8.9 Public Health

This section presents the methodology and results of a screening human health risk assessment performed to assess potential impacts and public exposure associated with airborne emissions from the construction and operation of the Humboldt Bay Repowering Project (HBRP). This public health section describes project design features that keep potential impacts below public health-related thresholds of significance (e.g., the use of clean-burning natural gas in the HBRP, with small quantities of ultra-low sulfur California Air Resources Board (CARB) diesel fuel[1] as a pilot and emergency backup fuel). These clean fuels, along with other design and operating aspects, will ensure that the public health impacts of the HBRP will be less than significant. As discussed in Section 8.5, Hazardous Materials Handling, multiple design features will be implemented in the HBRP to ensure that potential public health impacts of a hypothetical accidental release of aqueous ammonia will also be kept below a level of public health-related significance.

Following this introduction, Section 8.9.1 describes the potentially affected public health environment in the vicinity of the HBRP site. Section 8.9.2 discusses the environmental consequences from site clearing for, and construction and operation of, the HBRP. The calculations of non-criteria pollutant emissions and the air dispersion modeling for the screening health risk assessment are presented in Section 8.1, Air Quality and Appendix 8.1C. Section 8.9.3 discusses potential cumulative impacts of the HBRP when combined with other projects being permitted in the area or under consideration. Section 8.9.4 discusses the design features and mitigation measures that will minimize public health impacts. Section 8.9.5 describes the laws, ordinances, regulations, and standards (LORS) relevant to potential public health impacts of the project. Section 8.9.6 describes the public health-related permits required for the HBRP, and Section 8.9.7 provides contact information for the agencies that regulate the project's public health-related aspects. Section 8.9.8 contains references cited or consulted in preparing this section.

Air will be the dominant pathway for potential public exposure to non-criteria pollutants released by the HBRP. Emissions to the air will consist primarily of combustion by-products produced by the 10 reciprocating engine-generators, "black-start" emergency generator, and emergency fire water pump engine. Potential health risks from combustion emissions will occur almost entirely by direct inhalation. To be conservative, additional pathways for dermal absorption, soil ingestion, and mother's milk ingestion were included in the screening health risk modeling; however, direct inhalation is the dominant exposure pathway. The screening health risk assessment methodology was conducted in accordance with guidance established by the California Office of Environmental Health Hazard Assessment (OEHHA, 2003) and CARB (2005a).

The project will use highly efficient reciprocating engine technology to minimize emissions of pollutants per unit of electric energy generated, and will use an optimized stack height to reduce ground-level concentrations of the emissions, thus reducing potential effects on public health.

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[1] CARB diesel fuel is diesel fuel that meets CARB's standards for low aromatics content, and is regulated to contain no more than 15 parts per million by weight of sulfur, thereby reducing both sulfur dioxide and particulate emissions.

Combustion by-products with established national and California ambient air quality standards (referred to as "criteria pollutants") are addressed in Section 8.1, Air Quality. However, this section discusses potential health risks associated with these substances.

8.9.1 Affected Environment

Because health risks from operation of the HBRP will be below public health significance criteria thresholds, no residential, workplace, or sensitive receptors will be significantly affected. Sensitive receptors are locations where groups of individuals, including infants, children, the elderly, and chronically ill, that may be more susceptible than the general population to health risks from air pollution may be found. Schools, day-care facilities, convalescent homes, and hospitals are of particular concern. A search was conducted for sensitive receptors within 6 miles of the project. Daycare, hospital, nursing home, and school receptors found within 6 miles are listed in Appendix 8.9A, Table 8.9A-1 with their Universal Transverse Mercator (UTM) coordinates. The combined set of all sensitive receptors is shown on Figure 8.9-1. Sensitive receptors within 6 miles of the project are shown in Appendix 8.9A, Figures 8.9A-1 and 8.9A-4 with a scale of 1:36000, and Figures 8.9A-5A and 8.9A-5B with the California Energy Commission (CEC) requested scale of 1:24000.

The area within 10 miles of the project is shown as the circle in Figure 8.9-2. Copies of this map at a scale of 1:24:000 are available on request.

The following project features help to protect public health. The project will use:

- Highly efficient reciprocating internal combustion engine technology capable of dispatching power in 16.3-megawatt (MW) increments to allow fast-start (cycling) and load following capability while maintaining high efficiency (i.e., low heat rate) and minimizing fuel consumption
- Clean-burning natural gas and CARB diesel fuels, to minimize air emissions
- Low sulfur fuels, which reduces sulfate fine particulate and sulfur dioxide generation
- Advanced reciprocating engine combustion technology, minimizing the amount of fuel needed to produce electricity and the associated air emissions
- Selective catalytic reduction (SCR) technology to control oxides of nitrogen emissions (NO_x)
- Oxidation catalyst technology to control carbon monoxide emissions and to reduce emissions of toxic air contaminants
- Optimized stack design to reduce ground-level concentrations of exhaust pollutants below public health-related significance thresholds

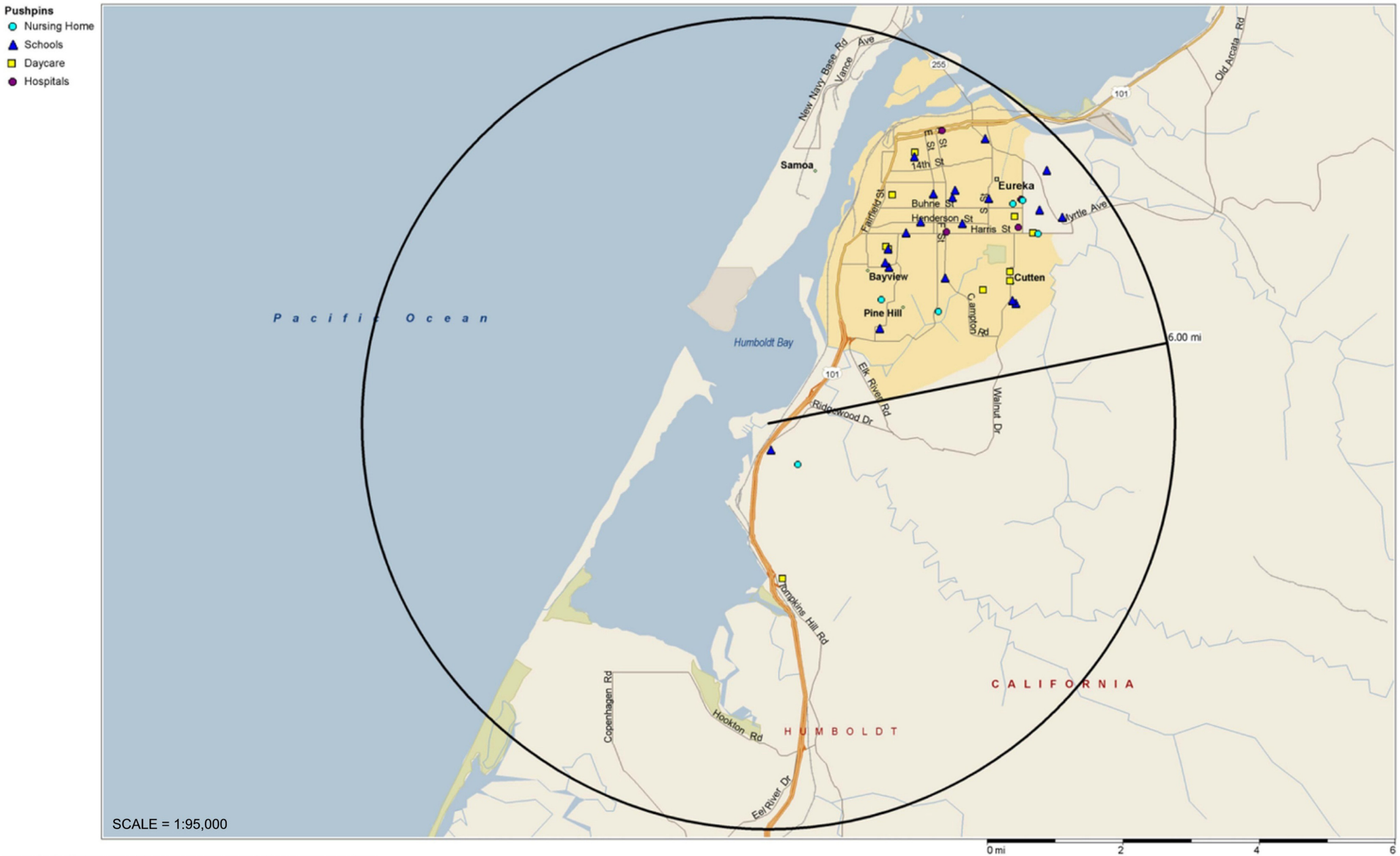

FIGURE 8.9-1
SENSITIVE RECEPTORS WITHIN 6 MILES OF HBRP
HUMBOLDT BAY REPOWERING PROJECT

CH2MHILL

PO062006001SAC figure_8.9-1.ai 09/15/06 tdaus

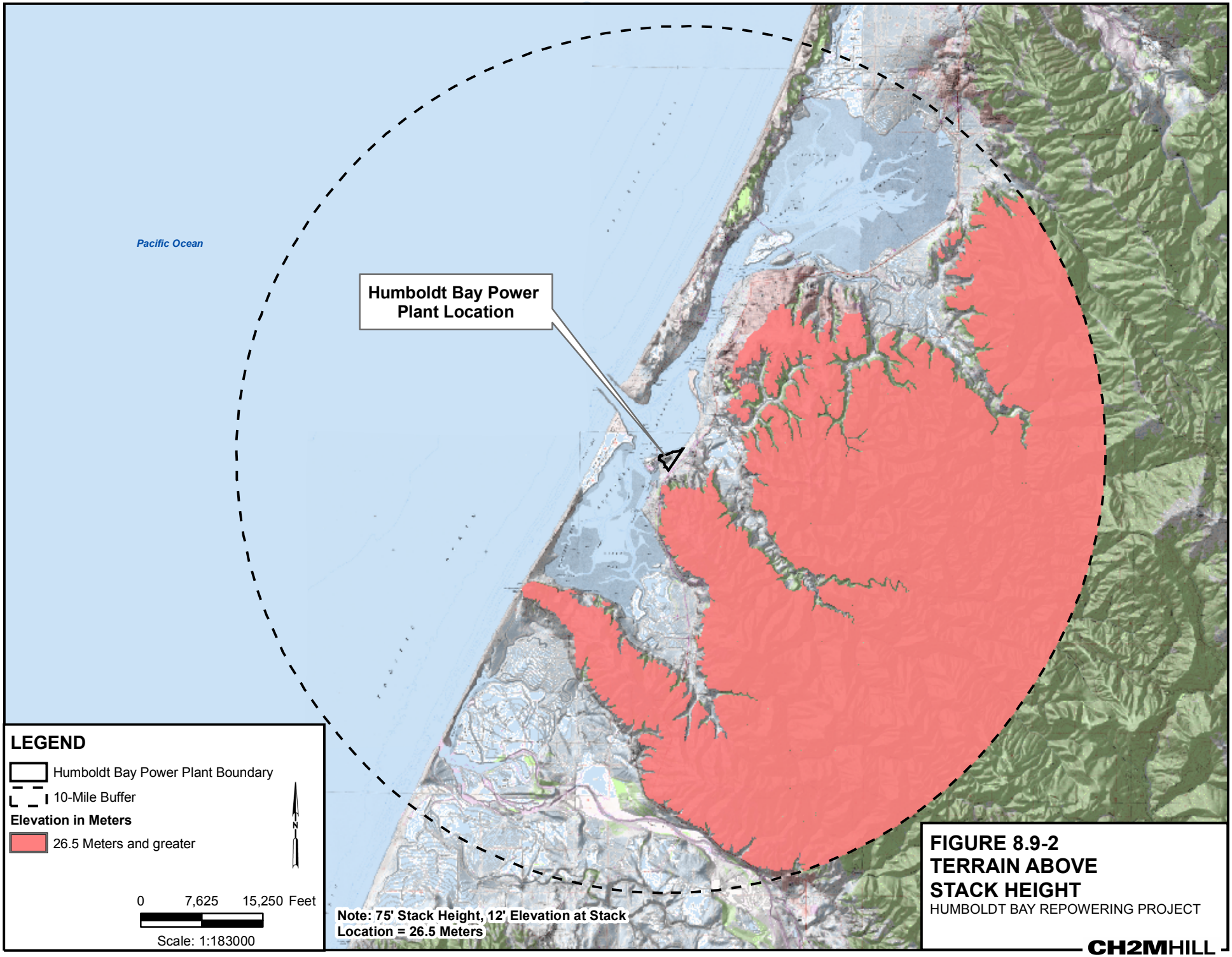

FIGURE 8.9-2
TERRAIN ABOVE STACK HEIGHT
HUMBOLDT BAY REPOWERING PROJECT

CH2MHILL

PO062006001SAC figure_8.9-2.ai 09/18/06 tdaus

Air quality and health risk data presented by CARB in the 2006 Almanac of Emissions and Air Quality for the North Coast Air Basin show that from 2000 through 2005, the annual emissions for five of the top seven toxic air contaminants (TACs) have decreased while emissions of diesel exhaust particulate and methylene chloride, a laboratory solvent, have increased (see Table 8.9-1). Overall, there has been a large decrease in emissions of TACs in the North Coast Air Basin over the last 5 years, principally related to reductions in emissions from gasoline-fueled motor vehicles.

TABLE 8.9-1
Top Non-criteria Pollutants Emitted by All Sources in the North Coast Air Basin

TAC	Annual Emissions (tons/yr)		
	2000	2005	Increase (Decrease), 2000 to 2005
Diesel particulate matter (PM)	549	606	57
Formaldehyde	623	471	(152)
Benzene	660	255	(405)
Acetaldehyde	279	254	(25)
1,3-Butadiene	136	77	(59)
Perchloroethylene	168	74	(94)
Methylene chloride	48	51	3
Total	2,463	1,788	(675)

8.9.2 Environmental Consequences

This section is organized to discuss the sources and kinds of air emissions associated with construction and operation of the HBRP (see Section 8.1, Air Quality), the methodology used in health risk assessment, and the results of the assessment of potential health risks from the project. Other potential public health risks associated with the HBRP are discussed in different sections of the Application for Certification (AFC) as follows:

- Potential exposure to hazardous materials generated by the HBRP is discussed in Section 8.5, Hazardous Materials Handling.
- Potential exposure to the hypothetical accidental release of aqueous ammonia onsite or during offsite transport is discussed in Section 8.5, Hazardous Materials Handling.
- Potential safety and health impacts relative to the work environment of project employees are discussed in Section 8.16, Worker Health and Safety.
- Potential exposure to transmission line electric and magnetic fields is discussed in Chapter 5, Electrical Transmission.

HBRP operational air emissions will consist of combustion by-products from the reciprocating engines and from routine testing and maintenance of the diesel-fueled black-start emergency generator and emergency fire water pump engine. After dispersion to ground-level, inhalation is the main pathway by which air pollutants can potentially cause public health impacts. Other pathways, including ingestion of soil and mother's milk, and

dermal contact, also are evaluated for potential exposure. As discussed below, these health risks are not significant.

Construction emissions are presented in detail in Appendix 8.1D, followed by an air dispersion analysis that demonstrates that project construction will not cause ambient air quality standards to be exceeded. The dominant emission with potential health risk during construction is diesel particulate matter from combustion of diesel fuel in construction equipment (e.g., cranes, dozers, excavators, graders, front-end loaders, backhoes). A screening-type health risk calculation in Appendix 8.1C demonstrates that the potential carcinogenic risk of diesel particulate matter emissions during construction and demolition will be less than significant.

To evaluate potential health risks, the measures of these risks are first described in terms of the types of public health effects and the significance criteria and thresholds for those effects.

8.9.2.1 Significance Criteria

Significance criteria exist for carcinogenic and non-carcinogenic risks, and are discussed separately.

8.9.2.1.1 Carcinogenic Risk

Carcinogenic or cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 70 years). Carcinogens are assumed to have no 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 state regulations, an incremental cancer risk less than or equal to 10 in 1 million due to a project that uses Toxics-Best Available Control Technology (Toxics-BACT) is considered to be a less-than-significant impact on public health. The 10-in-1-million risk level is also 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.

8.9.2.1.2 Non-Carcinogenic Risk

Non-carcinogenic or non-cancer health effects can be either long-term (chronic) or short-term (acute). In evaluating potential non-carcinogenic health risks 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-carcinogenic health risks are measured in terms of a health hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are summed with the resulting totals expressed as health hazard indexes for each organ system. A hazard index of less than or equal to 1.0 is considered to indicate a less-than-significant health risk. For this health risk assessment, all health hazard quotients were summed regardless of target organ.

This method leads to a conservative (upper bound) assessment. RELs used in the health hazard index calculations were those published in the CARB/OEHHA listings dated April 25, 2005 (see Appendix 8.1C).

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 the level 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 health hazard quotients are typically summed to calculate the acute health hazard index. One-hour average concentrations are divided by acute RELs to obtain a health hazard index for health effects caused by relatively high, short-term exposure to air toxics.

8.9.2.2 Construction Impacts

Construction of the HBRP is expected to take approximately 18 months. No significant public health effects are expected during construction. Strict construction practices that incorporate safety and compliance with applicable 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 8.9.4.

Temporary air emissions from construction-related activities are discussed in Section 8.1.2.2.2, and a detailed emission inventory is presented in Appendix 8.1D. Ambient air modeling for particulate matter less than 10 micrometers (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), and NO_x was performed as described in Sections 8.1.2.3 and 8.1.2.4 and Appendix 8.1B. Construction-related emissions are temporary and localized, resulting in no long-term significant impacts to the public.

Small quantities of hazardous waste will be generated during construction 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 onsite 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 Health and Safety).

8.9.2.3 Operations Impacts

Potential human health impacts associated with the project stem from exposure to air emissions from operation of the reciprocating engine power-generation units, and routine testing and maintenance of the emergency black-start engine and emergency fire water pump engine. The non-criteria pollutants emitted from the HBRP include certain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) from the combustion of natural gas, and ammonia from the SCR NO_x control systems. Diesel exhaust particulate matter (DPM) will also be emitted from combustion of diesel fuel during backup fuel testing of the 10 reciprocating engines, and during testing and maintenance of the emergency black-start and fire water pump engines. These pollutants are listed in Table 8.9-2, and their emission rates are presented in Appendix 8.1C.

TABLE 8.9-2
Pollutants Potentially Emitted to the Air from the HBRP

Criteria Pollutants	**Non-criteria Pollutants (Continued)**
Carbon monoxide	Formaldehyde
Oxides of nitrogen	Hexane
Particulate matter	Naphthalene
Oxides of sulfur	Propylene
Reactive organic compounds	Toluene
Non-criteria (Toxic) Pollutants	Xylene
Ammonia	Hexane
Acetaldehyde	Polycyclic aromatic hydrocarbons (PAHs)
Acrolein	Benzo(a)anthracene
1,3-Butadiene	Benzo(a)pyrene
Benzene	Benzo(b)fluoranthene
Dichlorobenzene	Benzo(k)fluoranthene
Diesel Exhaust Particulate	Chrysene
Ethylbenzene	Dibenz(a,h)anthracene
	Indeno(1,2,3-cd)pyrene

Emissions of criteria pollutants will not cause violations of the National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS), as discussed in Section 8.1 (Air Quality). The HBRP will include BACT as required under North Coast Unified Air Quality Management District (NCUAQMD) Rule 220. Contemporaneous emission reductions will be obtained from shutdown of existing Humboldt Bay Power Plant units and emission reduction credits (ERCs) from other stationary sources to sufficiently offset emissions of criteria pollutants from the HBRP, ensuring that total emissions will not increase.

Finally, air dispersion modeling results (see Section 8.1.2.5) show that emissions will not result in ambient concentrations of criteria pollutants that exceed ambient air quality standards. These standards are intended to protect public health, including that of "sensitive" populations such as asthmatics, children, and the elderly. Therefore, the project will not have a significant impact on public health from emissions of criteria pollutants.

The screening health risk assessment of potential impacts associated with emissions of non-criteria pollutants to the air from the HBRP is presented in Appendix 8.1C. The risk assessment was prepared using guidelines developed by OEHHA and the CARB, and implemented in the latest version (1.2a) of the Hot Spots Analysis and Reporting Program (HARP) model (updated 8-26-05) (CARB, 2005b).

8.9.2.4 Public Health Impact Study Methods

Emissions of non-criteria pollutants from the HBRP were estimated using emission factors approved by the CARB and the U.S. Environmental Protection Agency (USEPA). Air dispersion modeling combines the emissions with site-specific terrain and meteorological conditions to estimate short-term and long-term arithmetic mean concentrations in air for use

in the screening health risk assessment, along with health risk parameters (e.g., inhalation cancer potency factors) provided by HARP, Version 1.2a. Health risks potentially associated with the estimated concentrations of non-criteria pollutants in air were characterized in terms of lifetime incremental cancer risk for carcinogenic substances, or acute and chronic health hazard indexes of non-cancer health effects for non-carcinogenic substances.

The Maximum Incremental Cancer Risk (MICR) was evaluated for a hypothetical maximum exposed individual (MEI) at the maximum impact receptor (MIR). The hypothetical MEI is an individual assumed to be located at the MIR point, defined as the public-accessible location where the highest concentrations of air pollutants associated with facility emissions are predicted to occur, based on air dispersion modeling. If there is no significant public health impact associated with concentrations in air at the MIR location, it is assumed that there would not be significant impacts in any other location.

To better place these estimated risks into perspective, it is important to note that the risk assessment methods used to transform emissions into health risk estimates involve a series of conservative assumptions. In this case "conservative" means that a particular assumption is selected or stated in a manner that deliberately overstates the magnitude of health impacts potentially associated with exposure to a chemical substance. Example of conservative assumptions include:

- Selecting meteorological conditions that produce the highest concentration in air when modeling emissions
- Estimating risks based on potential exposure to an individual who is assumed to be located continuously (24 hours/day, 365 days/year, for a 70-year lifetime) at the one point where the highest pollutant concentrations will be found
- Calculating the excess lifetime cancer risk associated with this highly unlikely scenario by statistically extrapolating to humans the maximum cancer incidence as observed from a laboratory study using the most sensitive animal species

When using such estimates to evaluate the risks potentially associated with these emissions, it should be remembered that the actual risks are very likely to be much lower than projected in the risk assessment. The actual risks are highly unlikely to ever approach or exceed the risks projected in the risk assessment.

Health risks potentially associated with concentrations of carcinogenic pollutants in air were calculated as estimated excess lifetime cancer risks. The inhalation excess cancer risk associated with the HBRP is calculated from the ground-level concentration and inhalation cancer potency factor as follows:

$$ECR_{ij} = CONC_{ij} * ICPF_i * BR$$

where: ECR_{ij} = excess cancer risk from carcinogenic substance i at location j

$CONC_{ij}$ = ground-level concentration (in $\mu g/m^3$) of carcinogenic substance i at location j

$ICPF_i$ = inhalation cancer potency factor for carcinogenic substance i (in kg-day/mg)

BR = breathing rate (in L/kg-day)

The total carcinogenic risk at location j is found by summing the contributions from each carcinogenic substance i. The resulting ECR_j can be plotted over all calculated locations.

Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in air was performed by comparing modeled concentrations in air with the RELs. An REL is a concentration in air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer health effects at each receptor location were evaluated by calculating the ratio of the maximum-modeled annual concentration in air at that receptor to the chronic REL for each chronic non-carcinogen, and the ratio of the maximum-modeled hourly concentration in air at that receptor to the acute REL for each acute non-carcinogen. The ratio is referred to as the health hazard quotient for that non-carcinogen. The health hazard quotients for multiple non-carcinogens are added to give the health hazard index (HHI) or total hazard index (THI). The inhalation cancer potency factors 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*, and are presented in Table 8.9-3.

TABLE 8.9-3
Health Risk Assessment Values

Compound	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)
Acetaldehyde	0.010	9.00	--
Acrolein	--	0.06	0.19
Ammonia	--	200	3,200
Benzene	0.10	60	1,300
1,3-Butadiene	0.60	20	--
Diesel PM	1.1	5.0	--
Ethylbenzene	--	2,000	--
Formaldehyde	0.021	3.0	94
Hexane	--	7,000	--
Naphthalene	0.12	9.0	--
PAHs (as BaP for HRA)	3.9	--	--
Propylene	--	3,000	--
Toluene	--	300	37,000
Xylene	--	700	22,000

Source: CARB, 2005a.

8.9.2.5 Characterization of Risks from Toxic Air Pollutants

The estimated potential maximum carcinogenic risk associated with concentrations in air estimated for the MIR location is shown in Table 8.9-4. The maximum carcinogenic risk is below the 10×10^{-6} threshold of significance. As discussed above, the carcinogenic risk shown here is extremely unlikely to occur because it is based on the assumption that an individual remains at the one point where the highest pollutant concentrations will be

found for 70 years, and that the meteorological conditions that caused the highest pollutant concentrations during a single year will persist for all 70 years.

TABLE 8.9-4
Summary of Potential Health Risks

Receptor	Carcinogenic Risk (per million)	Cancer Burden	Acute Health Hazard Index	Chronic Health Hazard Index
MICR at the MIR[a]	6.5		0.39	0.05
MEI (resident)[b]	6.5	0.02	0.39	0.05
Maximum Exposed Worker (MEW)[c]	0.15		0.25	0.003
Significance Threshold Level	10	1.0	1.0	1.0

[a] The MIR location is any place that is accessible to the public, whether for work, school, residence, or leisure.

[b] The MEI for a resident or residential receptor is the highest potential health effect where someone is living, or where the property is zoned such that someone could build a home there.

[c] The MEW for a worker or workplace receptor is the highest potential health effect where someone is working, or where the property is zoned such that someone could work there, not including the employees who work onsite at the source being evaluated (e.g., a substation not owned by the applicant, adjacent to the proposed power plant, is a workplace receptor.)

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 for a screening health risk assessment is conservatively calculated as the product of the MICR and the number of individuals residing at locations between that risk level and a modeled cancer risk of 1 in 1 million (OEHHA, 2003). The resulting cancer burden of 0.02, as shown in Table 8.9-4, is well below the significance threshold of 1.0.

The maximum potential acute non-carcinogenic health hazard index associated with concentrations in air is shown in Table 8.9-4. The acute non-carcinogenic health hazard index for all target organs is below 1.0, the threshold of significance. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 8.1C.

Similarly, the maximum potential chronic non-carcinogenic health hazard index associated with concentrations in air is shown in Table 8.9-4. The chronic non-carcinogenic health hazard index also is below 1.0, the threshold of significance.

The estimates of carcinogenic and non-carcinogenic risks associated with chronic or acute exposures are 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, below which the risk would be zero. Because risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of carcinogenic risks based on the most sensitive species of laboratory animal for extrapolation to humans (i.e., the assumption being that humans are as sensitive as the most sensitive animal species). Therefore, the true risk is not likely to be higher than risks

estimated using inhalation cancer potency factors and is most likely lower, and could even be zero[2].

The analysis of potential cancer risk described in this section employs methods and assumptions generally applied by regulatory agencies for this purpose. Given the importance of assuring protection of public health, these methods and assumptions are highly conservative as follows:

- The analysis includes representative weather data over 5 years to ensure that the least favorable conditions producing the highest ground-level concentration of power plant emissions are included. The analysis then assumes that these worst-case weather conditions, which occurred only once in 5 years, will occur every year for 70 years.
- The power plant is assumed to operate at hourly, daily, and annual emission conditions that produce the highest ground-level concentrations. In fact, the power plant is expected to operate at a variety of conditions that will produce lower emissions and impacts.
- The location of the highest ground-level concentration of power plant emissions is identified and the analysis then assumes that a sensitive individual is at this location continuously over the entire 70-year period. In reality, people rarely live in their homes for 70 years, and even if they do, they leave their homes to attend school, go to work, go shopping, and so on.

The point of using these unrealistic assumptions is to consciously overstate the potential impacts. No one will experience exposures as great as those assumed for this analysis. By determining that even this highly overstated exposure will not be significant, the analysis enables a high degree of confidence that the much lower exposures that actual persons will experience will not result in a significant increase in cancer risk. In short, the analysis ensures that there will not be significant public health impacts at any location, under any weather condition, under any operating condition.

8.9.2.6 Hazardous Materials

Hazardous materials will be used and stored at the facility. The hazardous materials stored in significant quantities onsite 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, if an accidental release migrated offsite, potential impacts to the public could result.

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

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[2] USEPA, 1986.

RMP listed materials proposed to be used at the facility include aqueous ammonia as discussed in Section 8.5.

An offsite consequence analysis will be performed to assess potential risks to offsite human populations if a spill or rupture of one of the two 27,000-gallon aqueous ammonia storage tanks were to occur. The results of this analysis are expected to show that offsite ammonia concentrations do not exceed the CEC's 75 parts per million by volume (ppmv) significance threshold. A protocol for this analysis is included in Appendix 8.5B.

8.9.2.7 Operation Odors

A small amount of ammonia used to control NO_x emissions can "slip" past the SCR catalyst and be emitted from the exhaust stack, but this amount is less than that required to produce an odor offsite. The expected exhaust gas ammonia concentration, known as ammonia "slip," will be limited to 10 ppmv. After mixing with the atmosphere, the concentration at ground level will be far below the detectable odor threshold of 5 ppmv that the Compressed Gas Association has determined to be acceptable, as well as being below the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) and Short-Term Exposure Level (STEL) of 25 and 35 ppmv, respectively (adopted 2003). Therefore, potential ammonia emissions would not create a significant odor. Other combustion contaminants are not present at concentrations that could produce a significant odor.

8.9.2.8 Electromagnetic Field Exposure

The existing electric transmission lines are not part of the HBRP. The project will include additional electric power handling transformers and associated equipment in and connections with the existing 60-kilovolt (kV) Humboldt Bay Power Plant Substation and 115-kV Humboldt Bay Power Plant to Humboldt Substation transmission line as described in Section 2.0, and in more detail in Section 5.0. The HBRP electric power handling equipment does not travel through residential areas, and, based on findings of the National Institute of Environmental Health Sciences (NIEHS, 1999), electromagnetic field (EMF) exposures would not result in a significant impact on public health. The NIEHS report to the U.S. Congress found that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm" (NIEHS, 1999).

8.9.2.9 Summary of Impacts

Results from the screening health risk assessment based on emissions modeling indicate that there will be no significant incremental public health risks from construction or operation of the HBRP. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of nitrogen dioxide (NO_2), CO, SO_2, and PM_{10} would not exceed ambient air quality standards, which protect public health with a margin of safety for the most sensitive subpopulations (Section 8.1.2).

8.9.3 Cumulative Impacts

An analysis of potential cumulative air quality impacts that may result from the HBRP and other reasonably foreseeable projects is required by the CEC. A protocol for performing the

cumulative impacts analysis is presented in Appendix 8.1F. The analysis will be submitted upon receipt of the list of potentially cumulative projects within a radius of 6 miles around the HBRP and their emissions, which will be requested from the NCUAQMD. The cumulative impact analysis determines if the total set of proposed HBRP and foreseeable projects will cause a combined air quality impact that exceeds significance thresholds. In contrast with the approach used to estimate impacts for criteria pollutants, the significance thresholds developed for toxic air contaminants are set sufficiently stringent so as to preclude the potential for significant cumulative impacts. Thus, a separate cumulative impacts analysis for toxic air contaminants is not prepared.

8.9.4 Mitigation Measures

The HBRP would not cause any significant adverse impacts in terms of public health, and, therefore, no mitigation measures are proposed. Project design and operation will incorporate a number of features designed to minimize emissions of toxic air contaminants. These design features and operating practices include:

- Shutting down the existing, less-efficient generating units at Humboldt Bay Power Plant
- Using the most efficient and most appropriate generating technology to generate electricity in a manner that will minimize the amount of fuel needed and thus the emissions of criteria and non-criteria air pollutants
- Using clean fuels (natural gas and CARB diesel)
- Using oxidation catalysts to reduce emissions of carbon monoxide and specific toxic organic pollutants
- Constructing appropriately sized exhaust stacks to minimize ground-level concentrations of exhaust constituents

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 8.9-5. The compliance of the project with each of the LORS applicable to public health is also presented in this table.

TABLE 8.9-5
Laws, Ordinances, Regulations, and Standards

LORS	Public Health Concern	Primary Regulatory Agency	Project Compliance
Clean Air Act	Public exposure to air pollutants	USEPA Region IX CARB NCUAQMD	Based on acceptable risks computed in a health risk assessment that follows CARB/OEHHA guidelines, the project emission rates of non-criteria pollutants are acceptable. Emissions of criteria pollutants will be minimized by applying BACT to the facility, resulting in project ambient levels that would not exceed primary ambient air quality standards, which have been established to protect public health.
Reciprocating Internal Combustion Engine (RICE) Maximum Achievable Control Technology (MACT)	Potential health risks of emitting TACs from RICE	USEPA Region IX	The Wärtsilä reciprocating engine-generators proposed for the HBRP comply with the RICE MACT. (See Section 8.1.5.2.1.3)
Air Toxics Control Measure (ATCM) for Compression Ignition Nonroad Engines	Potential cancer risk and noncarcinogenic chronic health hazard.	CARB	The Wärtsilä reciprocating engine-generators proposed for the HBRP comply with this ATCM. (See Section 8.1.5.2.2.2)
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	The HBRP is proposed within a facility that already has satisfied the requirements of Proposition 65 through an appropriate public warning system of posted signs and published notices.
40 CFR Part 68 (Risk Management Plan)	Public exposure to acutely hazardous materials	USEPA Region IX Humboldt County Health and Human Services Department, Division of Environmental Health (Certified Unified Program Agency)	As discussed in AFC Section 8.5 (Hazardous Materials Handling), an offsite consequence analysis will be performed to assess potential risks from a spill or rupture of the aqueous ammonia storage tank. An RMP will be prepared prior to commencement of facility operations.
Health and Safety Code, Article 2, Chapter 6.95, Sections 25531 to 25541; CCR Title 19 (Public Safety), Division 2 (Office of Emergency Services), Chapter 4.5 (California Accidental Release Prevention Program)	Public exposure to regulated substances	Humboldt County Health and Human Services Department, Division of Environmental Health (Certified Unified Program Agency)	As discussed in AFC Section 8.5 (Hazardous Materials Handling), an offsite consequence analysis has been performed to assess potential risks from a spill or rupture of the aqueous ammonia storage tank. An RMP will be prepared prior to commencement of facility operations.
Health and Safety Code Sections 44360 to 44366 (Air Toxics “Hot Spots” Information and Assessment Act—AB 2588)	Public exposure to toxic air contaminants	NCUAQMD CARB	Based on the non-criteria pollutant emission inventory proposed for the HBRP, toxic air contaminants will not exceed acceptable levels.

8.9.6 Agencies Involved and Agency Contacts

Table 8.9-6 provides contact information for agencies involved with public health.

TABLE 8.9-6
Summary of Agency Contacts for Public Health

Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Public exposure to air pollutants	USEPA Region IX	Gerardo Rios USEPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (916) 972-3974
	CARB	Mike Tollstrup Project Assessment Branch California Air Resources Board 1001 I Street Sacramento, CA 95812 (916) 323-8473
	NCUAQMD	Simona Altman Permit Services Division Manager 2300 Myrtle Avenue Eureka, CA 95501-3327 (707) 443-3093
Public exposure to chemicals known to cause cancer or reproductive toxicity	California Environmental Projection Agency (Cal-EPA), OEHHA	Cynthia Oshita or Susan Long Office of Environmental Health Hazard Assessment 1001 I Street Sacramento, CA 95814 (916) 445-6900
Public exposure to accidental releases of hazardous materials	USEPA Region IX	Deborah Jordan USEPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (916) 947-4157
	California Office of Emergency Services	Moustafa Abou-Taleb Governor's Office of Emergency Services 3650 Schriever Avenue Mather, CA 95655 (916) 845-8741
	Humboldt County Health and Human Services Department, Division of Environmental Health	Jim Clark, Supervisor, CUPA Program Humboldt County Health and Human Services Department Division of Environmental Health 100 H Street, Suite 100 Eureka, CA 95501 (707) 445-6215

8.9.7 Permits Required and Schedule

Agency-required permits related to public health include a Risk Management Plan for hazardous materials, and the NCUAQMD Determination of Compliance (DOC). Upon

approval of the project by the CEC, the DOC serves as the District Authority to Construct. A Permit to Operate will be issued by the NCUAQMD after construction and commencement of operation. These requirements are discussed in detail in Sections 8.1 (Air Quality) and 8.5 (Hazardous Materials Handling).

8.9.8 References

California Air Resources Board (CARB). 2005a. *Consolidated table of OEHHA/ARB approved risk assessment health values*. (http://arbis.arb.ca.gov/toxics/healthval/contable.pdf), August 25.

California Air Resources Board (CARB). 2005b. HARP Model, Version 1.2a, August 26.

California Office of Environmental Health Hazard Assessment (OEHHA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, Cal-EPA, August.

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

U.S. Environmental Protection Agency (USEPA). 1986. *Guidelines for Carcinogenic Risk Assessment,* Federal Register, Volume 51, pages 33992-34003.