5.9 Public Health

This section presents the methodology and results of the human health risk assessment (HRA) that was conducted to assess the potential public health impacts and exposure associated with airborne emissions from the proposed routine operation of the Mariposa Energy Project (MEP). The quantities of hazardous materials proposed to be stored onsite, a description of their uses, and the potential concerns regarding these materials are presented in Section 5.5, Hazardous Materials Handling. A discussion of the potential concerns associated with electromagnetic field exposure is presented in Section 3.0, Electric Transmission.

5.9.1 Affected Environment

Based on the Environmental Data Resources (EDR) *Offsite Receptor Report* (EDR, 2009), approximately 9,900 residents live within a 6-mile radius of MEP. Per California Energy Commission (CEC) siting regulation Appendix B (g)(9)(E)(i), sensitive receptors include infants and children, the elderly, the chronically ill, and any other member of the general population who is more susceptible to the effects of exposure than the population at large. Therefore, schools (public and private), daycare facilities, convalescent homes, and hospitals are of particular concern. Sensitive receptors within a 6-mile radius of the project site include five schools and twenty-three preschool/daycare facilities. A list of the sensitive receptors located within a 6-mile radius of the project site and a copy of the EDR Receptor Report are presented in Appendix 5.5A. This list was developed from review of the EDR Receptor Report and various internet searches for schools, hospitals, and licensed daycare facilities. The nearest sensitive receptor is Mountain House School at 3950 Mountain House Road, located approximately 1.4 miles east of the project site. The nearest hospital is Sutter Tracy Community Hospital, which is located approximately 9.6 miles to the southeast. The nearest resident is approximately 0.6 miles northeast of the facility along Kelso Road. The nearest business, the Byron Power Cogen Plant, is less than 0.1 miles due north of the site.

Per CEC siting regulation Appendix B (g)(9)I, a search of available health studies concerning the potentially affected populations within a 6-mile radius is required. A search for health studies within 6 miles of the site did not identify any studies that specifically address respiratory illnesses, cancers, or related diseases, nor were any studies identified for eastern Alameda or western San Joaquin counties. However, the California Air Resources Board's (ARB) *Almanac of Emissions and Air Quality* indicates the estimated average excess cancer health risk for residents living in the San Joaquin Air Basin has decreased approximately 50 percent from 1990 to 2000, i.e., from 1,230 to 586 excess cancer cases per million people based on a 70-year lifetime exposure to the annual average toxic air contaminant (TAC) concentrations[1] in the air basin (ARB, 2009). Furthermore, data from the most recent years (2000 to 2005) indicate the trend in average risk has also continued to decline over this period (ARB, 2009).

[1] From Table 5-55 of the ARB Almanac 2009 – Chapter 5: Toxic Air Contaminant Emissions, Air Quality, and Health Risk. The summary information includes available data for the ten TACs posing the greatest known health risk in California, based primarily on ambient air quality data. The annual average concentrations for the ten TACs were based on a stationary source emission inventory developed by ARB in cooperation with affected industries and the air pollution control and air quality management districts as part of AB2588 and ARB developed emission estimates for area-wide and mobile sources.

5.9.2 Environmental Analysis

5.9.2.1 Toxic Air Contaminant Exposure Assessment (Operation Impacts)

Human health risks potentially associated with TAC emissions from the proposed operation of MEP were evaluated. The HRA was conducted using the following guidance:

- *Air Toxics Hot Spots Program Risk Assessment Guidelines* (Office of Environmental Health Hazard Assessment [OEHHA], 2003)
- *Mariposa Energy Facility Dispersion Modeling Protocol* (CH2M HILL, 2009)
- *Guideline on Air Quality Models* (U.S. Environmental Protection Agency [EPA], 2005)
- *ARB Recommended Interim Risk Management Policy for Inhalation-based Residential Cancer Risk* (ARB, 2003)

The HRA modeling was conducted using the ARB *Hotspots Analysis Reporting Program* (HARP, Version 1.4a, July 2008), along with the ARB HARP On-ramp program (Version 1.0, May 2008). The HARP On-ramp tool was used to import the American Meteorological Society/EPA Regulatory Model (AERMOD) air dispersion modeling results into the HARP Risk Module.

The HRA process requires four general steps to estimate health impacts: (1) identify and quantify project-generated emissions; (2) evaluate pollutant transport (air dispersion modeling) to estimate ground-level TAC concentrations at each receptor location; (3) assess human exposure; and (4) use a risk characterization model to estimate the potential health risk at each receptor location. The following sections describe in detail the methods used in this HRA.

5.9.2.1.1 Toxic Air Contaminant Emission Calculations

TAC emissions associated with the project will consist primarily of combustion byproducts produced by the four natural gas-fired combustion turbines and the diesel-fired fire pump. TACs are compounds that have been identified by ARB as pollutants that may pose a significant health hazard.

TAC emission factors for the gas turbines were obtained from the ARB California Air Toxics Emission Factors (CATEF) emission database (ARB, 2008), with the exception of polyaromatic hydrocarbons (PAH). The PAH emission factor was based on two separate source tests (2002 and 2004) at the Delta Energy Center in Pittsburg, California (Avagadro Group, 2002 and 2004). Diesel particulate emission factors for the diesel fire pump were based on vendor estimates. The remaining TAC emission factors for the diesel engines were based on factors published by the Ventura County Air Pollution Control District (VCAPCD, 2001).

The HRA was conducted assuming the combustion turbines would be operated at the maximum scenario of 4,000 hours per year at the maximum heat input rating plus an additional 300 hours per year at the maximum heat input rating for start-up and shutdown emissions. However, based on a CEC review, peaking units in California have on average operated fewer than 600 hours per year (CEC, 2006). Therefore, an analysis that assumes up to 4,000 hours of operation per year plus 300 start-up and shutdown events would result in a conservative estimate of emissions, because the planned operating rates would likely be

significantly less than this amount. The analysis was conducted assuming the diesel fire pump would only operate 4 hours per year for non-emergency use.

A summary of the TAC emissions is presented in Table 5.9-1. The detailed emission calculations for the TACs are provided in Appendix 5.1B.

TABLE 5.9-1
TAC Pollutant Emission Rates Modeled for MEP

		CTG (per turbine)		Diesel Fire Pump *	
Pollutant	**CAS**	**lb/hr**	**lb/yr**	**lb/hr**	**lb/yr**
NH_3	7664417	3.28E+00	1.41E+04	—	—
Acetaldehyde	75070	6.46E-02	2.78E+02	2.95E-03	3.54E-02
Acrolein	107028	8.92E-03	3.83E+01	1.28E-04	1.53E-03
Benzene	71432	6.28E-03	2.70E+01	7.02E-04	8.42E-03
1,3-Butadiene	106990	5.99E-05	2.58E-01	8.19E-04	9.83E-03
Ethyl Benzene	100414	8.45E-03	3.63E+01	4.11E-05	4.93E-04
Formaldehyde	50000	4.33E-01	1.86E+03	6.50E-03	7.80E-02
Hexane	110543	1.22E-01	5.26E+02	1.01E-04	1.22E-03
Naphthalene	91203	7.83E-04	3.37E+00	7.42E-05	8.90E-04
PAHs	1151	6.61E-06	2.84E-02	1.36E-04	1.64E-03
Propylene	115071	3.64E-01	1.56E+03	1.76E-03	2.11E-02
Propylene Oxide	75569	2.26E-02	9.70E+01	—	—
Toluene	108883	3.35E-02	1.44E+02	3.97E-04	4.76E-03
Xylenes	1330207	1.23E-02	5.30E+01	1.60E-04	1.92E-03
Diesel Exhaust PM	9901	—	—	1.63E-02	1.96E-01
Chloro-benzene	108907	—	—	7.53E-07	9.04E-06
Lead	7439921	—	—	3.13E-05	3.75E-04
Manganese	7439965	—	—	1.17E-05	1.40E-04
Mercury	7439976	—	—	7.53E-06	9.04E-05
Nickel	7440020	—	—	1.47E-05	1.76E-04
Arsenic	7440382	—	—	6.03E-06	7.23E-05
Cadmium	7440439	—	—	5.65E-06	6.78E-05
Copper	7440508	—	—	1.54E-05	1.85E-04
Zinc	7440666	—	—	8.44E-05	1.01E-03
HCl	7647010	—	—	7.02E-04	8.42E-03
Selenium	7782492	—	—	8.29E-06	9.94E-05
Cr(VI)	18540299	—	—	3.77E-07	4.52E-06

* The chronic and cancer risks were evaluated based on the annual diesel particulate matter emissions. The acute risk was evaluated based on the individual speciation factors for diesel fired internal combustion engines. Annual emissions were estimated assuming four hours of non-emergency use. Hourly emissions were estimated assuming a maximum of 20 minutes of operation per hour.

5.9.2.1.2 Dispersion Modeling

The AERMOD dispersion model (Version 07026) was used to predict ground-level concentrations of TACs associated with MEP. The AERMOD settings, source parameters, meteorological data, and source definition for the risk assessment were the same as the air

quality impact analysis methodology (Section 5.1). A unit emission rate (i.e., 1 gram/second) was used to model each source, as outlined in the HARP On-ramp program manual.

The maximum hourly impacts were predicted for the 93 degrees Fahrenheit (°F), 50 percent load case, which represents the turbine exhaust parameters associated with the maximum predicted 1-hour impact in Section 5.1. The annual impacts were predicted for the 59°F, base load case, which represents the average annual temperature and load scenario. Detailed modeling source parameters for MEP are presented in Appendix 5.1C.

The discrete receptor grid spacing out to 10 kilometers was similar to the air quality impact analysis modeling methodology. In addition to the discrete receptor grid, the census block receptor locations and sensitive receptors within 6 miles of the facility were also included in the HRA.

5.9.2.1.3 Risk Characterization

The results of the dispersion modeling analysis represent an intermediate product in the HRA process. The HARP On-ramp program was used to convert the AERMOD output files to a format compatible with the HARP model. The HARP model was subsequently used to determine cancer, chronic, and acute health risks.

Cancer risks were evaluated based on the annual TAC ground-level concentrations, inhalation cancer potency, oral slope factor, frequency and duration of exposure at the receptor, and breathing rate of the exposed persons. Cancer risks were estimated using a conservative assumption of 70-year continuous exposure duration for residential and sensitive receptors and a 40-year, 5-day week, 8-hours-per-day exposure duration for commercial/industrial receptors. In addition, for predicted cancer risks where the inhalation pathway is the dominant pathway of cancer risks, the Derived (Adjusted) Method was used for the cancer risk evaluation, based on the *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk* (ARB, 2003).

If a predicted Derived Adjusted cancer risk is greater than one in a million, the cancer burden is calculated for each census block receptor. Cancer burden is defined as the estimated increase in the occurrence of cancer cases in a population resulting from exposure to carcinogenic air contaminants. The population data for census block receptors within 6 miles of the facility would be based on the population information within the HARP database.

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure caused by chemicals accumulating in the body. Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. To assess chronic and acute non-cancer exposures, annual and 1-hour TAC ground-level concentrations are compared with the Reference Exposure Levels (RELs) developed by OEHHA to obtain a chronic or acute hazard index. The REL is a concentration in ambient air at or below which no adverse health effects are anticipated.

OEHHA/ARB Cancer and Non-Cancer RELs

This HRA included potential health impacts from home-grown produce, dermal absorption, soil ingestion, and mother's milk, as required by OEHHA guidelines (OEHHA, 2003). The inhalation cancer potency, oral slope factor values, and RELs used to characterize health

risks associated with the modeled impacts were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (OEHHA and ARB, 2009), and are shown in Table 5.9-2.

TABLE 5.9-2
Risk Assessment Health Values for Toxic Air Contaminants

Compound	Inhalation Cancer Potency (mg/kg-day) $^{-1}$	Oral Cancer Slope Factor (mg/kg-day) $^{-1}$	Chronic Inhalation Reference Exposure Level (μg/m^3)	Chronic Oral Reference Exposure Level (mg/kg-day)	Acute Inhalation Reference Exposure Level (μg/m^3)
PAHs	3.90E+00	1.20E+01	—	—	—
Xylenes	—	—	7.00E+02	—	2.20E+04
Formaldehyde	2.10E-02	—	9.00E+00	—	5.50E+01
Benzene	1.00E-01	—	6.00E+01	—	1.30E+03
Acetaldehyde	1.00E-02	—	1.40E+02	—	4.70E+02
Propylene Oxide	1.30E-02	—	3.00E+01	—	3.10E+03
Naphthalene	1.20E-01	—	9.00E+00	—	—
Ethyl Benzene	8.70E-03	—	2.00E+03	—	—
1,3-Butadiene	6.00E-01	—	2.00E+01	—	—
Acrolein	—	—	3.50E-01	—	2.50E+00
Toluene	—	—	3.00E+02	—	3.70E+04
Hexane	—	—	7.00E+03	—	—
Propylene	—	—	3.00E+03	—	—
NH3	—	—	2.00E+02	—	3.20E+03
Diesel Exhaust PM	1.10E+00	—	5.00E+00	—	—
Chlorobenzene	—	—	1.00E+03	—	—
Lead	4.20E-02	8.50E-03	—	—	—
Manganese	—	—	9.00E-02	—	—
Mercury	—	—	3.00E-02	1.60E-04	6.00E-01
Nickel	9.10E-01	—	5.00E-02	5.00E-02	6.00E+00
Arsenic	1.20E+01	1.50E+00	1.50E-02	3.50E-06	2.00E-01
Cadmium	1.50E+01	—	2.00E-02	5.00E-04	—
Copper	—	—	—	—	1.00E+02
Zinc	—	—	—	—	—
HCl	—	—	9.00E+00	—	2.10E+03
Selenium	—	—	2.00E+01	—	—
Cr(VI)	5.10E+02	—	2.00E-01	2.00E-02	—

mg/kg-day = milligrams per kilogram per day
μg/m^3 = micrograms per cubic meter

Source: OEHHA/ARB, 2009

Significance Criteria

Cancer Risk. Residential excess 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 is 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 (time or mass), the lower the cancer risk (i.e., a linear, no-threshold model). State and local regulations in California use an excess (i.e., an incremental increase) cancer risk greater than 10 in 1 million as the significant impact level for public health impact assessments. For example, the 10-in-1-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. An excess cancer risk below one in a million is typically considered the de minimus impact level, meaning an excess cancer risk less than one in a million would be less than significant.

Based on Bay Area Air Quality Management District (BAAQMD) Regulation 2, Rule 5, Best Available Control Technology for Toxics (TBACT) shall be applied to any new source of TACs where the excess cancer risk for each individual source is predicted to be greater than one in a million. An Authority to Construct (ATC) or Permit to Operate (PTO) shall be denied if the project risk exceeds a cancer risk of 10 in a million.

Therefore, the predicted health risk values for each individual source, and the project, will be considered less than significant if the incremental increase in cancer risk is less than one in 1 million individuals per source (i.e., each of the four combustion turbine generators and the diesel pump) and the predicted incremental increase in cancer risk is less than 10 in 1 million individuals for the project.

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 TAC below which there would be no impact on human health. The air concentration corresponding to this dose is called the Reference Exposure Level. 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 indexes for each organ system. Based on BAAQMD Regulation 2, Rule 5, a hazard index of less than 1.0 for the entire project is considered to be a less-than-significant health risk. A chronic hazard index less than 0.2 for each individual source would also be considered less than significant. For this HRA, all hazard quotients were summed regardless of target organ.

5.9.2.1.4 Summary of TAC Exposure Assessment Results

A summary of the point of maximum impact (PMI) locations for the increased cancer risk, chronic health index, and acute health index, as well as the maximum predicted public health impacts for worker, residential, and sensitive receptors, have been included in Table 5.9-3 and Table 5.9-4. The results in Table 5.9-3 represent the predicted risk for each individual emission unit while the results in Table 5.9-4 represent the total predicted facility impact. Additionally, the HARP report files were also prepared and submitted to the CEC on compact disc.

TABLE 5.9-3
Health Risk Assessment Summary: Individual Units

Risk	Fire Pump	Turbine 1	Turbine 2	Turbine 3	Turbine 4
Cancer Risk at the PMI[a]	0.76 per million	0.011 per million	0.012 per million	0.011 per million	0.011 per million
Cancer Risk at the PMI[b]	0.59 per million	0.0089 per million	0.0091 per million	0.0089 per million	0.0089 per million
Cancer Risk at the MEIR[b]	0.0026 per million	0.0032 per million	0.0038 per million	0.0046 per million	0.0053 per million
Highest Cancer Risk at a Sensitive Receptor [b]	0.00028 per million	0.0026 per million	0.0025 per million	0.0022 per million	0.0021 per million
Cancer Risk at the MEIW	0.0018 per million	0.00042 per million	0.00047 per million	0.00056 per million	0.00063 per million
Chronic Hazard Index at the PMI	0.00037	0.00023	0.00023	0.00023	0.00023
Resident Chronic Hazard Index	0.0000017	0.000082	0.000096	0.00012	0.00014
Worker Chronic Hazard Index	0.0000059	0.000058	0.000065	0.000077	0.000087
Chronic Hazard Index at Sensitive Receptor	0.00000018	0.000067	0.000063	0.000057	0.000053
Acute Hazard Index at the PMI	0.068	0.016	0.016	0.015	0.016
Resident Acute Hazard Index	0.0068	0.0055	0.0055	0.0055	0.0055
Worker Acute Hazard Index	0.034	0.0040	0.0040	0.0039	0.0039
Acute Hazard Index at Sensitive Receptor	0.00083	0.0010	0.0010	0.0011	0.0011

[a] Cancer risk values represent the OEHHA Derived Methodology.
[b] Risk values represent the Derived Adjusted Methodology

As presented in Table 5.9.3, the maximum incremental cancer risk at the PMI for an individual unit is associated with the diesel fire pump emissions and is approximately 0.76 in a million.[2] The maximum incremental cancer risk at the PMI for each individual turbine is considerably lower at approximately 0.012 in a million. The maximum impact associated with the diesel fire pump emissions is located along the northeast facility fence line. The maximum exposed individual resident (MEIR), which is approximately 1,000 meters northeast of MEP, is predicted to be 0.0053 in a million (Derived Adjusted) and the predicted incremental increase in cancer risk for the maximum exposed individual worker (MEIW), which is located only 50 meters north of MEP, is predicted to be 0.0018 in a million (Derived Adjusted) for the individual units. The predicted incremental increase in cancer risk at the maximum exposed sensitive receptor is predicted to be 0.0026 in a million. Overall, the maximum predicted incremental increase in cancer risks for the MEIR, MEIW and the sensitive receptors are well below the individual source significance threshold of one in a million. Therefore, based on BAAQMD Regulation 2, Rule 5, the predicted incremental increase in cancer risk from each individual unit will be less than significant and TBACT will not be required.

The maximum chronic hazard index increment for an individual source at the PMI is predicted to be 0.00037. The maximum impact is located along the northeast facility fence line. The predicted chronic index is well below the BAAQMD individual source significance threshold of 0.2. Therefore, the predicted impact from each individual unit will be less than significant and TBACT will not be required.

A risk analysis was also performed to evaluate the potential facility-wide impacts. The potential health impacts at the PMI, the MEIR, the MEIW, and sensitive receptors resulting from the operation of the proposed facility are summarized in Table 5.9-4.

It should be noted that the maximum impacts reported in Table 5.9-4 represent the maximum predicted impacts at one receptor from all sources combined. In contrast, the maximum impacts reported for each individual source in Table 5.9-3 may occur at different receptors. For example, the PMI associated with the fire pump emissions in Table 5.9-3 is predicted to occur at receptor number 161 but the PMI associated with Turbine 1 is predicted to occur at receptor number 532. Therefore, the facility totals in Table 5.9-4 should not be directly compared to the results presented in Table 5.9-3. A complete summary of the individual and facility impacts and their respective receptor locations are included in Appendix 5.9A.

The predicted incremental increase in cancer risk at the PMI associated with the proposed facility is approximately 0.77 in a million.[3] As previously discussed, the maximum impact is primarily associated with the diesel fire pump emissions and is located along the facility's northeast fence line. The predicted incremental increase in cancer risk at the MEIR is predicted to be 0.019 in a million (Derived Adjusted). The receptor location for the MEIR is about 1,000 meters northeast of MEP. The predicted incremental increase in cancer risk for the MEIW, which is located approximately 1,400 meters northeast of MEP, is predicted to be 0.0023 in a million (Derived Adjusted). The predicted incremental increase in cancer risk at the maximum exposed sensitive receptor is predicted to be 0.0097 in a million. The

[2] All cancer risk values presented represent the 70-year OEHHA Derived methodology, unless noted.
[3] All cancer risk values presented represent the 70-year OEHHA Derived methodology, unless noted.

maximum predicted incremental increase in cancer risks for the MEIR, MEIW and the sensitive receptors are below the facility significance threshold of 10 in 1 million. Therefore, based on BAAQMD Regulation 2, Rule 5, the predicted facility-wide incremental increase in cancer risk will be less than significant.

The maximum chronic hazard index increment at the PMI is predicted to be 0.00088. The maximum predicted chronic impact is located approximately 575 meters east of the facility. The maximum acute hazard index at the PMI is predicted to be approximately 0.070. The maximum predicted acute impact is also located along the northeast facility fenceline. The chronic and acute index increments are below the significance threshold of 1.0.

The predicted chronic and acute indices are well below the BAAQMD facility-wide significance threshold of 1.0. Therefore, the predicted impact from the proposed project will be less than significant.

The specific locations for each result are detailed in Appendix 5.9A.

TABLE 5.9-4
Health Risk Assessment Summary: Facility

Risk	Receptor Number	Value	Universal Transverse Mercator (NAD 27)
Cancer Risk at the PMI[a]	161	0.77 per million	(623308, 4183274.70)
Cancer Risk at the PMI[b]	161	0.59 per million	(623308, 4183274.70)
Cancer Risk at the MEIR[b]	660	0.019 per million	(624300, 4183600)
Highest Cancer Risk at a Sensitive Receptor [b]	3	0.0097 per million	(625338.14, 4182969.67)
Cancer Risk at the MEIW	40	0.0023 per million	(624670.52, 4183852.70)
Chronic Hazard Index at the PMI	557	0.00088	(623900, 4183200)
Resident Chronic Hazard Index	660	0.00043	(624300, 4183600)
Worker Chronic Hazard Index	40	0.00023	(624670.52, 4183852.70)
Chronic Hazard Index at Sensitive Receptor	3	0.00024	(625338.14, 4182969.67)
Acute Hazard Index at the PMI	161	0.070	(623308, 4183274.70)
Resident Acute Hazard Index	62	0.022	(622838.83, 4178401.55)
Worker Acute Hazard Index	600	0.037	(623300, 4183400)
Acute Hazard Index at Sensitive Receptor	3	0.0051	(625338.14, 4182969.67)

[a] Cancer risk values represent the OEHHA Derived Methodology.
[b] Risk values represent the Derived Adjusted Methodology

5.9.2.2 Uncertainty in the Public Health Impact Assessment

Sources of uncertainty in the HRA include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans. Assumptions used in HRAs are designed to provide sufficient health protection to avoid

underestimation of risk to the public, which may add an additional level of conservativeness in the predicted impacts. Some sources of uncertainty and conservativeness applicable to this HRA are discussed below.

The emissions were developed assuming all equipment would operate at the same time and at the maximum heat input rate. Long-term emissions were estimated assuming the turbines would operate at 100 percent load with inlet air chillers operating for 4,000 hours per year, plus 300 hours of start up and shutdown, and the diesel fire pump would operate 4 hours per year. Under actual operating conditions, the turbines would likely operate less than the modeled hours per year. Consequently, the emissions used for this HRA are likely to be higher than levels that would be experienced during normal operation.

The models used in dispersion modeling contain assumptions that tend to over predict 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). During the transport of pollutants from sources to receptors, none of the material was assumed to be removed through chemical reaction or to be lost at the ground surface through reaction, gravitational settling, or turbulent impaction. In reality, these mechanisms work to reduce the level of pollutants remaining in the atmosphere.

The long-term exposure characteristics assessed in the HRA included the assumption that residents were exposed to turbine and fire pump emissions continuously at the same location for 24 hours per day, 365 days per year, for 70 years. It is extremely unlikely that any person would meet this condition. The conservative exposure assumption tends to over-predict risk estimates in the HRA process.

The toxicity data used in the HRA contain uncertainties due to the extrapolation of 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; thus, the intraspecies variability among humans is expected to be much greater 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.

5.9.2.3 TAC Exposure Assessment (Construction Impacts)

TAC emissions associated with the construction of MEP will consist primarily of combustion byproducts from onsite construction equipment and vehicular miles traveled (VMT) on site, as well as worker and delivery truck VMT to and from the construction site. However, the construction phase is only expected to occur for 14 months and an assessment of the potential health impacts from TACs from the above construction activities are not required by the BAAQMD (Long, 2008). Therefore, an assessment of the potential health impacts from TACs from construction activities were not evaluated as part of this analysis.

5.9.3 Cumulative Effects

Mariposa Energy requested a list of projects that are within a 6-mile radius of MEP and are either currently in the permitting process, undergoing California Environmental Quality Act review, or recently receiving an authority to construct permit from either BAAQMD or the

San Joaquin Valley Air Pollution Control District (SJVAPCD). Both districts were also provided the coordinates for the MEP turbine exhaust stacks.

BAAQMD has responded that three applicants have proposed projects within 6 miles of MEP. These projects include the East Altamont Energy Center and the Midway Power, LLC Project, as well as several individual projects proposed by Waste Management of Alameda County. These projects will be evaluated for incorporation into the cumulative public health impact assessment.

Mariposa Energy will continue to work with SJVAPCD to identify applicable sources. Once the source lists are received, the sources will be provided to the CEC for review and comment on the appropriateness of excluding specific sources (e.g., sources with negligible emissions or administrative permit amendments with no increase in air emissions), a cumulative public health impact analysis will be prepared using the methodology presented in the Air Dispersion Modeling Protocol within 60 days of receipt of the necessary data from the air districts. A copy of the Dispersion Modeling Protocol is provided in Appendix 5.1D.

5.9.4 Mitigation Measures

5.9.4.1 Criteria Pollutants

The results of the air dispersion modeling presented in Section 5.1, Air Quality, concluded that MEP emissions will not cause or contribute to the violation of the ambient air quality standards (either National Ambient Air Quality Standards [NAAQS] or California Ambient Air Quality Standards) for those pollutants for which the area is designated as attainment. These standards are intended to protect the general public with a wide margin of safety. Therefore, MEP is not expected to have a significant impact on public health from emissions of criteria pollutants. For those criteria pollutants (and their precursor pollutants) where the ambient air quality standards are categorized as non-attainment, mitigation will be provided to reduce the impacts to less-than-significant levels (see Section 5.1). The proposed facility will also include emission-control technologies necessary to meet the required emission standards specified for criteria pollutants under BAAQMD rules.

5.9.4.2 TAC Pollutants

As presented in Section 5.9.3, the maximum incremental increase in the cancer risk predicted at the point of maximum impact, MEIR, and MEIW are 0.59, 0.019, and 0.0023 in a million, respectively. The maximum chronic and acute hazard indices are 0.00088 and 0.070, respectively. These levels are below the significance thresholds for cancer risk of 10 in 1 million, and/or the chronic and acute hazard index of 1.0. Therefore, mitigation measures are not required for TAC emissions from MEP.

5.9.5 Laws, Ordinances, Regulations, and Standards

An overview of the relevant laws, ordinances, regulations, and standards (LORS) that affect public health and the conformity of the project to each of the LORS are identified in Table 5.9-5.

TABLE 5.9-5
Laws, Ordinances, Regulations, and Standards for Public Health

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Title 40 CFR, Part 63	Establishes national emission standards to limit emissions of hazardous air pollutants (HAPs, or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established) from facilities in specific categories.	BAAQMD, with EPA Region IX oversight	The estimated annual MEP HAP emissions are less than the major source thresholds for HAPs (10 tons per year for any one pollutant or 25 tons per year for all HAPs combined). Therefore, National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations do not apply.
State			
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	BAAQMD with oversight from ARB/OEHHA	An estimate of TAC emissions and associated risk was conducted as part of this analysis. (See Conformance description for BAAQMD Regulation 2, Rule 5 (Permits – Toxics New Source Review)
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Provides notification of Proposition 65 chemicals.	OEHHA	MEP will comply with all signage and notification requirements, if required.
Local			
BAAQMD Regulation 2, Rule 5 (Permits – Toxics New Source Review)	The purpose of this rule is to provide for the review of new and modified sources of TAC emissions in order to evaluate potential public exposure and health risk, to mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced.	BAAQMD	TBACT shall be applied to any new or modified source of TACs where the source risk is a cancer risk greater than 1.0 in a million (10^{-6}), and/or a chronic hazard index greater than 0.20. An ATC or PTO will be denied if the facility cancer risk exceeds 10 in a million, or the chronic hazard index exceeds 1.0, or the acute hazard index exceeds 1.0. The predicted MEIR and MEIW cancer risks for the project are 0.019 and 0.0023 in a million, respectively. The maximum predicted chronic and acute hazard indices are 0.00088 and 0.070, respectively. The values are less than the individual source TBACT thresholds of 1.0 in a million (10^{-6}), and/or a chronic hazard index greater than 0.20. The levels are also below the ATC or PTO facility thresholds for cancer risk of 10 in a million and the chronic and acute hazard index of 1.0.

5.9.6 Agencies and Agency Contacts

Table 5.9-6 provides contact information for agencies involved with public health.

TABLE 5.9-6
Agency Contacts for Public Health

Issue	Agency	Contact
Regulatory oversight	EPA Region IX	Gerardo Rios EPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 947-3974
Regulatory oversight	ARB	Michael Tollstrup Project Assessment Branch California Air Resources Board 2020 L Street Sacramento, CA 95814 (916) 322-6026
Permit issuance, enforcement	BAAQMD	Brian Bateman Bay Area Air Quality Management District 939 Ellis Street San Francisco, CA 94109 (415) 771-6000

5.9.7 Permits Required and Permit Schedule

BAAQMD is responsible for issuing the required operating permits related to public health. BAAQMD must issue a preliminary determination of compliance within 180 days after issuing the application completeness determination letter. If all requirements of BAAQMD rules are met, BAAQMD will issue a determination of compliance to the CEC within 240 days after the acceptance of the application as complete. Upon approval by the CEC, a determination of compliance serves as the BAAQMD authority to construct. A permit to operate will be issued by BAAQMD after construction and prior to commencement of operation.

5.9.8 References

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Environmental Data Resources (EDR). 2009. EDR Offsite Receptor Report. March 24.

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OEHHA and ARB. 2009. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. February.

Office of Environmental Health Hazard Assessment (OEHHA). 2003. Air Toxics Hotspots Program Guidance Manual for Preparation of Health Risk Assessments.

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