

## 8.9 PUBLIC HEALTH

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This section presents the methodology and results of a human health risk assessment performed to assess potential impacts and public exposure associated with airborne emissions from the construction and routine operation of the proposed Pico Power Project (PPP).

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 natural gas-fired turbines and HRSG duct burners. 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; however, direct inhalation is considered the most likely exposure pathway. The risk assessment was conducted in accordance with guidance established by the California Air Pollution Control Officers' Association (CAPCOA 1993).

Combustion byproducts with established CAAQS or NAAQS, including oxides of nitrogen (NO<sub>x</sub>), carbon monoxide and fine particulate matter are addressed in the Ambient Air Quality section (see Section 8.1). However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks potentially associated with accidental releases of stored hazardous materials at the proposed facility (aqueous ammonia) are discussed in Section 8.5.

### 8.9.1 Affected Environment

The proposed PPP will be located in the City of Santa Clara, Santa Clara County. Surrounding land uses are described in Section 8.6, Land Use. The nearest residences are located approximately 0.39 mile west-northwest from the site in a motel that has been converted to apartments. The nearest residential neighborhood is 0.51 miles from the project site.

Terrain within a 10-mile radius of equal or greater elevation than the stack exhaust exit point (i.e., stack height plus grade elevation) is shown in Figure 8.9-1. This figure is available by request at a 1:24,000 scale.

Sensitive receptors are defined as groups of individuals that may be more susceptible to health risks due to chemical exposure. Schools (public and private), day care facilities, convalescent homes, and hospitals are of particular concern. The sensitive receptors within six miles of the PPP site are listed in Table 8.9-1 below. Figure 8.9-2 shows sensitive receptors within six miles of the project site. This figure is available by request at a 1:24,000 scale.

Air quality and health risk data presented by CARB in the 2001 Almanac of Emissions and Air Quality for the San Francisco Bay Area Air Basin shows that over the period 1990 through 1999, the average concentrations and associated health risks for the top ten toxic air contaminants (TACs) has been substantially reduced, and the concentrations and associated health risks for the air basin are typically lower than the statewide averages. CARB estimated emissions inventory values for the top ten TACs for 2000 and ambient concentration and associated risk values for 1990-1999 are presented in Table 8.9-2 for Santa Clara County.

**Table 8.9-1. Sensitive receptors within six miles of the Pico Power Project.**

<b>Name</b>	<b>Address</b>	<b>City</b>
<b>Convalescent &amp; Nursing Homes</b>		
Bellarose Convalescent Hospital	100 Bellarose Drive	San Jose
Emmanuel Convalescent Hosp.	180 N Jackson Avenue	San Jose
Hospice Of The Valley	1150 S Bascom Avenue	San Jose
Hy Lond Convalescent Hospital	797 E Fremont Avenue	Sunnyvale
Pleasant View Conv. Hospital	22590 Voss Avenue	Cupertino
San Tomas Convalescent Hosp.	3580 Payne Avenue	San Jose
Willow Glen Convalescent Hosp.	1267 Meridian Avenue	San Jose
Winchester Convalescent Hosp.	1250 S Winchester Boulevard	San Jose
<b>Hospitals</b>		
Fair Oaks Health Center	660 S Fair Oaks Avenue	Sunnyvale
Guardian of Santa Clara Valley	1990 Fruitdale Avenue	San Jose
Horizon Center	2 N 2 <sup>nd</sup> Street	San Jose
Milpitas Care Center	120 Corning Avenue	Milpitas
Mission Skilled Nursing Center	410 N Winchester Blvd.	Santa Clara
O'Connor Hospital	2105 Forest Avenue	San Jose
Rara Incorporated	3032 Bunker Hill Lane	Santa Clara
South Bay International	10029 Judy Avenue	Cupertino
<b>Preschools and Day Care Centers</b>		
Bright Horizons at Cupertino	10253 North Portal Avenue	Cupertino
Cherrywood Extended Day Care	2550 Greengate Drive	San Jose
Christian Day Care	3111 Benton Street	Santa Clara
Hughes Extended Day Care	4949 Calle De Escuela	Santa Clara
Kidsville Presch. & Day Care Ctr	1247 Benton Street	Santa Clara
KinderCare Learning Centers	840 Bing Drive	Santa Clara
KinderCare Learning Centers	400 School Abel Street	Milpitas
Koala-T Day Care	1144 Loyola Drive	Santa Clara
Noah's Ark Presch. & Day Care	2545 Warburton Avenue	Santa Clara
San Jose Unified – Grant Presch.	470 Jackson Street	San Jose
Voyager Child Care	1590 Las Plumas Avenue	San Jose
YMCA – Eisenhower School	277 Rodonovan Drive	Santa Clara
YMCA – Millikin School	2720 Sonoma Place	Santa Clara
YMCA – Brooktree School	1781 Olivetree Drive	San Jose
YMCA – Anderson School	4000 Rhoda Drive	San Jose
YMCA – Vinci Park School	1311 Vinci Park Way	San Jose
YMCA – Easterbrook School	4660 Eastus Drive	San Jose
YMCA – Lowell School	625 South 7 <sup>th</sup> Street	San Jose
YMCA – Laneview School	2095 Warmwood Lane	San Jose
YWCA in Santa Clara Valley	881 Cypress Avenue	San Jose
<b>Elementary &amp; Middle Schools</b>		
Ben Painter Elementary School	500 Rough And Ready Road	San Jose
Buchser Middle School	1111 Bellomy Street	Santa Clara
Cabrillo Middle School	2550 Cabrillo Avenue	Santa Clara
Capri School Elementary	850 Chapman Street	San Jose
Cedarwood Sudbury School	2545 Warburton Avenue	Santa Clara
Challenger School	711 E Gish Road	San Jose
Collins Elementary School	10401 Vista Drive	Cupertino
Cumberland School	824 Cumberland Drive	Sunnyvale

**Table 8.9-1.** (continued).

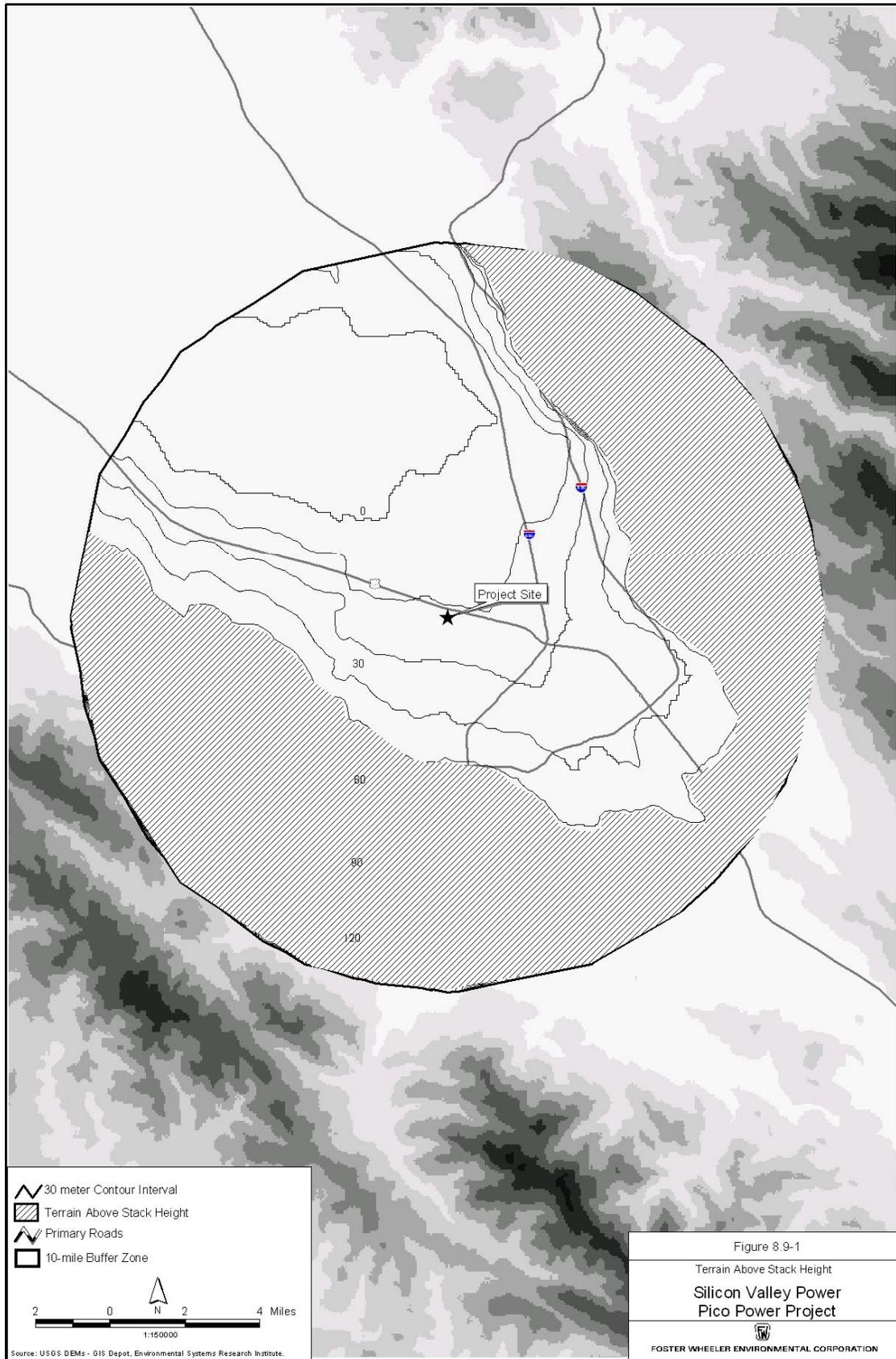
<b>Name</b>	<b>Address</b>	<b>City</b>
De Vargas Elementary School	5050 Moorpark Avenue	San Jose
Dilworth Elementary School	1101 Strayer Drive	San Jose
Eaton Elementary School	20220 Suisun Drive	Cupertino
Eisenhower Elementary School	277 Rodonovan Drive	Santa Clara
Granada Islamic School	3003 Scott Boulevard	Santa Clara
Laurelwood Elementary School	955 Teal Drive	Santa Clara
Monroe Middle School	1055 S Monroe Avenue	San Jose
Morrill Middle School	1970 Morrill Avenue	San Jose
New Covenant School	220 Blake Avenue	Santa Clara
Nimitz Elementary School	545 Cheyenne Drive	Sunnyvale
Piedmont Middle School	955 Piedmont Road	San Jose
Ponderosa Elementary School	804 Ponderosa Avenue	Sunnyvale
Queen of Apostles Elementary School	4950 Mitty Way	San Jose
Rancho Milpitas Middle School	1915 Yellowstone Avenue	Milpitas
Resurrection School	1395 Hollenbeck Avenue	Sunnyvale
Russell Thomas Middle School	1500 Escuela Parkway	Milpitas
San Antonio Elementary School	1855 E San Antonio Street	San Jose
Sedgewick School	19200 Phil Lane	Cupertino
Sheppard William Middle School	480 Rough And Ready Road	San Jose
Sierra Elementary & High School	220 Blake Avenue	Santa Clara
Sierramont Middle School	3155 Kimlee Drive	San Jose
St. Thomas Moore School	1590 Berryessa Road	San Jose
Stocklmeir Elementary School	592 Dunholme Way	Sunnyvale
Sunnyvale Middle School	1080 Mango Avenue	Sunnyvale
Vargas School	1054 Carson Drive	Sunnyvale
West Valley Middle School	3500 Amber Drive	San Jose
<b>High Schools</b>		
Archbishop Mitty High School	5000 Mitty Way	San Jose
Calaveras Hills High School	1331 E Calaveras Blvd	Milpitas
Del Mar High School	1224 Del Mar Ave. Ste. A	San Jose
Independence High School	1776 Educational Park Dr.	San Jose
Kehillah Jewish High School	3800 Blackford Avenue	San Jose
Notre Dame High School	596 South 2 <sup>nd</sup> Street	San Jose
Piedmont Hills High School	1377 Piedmont Road	San Jose
Santa Clara High School	3000 Benton Street	Santa Clara
Sierra Elementary & High School	220 Blake Avenue	Santa Clara
Wilcox High School	3250 Monroe Street	Santa Clara

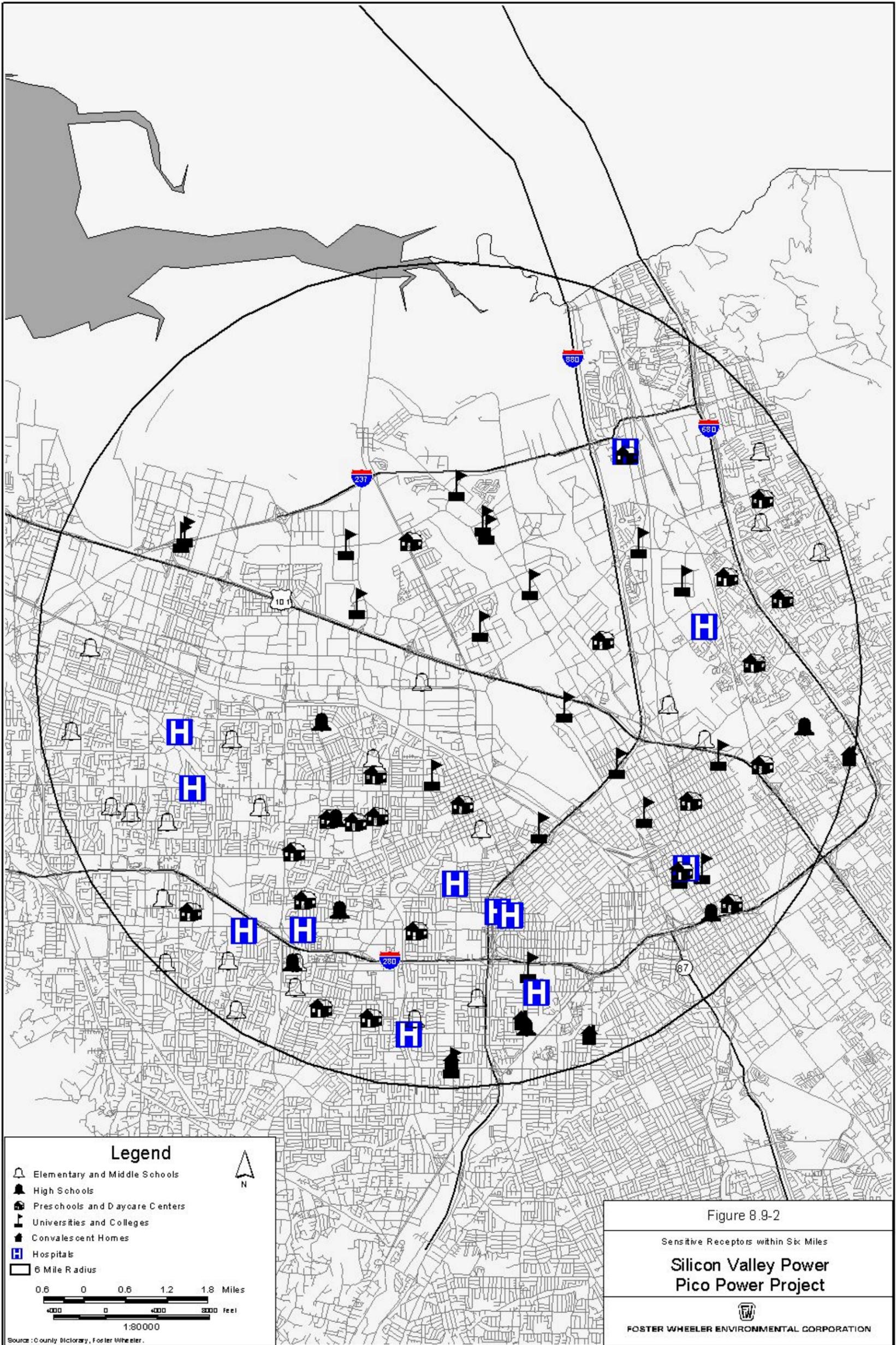
## 8.9.2 Environmental Consequences

### 8.9.2.1 Significance Criteria

#### **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 (BAAQMD and CEC), an incremental cancer risk of 10-in-one million





**Table 8.9-2.** Top ten Santa Clara County toxic air contaminants.

TAC	Year 2000 Emissions (tons/yr)	1990-1999 Data Averages	
		Concentration	Risk per Million
Acetaldehyde	300	1.14 ppb	5.7
Benzene	1015	1.65 ppb	152.7
1,3 Butadiene	150	0.37 ppb	139.4
Carbon tetrachloride	0.01	0.11 ppb	28.4
Chromium 6	0.0089	0.22 ng/m3	32.7
Para-Dichlorobenzene	79	0.12 ppb	8.2
Formaldehyde	815	2.28 ppb	17.0
Methylene Chloride	978	0.69 ppb	2.41
Perchloroethylene	322	0.10 ppb	4.13
Diesel PM	873	ND	ND

due to a project is considered to be a significant impact on public health. In addition, the 10-in-one-million risk level is used by the Air Toxics Hot Spots (AB 2588) program and California's Proposition 65 as the public notification level for air toxic emissions from existing sources.

### **Non-Cancer Risk**

Non-cancer health effects can be either chronic or acute. In determining potential non-cancer health risks (chronic and acute) from 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 health risk assessment, 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 CAPCOA AB 2588 Risk Assessment Guidelines (CAPCOA 1993).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, caused by chemicals accumulating in the body. 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 no more than 24 hours. For most chemicals, the air concentration required to produce acute effects is higher than levels required to produce chronic effects because the duration of exposure 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.

### **8.9.2.2 Construction Phase Impacts**

The construction phase of the PPP is expected to take approximately 18 to 20 months. No significant public health effects are expected during the construction phase. Strict construction practices that incorporate safety and compliance with applicable laws, ordinances, regulations, and standards (LORS) will be followed (see Section 8.9.5). In addition, mitigation measures to reduce air emissions from construction impacts will be implemented as described in Section 8.1.

Temporary emissions from construction-related activities are discussed in Section 8.1. Ambient air modeling for PM<sub>10</sub>, CO, SO<sub>2</sub> and NO<sub>x</sub> was performed as described in Section 8.1. 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 8.14 (Waste Management) for more information). No acutely hazardous materials will be used or stored on-site during construction (see Section 8.5, Hazardous Materials Handling). To ensure worker safety during construction, safe work practices will be followed (see Section 8.16, Worker Safety).

### **8.9.2.3 Operational Phase Impacts**

Environmental consequences potentially associated with the project are potential human exposure to chemical substances emitted into the air. The human health risks potentially associated with these chemical substances were evaluated in a health risk assessment. The chemical substances potentially emitted to the air from the proposed facility include ammonia, volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) from the combustion turbines, and metals from the cooling tower. These chemical substances are listed in Table 8.9-3.

Emissions of criteria pollutants will adhere to NAAQS or CAAQS as discussed in the Ambient Air Quality section (see Section 8.1). The proposed facility also will include emission control technologies necessary to meet the required emission standards specified for criteria pollutants under Bay Area Air Quality Management District (BAAQMD) rules. Offsets will be required for emissions of criteria pollutants that exceed specified thresholds, to assure that the project will not result in an increase in total emissions in the vicinity. Finally, air dispersion modeling results (presented in the Ambient Air Quality section, Section 8.1) 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 facility were addressed in a health risk assessment, presented in Appendix 8.1-D. The risk assessment was prepared using guidelines developed under the AB 2588 Air Toxics “Hot Spots” Information and Assessment Act (CAPCOA 1993).

**Table 8.9-3.** Chemical substances potentially emitted to the air from the PPP.

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**Criteria Pollutants**

Carbon monoxide  
Oxides of nitrogen  
Particulate matter  
Oxides of sulfur  
Volatile organic compounds

**Noncriteria Pollutants (Toxic Pollutants)**

Ammonia	Naphthalene
Acetaldehyde	Arsenic
Acrolein	Cadmium
1,3-Butadiene	Chromium
Benzene	Copper
Ethylbenzene	Lead
Formaldehyde	Mercury
Hexane	Nickel
Propylene	Silver
Propylene oxide	Zinc
Toluene	
Xylene	
Polycyclic aromatic hydrocarbons (PAHs)	
Benzo(a)anthracene	
Benzo(a)pyrene	
Benzo(b)fluoranthene	
Benzo(k)fluoranthene	
Chrysene	
Dibenz(a,h)anthracene	
Indeno(1,2,3-cd)pyrene	

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#### 8.9.2.4 Public Health Impact Study Methods

Emissions of toxic pollutants potentially associated with the facility were estimated using emission factors approved by BAAQMD, CARB, and the U.S. Environmental Protection Agency (USEPA). Concentrations of these pollutants in air potentially associated with the emissions were estimated using dispersion modeling. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in a risk assessment, 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 noncancer health effects (for noncarcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the MIR (maximum impact receptor). The hypothetical MEI is an individual assumed to be located at the point (MIR) where the highest concentrations of air pollutants associated with facility emissions are predicted to occur, based on air dispersion modeling. Human health risks associated with emissions from the proposed facility 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 will be significant impacts in any location in the vicinity of the facility.

Health risks potentially associated with concentrations of carcinogenic pollutants in air 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  $1 \mu\text{g}/\text{m}^3$  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 noncancer 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 noncancer 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 2000), and are presented in Table 8.9-4.

**Table 8.9-4.** Toxicity values used to characterize health risks.

Compound	Unit Risk Factor ( $\mu\text{g}/\text{m}^3$ ) <sup>-1</sup>	Chronic Reference Exposure Level ( $\mu\text{g}/\text{m}^3$ )	Acute Reference Exposure Level ( $\mu\text{g}/\text{m}^3$ )
Acetaldehyde	2.7E-06	9.00E+00	--
Acrolein	--	2.00E-02	1.90E-01
Ammonia	--	2.00E+02	3.2E+03
Arsenic	3.3E-03	5.10E-01	1.9E-01
Benzene	2.9E-05	6.0E+01	1.3E+03
1,3-Butadiene	1.7E-04	--	--
Cadmium	4.2E-03	3.50E+00	--
Chromium	1.5E-01	2.00E-03	--
Copper	--	2.40E+00	1.0E+02
Ethylbenzene	--	2.0E+03	--
Formaldehyde	6.0E-06	3.0E+00	9.4E+01
Hexane	--	--	--
Lead	1.2E-05	--	--
Mercury(inorganic)	--	9.0E-02	1.8E+00
Naphthalene	--	9.0E+00	--
Nickel	2.6E-04	5.0E-02	6.0E+00
Polycyclic aromatic hydrocarbons	5.6E-03	--	--
Propylene	--	3.0E+03	--
Propylene oxide	3.7E-06	3.00E+01	3.1E+03
Silver	--	--	--
Toluene	--	3.00E+02	3.7E+04
Xylene	--	7.00E+02	2.2E+04
Zinc	--	3.50E+01	--

Source: CARB/OEHHA, 9-26-2000

### 8.9.2.5 Characterization of Risks from Toxic Air Pollutants

The excess lifetime cancer risk associated with concentrations in air estimated for the MIR location is estimated to be  $0.133 \times 10^{-6}$ . Excess lifetime cancer risks less than  $10 \times 10^{-6}$  are unlikely to represent significant public health impacts that require additional controls of facility emissions. Risks higher than  $10 \times 10^{-6}$  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. Risks associated with pollutants potentially emitted from the facility are presented by exposure pathway in Table 8.9-5. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 8.1-D. As described previously, human health risks associated with emissions from the proposed facility 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 will be significant impacts in any other location in the vicinity of the facility.

**Table 8.9-5.** Summary of excess lifetime cancer risks for the Maximum Impact Receptor.

<b>Increased Lifetime Cancer Risk by Exposure Pathway</b>					
<b>Emission Source</b>	<b>Inhalation of Ambient Air</b>	<b>Soil Ingestion</b>	<b>Dermal Contact with Soil</b>	<b>Ingestion of Garden Fruits and Vegetables</b>	<b>Infant Ingestion of Mother's Milk<sup>2</sup></b>
Total Pathway Risk (Combustion Sources <sup>1</sup> and Cooling Tower)	6.05E-08	1.41E-08	7.92E-09	3.03E-08	2.05E-08
Total Risk	0.133 in one million (70 year exposure)				

<sup>1</sup>Combustion sources include turbines and duct burners.  
<sup>2</sup>Mother's milk risk derived from 44-year exposure scenario.

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 facility. Cancer burden is calculated as the product of excess lifetime cancer risk and the number of individuals at that risk level. A worst-case estimate of cancer burden was calculated based upon the following assumptions.

The MIR concentration was applied to all affected portions of identified census tracts within the one-mile radius area of the site. A detailed listing and map of affected census tracts and year 2000 population estimates are provided in Appendix 8.1-D. Figure 8.10-1 also shows the census tract locations. This procedure results in a conservatively high estimate of cancer burden. The calculated cancer burden for the PPP is 0.001.

The locations of the one-hour and annual MIR highest concentrations are all within a few hundred feet east of the PPP. Please note that the three highest concentrations for each averaging time, per the modeling results, were at the same location.

As described previously, human health risks associated with emissions from the proposed facility 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  $0.133 \times 10^{-6}$ . The estimated cancer burden was 0.001, indicating that emissions from the facility will not be associated with any increase in cancer cases in the previously defined population. As stated previously, the methods used in this calculation considerably overstate the potential cancer burden, further suggesting that facility emissions are unlikely to represent a significant public health impact in terms of cancer risk.

The chronic noncancer hazard quotients associated with concentrations in air estimated for the MIR location were well below one for all target organs. A noncancer hazard quotient less than one is unlikely to represent a significant impact to public health. Chronic noncancer hazard quotients associated with

inhalation of pollutants potentially emitted from the facility are presented in Table 8.9-6. The chemicals providing the largest contribution to noncancer risks associated with facility emissions are acrolein and ammonia, from combustion sources. The chronic noncancer hazard indices associated with non-inhalation exposure pathways are well below one for all target organs. Chronic noncancer hazard indices for non-inhalation exposure pathways are presented in Table 8.9-7. A noncancer reference exposure level (REL) is not available for lead. However, lead exposures are well below typical estimates of average daily exposures estimated for lead (ATSDR 1996).

The acute noncancer hazard quotients associated with concentrations in air are shown in Table 8.9-8. The noncancer hazard quotients for all target organs fall below one. The chemicals providing the largest contribution to acute noncancer health risks are ammonia and acrolein. As described previously, a hazard quotient less than one 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 8.1-D. As described previously, human health risks associated with emissions from the proposed facility 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 will be significant impacts in any other location in the vicinity of the facility.

**Table 8.9-6.** Summary of chronic noncancer hazard quotients (inhalation exposure pathway) for the Maximum Impact Receptor.

Emission Source	Resp	CV/BL	CNS	Target Organ <sup>1</sup>				
				Skin	Repro	Kidn	GI/LV	Immun
Combustion Sources <sup>2</sup> and Cooling Tower	0.0081	<0.0002	<0.0002	0.0045	<0.0002	<0.0002	<0.0001	--
Total, All Pathways	<0.014							

<sup>1</sup>Resp = respiratory  
<sup>2</sup>Combustion sources include turbines and duct burners  
CV/BL = cardiovascular/blood, CNS = central nervous system, Repro = reproductive system, Kidn = renal system, GI/LV = gastrointestinal/liver, Immun = immunological system

**Table 8.9-7.** Summary of chronic noncancer hazard quotients (non-inhalation exposure pathway) for the Maximum Impact Receptor (mg/kg-d).

Chemical	Combustion Sources and Cooling Tower	REL <sup>1</sup> (mg/kg-d)	Hazard Quotient (Total Dose/REL)
Naphthalene	4.62E-08	--	--
PAH (as BaP)	4.20E-09	--	--
Arsenic Compounds	1.29E-09	3.00E-04	4.31E-06
Cadmium Compounds	3.12E-09	5.00E-04	6.24E-06
Lead Compounds	2.59E-09	--	--
Mercury Compounds	9.30E-12	3.00E-04	3.10E-08
Nickel Compounds	--	5.00E-02	--

<sup>1</sup>REL=noncancer reference exposure level.

**Table 8.9-8.** Summary of acute noncancer hazard quotients for the Maximum Impact Receptor.

Emission Source	Target Organ <sup>1</sup>							
	Resp	CV/BL	CNS	Eye	Repro	Kidn	GI/LV	Immun
Combustion Sources <sup>2</sup> and Cooling Tower	0.0998	<0.0001	<0.0001	0.0998	<0.0002	--	--	0.0048
Total Acute Hazard Quotient	<0.205							

<sup>1</sup>Resp = respiratory  
<sup>2</sup>Combustion sources include turbines and HRSG duct burners  
CV/BL = cardiovascular/blood, CNS = central nervous system, Repro = reproductive system, Kidn = renal system  
GI/LV = gastrointestinal/liver, Immun = immunological system

The estimates of excess lifetime cancer risks and noncancer 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 used to extrapolate 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 (i.e., the assumption being that man is 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 (USEPA 1986; USEPA 1996).

An excess lifetime cancer risk of  $10 \times 10^{-6}$  is typically used by the BAAQMD and CEC as a threshold of significance for potential exposure to carcinogenic substances in air. An excess cancer risk level of  $1 \times 10^{-6}$ , which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration (FDA) to use quantitative risk assessment 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” (VSD) has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a recent 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  $1 \times 10^{-6}$  (one-in-one million), which are called *de minimis* risks. *De minimis* risks are historically considered risks of no regulatory concern. Chemical exposures with risks above  $4 \times 10^{-3}$  (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 MIR are less than  $10 \times 10^{-6}$ , and the aggregated cancer burden associated this risk level is less than one excess cancer case. These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the facility emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstate the risks from facility emissions. Based on the results of this risk assessment, there are no significant public health impacts anticipated from emissions of toxic pollutant to the air from the proposed facility.

### 8.9.2.6 Hazardous Materials

Hazardous materials will be used and stored at the facility. The hazardous materials stored in significant quantities on-site and descriptions of their uses are presented in Section 8.5. Use of chemicals at the

proposed facility 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 offsite could result in potential impacts to the public.

The California Health and Safety Code Sections 25531 to 25541 and Code of Federal Regulations (CFR) Title 40 Part 68 under the Clean Air Act establish emergency response planning requirements for listed 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 wide range of hazardous materials. One of the hazardous materials to be used at the facility is aqueous ammonia, which is discussed in Section 8.5.

An offsite consequence analysis was performed to assess potential risks to humans offsite if a spill or rupture of the aqueous ammonia storage tank were to occur; results of this analysis are presented in Section 8.5.

#### **8.9.2.7 Operation Odors**

Small amounts of ammonia used to control oxides of nitrogen (NO<sub>x</sub>) emissions may escape up the exhaust stack but will not produce objectionable odors. The expected exhaust gas ammonia concentration, known as ammonia “slip,” will be less than 10 parts per million (ppm). After mixing with the atmosphere, the concentration at ground level will be far below the detectable odor threshold of 5 ppm that the Compressed Gas Association has determined to be acceptable. Therefore, potential ammonia emissions are not expected to create objectionable odors. Other combustion contaminants are not present at concentrations that could produce objectionable odors.

#### **8.9.2.8 Electromagnetic Field Exposure**

Because the electric transmission line does not travel through residential areas, and based on recent findings of the National Institute of Environmental Health Sciences (NIEHS 1999), electromagnetic field exposures are not expected to result in a significant impact on public health. The NIEH 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 (NIEH 1999).”

#### **8.9.2.9 Summary of Impacts**

Results from an air toxics risk assessment 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<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub> will not significantly impact air quality (Section 8.1). Potential concentrations are below the federal and California standards established to protect public health, including the more sensitive members of the population.

### **8.9.3 Cumulative Impacts**

The health risk assessment for the proposed project indicates that the maximum cancer risk will be approximately 0.133 in one million (verses a significance threshold of 10.0 in one million) 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 will also be less than significant.

## **8.9.4 Mitigation Measures**

### **8.9.4.1 Criteria Pollutants**

Emissions of criteria pollutants will be minimized by applying Best Available Control Technology (BACT) to the facility. BACT for the combustion turbine includes the combustion of natural gas.

The proposed project location is in an area that is designated by the state as nonattainment for ozone and particulate matter (PM). Therefore, all increases in emissions of NO<sub>x</sub>, volatile organic compound (VOC), particulate matter with an aerodynamic diameter less than a nominal 10 micrometers (PM<sub>10</sub>), and sulfur oxides (SO<sub>x</sub>) must be fully offset if emissions exceed specified BAAQMD trigger limits. The combination of using BACT and providing emission offsets as needed may result in no net increase in criteria pollutants. Therefore, further mitigation of emissions is not required to protect public health.

### **8.9.4.2 Toxic Pollutants**

Emissions of toxic pollutants to the air will be minimized through the use of natural gas as the only fuel at the proposed facility. 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

### **8.9.4.3 Hazardous Materials**

Mitigation measures for hazardous materials are presented below and discussed in more detail in Section 8.5. 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 PPP 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 the applicable laws, ordinances, regulations, and standards (LORS).
- Construction of the aqueous ammonia storage system will be in accordance with applicable LORS.

A Risk Management Plan (RMP) for the PPP facility will be prepared prior to commencement of facility operations. The RMP will estimate the risk presented by handling ammonia at the facility. 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, 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 PPP 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 an oily waste collection sump or to the waste water neutralization tank. Also, piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

### 8.9.5 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 this project are identified in Table 8.9-9.

**Table 8.9-9.** Summary of primary regulatory jurisdiction for public health.

<b>LORS</b>	<b>Public Health Concern</b>	<b>Primary Regulatory Agency</b>	<b>Project Conformance</b>
Clean Air Act	Public exposure to air pollutants	USEPA Region IX CARB BAAQMD	Based on results of risk assessment as per CAPCOA guidelines, toxic contaminants do not exceed acceptable levels. (see Section 8.9.2.5) Emissions of criteria pollutants will be minimized by applying BACT to the facility. Increases in emissions of criteria pollutants will be offset as required by BAAQMD rules. (Section 8.1.)
Health and Safety Code 25249.5 <i>et seq.</i> (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	Office of Environmental Health and Hazard Assessment (OEHHA)	Based on results of risk assessment as per CAPCOA guidelines, toxic contaminants do not exceed thresholds that require exposure warnings. (see Section 8.9.2.5)
40 CFR Part 68 (Risk Management Plan)	Public exposure to listed hazardous materials	USEPA Region IX Santa Clara County Office of Emergency Services (OES) City of Santa Clara Fire Department	A vulnerability analysis will be performed to assess potential risks from a spill or rupture of the aqueous ammonia storage tank. (See Section 8.5) An RMP will be prepared prior to commencement of facility operations. (See Section 8.9.4.3)

**Table 8.9-9.** (continued).

<b>LORS</b>	<b>Public Health Concern</b>	<b>Primary Regulatory Agency</b>	<b>Project Conformance</b>
Health and Safety Code Sections 25531 to 25541	Public exposure to listed hazardous materials	Santa Clara County Office of Emergency Services (OES) CARB BAAQMD	A vulnerability analysis will be performed to assess potential risks from a spill or rupture of the aqueous ammonia storage tank. (See Section 8.5)
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 BAAQMD	Based on results of risk assessment as per CAPCOA guidelines, toxic contaminants do not exceed acceptable levels. (see Section 8.9.2.5)

Table 8.9-10 also 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. 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 selection locations within this report where each of these issues is addressed. Points of contact with the primary agencies responsible for public health are identified in Table 8.9-10.

### 8.9.6 Permits Required and Schedule

Agency-required permits related to public health include a Risk Management Plan and Bay Area Air Quality Management District Authority to Construct/Permit to Operate. These requirements are discussed in detail in Sections 8.5 (Hazardous Materials Handling) and 8.1 (Air Quality), respectively.

**Table 8.9-10.** Summary of agency contacts for public health.

<b>LORS</b>	<b>Public Health Concern</b>	<b>Primary Regulatory Agency</b>	<b>Regulatory Contact</b>
Clean Air Act	Public exposure to air pollutants	USEPA Region IX CARB BAAQMD	Gerardo Rios, 415-744-1500 Richard Bode, (916) 323-8413 William deBoisblanc, (415) 749-4990
Health and Safety Code 25249.5 <i>et seq.</i> (Safe Drinking Water and Toxic Enforcement Act of 1986— Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	Office of Environmental Health and Hazard Assessment (OEHHA)	Cynthia Oshita or Susan Long, (916) 445-6900
40 CFR Part 68 (Risk Management Plan)	Public exposure to listed hazardous materials	USEPA Region IX" Santa Clara County Office of Emergency Services (OES)  City of Santa Clara Fire Department (HazMat)	Gerardo Rios, 415-744-1500 Terry Gitlin, (408) 299-3751  David Parker, (408) 615-4961

**Table 8.9-10.** (continued).

<b>LORS</b>	<b>Public Health Concern</b>	<b>Primary Regulatory Agency</b>	<b>Regulatory Contact</b>
Health and Safety Code Sections 25531 to 25541	Public exposure to listed hazardous materials	Santa Clara County Office of Emergency Services (OES) BAAQMD	Terry Gitlin, (408) 299-3751  William deBoisblanc, (415) 749-4990
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 BAAQMD	Richard Bode, (916) 323-8413 William deBoisblanc, (415) 749-4990

### 8.9.7 References

- ATSDR. 1996. *Toxicological Profile for Lead. Update*. Agency for Toxic Substances and Disease Registry.
- CAPCOA. 1993. *Air Toxics “Hot Spots” Program, Revised 1992 Risk Assessment Guidelines*. California Air Pollution Control Officers Association. October 1993.
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- 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*, D.G. Hoel, R.A. Merrill and F.P. Perera (eds). Banbury Report 19, Cold Springs Harbor Laboratory.
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- U.S. Environmental Protection Agency (USEPA). 1986. Guidelines for carcinogen risk assessment. Federal Register. 51:33992. September 24, 1986.
- USEPA. 1996. *Proposed Guidelines for Carcinogen Risk Assessment*. Office of Health and Environmental Assessment. EPA/600/P-92/003C. April 1996.