8.6 Public Health

This section presents the methodology for and results of the health risk assessment (HRA) performed to address the potential public health impacts associated with the emissions of toxic air contaminants (TACs) and/or hazardous air pollutants (HAPs) from the construction and operation of the proposed Eastshore Energy Center (Eastshore).

Both the State of California and the federal government have identified specific lists of compounds that are to be evaluated for potential effects on public health. These compounds are referred to as "toxic air contaminants" by the Bay Area Air Quality Management District and the California Air Resources Board; "hazardous air pollutants"; and "non-criteria pollutants" by the USEPA. They will be referred to herein as toxic air pollutants. The State of California identifies toxic air pollutants under two specific programs: the Air Toxics Hot Spots Program (AB2588) and the Air Resources Board Toxic Air Contaminant Identification Program (AB1807). The federal list of hazardous air pollutants is presented in Title III of the CAAA of 1990, and consists of a total of 189 specific compounds. It is incorporated by reference in the California lists.

The toxic air pollutants identified in the various programs noted above are known or suspected to cause a variety of health-related problems, including short-term (acute), long-term (chronic), and long-term (carcinogenic) health effects. The primary exposure pathway for these pollutants, as emitted from the proposed facility, would be the air pathway. Potential health risks are estimated using project-specific information in the health risk assessment process.

Section 8.1 (Air Quality) and Appendix 8.1D of the AFC identify toxic air pollutants potentially resulting from the operation of the proposed facility. The primary source of such pollutants at Eastshore will be the exhaust stacks of the reciprocating engine/generator sets. A smaller amount of pollutants will be emitted from the black start diesel engine. Emissions of toxic air pollutants will consist of small quantities of specific pollutants found in the engine exhausts in the form of both gaseous and particulate species.

The HRA performed for the facility consisted of a multiple-pathway assessment using the latest version of the California Air Resources Board Office of Environmental Health Hazard Assessment (CARB/OEHHA) HARP model (Version 1.2a). The HARP model estimates ambient concentrations of identified pollutants at specified receptors using a sophisticated modeling approach, and couples these exposure estimates with standard toxicological values for the pollutants of interest to estimate worst-case cancer risk, chronic non-cancer risk, and acute non-cancer risk. The HARP modeling approach, assumptions, and toxicological data reflect the most current guidance from the involved environmental regulatory agencies.

Cancer risk is the probability or chance of contracting cancer over an average human lifespan of 70 years. Note that cancer risk is defined in the previous sentence in terms of contracting cancer, not cancer mortality probability. Currently, in the United States, the National Cancer Institute estimates that the risk of contracting cancer from all known causes is about 400,000 per million, or about 40 percent. Environmental and occupational exposures, and therefore related cancer risk probabilities, are generally estimated to be only

a small fraction of the total background risk. Notwithstanding the foregoing, environmental and occupational cancer risks are a primary program focus of current regulatory policy because public exposures are considered to be involuntary, and in principle, these exposures can be reduced by regulatory programs.

Non-cancer health effects are classified as either chronic or acute. Chronic effects result from long-term exposures via chemical accumulation in the body over a period of years. Acute effects are caused by brief exposures which typically last no more than 24 hours, but the concentrations involved in acute effects are typically much higher than those involved in manifestation of chronic health effects.

8.6.1 Environmental Setting

8.6.1.1 Project Description, Site Location, and Topography

The Eastshore Energy Center will be a nominal 115.5-megawatt (MW) net intermediate/peaking load facility operating up to 4,000 hours per year using lean burn natural gas-fired reciprocating engine technology. The Eastshore facility will be located at 25101 Clawiter Road in the City of Hayward, Alameda County, California, on a 6.22-acre parcel owned by Eastshore Energy, LLC, the project owner. Major features of the Eastshore project include the following:

- Demolition of the existing site building, foundations, and paved surface,
- Grading of site and installation of new foundations, piping, and utility connections,
- Fourteen (14) nominal 8.4 MW (gross) Wärtsilä model 20V34SG natural gas-fired spark ignited reciprocating engines and generator sets,
- Fourteen (14) state-of-the-art air pollution control systems representing Best Available Control Technology (BACT), one system per each of the 14 engines, consisting of a selective catalytic reduction (SCR) unit for oxides of nitrogen (NO_x) control and an oxidation catalyst unit for carbon monoxide (CO) and precursor organic compounds (POC) control,
- Fourteen (14) approximately 70-foot-tall, 48-inch outside diameter stacks, each with a separate exhaust silencer and continuous emissions monitoring system (CEMS),
- One (1) nominal 225 kilowatt (kW) Caterpillar model C9 ATAAC, diesel fuel oil-fired emergency engine generator set (black start diesel engine) that is USEPA Tier 3-certified. This emergency generator will use CARB ultra-low sulfur diesel fuel.
- One (1) either electric or natural gas-fired heater, used for heating of the natural gas fuel to the reciprocating engines to 25°F above dew point of the gas. If a natural gas-fired heater is ultimately selected, its firing rate will not be more than 7.15 MMBtu/hr heat input. Final selection of heater type will be made during final design.
- An acoustically engineered main building enclosing all 14 engines, with stacks located outside the building,
- A closed-loop cooling system consisting of multiple fan-cooled low-noise radiator assemblies outside of the main engine building,

- Two 10,000-gallon (each) nominal 19 percent aqueous ammonia storage tanks and handling system serving the SCR units,
- One raw water storage tank, approximately 35,000 gallons,
- Miscellaneous ancillary equipment,
- Pre-existing onsite water and wastewater service interconnections,
- Onsite 115 kV switchyard including switchgear and step-up voltage transformers,
- Approximately 1.1-mile 115 kV single-circuit transmission line interconnecting to PG&E's Eastshore Substation,
- Approximately 200-foot offsite natural gas line connection to PG&E Line 153,
- Chain-link security fencing enclosing the facility with a secured entrance on Clawiter Road, and
- 4.65-acre temporary construction laydown and parking area located immediately across Clawiter Road from the Eastshore site on property owned by Berkeley Farms.

The 6.22-acre parcel currently is largely covered with a large industrial building and asphalt paving. The building is not currently being utilized as an industrial facility but was last used as a metal stamping facility for the manufacture of automobile parts. The existing building will be demolished to make room for the new facilities.

Eastshore will minimize emissions and impacts on ambient air quality. Additional environmental benefits include:

- Generation of electricity using clean fuels,
- Utilization of generation technology that minimizes pollutant emissions,
- Use of BACT to control emissions of NO_x, CO, VOC (POC), SO_2, and particulate matter and fine particulate matter (PM_{10}/2.5),
- Reduction of vehicle traffic and related air emissions from previous or anticipated other typical uses of existing buildings,
- Provision of emission reductions for offsets pursuant to the BAAQMD regulations and for meeting the California Environmental Quality Act (CEQA) provisions to mitigate emissions increases, and
- A very low water demand relative to other industrial facilities.

As discussed in Section 8.1 (Air Quality), Eastshore Energy, LLC proposes to construct the Eastshore Energy Center and operate a nominally rated 118 MW (gross) and 115.5 MW (net) intermediate and peaking load power plant in Hayward, California. The site will be located at 25101 Clawiter Road on a 6.22-acre, industrially-zoned site, which is located at the southwest corner of the intersection of the Union Pacific (UP) railroad corridor and Clawiter Road, in the City of Hayward. The parcel is in Section 30, Township 3 South, Range 4 East, in Alameda County. An approximately 4.65-acre parcel immediately across Clawiter Road and just to the south of the site will be used for additional construction laydown and temporary parking.

The topography of the site is essentially flat, with a mean elevation of approximately 23 ft. above mean sea level (AMSL). The site lies approximately 1.85 miles east of the eastern shoreline of South San Francisco Bay. Elevations to the north, west, and south of the site are relatively low, i.e., similar to site elevations. Elevations to the east tend to increase gradually as you move towards the East Bay foothills. Elevations of 100 ft. AMSL or greater are encountered at distances of approximately 3.4 miles from the site. A 1:24000 map showing all nearby terrain exceeding the stack height for the project engines is presented in Figure 8.6-1. Section 2.0 of the AFC (Project Description) presents data on location (maps), plot plans, and process diagrams.

8.6.1.2 Population Data

Several figures representing population and land use information are presented in the following locations:

- Sensitive receptors – Appendix 8.1D, Figure 8.1D-1 presents the sensitive receptors, which goes out to approximately 6 miles in radius.
- Census tract – Appendix 8.1D, Figure 8.1D-2 presents the Alameda County Census Tract 4371, with the population distribution. The site location is within Tract 4371 at a scale of 1:19200. This figure also shows a 6-mile-radius boundary.

Appendix 8.1D contains data on population statistics for all the census tracts within the 3- and 6-mile-radius boundaries, as well as the census data for the maximum impact area.

8.6.1.3 Land Use

According to the Auer land use classification scheme, a 3-km-radius boundary around the proposed site yields a predominately urban classification. This is consistent with the current land use and zoning designation for the site and surrounding area as "industrial (I)." The site is located in the City of Hayward Industrial Corridor, which extends to Hayward Air Terminal to the north, and to the east for about 1 mile. To the west and south of the site lie predominately open lands and municipal properties. The nearest residential area lies approximately 1,100 feet from the site entrance, directly east of the site, adjacent to the west side of the Mt. Eden cemetery complex. The total amount of residential housing in the immediate area is small. The General Plan designation for the site and surrounding area is "west industrial," as the site lies within the West Industrial Planning Area.

8.6.2 Risk Assessment Methodology

8.6.2.1 Overview of Risk Assessment

The standard approach to assessing public health risks has its origins in early documents produced by the National Academy of Sciences. These early documents proposed a four-step assessment process which is still being implemented and used in the current HRA process at both the federal and State of California levels. The four basic assessment elements are (1) hazard identification, (2) exposure estimation or assessment, (3) dose-response assessment, and (4) risk characterization. Appendix 8.1D contains detailed information on the project data, assumptions, and methodology used for each step of the risk assessment process as described above. The following text provides that information in overview format.

8.6.2.2 Risk Assessment Process

Each of the four basic elements of the HRA scheme is discussed below.

8.6.2.2.1 Hazard Identification. Hazard Identification includes first the identification of the toxic air pollutants of concern for a particular project, and then, for a specific air toxic pollutant, involves the evaluation to determine if a hazard exists from exposure to the compound or substance. If a hazard is identified, then further evaluation is performed to establish if the hazard is associated with acute, chronic, carcinogenic, or other adverse health effects.

8.6.2.2.2 Exposure Assessment. Exposure assessment estimates the extent of public exposure to the compound or compounds under evaluation, for which potential cancer risk or acute and/or chronic non-cancer health effects may occur. Exposure assessment couples project-specific emission rates for toxic air pollutants with modeling to estimate the concentration of contaminants present at exposure locations. Exposure estimation is typically accomplished by air dispersion modeling using models approved by various local, state, and federal agencies, e.g., local air district, Air Resources Board, and the USEPA. For purposes of the HRA, dispersion modeling is typically used to establish the maximum one-hour and annual concentrations of each air toxic pollutant at a wide variety of receptor locations. One-hour concentration values are used to assess short-term (acute) health effects, while annual concentration values are used to assess long-term (chronic and carcinogenic) health effects.

8.6.2.2.3 Dose-Response Assessment. Dose-response assessment characterizes the link between exposures and the predicted incidence of an adverse health effect with respect to the exposed population. With respect to carcinogenic risk assessment, the dose-response link is delineated in terms of "potency slope" values that are used to predict the probability of cancer risk associated with an estimated exposure. Cancer potency slope values are generally expressed as the 95th percentile upper confidence limits of the slope of the dose-response curve. These values assume a continuous lifetime exposure to the substance under consideration at a dose of 1 mg/kg body weight per day. For cancer risk, it is assumed that risk is directly proportional to dose, and that there is no threshold (or lower bound) for carcinogenesis.

Dose-response data for non-cancer health effects are derived from animal and human studies that are used to establish acute and chronic Reference Exposure Levels (RELs). These REL values are defined as concentration values at which no adverse non-cancer health effects are expected or predicted to occur. As such, non-cancer acute and chronic health effects are assumed to have thresholds below which no health effects are anticipated. The actual threshold for health effects in the general population is not known with any precision. Typically, the most sensitive health effect is chosen to determine the REL if the substance affects multiple organ systems.

8.6.2.2.4 Risk Characterization. Risk characterization is the final step in risk assessment. Population exposures established via dispersion modeling in the exposure assessment are coupled with potency factors and RELs obtained in the dose-response step to predict cancer risk as well as acute and chronic non-cancer health effects for the target population under consideration. Cancer risk is generally expressed as an occurrence rate per million of exposed population, where cancer risks from multiple carcinogens are considered additive.

Non-cancer health effects are expressed as a Hazard Index (HI); for exposures to multiple non-carcinogen substances, the HI is additive for all substances affecting the same organ system.

8.6.2.3 Air Dispersion Modeling

Subsequent to calculation of emissions, and confirmation of all applicable release parameters, dispersion modeling is used to predict population exposures for the various air toxic pollutants under consideration. Dispersion models are typically classified as "screening" or "refined," depending upon the level of detail built into the model to assess population concentration estimates. Refined models are preferred for use in the HRA process due to the increased level of "robustness" of the internal algorithms used to predict concentration estimates. In addition, refined models typically have the capability to use representative meteorological data sets, which tend to predict more representative and less conservative concentration values. The most widely used refined model for HRA purposes is the USEPA ISCST3 model. The current version of the HARP model incorporates the ISCST3 model (although not the most current version of the ISCST3).

For this assessment, the most current version of ISCST3 (external to the HARP model) was used to establish the locations of the first, second, and third high concentration locations, i.e., the maximum impact receptors (MIRs) for both the one-hour and annual average exposures. These receptor locations were then included as part of the HARP model input, assuring that the MIR locations are evaluated for all applicable health impacts.

8.6.2.4 Emissions Estimation

Table 8.6-1 identifies the toxic air pollutants expected to be emitted from the facility. The table includes notes that between the pollutants listed in the applicable federal, state and local regulatory frameworks.

TABLE 8.6-1
Toxic Air Pollutants Emitted from Eastshore Facility[1, 2, 3]

Constituents			
1-3 Butadiene	Benzo-a-pyrene[4]	Diesel Particulate Matter	Naphthalene[4]
Acenapthene[4,7]	Benzo-a-fluoranthene[4,7]	Ethylbenzene	Nickel
Acenapthylene[4,7]	Benzo-ghi-perylene[4,7]	Fluoranthene[4]	Phenanthrene[4,7]
Acetaldehyde	Benzo-k-fluoranthene[4]	Fluorene[4]	Propylene
Acrolein[6]	Beryllium	Formaldehyde	Pyrene[4,7]
Ammonia[5]	Cadmium	Hexane	Selenium
Anthracene[4,7]	Chromium VI	Indeno-123cd-pyrene[4]	Toluene
Arsenic	Chrysene[4]	Lead	Xylenes
Benzene	Copper	Manganese	Zinc
Benzo-a-anthracene[4]	Dibenz-ah-anthracene[4]	Mercury	

[1] USEPA Hazardous Air Pollutant per Federal Clean Air Act, Title III, Section 112.
[2] California Toxic Air Contaminant per AB2588 Air Toxics Hot Spots Program and the Air Resources Board Toxic Air Contaminant Identification Program AB1807.
[3] California Proposition 65 chemical per California Health and Safety Code 25249.8
[4] These compounds are all polycyclic aromatic hydrocarbons, or PAHs.
[5] Listed under California AB1807 as a Category IIB contaminant, but not a TAC.
[6] The BAAQMD currently does not require acrolein to be included in health risk assessments per the *Air*

TABLE 8.6-1
Toxic Air Pollutants Emitted from Eastshore Facility[1, 2, 3]

Constituents

Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines (June 2005). BAAQMD expressed concerns regarding source testing procedures and the accuracy of source test results.
[7] Compounds with no risk assessment health values specified by OEHHA (cancer potency slope factor, or non-cancer RELs).

Tables 8.6-2 and 8.6-3 show the estimated maximum hourly and annual emissions of all identified toxic air pollutants from the facility. Emission rates for these pollutants have been calculated for the proposed facility processes and equipment, which includes fourteen (14) lean-burn internal combustion engines and one CARB diesel fuel oil-fired emergency generator. Emissions calculation methodology is presented in Section 8.1 (Air Quality) and in Appendix 8.1D. Emissions have been calculated based upon established and approved methods and factors as referenced. The California Air Resources Board CATEF (California Air Toxics Emission Factor) database was used to establish uncontrolled emission factors for all toxic air pollutants of concern.

Because the project is applying Toxics BACT (T-BACT) to the lean-burn engines, a conservative organics reduction factor of 40 percent has been applied to account for the reductions expected due to the presence of the oxidation catalyst. References for this assumption are provided at the end of this section. The risk impact from the black start diesel engine alone, which will be infrequently used, will not exceed one in one million cancer risk or 0.2 chronic hazard index; therefore, T-BACT for the black start diesel engine will not be required. Maximum one-hour and annual emissions values have been used in the risk assessment process to insure that the health effects from the proposed facility are not underestimated. The compounds listed in the table are a subset of those listed in Table 8.6.1. The list includes only those compounds with cancer potency slope factors or non-cancer reference exposure levels as listed by BAAQMD Regulation 2 Rule 5, and consistent with OEHHA and CARB guidance.

8.6.2.5 Sensitive Receptor Identification

Within the general population there are individuals who may be more sensitive to toxic air pollutant exposures. These sensitive populations include, but are not limited to, young children and chronically ill individuals. The regional area surrounding the proposed facility may contain high densities of these types of individuals located at receptors identified as daycare centers, elementary schools, middle schools, high schools, colleges and universities, nursing and convalescent homes, residential daycare facilities, hospitals, etc. These sensitive populations are protected by general assumptions included in the dose-response assessment portion of a HRA, but their identification is essential to ensuring the general public that such populations are being adequately considered in the risk analysis.

TABLE 8.6-2
Maximum Hourly and Annual Toxic Air Pollutant Emissions for the Lean Burn Engines

Toxic Air Pollutant	Uncontrolled Emission Factor Lbs/MMBtu[1]	Max Hour Emissions Lbs/hr[2]	Max Annual Emissions Lbs/yr[2]
1-3 Butadiene	3.60E-04	2.18E-01	8.70E+02
Acetaldehyde	5.19E-04	3.14E-01	1.25E+03
Acrolein[3]	5.78E-05	3.50E-02	1.40E+02
Ammonia	2.72E-02	2.74E+01	1.10E+05
Benzene	2.14E-04	1.29E-01	5.17E+02
Benzo-a-anthracene	5.76E-08	3.49E-05	1.39E-01
Benzo-a-pyrene	2.65E-09	1.60E-06	6.40E-03
Benzo-b-fluoranthene	4.01E-08	2.42E-05	9.70E-02
Benzo-k-fluoranthene	7.68E-09	4.64E-06	1.86E-02
Chrysene	1.40E-08	8.48E-06	3.39E-02
Dibenz-ah-anthracene	2.65E-09	1.60E-06	6.40E-03
Ethylbenzene	6.97E-05	4.22E-02	1.69E+02
Formaldehyde	4.62E-03	2.79E+00	1.12E+04
Indeno-123cd-pyrene	7.03E-09	4.25E-06	1.70E-02
Naphthalene	2.46E-05	1.49E-02	5.95E+01
Propylene	5.27E-03	3.19E+00	1.28E+04
Toluene	2.34E-04	1.42E-01	5.67E+02
Xylenes	6.33E-04	3.83E-01	1.53E+03

[1] CARB-CATEF Database for compounds with chemical potency values (uncontrolled, mean values for source type and category).
[2] Emission values assume that the oxidation catalyst will result in a reduction factor of 40 percent from the uncontrolled emissions. Because the engines are new with state-of-the-art combustion controls and will have oxidation catalyst emission controls for organics, this assumption is highly conservative.
[3] The BAAQMD currently does not require acrolein to be included in health risk assessments, per the *Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines* (June 2005). Based on discussions with BAAQMD and review of BAAQMD information, BAAQMD expressed concerns regarding source testing procedures and the accuracy of source test results. OEHHA also has expressed concerns over the validity of the current CATEF emission rates for acrolein, but has not provided specific guidance to remove it from HRAs. The acrolein emissions have been retained herein for completeness.

TABLE 8.6-3
Maximum Hourly and Annual Toxic Air Pollutant Emissions, Black Start Diesel Engine

Toxic Air Pollutant	Uncontrolled Emission Factor Lbs/1000 gal[1]	Max Hour Emissions Lbs/hr[2]	Max Annual Emissions Lbs/yr[2]
Acetaldehyde	3.47E-03	6.25E-05	1.87E-03
Acrolein[3]	1.07E-03	1.93E-05	5.78E-04
Arsenic	1.60E-03	2.88E-05	8.64E-04
Benzene	1.81E-01	3.26E-03	9.77E-02
Benzo-a-anthracene	9.60E-05	1.73E-06	5.18E-05
Benzo-a-pyrene	7.90E-05	1.42E-06	4.27E-05
Benzo-k-fluoranthene	7.83E-05	1.41E-06	4.23E-05
Cadmium	1.50E-03	2.70E-05	8.10E-04
Chromium VI	1.00E-04	1.80E-06	5.40E-05
Chrysene	1.30E-04	2.34E-06	7.02E-05
Copper	4.10E-03	7.38E-05	2.21E-03
Dibenz-ah-anthracene	8.20E-05	1.48E-06	4.43E-05
Diesel Particulate Matter	5.85E+00	1.05E-01	3.20E+00
Ethylbenzene	6.76E-03	1.22E-04	3.65E-03
Formaldehyde	5.10E-02	9.18E-04	2.75E-02
Hexane	1.39E-03	2.50E-05	7.51E-04
Indeno-123cd-pyrene	8.45E-05	1.52E-06	4.56E-05
Lead	8.30E-03	1.49E-04	4.48E-03
Manganese	3.10E-03	5.58E-05	1.67E-03
Mercury	2.00E-03	3.60E-05	1.08E-03
Naphthalene	1.60E-02	2.88E-04	8.64E-03
Nickel	3.90E-03	7.02E-05	2.11E-03
Propylene	3.41E-01	6.14E-03	1.84E-01
Selenium	2.20E-03	3.96E-05	1.19E-03
Toluene	6.10E-02	1.10E-03	3.29E-02
Xylenes	2.10E-02	3.78E-04	1.13E-02
Zinc	2.24E-02	4.03E-04	1.21E-02

[1] CARB-CATEF Database for organic compounds, Ventura County emission factors for metal compounds (VCAPCD 2001), and manufacturer data for diesel particulate matter. Only compounds with chemical potency values are listed (uncontrolled, mean values for source type and category). Emissions assume maximum 30 hours per year operation at 18 gallons per hr fuel usage rate.
[2]Following CARB guidance, diesel particulate matter emissions are to be used as a surrogate to calculate cancer risk and chronic non-cancer risk from specific compounds emitted from diesel engines (*Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines*, October 2000). Acute non-cancer risk calculations have been made for specific compounds with acute reference exposure levels. See Appendix 8.1D for details on the emission rates input to HARP.
[3] The BAAQMD currently does not require acrolein to be included in health risk assessments, per the *Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines* (June 2005). Based on discussions with BAAQMD and review of BAAQMD information, BAAQMD expressed concerns regarding source testing procedures and the accuracy of source test results. OEHHA also has expressed concerns over the validity of the current CATEF emission rates for acrolein, but has not provided specific guidance to remove it from HRAs. The acrolein emissions have been retained herein for completeness.

Sensitive receptors included in the HRA were derived from the following sources: (1) a sensitive receptor search performed by Environmental Data Resources (EDR) for a radius of 6 miles around the facility site (EDR 2006), and (2) review of available map resources, such as the applicable U.S. Geological Survey (USGS) topographic maps to augment the EDR receptor list. Each of these identified sensitive receptors was included in the HARP dispersion modeling and subsequent HRA analysis. A listing of these receptors is included in Appendix 8.1D. Figure 8.1D-1 shows the location of all identified sensitive receptors within a 6-mile radius of the facility site.

8.6.2.6 Significance Criteria for Health Effects

Table 8.6-4 presents the current significance criteria for both cancer and non-cancer health effects for the State of California and the BAAQMD. Risk assessment results, which are below these significance levels are deemed "not significant." Section 8.6.4 below identifies the laws, regulations, and/or statutes from which these significance levels are derived.

TABLE 8.6-4
Health Effects Significant Threshold Levels

	Significance Thresholds[1]	
Risk Category	**BAAQMD**	**State of California**
Cancer Risk per million	<= 1.0 without T-BACT <= 10.0 with T-BACT	<= 1.0 without T-BACT <= 10.0 with T-BACT
Acute HI	1.0	1.0
Chronic HI	1.0	<=0.2 without T-BACT <=1.0 with T-BACT

[1] See Section 8.6.4 for regulatory references including discussion of T-BACT, which is Best Available Control Technology for air toxics.

As described earlier, cancer risk is generally expressed as an occurrence rate per million of exposed population, where cancer risks from multiple carcinogens are considered additive. Non-cancer health effects are expressed as a Hazard Index; for exposures to multiple non-carcinogen substances, the HI is additive for all substances affecting the same organ system.

Table 8.6-5 presents data on the top ten air toxics in the BAAQMD, based on BAAQMD information, as derived from CARB and BAAQMD publications. This information provides comparative data for the reader for health effects of common pollutants within the Bay Area.

TABLE 8.6-5
Top Ten BAAQMD Toxic Air Pollutants-Summary Data 2004

Compound	Emissions, tons/yr	Maximum Concentration[1]	Predicted Cancer Risk, 10^6
Acetaldehyde	1355	0.74 ppb	4
Benzene	1997	0.372 ppb	34
1-3 Butadiene	414	0.09 ppb	34
Carbon Tetrachloride	0.94	0.10 ppb	25
Hexavalent Chromium	0.10	0.091 ng/m^3	14
Para-Dichlorobenzene	456	0.17 ppb	11
Formaldehyde	3208	1.71 ppb	13
Methylene Chloride	956	0.14 ppb	<1
Perchloroethylene	730	0.04 ppb	1
Diesel PM	4552	1.6 ug/m^3	111

[1] ppb refers to part per billion; ng/m^3 refers to nanograms per cubic meters; µg/m^3 refers to micrograms per cubic meters.

8.6.2.7 Conservative Assumptions Used in the Risk Assessment Process

In order to provide a conservative estimate of health effects, several assumptions were made in the performance of the HRA for the Eastshore facility. These assumptions are as follows:

- The first high annual maximum impact receptor (MIR) location was used with worst-case residential exposure assumptions to establish the proposed project health impacts for cancer risk as well as chronic non-cancer health effects. The MIR represents the point of maximum impact irrespective of whether the location was a residential or worker location. Use of the MIR in this manner results in the probability that cancer or chronic health effects at any other known receptor location will not exceed the MIR values.
- The first high one-hour MIR receptor location was used to establish the proposed project health impacts for all acute non-cancer health effects. The MIR represents the point of maximum impact irrespective of whether the location was a residential or worker location. Use of the MIR in this manner results in the probability that cancer or chronic health effects at any other known receptor location will not exceed the MIR values.
- The MIR locations (both annual average and 1 hr) are located in an area that is zoned commercial. Therefore, the use of the concentrations estimated at the point of maximum impact, in conjunction with residential exposure assumptions to estimate exposure and thus risk, is extremely conservative. Modeled exposure concentrations at the worst-case actual residential location are significantly lower, and thus would result in correspondingly lower residential risk estimates.

As a result, the human health risks predicted at any other receptor location will not be higher than those values predicted for the MIR locations noted above. If there are no significant impacts at the worst-case location, then it is highly unlikely that there would be

significant health impacts at any other known location within the established impact area of the facility.

8.6.2.8 HARP Model

The Hot Spots Analysis and Reporting Program (HARP) software was developed by the California Air Resources Board to implement the most recent OEHHA *Risk Assessment Guidelines*. The software is recommended by CARB for completing refined health risk assessments involving multiple emission sources. HARP integrates the process of inputting facility emissions data and source information, completing air dispersion modeling, and calculating cancer and non-cancer values. Risk calculation scenarios include 70-year, 30-year, and 9-year residential cancer risk; offsite worker cancer risk; chronic non-cancer risk; and acute risk. HARP contains a useful mapping interface for displaying and printing risk isopleths.

The most current version of the CARB/OEHHA HARP model (1.2a, August 2005) was used to perform the HRA. HARP, as currently configured, will not accept an input or output file from the most current version of ISCST3. As such, HARP relies upon a previous version of ISCST3 to generate the population exposure estimates. This difference in dispersion model versions is not expected to result in any significant differences in receptor concentrations as compared to the current version of ISCST3.

8.6.3 Risk Assessment Results

8.6.3.1 Operational Risk Assessment Results

Table 8.6-6 presents a summary of the health risk assessment for the operational phase of the Eastshore facility. These results show that the facility health risks are not considered "significant" with respect to the regulatory criteria applicable to the project. The results both with and without acrolein are shown; as previously noted, the BAAQMD does not currently include acrolein in risk assessments, per the BAAQMD's June 2005 guidance, as conducted under Regulation 2 Rule 5, New Source Review of Air Toxic Contaminants.

TABLE 8.6-6
Operational Health Risk Assessment Summary

Risk Category	Maximum Risk, 14 Lean-Burn Engines	Maximum Risk, 1 Black Start Diesel Engine	Facility Cumulative Maximum Risk[2]	Applicable Significance Threshold
Cancer Risk per Million	8.3	0.50	8.5	<= 10.0 with T-BACT
Acute Hazard Index with acrolein; without acrolein (BAAQMD)[1]	0.65 0.11	0.018 0.018	0.66 0.11	1.0
Chronic Hazard Index with acrolein: without acrolein (BAAQMD)[1]	0.23 0.15	0.0003	0.23 0.15	<=1.0 with T-BACT <=0.2 without T-BACT

[1] Because of concerns regarding source testing procedures, the BAAQMD does not require acrolein to be included in health risk assessments per the *Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines* (June 2005).
[2] The maximum risks from the 14 lean-burn engines (combined) alone, and from the black start diesel engine alone, occur at separate locations. The maximum project cumulative risk location is the same as the location of maximum risk from the 14 lean-burn engines.

Appendix 8.1D contains details of the analysis, including key input and output parameters and printouts of the risk assessment results.

8.6.3.2 Construction Risk Assessment Results

Diesel particulate matter (DPM) was identified as the contaminant of concern with respect to construction activities at the project site. A health risk assessment was completed for DPM emissions from construction equipment. A detailed description of the methods used to calculate maximum screening-level residential and offsite worker cancer risk values are provided in Appendix 8-1E. A summary of the health risks from diesel-fueled construction equipment is provided in Table 8.6-7. Note that the calculated health risk impacts will not be concurrent with the operational health risk impacts described in the previous section.

TABLE 8.6-7
Construction Health Risk Assessment Summary

Risk Category	Facility Values	Applicable Significance Threshold
Max. Cancer Risk per Million	6.7	<= 10.0
Max. Chronic Hazard Index	0.30	1.0

8.6.3.3 Cumulative Risk Impacts

Health risks from the proposed facility processes and equipment have been evaluated and compared to the existing significance thresholds. The facility risks, based on the proposed design and operational characteristics, are not significant.

Because of that result, no further modeling or cumulative analyses were conducted for air toxics impacts.

8.6.3.4 Mitigation of Risk Impacts

BAAQMD Regulation 2 Rule 5 indicates that for projects with an unmitigated risk of greater than 1 in a million cancer burden or 0.2 chronic hazard index, T-BACT must be applied. Once T-BACT is applied, a permit may be issued if the cancer risk is less than or equal to 10 in a million, and the chronic hazard index is less than 1.0.

Eastshore will apply T-BACT for this project. For IC engines of this type, T-BACT consists of the following:

- The use of natural gas as fuel. Other fuels result in higher emissions of toxic air pollutants
- The use of selective catalytic reduction (SCR)
- The use of an oxidation catalyst

Oxidation catalysts typically are expected to provide a significant level of reduction in organics emissions along with their reduction in carbon monoxide emissions.

8.6.3.5 Significant or Unavoidable Adverse Risk Impacts

Based on the results of the health risk assessment, no significant adverse health effects or impacts are anticipated from either the construction or operation of the proposed facility.

8.6.3.6 Hazardous Materials

The facility may use and store, on a periodic basis, materials which may be deemed hazardous. Use and storage of such materials will comply with all applicable regulations and standard practices pertaining to such materials. Normal use and storage of such materials is not expected to result in any significant impacts on public health. In addition, the facility will comply with all applicable regulations pertaining to avoidance and mitigation of hazardous material spills, releases, etc., including but not limited to the CalARP provisions of CCR Title 19, Division 2, Chapter 4.5. Section 8.12 of the AFC presents a detailed discussion on hazardous materials use, storage, and disposal, as well as mitigation measures and compliance with applicable regulations.

8.6.3.7 EMF Exposure

As discussed in Section 5.0, electro-magnetic field exposures are expected to be minimal. The National Institute of Environmental Health Sciences (NIEHS) concluded in 1999 that EMF exposures are not expected to result in a significant impact on public health. In addition, the NIEHS report stated that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm."

8.6.4 Laws, Ordinances, Regulations, and Standards

Table 8.6-8 presents an overview of the various laws, ordinances, and regulations applicable to public health.

Within the BAAQMD permitting process, the facility will be subject to BAAQMD Regulation 2 Rule 5, New Source Review of Air Toxic Contaminants. Regulation 2-5-301 requires that Best Available Control Technology for air toxics be applied to the facility if the unmitigated cancer risk exceeds 1.0 in a million and/or the unmitigated chronic hazard index exceeds 0.2. Once mitigation via T-BACT is applied, Regulation 2-5-302 allows a permit to be issued only if cancer risk is less than or equal to 10 in a million, and the chronic and acute hazard indices are less than or equal to 1.0.

TABLE 8.6-8
Summary of Federal, State and Local LORS Requirements

LORs Citation	Regulating Agency	LORs Requirement	Applicability	Compliance Strategy/Permit Schedule	Conformance (section reference)
Federal Requirements					
Clean Air Act Section 112 (42 U.S. Code section 7412)	USEPA Region IX	Facility must apply MACT if individual HAP is 10 TPY or greater; or total HAPs is 25 TPY or greater	Not applicable; facility does not emit hazardous air pollutants (HAPs) greater than thresholds	NA	8.1
40 CFR 63 Subpart ZZZZ	BAAQMD with USEPA Region IX oversight	National Emission Standards for Hazardous Air Pollutants – for Stationary Reciprocating Internal Combustion Engines	Does not apply to facility as the facility is not a major source of HAPs	NA	NA
State Requirements					
California Clean Air Act, CA Health & Safety Code (H&SC), Section 39650 et seq	BAAQMD with CARB oversight	Limits exposure of the public to toxic air pollutants per programs implemented pursuant to H&SC 39650	Applies based on emissions of toxic air pollutants	Analysis included in AFC; application for Authority to Construct (ATC) will be submitted to BAAQMD within 10 days of AFC. Application of BACT and T-BACT per BAAQMD regulation Reg 2 Rule 5.	8.6
California H&SC, Section 25249.5 et seq	OEHHA	Proposition 65 – public exposure to contaminants known to the state to cause cancer or reproductive effects	Applies based on emission of toxic air pollutants included in Prop 65 list	Facility will comply with all signage and notification requirements, etc.	To be addressed during construction
California H&SC, Section 44300 et seq	BAAQMD	Air Toxics “Hot Spots” Program (AB2588) – requires initial health risk assessment and biennial reporting of TAC/HAP inventory	Applies to this facility as a source of air toxic emissions	Participate in AB2588 risk assessment, inventory and reporting program at District level. Initial HRA included in AFC and application for ATC	8.6

TABLE 8.6-8
Summary of Federal, State and Local LORS Requirements

LORs Citation	Regulating Agency	LORs Requirement	Applicability	Compliance Strategy/Permit Schedule	Conformance (section reference)
California H&SC, Section 41700	BAAQMD	Prohibits discharge of air contaminants that may cause injury or nuisance to the public	Applies to the facility as a source of toxic air pollutants	Refined health risk assessment will be included with BAAQMD application for ATC to demonstrate no nuisance to the public	8.6
19 CCR 2735 et seq, California HSC Article 2 Section 6.95	City of Hayward Fire Department, local California Unified Permitting Agency (CUPA)	California Accidental Release Prevention Program requires CalARP plan to be prepared	All forms of ammonia including aqueous ammonia trigger CalARP per Table 3, 19 CCR 2770, note 5	Eastshore will prepare the requisite CalARP plan in accordance with the regulatory timeframe for a new facility	8.12
Local Requirements					
BAAQMD Reg 2 Rule 2, New Source Review	BAAQMD	NSR Provisions – requires MACT (defined as T-BACT) for major sources of HAPs	Facility is not a major source of HAPs, as no individual HAP exceeds 10 TPY and the combined total is < 25 TPY	BAAQMD application for ATC will be submitted within 10 days of AFC	8.1
Regulation2 Rule 5, Toxic Air Contaminants	BAAQMD	Air Toxics NSR – requires new sources of air toxics to complete health risk assessment and apply T-BACT	HRA requirement 2-5-401 applies to this facility as a source of air toxic emissions. T-BACT requirement 2-5-301 applies based on HRA results of greater than 1.0 in million cancer risk	Refined health risk assessment will be included with BAAQMD application for ATC; T-BACT included	8.6

8.6.5 Jurisdictional Agencies and Contacts

8.6.5.1 Agencies and Contact Information

Table 8.6-9 presents data on the involved agencies, contact information, and the reason why the agency is involved from the standpoint of air toxics and/or hazardous materials.

TABLE 8.6-9
Agencies, Contacts, Jurisdictional Involvement, Required Permits

Agency	Contact	Jurisdictional Area	Permit Status
California Energy Commission (CEC)	Assigned Project Manager Assigned CEC Member 1516 Ninth St. Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the proposed facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
California Air Resources Board (CARB)	Richard Bode Chief, Health and Exposure Assessment Branch 1001 I St. Sacramento, CA 95814 916-323-8413	Oversight of AQMD stationary source permitting and enforcement program. Applicability of state air programs, air toxics exposure assessment and compliance.	CARB staff will provide comments on applicable AFC sections affecting air quality and public health. CARB staff will also have opportunity to comment on draft ATC.
Bay Area Air Quality Management District (BAAQMD)	Brian Bateman Director, Engineering Division 939 Ellis St. San Francisco, CA 94109 415-749-4653	Prepares DOC for CEC. Issues AQMD Permit to Construct and Operate. Primary air regulatory and enforcement agency	DOC will be prepared subsequent to AFC submittal. ATC application will be submitted to AQMD within 10 days of AFC submittal to CEC.
U.S. Environmental Protection Agency, Region IX	Gerardo Rios Chief, Permits Section USEPA Region IX 75 Hawthorne St. San Francisco, CA 94105 415-947-3974	Oversight of all AQMD programs, including permitting and enforcement programs. Applicability of federal air programs, Title III MACT, air toxics exposure assessment and compliance.	USEPA Region IX staff will receive a copy of the DoC. USEPA Region IX staff will have opportunity to comment on draft ATC.
City of Hayward Fire Department	Hugh Murphy HazMat Coordinator, HazMat Division 777 B St. Hayward, CA 94541 510-583-4924	Hazardous Materials Business Plan, HazMat Permit, Fire Code compliance, CalARP	City of Hayward Fire Department will review and approve the CalARP plan that will be required for the Eastshore facility.
Office of Environmental Health and Hazard Assessment (OEHHA)	Cynthia Oshita Manager 1001 I St. Sacramento, CA 95814 916-322-2068	Air toxics exposure assessment and compliance, public exposure to toxic/hazardous materials	OEHHA information is relied upon as references for the conduct of the public health evaluation and for Prop 65 chemical identification.

8.6.5.2 Required Permits and Schedule

The BAAQMD is responsible for providing the California Energy Commission (CEC) with a Determination of Compliance (DoC) for the proposed facility. The BAAQMD DoC will be used in conjunction with the Authority to Construct and Permit to Operate (ATC/PTO) application as the basis for issuance of the BAAQMD ATC/PTO. An ATC/PTO application, which will be comprised of the AFC Air Quality and Public Health sections and appendices plus any required BAAQMD forms and fees, will be submitted to the AQMD within 10 working days after submittal of the AFC to the CEC.

The City of Hayward Fire Department, as the Certified Unified Permitting Agency (CUPA), will be responsible for review and approval of any required California Accidental Release Program (CalARP) plan pertaining to ammonia, which is stored onsite and at quantities greater than the CalARP Table 3 (California only) threshold amounts. Ammonia will not be stored or used on site in amounts exceeding the federal RMP thresholds, and thus the federal USEPA requirements do not apply. Only a CalARP plan will be required to be completed and approved prior to bringing ammonia on site.

References

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