucks for the total Project were estimated to be 0.068

lb/hour and 213.6 lb/year. The emissions from the delivery trucks were spread out evenly among 46 points sources along the route of the truck travel onsite.

5.16.2.4 Model Input Parameters

The HRA was conducted using worst-case emissions (short- and long-term) of the operational SJS 1&2 from all sources described in the previous section. Cancer and chronic non-cancer health effects were estimated using the annual emissions estimate in pounds per year, and acute non-cancer health effects were estimated using the worst-case maximum hourly emissions in pounds per hour. These emissions were used as direct input to the HARP model.

Dispersion modeling was performed using the AERMOD model and methods consistent with the approach described in Section 5.2, Air Quality (*e.g.,* building downwash and meteorological input data), and the modeling protocol submitted for review to CEC and SJVAPCD (URS 2008). The AERMOD model was run with unit emission rates (1 gram per second emissions), to calculate the concentration of TACs per unit emission rate due to each source. HARP then uses this information along with the estimated maximum source emission rates for specific TAC compounds (as described above) to calculate ground-level concentrations for each chemical species. Hourly meteorological data for the year 2004 (the same year of data used in the air quality modeling analysis described in Section 5.2) were used in the HRA.

Risk values were modeled for all sensitive receptors within 3 miles of the Project site and at all grid and census receptors within 6 miles of the site. The same grid and boundary receptors used in the air quality modeling were used in the HRA (see Section 5.2 for details). The grid receptors extend 10 km in all directions from the Project boundary, including receptors spaced every 25 meters along the facility property line. To be certain that the maximum potential risks resulting from Project emissions would be addressed, all receptors were treated as sensitive receptors, except offsite worker receptors. A separate analysis was conducted to examine the potential health risk to workers at facilities not on the SJS 1&2 site. Receptors were placed at the nearest 16 offsite worker locations. No receptors were located within the SJS 1&2 site since both plants will be operated with the same team of employees.

Toxicological data, cancer potency factors and RELs for specific chemicals are built into CARB's HARP model. The pollutant-specific cancer potency factors and RELs used in the HRA were listed in Table 5.16-1. The HARP model uses the toxicological data in conjunction with the other input data described above to perform health risk estimates based on OEHHA equations and algorithms.

5.16.2.5 Calculation of Health Effects

Adverse health effects are expressed in terms of cancer or noncancer health risks. Cancer risk is typically reported as "lifetime cancer risk," which is the estimated maximum increase in the risk of developing cancer caused by long-term exposure to a pollutant suspected of being a carcinogen. The calculation of cancer risk very conservatively assumes that an individual is exposed continuously to the maximum pollutant concentrations 24 hours per day for 70 years. Although such continuous lifetime exposure to maximum TAC levels is unlikely, the goal of the approach is to produce a conservative worst-case estimate of potential cancer risk. To estimate the cancer risk to an offsite worker, an individual is assumed

to be exposed continuously to the maximum pollutant concentrations 24 hours per day for 245 days per year for 40 years.

Noncancer risk is typically reported as a total hazard index (THI). The THI is calculated for each target organ as a fraction of the maximum acceptable exposure level or REL for an individual pollutant. The REL is generally the level at (or below) which no adverse health effects are expected. The THIs are calculated for both short-term (acute) and long-term (chronic) exposures to noncarcinogenic substances by adding the ratios of predicted concentrations to RELs for all pollutants.

Both cancer and noncancer risk estimates produced by the HRA represent incremental risks (*i.e.,* risks due to the modeled sources only) and do not include potential health risks posed by existing background concentrations. This approach is consistent with the significance criteria used to evaluate predicted impacts, which are also based on the incremental contributions to risk by the Project sources. The HARP model performs all of the necessary calculations to estimate the potential lifetime cancer risk and the acute and chronic noncancer THIs due to the Projects TAC emissions.

5.16.2.6 Health Effects Significance Criteria

Various state and local agencies use different significance criteria for cancer and non-cancer health effects. For carcinogenic health effects, an exposure to a new emissions source is normally considered potentially significant when the predicted incremental lifetime cancer risk of the source exceeds 10 in 1 million (10 × 10-6). For non-carcinogenic health effects (chronic or acute), an exposure that affects each target organ is considered potentially significant when the THI exceeds a value of one.

5.16.2.7 Estimated Lifetime Cancer Risk

Based on the risk assessment methodology described in the foregoing subsections, the maximum incremental cancer risk resulting from total SJS 1&2 site emissions was estimated to be 8.630 in 1 million, at a location on the eastern SJS 1&2 property line. Figure 5.16-2 shows the isopleth of maximum predicted cancer risk equal to or greater than one in one million that are predicted to occur as a result of the combined TAC emissions from the total SJS 1&2 site.

The peak cancer risk predicted at a sensitive receptor from the total SJS 1&2 site was 0.747 in 1 million, at the Coalinga State Hospital just west of the Project. The peak cancer risk predicted at an offsite worker receptor from the total SJS 1&2 site was 0.148 in 1 million, at the Coalinga State Hospital just west of the project.

Table 5.16-6 presents the detailed cancer risk, acute and chronic noncancer THI results of the HRA for the total SJS 1&2 site. Specific results presented in this table include the risk values at the point of maximum impact (PMI), the maximum impact at a sensitive receptor and the maximum impact at an offsite worker receptor. All HARP model files, along with all air quality modeling files are provided electronically on a DVD that is supplied separately with this AFC.

Table 5.16-6
Estimated Cancer Risk and Acute and
Chronic Total Hazard Indices for SJS 1&2 Site

Receptor Type	Risk	Maximum Risk	NAD 27 UTM Easting (m)[1]	NAD27 UTM Northing (m)[1]	Description of Receptor
PMI	Cancer (in 1 million)	8.630	750374	4002135	on the eastern SJS 1&2 fence line
	Chronic	0.104	750167	4001005	on the southern SJS 1&2 fence line
	Acute	0.024	742000	3997000	~ 8km southwest from the SJS 1&2 site in the Jacalitos hills
Sensitive	Cancer (in 1 million)	0.747	748729	4001966	Coalinga State Hospital
	Chronic	0.006	748729	4001966	Coalinga State Hospital
	Acute	0.011	748633	4002174	Coalinga State Hospital
Offsite Worker	Cancer (in 1 million)	0.148	748729	4001966	Coalinga State Hospital
	Chronic	0.006	748729	4001966	Coalinga State Hospital
	Acute	0.011	748633	4002174	Coalinga State Hospital

Note:
[1] Coordinates are provided in accordance with the Universal Transverse Mercator and North American Datum, 1927, Zone 10.

The estimated cancer risk at all locations for the total SJS 1&2 site is below the significance criteria of 10 in 1 million. Thus, it is concluded that the Project emissions will not pose a significant cancer risk to any populations potentially exposed to these emissions.

5.16.2.8 Estimated Chronic and Acute Total Hazard Indices

The maximum chronic THI resulting from the total SJS 1&2 site emissions was estimated to be 0.104. The location of the maximum estimated chronic THI is on the southern project fence line. The sensitive and offsite worker receptor with the highest chronic THI from the total SJS 1&2 site emissions are both the Coalinga State Hospital, located on the west edge of the Project. The maximum chronic THI at this receptor was estimated to be 0.006.

The estimated chronic THI from the total SJS 1&2 site is well below the significance criterion of 1.0. Thus, it is concluded that the Project emissions will not pose a significant chronic non-cancer health risk to any populations potentially exposed to the operational emissions of TACs.

The maximum acute THI resulting from the total SJS 1&2 site emissions was estimated to be 0.024 at a location approximately 10 kilometers southwest of the SJS 1&2 site. This receptor is located in an unpopulated area of the Jacalitos Hills. The sensitive and offsite worker receptors with the highest

predicted acute THI impact from the total SJS 1&2 site emissions are both the Coalinga State Hospital, located west of the Project. The maximum acute THI at this location was estimated to be 0.011.

The estimated acute THI from the total SJS 1&2 site is far below the significance criterion of 1.0. Thus, it is concluded the Project emissions will not pose a significant acute non-cancer health risk to any populations potentially exposed to the operational the Project emissions of TACS.

5.16.2.9 Uncertainty in the Public Health Impact Assessment

Sources of uncertainty in the results of HRAs include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans. For this reason, assumptions used in HRAs are typically designed to provide sufficient health protection to avoid underestimation of risk to the public. Some sources of uncertainty applicable to this HRA and the procedures and assumptions used to ensure health-protective results are discussed below.

The biomass combustor emission rates of individual TACs were derived using vendor data and from emission factors provided from SJVAPCD from a similar facility. Both the short- and long-term biomass combustor emissions used in the HRA were developed assuming all four biomass combustors would operate at the maximum load for the maximum number of annual operating hours requested in this application. Under actual operating conditions, the biomass combustors may operate less and the operating loads may be lower than 100 percent of capacity. The emissions from the ancillary sources were estimated in a similar manner; that is, assuming maximum hours of annual operations and full load capacity for all of those hours of operations. Consequently, the emissions used for this HRA are likely to be higher than those that would actually occur under normal operation of the proposed project.

Dispersion models approved for regulatory applications contain assumptions that lead to overprediction of ground-level concentrations. For example, the modeling performed in the HRA assumed a conservation of mass (*i.e.,* all of the pollutants emitted from the sources remained in the atmosphere while being transported downwind to a receptor at any distance from the Project). During the transport of pollutants from sources toward receptors, none of the emitted material was assumed to be removed from the source plumes by means of chemical reactions or losses at the ground surface due to reactions, gravitational settling, or turbulent impaction. In reality, these mechanisms work to reduce the level of pollutants remaining in the atmosphere during plume travel.

The exposure characteristics assessed in the HRA included the assumption that all receptors (including residents) were continuously exposed to the Project emissions at the same location for 24 hours per day, 350 days per year, for 70 years. It is extremely unlikely that any resident would actually be subject to such continued, long-term exposure. This conservative exposure assumption leads to overpredicted risk estimates in the HRA modeling.

The toxicity data used in the HRA contain uncertainties due to the extrapolation of health effects data from animals to humans. Typically, safety factors are applied when doing the extrapolation. Furthermore, the human population is much more diverse, both genetically and culturally, than bred experimental animals. The intraspecies variability is expected to be much greater among humans than in laboratory animals. With all of the uncertainty in the assumptions used to extrapolate toxicity data, significant measures are taken to ensure that sufficient health protection is built into the available health effects data.

Conservative measures to compensate for all of these uncertainties and ensure that potential health risks are not underestimated are compounded in the final HRA predictions. Therefore, the actual risk numbers are expected to be well below the values presented in this analysis.

5.16.2.10 Criteria Pollutants

Emissions of the criteria pollutants (NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$) from the Project were modeled and an evaluation of their impacts on air quality is presented in Section 5.2, Air Quality. The federal and state NAAQS specify allowable levels of specific air pollutants that should not be exceeded in order to protect the public health. The results of the air quality analysis in Section 5.2, Air Quality, show that the Project would not cause a violation of any state or federal AAQS and would not significantly contribute to existing violations of such standards. Therefore, no significant adverse health effects are anticipated to result from the Projects criteria pollutant emissions.

5.16.3 Cumulative Impacts

Risks from the proposed project TAC emissions are evaluated on their own and then compared to the applicable significance criteria. The cumulative effects from TAC emissions from sources other than the proposed project are not considered. CEC requirements specify that an analysis must be conducted to determine the cumulative impacts of the Project and other projects within a 6-mile radius that have received construction permits but are not yet operational or that are in the permitting process or can be expected to do so in the near future. This analysis will be conducted for criteria pollutants, since there are no significance thresholds for a cumulative HRA to be assessed against. Information requests have been made to SJVAPCD to obtain data on new projects planned within six miles from the proposed site. The resulting list of projects will be submitted to CEC for final determination of which new projects, if any, need to be evaluated by cumulative modeling.

5.16.4 Mitigation Measures

The criteria pollutant emissions from the Project will be mitigated by the use of BACT and through emissions offsets. The TAC emissions from the Project will be mitigated by the use of Toxic Best Available Control Technology (T-BACT). A complete discussion of the BACT measures is included in Section 5.2, Air Quality. The pollution control equipment that will be installed with each biomass combustor to control criteria pollutants will also significantly reduce TAC emissions. The biomass combustors will be tuned to ensure near complete combustion, thus reducing the emissions of most of the TACs and criteria pollutants. Per a discussion with SJVAPCD staff, the BACT measures proposed in this application satisfy the District's T-BACT criteria for the biomass combustors.

Emissions from the biomass combustor will be also be reduced by adding limestone to the fluidized bed combustor to control acid gas emissions. The following pollution control equipment will be installed with each biomass combustor:

- A SNCR system in the combustor to reduce NO_X emissions;
- A multi-clone and baghouse for particulate reduction;
- A dry scrubber for hydrogen chloride reduction;

- A SCR system to further reduce NO_X emissions; and
- A wet scrubber for hydrogen chloride and SO_X reduction.

The HRA presented in the foregoing subsections shows that the health effects impacts of the Project as proposed will be below the significance thresholds identified in Section 5.16.2.6, Health Effects Significance Criteria. Therefore, no further mitigation of emissions from the Project is required to protect public health.

5.16.5 LORS Compliance

The Project will be constructed and operated in accordance with all LORS applicable to protecting public health. This section briefly discusses the identified LORS. The relevant LORS that have been established to protect public health are identified in Table 5.16-7. This table also summarizes the agencies that are principally responsible for public health, as well as the general category(ies) of the public health concerns regulated by each of these agencies. The conformity of the Project to each of the LORS applicable to public health is also presented in this table, as well as references to the locations in this document where each relevant issue is addressed. Points of contact with the primary agencies responsible for public health are identified in the next section and in Table 5.16-9.

Table 5.16-7
Summary of Compliance with Public Health LORS

Authority	Administering Agency	Requirement	Project Compliance
Clean Air Act (CAA)	USEPA CARB SJVAPCD	Protect public from unhealthful exposure from air pollutants.	The application of TBACT will minimize TAC emissions. The HRA presented in Section 5.16, Public Health and Safety, of this application satisfies this requirement. Emissions of criteria pollutants will be minimized by application of control measures satisfying SJVAPCD BACT requirements on all facility emission sources. Increases in emissions of nonattainment pollutants and their precursors will be fully offset (Section 5.2, Air Quality)
40 CFR 63 Subpart DDDDD	EPA SJVAPCD	MACT standards for boilers at a major source of hazardous air pollutants are applicable to biomass combustors	Emission rates in Tables 5.2-11, 5.2-12 and 5.16-2.of this application are compliant with Subpart DDDDD limits on CO, PM, Hydrogen Chloride and Mercury.

Table 5.16-7
Summary of Compliance with Public Health LORS
(Continued)

Authority	Administering Agency	Requirement	Project Compliance
California Public Resource Code § 25523(a); 20 CCR § 1752.5, 2300-2309, and Division 2 Chapter 5, Article 1, Appendix B, Part(1)	CEC	Assure protection of environmental quality, requires quantitative HRA	The HRA in 5.16, Public Health and Safety, of this Application demonstrate the Project's compliance with this requirement
California Clean Air Act, TAC Program, H&SC § 39650, *et seq*.	SJVAPCD with CARB oversight	Requires quantification of TAC emissions, use of BACT, and preparation of an HRA	Preparation of the HRA in Section 5.16, Public Health and Safety, and the BACT assessment in Section 5.2, Air Quality, satisfy this requirement.
H&SC, Part 6, § 44300 *et seq*. (Air Toxics "Hot Spots")	SJVAPCD with CARB/OEHHA oversight	Regulates public exposure to air toxics. Requires inventory of TACs and HRA	The HRA presented in Section 5.16, Public Health and Safety, of this application demonstrate the Project's compliance with this requirement
H&SC § 41700	SJVAPCD with CARB oversight	Prohibits emissions in quantities that adversely affect public health, other businesses or property	Section 5.2, Air Quality, and the HRA (Section 5.16, Public Health and Safety) presented in this application demonstrate the Project's compliance with this requirement
Integrated Air Toxic Program	SJVAPCD	Integrates state and federal TAC requirements, primarily "Hot Spots" and California Airborne Toxic Control Measures (ATCM)	Section 5.16, Public Health and Safety and Section 5.2, Air Quality presented in this application demonstrate the Project's compliance with this requirement.
SJVAPCD Rule 2520	SJVAPCD	Issues operating permits for new sources of air contaminants in accordance with 40 CFR Part 70 and local requirements. Applies to a major source of air toxics.	Since the SJS 1&2 site is a major source of air toxics, the T-BACT will be applied to the combustors as described in Section 5.16, Public Health and Safety.
SJVAPCD Rule 2550	SJVAPCD	Applies to applications to construct for major sources of air toxics.	Since the SJS 1&2 site is a major source of air toxics, the T-BACT will be applied to the combustors as described in Section 5.16, Public Health and Safety.
SJVAPCD Rule 3110	SJVAPCD	Requires annual fees for the Air Toxic "Hot Spots" (AB2588) Program.	The HRA presented in 5.16, Public Health and Safety, of this application and the payment of fees to SJVAPCD satisfy this requirement.

Table 5.16-7
Summary of Compliance with Public Health LORS
(Continued)

Authority	Administering Agency	Requirement	Project Compliance
SJVAPCD Rule 4102	SJVAPCD	No source shall cause injury, detriment, nuisance or annoyance to the public, which could endanger their comfort, repose, health and safety, or property.	The HRA in Section 5.16, Public Health and Safety, and the analyses in Sections 5.2, Air Quality and 5.15 Hazardous Materials demonstrate the Project's compliance with this requirement.

Notes:
BACT = Best Available Control Technology
CARB = California Air Resources Board
CEC = California Energy Commission
HRA = Health Risk Assessment
OEHHA = Office of Environmental Health Hazard Assessment
SJVAPCD = San Joaquin Valley Air Pollution Control District
TAC = Toxic air contaminant
USEPA = United States Environmental Protection Agency

Under Section 112 of the CAA, a major source of HAPs is a source with the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs. According to these criteria, the Project will be a major source of federally regulated HAPs. A summary of the annual HAP emissions of the project is presented in Table 5.16-8. Section 5.16.4 discusses the T-BACT measures that will be applied to the biomass combustors to reduce the emissions of TACs and comply with CAA Section112.

Table 5.16-8
Annual Federal HAP Emissions from the Total SJS 1&2 Site Operations

Pollutants	Sources of Emissions	Total SJS 1&2 Site Annual HAP Emissions (ton/yr)
Acetaldehyde	Biomass combustors, natural gas burners	0.55
Acrolein	Natural gas burners	6.78E-06
Arsenic	Biomass combustors, cooling towers, fly ash fugitives	8.41E-04
Benzene	Biomass combustors, natural gas burners	0.63
Beryllium	Fly ash fugitives	5.02E-08
Cadmium	Biomass combustors, fly ash fugitives	9.00E-03
Chlorine	Cooling towers	4.31E-01

Table 5.16-8
Annual Federal HAP Emissions from the Total SJS 1&2 Project Operations
(Continued)

Pollutants	Sources of Emissions	Total SJS 1&2 Site Annual HAP Emissions (ton/yr)
Chromium 6+	Biomass combustors, fly ash fugitives	6.56E-04
Ethylbenzene	Natural gas burners	1.73E-05
Formaldehyde	Biomass combustors, natural gas burners	4.71
Hydrogen Chloride	Biomass combustors	18.66
Lead	Biomass combustors, fly ash fugitives	1.97E-02
Manganese	Biomass combustors, fly ash fugitives	1.77
Mercury	Biomass combustors, cooling towers	1.03E-04
Nickel	Fly ash fugitives	4.09E-06
Selenium	Fly ash fugitives	8.52E-08
Toluene	Biomass combustors, natural gas burners	0.10
Xylenes	Natural gas burners	4.94E-05
Polycyclic Aromatic Hydrocarbons (PAHs)		
PAHs other than naphthalene	Natural gas burners	2.51E-07
Naphthalene	Biomass combustors, natural gas burners	1.15E+00
Total HAP Emissions		**28.03**

5.16.5.1 Agencies and Agency Contacts

Table 5.16-9
Agency Contacts for Public Health Assessment

Agency	Contact/Title	Telephone
California Energy Commission	Keith Golden Air Quality Specialist 1516 Ninth Street Sacramento, CA 95814	(916) 654-4287
California Air Resources Board	Mike Tollstrup 1001 I Street Sacramento, CA 95814	(916) 322-6026
San Joaquin Valley Air Pollution Control District	Leland Villalvazo Permitting Specialist 1990 E. Gettysburg Avenue Fresno, CA 93726-0244	(559) 230-6000

5.16.5.2 Permits Required and Permitting Schedule

For power plants under the siting jurisdiction of the CEC, the SJVAPCD issues a DOC in lieu of an ATC. The DOC is incorporated into the CEC license. When the proposed Project commences operation and demonstrates compliance with the DOC, SJVAPCD will issue a PTO. The PTO specifies conditions that the air pollution source must comply with other air quality standards and will incorporate applicable DOC requirements. The final DOC should be issued within 6 months after receipt of a complete application (see Table 5.16-10).

Table 5.16-10
Applicable Permits

Responsible Agency	Permit/Approval	Schedule
San Joaquin Valley Air Pollution Control District	Determination of Compliance/Authority to Construct and Permit to Operate	Application to be filed concurrent with AFC filing. 180-day application review period will be requested.

5.16.6 References

2000. Air Toxics Hot Spots Risk Assessment Guidelines, Part III: Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels.

2002. Air Toxics Hot Spots Program Risk Assessment Guidelines – The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, Public Review Draft.

2005. Air Toxics Hot Spots Risk Assessment Guidelines, Part II: Technical Support Document for Describing Available Cancer Potency Factors.

California Environmental Protection Agency (Cal-EPA) & Office of Environmental Health Hazard Assessment (OEHHA). 1999. Air Toxics Hot Spots Risk Assessment Guidelines, Part I. Technical Support Document for the Determination of Acute Reference Exposure Levels for Airborne Toxicants.

CARB (California Air Resources Board), 2003. HARP User Guide – Software for Emission Inventory Database Management, Air Dispersion Modeling Analyses, and Health Risk Assessment version 1.3, Air Resources, Board, California Environmental Protection Agency. December 2003.

CARB. 2006. Emission Factors (EMFAC2007) Model. Version 2.3, November 1, 2006.

CARB. 2007. OFFROAD2007 Model. Version 2.0.1.2, November 2007.

OEHHA/CARB (Office of Environmental Health Hazard Assessment and California Air Resources Board), 2008. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. http://www.arb.ca.gov/toxics/healthval/healthval.htm.

San Joaquin Valley Air Pollution Control District (SJVAPCD), 2008. Telephone conversation between Leland Villalvazo of SJVAPCD and Julie Mitchell of URS Corporation, October 15.

San Joaquin Valley Air Pollution Control District. 2006. Guidance for Air Dispersion Modeling. August 2006, revision 1.2.

URS Corporation. 2008. Modeling Protocol for the San Joaquin 1 & 2 Solar Hybrid Project, Fresno County, California. Prepared for San Joaquin Valley Air Pollution Control District and California Energy Commission. October 2008.

Ventura County Air Pollution Control District. 2001. Ventura County Air Pollution Control District AB2588 Combustion Emission Factors. May 17, 2001.

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Public Health** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Section 5.16.1 Section 5.16.2 Section 5.16.3 Section 5.16.4		
Appendix B (g) (9) (A)	An assessment of the potential risk to human health from the project's hazardous air emissions using the Air Resources Board Hotspots Analysis and Reporting Program (HARP) (HSC §§44360-44366) or its successor and Approved Risk Assessment Health Values. These values should include the cancer potency values and noncancer reference exposure levels approved by the Office of Environmental Health Hazard Assessment (OEHHA Guidelines, Cal-EPA 2005).	Section 5.16.2		
Appendix B (g) (9) (B)	A listing of the input data and output results, in both electronic and print formats, used to prepare the HARP health risk assessment.	Section 5.16.2 Modeling DVD		
Appendix B (g) (9) (C)	Identification of available health studies through the local public health department concerning the potentially affected population(s) within a six-mile radius of the proposed power plant site related to respiratory illnesses, cancers or related diseases.	Section 5.16.1		
Appendix B (g) (9) (D)	A map showing sensitive receptors within the area exposed to the substances identified in subsection (g)(9)(A).	Figure 5.16.1		
Appendix B (g) (9) (E)	For purposes of this section, the following definitions apply:			

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (9) (E) (i)	A sensitive receptor refers to infants and children, the elderly, and 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;	Section 5.16.1		
Appendix B (g) (9) (E) (ii)	An acute exposure is one which occurs over a time period of less than or equal to one (1) hour; and	Section 5.16.2		
Appendix B (g) (9) (E) (iii)	A chronic exposure is one which is greater than twelve (12) percent of a lifetime of seventy (70) years.	Section 5.16.2		
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the proposed project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Section 5.16.5		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Section 5.16.5		

Adequacy Issue: Adequate ____ Inadequate ____

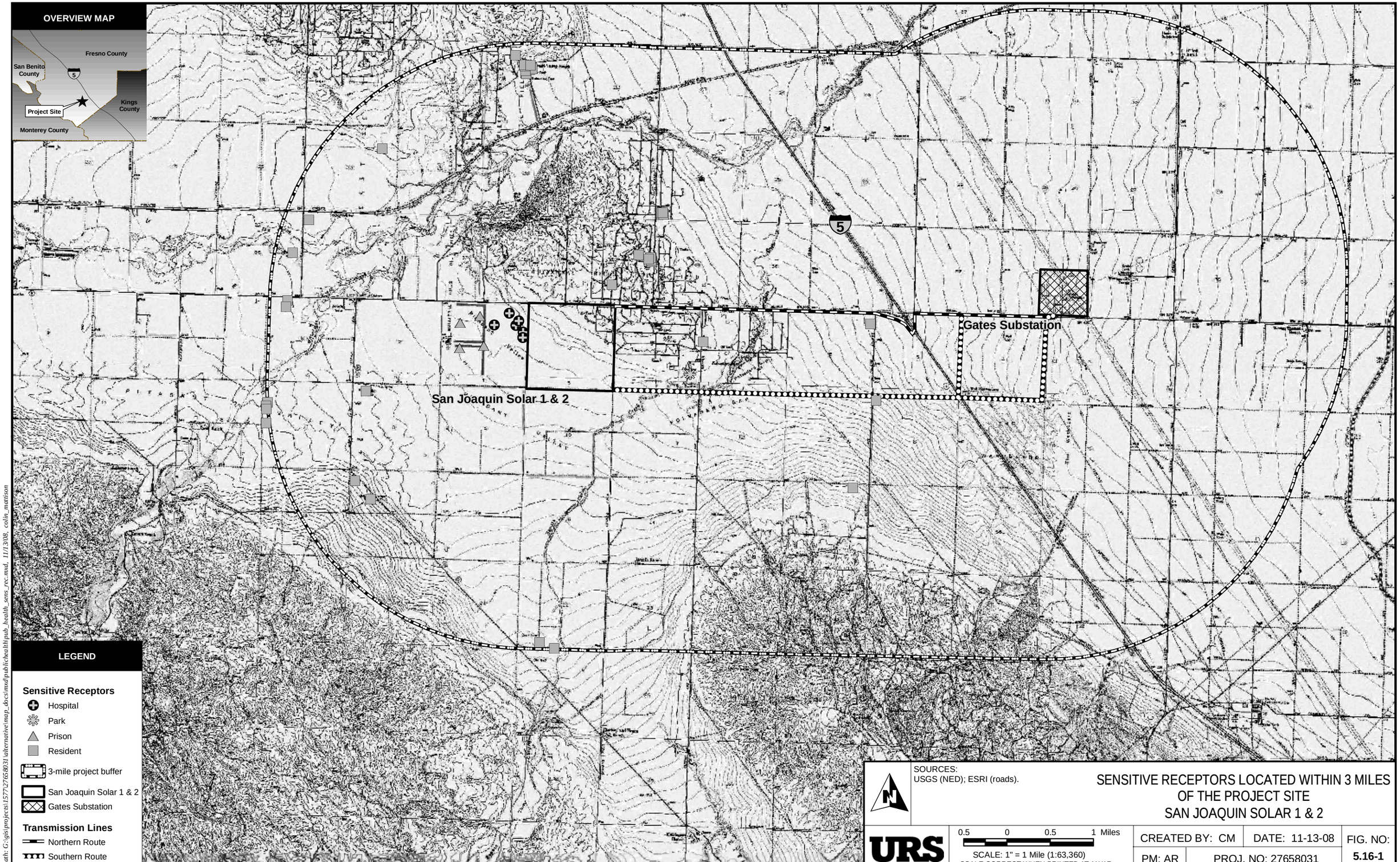
DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Public Health** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Section 5.16.5		
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	Section 5.16.5		



SOURCES:
USGS (NED); ESRI (roads).

SENSITIVE RECEPTORS LOCATED WITHIN 3 MILES OF THE PROJECT SITE
SAN JOAQUIN SOLAR 1 & 2

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PM: AR	PROJ. NO: 27658031	5.16-1

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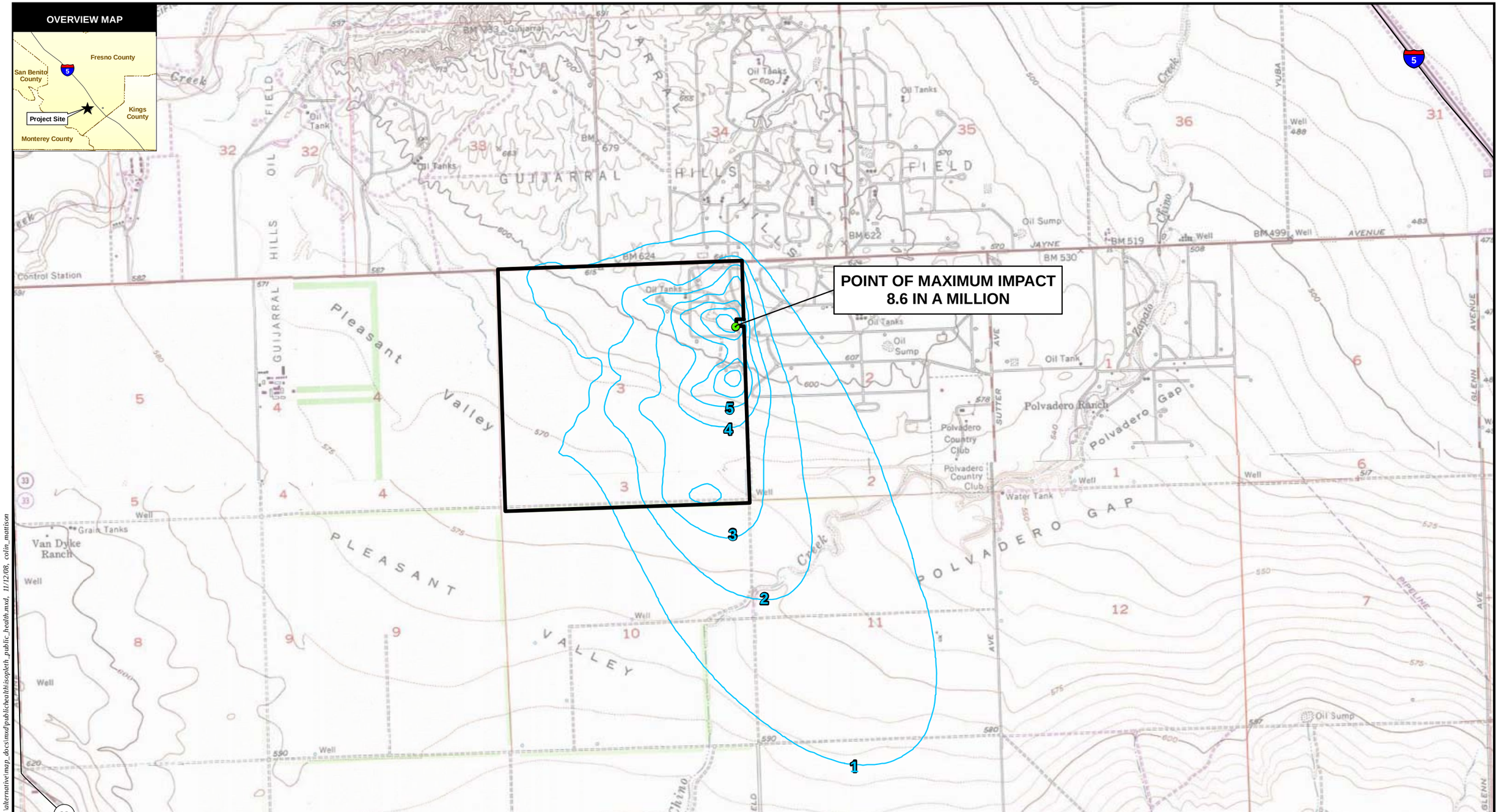

LEGEND

- Point of maximun impact (8.6)
- Isopleth of Cancer Risk (in a million)
- San Joaquin Solar 1 & 2

SOURCES:
USGS (NED); ESRI (roads).

INCREMENTAL LIFETIME CANCER RISK IN A MILLION
PREDICTED WITH HARP
SAN JOAQUIN SOLAR 1 & 2

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CM	DATE: 11-07-08	FIG. NO:
PM: AR	PROJ. NO: 27658031	5.16-2

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