3.8 PUBLIC HEALTH

A health risk assessment (HRA) was conducted to assess the potential impacts of the Project on public health. This section describes the methodology and results of the HRA for the Project. The purpose of the HRA is to evaluate potential public exposure to toxic air pollutant emissions from routine operations. Exposure to criteria pollutants, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), CO, VOC, and PM_{10}, is examined in Section 3.1, Air Quality. A limited number of hazardous materials will be used during normal Project operation, including aqueous ammonia. These are discussed further in Section 3.5, Hazardous Materials.

The details of the Public Health analysis are contained in the following sections: Environmental Baseline (Section 3.8.1), Environmental Consequences (Section 3.8.2), Mitigation Measures (Section 3.8.3), and Consistency with LORS (Section 3.8.4).

3.8.1 Environmental Baseline

The land use within a 3-mile radius of the Project site consists primarily of industrial or commercial facilities interspersed with undeveloped land, and is considered rural for the purposes of conducting the air quality modeling portion of the HRA, per San Diego Air Pollution Control District (SDAPCD) recommendations.

A search was conducted using the internet and the San Diego County Library Catalog to identify available health studies concerning the potentially-affected population. One report was found related to respiratory illnesses, cancers, or related diseases. The report titled *Air Quality in San Diego* (SDAPCD 2002), describes a decrease in incremental cancer risk from approximately 1100 to 700 in one million, based on recorded trends in the data collected at the SDAPCD's Chula Vista air toxic monitoring station from 1992 to 2000. No other pertinent health studies were identified.

The Project's combustion gas turbine stack would exhaust combustion gases at 60 feet above grade elevation. Topographical features within a 10-mile radius that are at elevations equal to or greater than the stack exhaust exit point (i.e., stack height plus grade elevation) are shown in Figure 3.1-1. Topographical features above the stack exhaust point from the black start engine are also shown in Figure 3.1-1.

For purposes of this analysis, sensitive receptors are defined as groups of individuals that may be more susceptible to health risks from a chemical exposure. Schools (public and private), day care facilities, convalescent homes, parks, and hospitals are of particular concern. The nearest sensitive receptor is the Donovan Correctional Facility, located about 1.2 miles northeast of the Project site. The nearest residence is approximately 2,700 feet east from the northeast corner of the Project site. All sensitive receptors located in the United States within a 3-mile radius of the Project site are shown in Figure 3.8-1; however, the health risk assessment approach treated all receptors as sensitive receptors.

3.8.2 Environmental Consequences

This section describes the potential public health risks due to the construction and operation of the Project, and the methodology and results of the HRA. Significant impacts are defined as a maximum incremental cancer risk greater than 10 in 1 million, a chronic total hazard index (THI) over 1 or an acute

THI over 1. Also, uncertainties in the HRA are discussed and other potential health impacts are described.

3.8.2.1 Public Health Impact Assessment Approach

The potential human health risks posed by the Project's emissions were assessed using procedures consistent with the Office of Environmental Health Hazard Assessment (OEHHA) *Air Toxics Hot Spots Program Risk Assessment Guidelines – The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2003) and SDAPCD *Supplemental Guidelines for Submission of Air Toxics "Hot Spots" Program Health Risk Assessments (HRAs)* (SDAPCD 2006). The OEHHA and SDAPCD guidelines were developed to provide risk assessment procedures as required under the Air Toxics Hot Spots Information and Assessment Act of 1987, Assembly Bill 2588 (Health and Safety Code Sections 44360 et seq.). The Hot Spots law established a statewide program for inventorying air toxics emissions from individual facilities, as well as requirements for conducting risk assessment and public notification of potential health risks.

As recommended by the SDAPCD guidelines, this HRA will perform a Tier 1 HRA for the Project. This includes a 70-year lifetime cancer risk assessment, which treats all receptors as residences.

The HRA was conducted in four steps using the Hotspots Analysis and Reporting Program (HARP):

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

Step 1. Hazard identification was performed to determine the potential health effects that may be associated with Project emissions. The purpose was to identify whether specific pollutants that will be emitted from the plant are classified as potential human carcinogens or have been associated with other types of adverse health effects. From the OEHHA and SDAPCD guidelines, a list of pollutants with potential cancer and non-cancer health effects associated with the emissions from specific sources of the Project are presented in Table 3.8-1, Toxicity Values Used to Characterize Health Risks.

TABLE 3.8-1
TOXICITY VALUES USED TO CHARACTERIZE HEALTH RISKS

Compound	Sources of Emissions	Inhalation Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$	Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)
Ammonia	Turbine	--	2.00E+02	3.20E+03
1,3-Butadiene	Turbine & black start engine	6.00E-01	2.00E+01	--
Acetaldehyde	Turbine & black start engine	1.00E-02	9.00E+00	--
Acrolein	Turbine & black start engine	--	6.00E-02	1.90E-01
Benzene	Turbine & black start engine	1.00E-01	6.00E+01	1.30E+03
Ethylbenzene	Turbine & black start engine	--	2.00E+03	--
Formaldehyde	Turbine & black start engine	2.10E-02	3.00E+00	9.40E+01
Hexane	Black start engine	--	7.00E+03	--
Methanol	Black start engine	--	4.00E+03	2.80E+04
Methylene Chloride	Black start engine	3.50E-03	4.00E+02	1.40E+04
Naphthalene	Turbine & black start engine	1.20E-01	9.00E+00	--
PAHs (other than naphthalene)	Turbine & black start engine	3.90E+00	--	--
Toluene	Turbine & black start engine	--	3.00E+02	3.70E+04
Xylenes	Turbine & black start engine	--	7.00E+02	2.20E+04

Notes:

-- = not applicable

mg/kg = milligrams per kilogram

$\mu g/m^3$ = micrograms per cubic meter

REL = reference exposure levels

Step 2. An exposure assessment was conducted to estimate the extent of potential public exposure to Project emissions. Public exposure is evaluated in terms of the predicted short- and long-term ground-level concentrations resulting from Project emissions, the pathway(s) of exposure, and the duration of exposure to the emissions. Dispersion modeling was performed using the ISCST3 model within HARP to estimate the ground-level concentrations near the Project site. The methods used in the dispersion modeling were consistent with the approach described in Section 3.1, Air Quality, and the modeling protocol submitted for the Project (URS 2007). For the ISCST3 modeling, receptors were placed at 25-meter spacing around the entire existing Larkspur Energy Facility fence line and at 100-meter spacing outside the fence out to a distance of 10 kilometers. The HARP simulations also included census receptors out to 10 kilometers, and additional receptors were placed at all sensitive locations (e.g., schools, hospitals, etc.) out to a distance of 3 miles from the Project site. An additional fine receptor grid with 50-meter spacing was not included, since the points of maximum impact for the cancer risk and acute and chronic THIs were all predicted to occur on the property boundary where the spacing between receptors was 25 meters. All receptors are characterized in terms of UTM NAD83 zone 11 coordinates, since this is the only coordinate system that ISCST3 within HARP accepts.

Step 3. A dose-response assessment was performed using the HARP model to characterize the relationship between pollutant exposure and the incidence of an adverse health effect in exposed populations. The dose-response relationship is expressed in terms of potency factors for cancer risk and reference exposure levels (RELs) for acute and chronic non-cancer risks. The OEHHA guidelines provide potency factors and RELs for an extensive list of toxic air contaminants (TAC). Potency factors and RELs are constantly being revised by the OEHHA, and the most recent values were applied in this HRA (Cal/EPA 2005). All exposure pathways available in HARP were included in this analysis, except for drinking water, fish, and dairy cows. For the calculation of cancer risk, the duration of exposure to Project emissions was conservatively assumed to be 24-hours per day, 365-days per year, for 70 years, at all receptors. The cancer risk was calculated in HARP using the "Derived (Adjusted) Method" and the chronic THI was calculated in HARP using the "Derived (OEHHA) Method."

Step 4. Risk characterization was performed to integrate the health effects and public exposure information and provide quantitative estimates of health risks from Project emissions. Risk modeling was performed using HARP to estimate cancer and non-cancer health risks due to emissions from the Project. The HARP model utilizes OEHHA equations and algorithms to calculate health risks based on input parameters such as emissions, "unit" ground-level concentrations, and toxicological data.

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

3.8.2.2 Construction Phase Emissions

Due to the relatively short duration of the Project's construction phase, significant long-term public health effects are not expected. To ensure worker safety during construction, safe work practices will be followed. A detailed analysis of the potential environmental impacts due to criteria pollutant emissions during construction and measures employed to control these emissions is discussed in Section 3.1, Air Quality.

3.8.2.3 Operational Phase Emissions

Project operations were evaluated to determine whether particular substances will be used or generated that may cause adverse health effects when released to the air. The primary sources of potential emissions are the natural-gas-fired CTG and the ammonia slip-stream from the SCR control system used to minimize gas turbine emissions of NO_x. A secondary source of potential emissions from the Project is the natural gas-fired black start engine, which will normally be operated only for short periods in testing mode to ensure operability, if needed or in emergency situations. The substances emitted from these sources (with associated toxicological information) are shown in Table 3.8-1. These potential air toxic species were identified from the *SDAPCD Emission Calculations Procedures* (SDAPCD 2004), which provides air toxic emission factors for each source type that are derived from data in the EPA AP-42 compendium. Table 3.8-1 includes toxicity information on all listed air toxic species associated with natural gas-fired turbines equipped with water injection and SCR, and natural gas-fired 4-cycle lean burn engines without controls for which cancer potency factors and/or chronic or acute RELs have been established. Ammonia emissions associated with potential ammonia slip from the turbine SCR system were also included.

Annual turbine emissions were estimated by assuming that the turbine would operate under full load conditions (100 percent load) for 4,090-hours per year, including startups and shutdowns. The Project will accept permit conditions limiting facility operations of the combustion turbine to no more than this number of operating hours. Turbine stack parameters (i.e., exit temperature and velocity) for the full load 64°F ambient condition were used in the modeling analysis to assess the hourly and annual ground-level impacts and health risks from Project emissions.

For both maximum hourly and annual gas turbine emission rates, the maximum natural gas consumption rate of 474.4 MM (British thermal unit per hour) Btu/hr (higher heated value [HHV]) was used. The black start engine has a rated capacity of 600 horsepower, which equates to a maximum natural gas consumption rate of 5.71 MMBtu per hour. The black start engine is expected to be tested for up to 2 hours every month, with individual tests limited to no more than 30 minute durations. Actual emergency operation of the black start engine is not included in the risk assessment, since these events would only occur for short overlap periods when start-up is underway.

Emission factors for the natural gas-fired turbine and the black start engine were obtained from the SDAPCD Emission Calculations Procedures (SDAPCD 2004). Although the SDAPCD turbine emission factors state they are for equipment with water injection and SCR emission controls, they are based on emission factors from AP-42 for turbines without any controls. Likewise, the black start engine emission factors are based on engines without any emission controls. These emission factors for each contaminant are expressed in units of pounds emitted per million cubic feet (lb/MMcf) of natural gas fuel usage, which were divided by the higher heating value of the natural gas (1,020 Btu/scf) to arrive at an emission factor in pounds per million British thermal units (lb/MMBtu). These emission factors were in turn multiplied by the Btu equivalent of the gas combusted per hour to obtain emissions in units of pounds per hour. The emission factors and estimated maximum hourly and annual turbine emissions are summarized in Table 3.8-2. The emission factors and estimated maximum hourly and annual black start engine emissions are summarized in Table 3.8-3.

TABLE 3.8-2
EMISSION RATES FROM OPERATION OF NATURAL GAS-FIRED COMBUSTION TURBINE

Chemical Species	Emission Factor (lb/MMcf)	Emission Factor (lb/MMBtu)	Maximum Hourly Emissions per Turbine[1]	Annual Emissions Per Turbine[1,2]
			(lb/hr)	(lb/yr)
Ammonia[3]	5 ppm	5 ppm	3.21	1.31E+04
1,3-Butadiene	0.000	3.92E-07	1.86E-04	7.61E-01
Acetaldehyde	0.0408	4.00E-05	1.90E-02	7.76E+01
Acrolein	0.0065	6.37E-06	3.02E-03	1.24E+01
Benzene	0.0122	1.20E-05	5.67E-03	2.32E+01
Ethylbenzene	0.0326	3.20E-05	1.52E-02	6.20E+01
Formaldehyde	0.7242	7.10E-04	3.37E-01	1.38E+03
Naphthalene	0.0013	1.27E-06	6.05E-04	2.47E+00
PAHs (other than Naphthalene)	0.0022	2.16E-06	1.02E-03	4.18E+00
Toluene	0.1326	1.30E-04	6.17E-02	2.52E+02
Xylenes	0.0004386	4.30E-07	2.04E-04	8.34E-01

Notes:

[1] See Appendix F, Public Health Data, for detailed emission calculations. Natural gas fuel heat rate assumed at 1,020 Btu/scf.

[2] Annual emissions calculations based on 4,090 operating hours per year, including startups and shutdowns.

[3] Based on estimated ammonia slip from NOx control (5 parts per million volumetric dry [ppmvd] at 15 percent oxygen).

PAHs = polycyclic aromatic hydrocarbons

lbs/hr = pounds per hour

lbs/yr = pounds per year

lb/MMcf = pounds per million cubic feet

lb/MMBtu = pounds per million British thermal unit

TABLE 3.8-3
EMISSION RATES FROM OPERATION OF NATURAL GAS-FIRED INTERNAL COMBUSTION BLACK START ENGINE

Chemical Species	Emission Factor (lb/MMcf)	Emission Factor (lb/MMBtu)	Maximum Hourly Emissions[1]	Annual Emissions[1,2]
			(lb/hr)	(lb/yr)
1,3-Butadiene	0.27	2.65E-04	7.56E-04	3.63E-02
Acetaldehyde	8.53	8.36E-03	2.39E-02	1.15E+00
Acrolein	0.10	9.80E-05	2.80E-04	1.34E-02
Benzene	0.45	4.41E-04	1.26E-03	6.05E-02
Ethylbenzene	0.04	3.92E-05	1.12E-04	5.38E-03
Formaldehyde	53.86	5.28E-02	1.51E-01	7.24E+00
Hexane	1.13	1.11E-03	3.16E-03	1.52E-01
Methanol	2.55	2.50E-03	7.14E-03	3.43E-01
Methylene Chloride	0.02	1.96E-05	5.60E-05	2.69E-03
Naphthalene	0.08	7.84E-05	2.24E-04	1.08E-02
PAHs (other than naphthalene)	0.03	2.94E-05	8.40E-05	4.03E-03
Phenol	0.02	1.96E-05	5.60E-05	2.69E-03
Toluene	0.42	4.12E-04	1.18E-03	5.64E-02
Xylenes	0.19	1.86E-04	5.32E-04	2.55E-02

Notes:

1. See Appendix F, Public Health Data, for detailed emission calculations. Fuel heat rate assumed at 1,020 Btu/scf.

2. Annual emissions based on 2 hours of test operations per month (24-hours per year).

PAHs = polycyclic aromatic hydrocarbons

lbs/hr = pounds per hour

lbs/yr = pounds per year

lb/MMcf = pounds per million cubic feet

lb/MMBtu = pounds per million British thermal unit

3.8.2.4 Model Input Parameters

The HRA was conducted using worst-case emissions (short and long term) from all sources at the Project. Cancer and chronic non-cancer health effects were estimated using the maximum annual turbine and black start engine emission estimates. Acute non-cancer health effects were estimated using the worst-case maximum hourly emissions for the turbine and black start engine, although it is unlikely that both of these sources would ever operate simultaneously. The maximum hourly emissions in pounds per hour and annual emissions in pound per year were used as input to the HARP model.

Dispersion modeling was performed using the ISCST3 model in HARP and methods consistent with the approach (e.g., building downwash, meteorological data, etc.) described in Section 3.1, Air Quality, and the modeling protocol submitted for the Project (URS 2007). The ISCST3 model uses the turbine and black start engine stack parameters to calculate the (Chi over Q) concentration per unit emissions. HARP then uses this information along with the emission rates (provided in the input file as described above) to calculate ground-level concentrations for each chemical species. Both surface and upper air meteorological data for the years 1992-1995 from Miramar were used in the HRA, per SDAPCD Risk Assessment Guidelines (SDAPCD 2006) for mesa locations. Risk values were modeled for all sensitive receptors in the United States within 3 miles of the Project site and all grid and United States census receptors within 6 miles of the Project, to assess potential health effects at these locations.

Toxicological data, cancer potency factors, and RELs for specific chemicals are built into the CARB HARP model. The pollutant-specific cancer potency factors and RELs used in the HRA are listed in Table 3.8-1. The HARP model uses the toxicological data in conjunction with the other input data described above to perform health risk estimates based on OEHHA equations and algorithms.

3.8.2.5 Calculation of Health Effects

Adverse health effects are expressed as cancer or non-cancer health risks. Cancer risk is typically reported as “lifetime cancer risk.” Lifetime cancer risk is the maximum estimated increased risk of contracting cancer caused by long-term exposure to a pollutant suspected of being a carcinogen. Lifetime cancer risk is calculated by assuming that an individual is exposed continuously to pollutants for 24-hours per day for 70 years. Although the continuous lifetime exposure is unlikely, the goal of this approach is to produce a worst-case estimate of potential cancer risk. Non-cancer risk is typically reported as a THI. The THI is calculated for each target organ as a fraction based on the maximum acceptable exposure level to a pollutant. The acceptable exposure level is generally the level at (or below) which no adverse health effects are expected. The THI is calculated for short- (acute) and long-term (chronic) exposures.

Both cancer and non-cancer risk estimates provided in the HRA represents incremental risks (i.e., risks due to Project sources only) and do not include potential health risks posed by existing background concentrations. The HARP model performs all of the necessary calculations to estimate the potential lifetime cancer risk and THI posed by Project emissions.

3.8.2.6 Health Effects Significance Criteria

Various state and local agencies provide different significance criteria for cancer and non-cancer health effects. For carcinogenic health effects, an exposure to a new emissions source is considered potentially

significant when the predicted incremental lifetime cancer risk of the source exceeds 10 in 1 million (10×10^{-6}). For non-carcinogenic health effects, an exposure that affects each target organ is considered potentially significant when the THI exceeds a value of one.

3.8.2.7 Estimated Lifetime Cancer Risk

The maximum incremental cancer risk resulting from Project emissions is estimated to be 0.968 in 1 million. The maximum cancer risk is located at the eastern boundary of the Project site (receptor located at UTM NAD83 zone 11 coordinates 505,311 m east, 3,603,289 m north). The cancer burden, the estimated increase in the occurrence of cancer cases in a population greater than or equal to 1 in 1 million resulting from exposure to TACs, was not calculated since the maximum cancer risk was predicted to be less than 1 in 1 million at all receptors. The sensitive receptor with highest predicted cancer risk is Ocean Views High School, located approximately 6.8 kilometers west of the Project site (498,384 m east, 3,603,024 m north); the maximum incremental cancer risk at this location was estimated to be 0.033 in 1 million. Table 3.8-4, Estimated Cancer Risk -- Acute and Chronic Total Hazard Indices, presents the results of the HRA for Project operations for cancer, chronic, and acute health risks. All HARP model files are contained in the air quality and public health modeling file DVD that is supplied separately with this Amendment.

TABLE 3.8-4
ESTIMATED CANCER RISK -- ACUTE AND CHRONIC TOTAL HAZARD INDICES

Cancer Risk at Point of Maximum Impact	Chronic Risk at Point of Maximum Impact	Acute Risk at Point of Maximum Impact
0.968 excess risk in 1 million	0.008 total hazard index	3.006 total hazard index

The estimated cancer risk at all locations is well below the significance criteria of 10 in 1 million. Thus, it is concluded that Project emissions, as an increment to emissions at the existing Larkspur Energy Facility, will not pose a significant cancer risk to any populations potentially exposed to these emissions.

3.8.2.8 Estimated Chronic and Acute Total Hazard Indices

The maximum chronic THI resulting from Project emissions is estimated to be 0.008. The location of the maximum estimated chronic THI is at the eastern boundary of the Project site (the receptor is located at UTM coordinates of 505,311 m east, 3,603,289 m north). The sensitive receptor with the highest predicted THI impact is a residence located approximately 1 kilometer east of the Project on Otay Mesa Road (at 506,287 m east, 3,603,366 m north); the maximum chronic THI at this receptor was estimated to be 0.00011.

The maximum acute THI resulting from Project emissions is estimated to be 3.01 at a location on the eastern property boundary (UTM coordinates 505,311 m east, 3,603,289 m north), as shown in Figure 3.8-2, Acute Total Hazard Index Predicted with HARP. Figure 3.8-2 also shows the acute THI isopleth, the area in which HARP predicted an acute THI greater than 1. All receptors with a predicted acute THI greater than 1 are located along the site boundary or within 8 meters of the boundary. This area

encompasses the Project fence line and the southern shoulder of Otay Mesa Road. Members of the public are not expected to be in this area. The sensitive receptor with the highest predicted acute THI impact is a residence located approximately 800 meters east of the facility on Otay Mesa Road (at 506,130 m east, 3,603,366 m north). The maximum acute THI at this location was estimated to be 0.042. Table 3.8-4 presents the detailed non-cancer results of the HRA for Project operations.

The estimated chronic THI is well below the significance criterion of 1. Since members of the public are not expected to use any portion of the area where the estimated acute THI is above the significance criterion of 1, it is concluded that Project emissions, as an increment to emissions at the existing Larkspur Energy Facility, are not expected to pose a significant non-cancer health risk.

3.8.2.9 Cumulative Impacts

A cumulative HRA modeling analysis was performed to include emissions from the existing Larkspur Energy Facility. The two Combustion Turbine Generator (CTG) units at the existing facility (CTG1 and CTG2) are LM-6000 natural gas turbines, similar to the proposed turbine on the Project site (CTG3).

The maximum fuel usage for CTG1 and CTG2 was obtained from the Authority to Construct application, and was used to estimate the air toxic emission rates. Currently, maximum fuel usage per CTG is 463.5 MMBtu/hr (HHV). Both CTG1 and CTG2 can burn fuel oil, but this has never occurred and is not expected to occur in the future; thus emissions were based on burning natural gas only for purposes of this cumulative HRA analysis. Emissions were calculated using the same SDAPCD natural gas-fired turbine emission factors as described above for CTG3. CTG1 and CTG2 are each permitted for up to 5,950 operating hours per year. Ammonia slip is limited by the permit to 10 ppmvd at 15 percent O_2.

The emission factors and estimated maximum hourly and annual CTG1 and CTG2 TAC emissions are summarized in Table 3.8-5.

TABLE 3.8-5
EMISSION RATES FROM OPERATION OF NATURAL GAS-FIRED COMBUSTION TURBINE GENERATORS 1 AND 2

Chemical Species	Emission Factor (lb/MMcf)	Emission Factor (lb/MMBtu)	Maximum Hourly Emissions per Turbine[1]	Annual Emissions Per Turbine[1,2]
			(lb/hr)	(lb/yr)
Ammonia[3]	10 ppm	10 ppm	6.2	3.69E+04
1,3-Butadiene	0.0004	3.92E-07	1.82E-04	1.08E+00
Acetaldehyde	0.0408	4.00E-05	1.85E-02	1.10E+02
Acrolein	0.0065	6.37E-06	2.95E-03	1.76E+01
Benzene	0.0122	1.20E-05	5.54E-03	3.30E+01
Ethylbenzene	0.0326	3.20E-05	1.48E-02	8.81E+01
Formaldehyde	0.7242	7.10E-04	3.29E-01	1.96E+03
Naphthalene	0.0013	1.27E-06	5.91E-04	3.51E+00
PAHs (other than Naphthalene)	0.0022	2.16E-06	1.00E-03	5.95E+00
Toluene	0.1326	1.30E-04	6.03E-02	3.59E+02
Xylenes	0.0004386	4.30E-07	1.99E-04	1.19E+00

Notes:

[1] See Appendix F, Public Health Data, for detailed emission calculations. Natural gas fuel heat rate assumed at 1,020 Btu/scf.

[2] Annual emissions calculations based on 5,950 operating hours per year, including startups and shutdowns.

[3] Based on estimated ammonia slip from NOx control (10 ppmvd at 15 percent oxygen).

PAHs = polycyclic aromatic hydrocarbons

lbs/hr = pounds per hour

lbs/yr = pounds per year

lb/MMcf = pounds per million cubic feet

lb/MMBtu = pounds per million British thermal unit

Stack parameters used in the modeling for CTGs 1 and 2 (stack exit temperature, stack height, stack diameter, stack flow rate or exit velocity) were obtained from the Authority to Construct application and are presented in Section 3.1, Air Quality. The cumulative HRA modeling was performed according to the methodology described in the previous sections to predict the cumulative cancer and non-cancer health risks from the existing CTGs 1 and 2.

Cumulative health risks predicted from the model HARP are summarized in Table 3.8-6. As shown in this table, the maximum cancer risk was predicted to be 1.04 in 1 million and was predicted to be located approximately 3.8 kilometers northeast of the Project (receptor located at UTM coordinate 508,865meters east, 3,604,647 meters north). The estimated cumulative cancer risk at all locations is well below the significance criteria of 10 in 1 million. Thus, it is concluded that Project emissions, along with emissions

from CTGs 1 and 2, will not pose a significant cancer risk to any populations potentially exposed to these emissions.

TABLE 3.8-6
ESTIMATED CANCER RISK – ACUTE AND CHRONIC TOTAL HAZARD INDICES FROM CUMULATIVE HRA[1]

Cancer Risk at Point of Maximum Impact	Chronic Risk at Point of Maximum Impact	Acute Risk at Point of Maximum Impact
1.04 excess risk in 1 million	0.009 total hazard index	3.06 total hazard index
Significance Threshold : 10 in 1 million	Significance Threshold : 1.0	Significance Threshold : 1.0

Notes:

1. Estimated risks due to proposed CTG1, CTG2, and CTG3 and black start engine.

The maximum chronic non-cancer THI from cumulative sources is predicted to be 0.009, located on the eastern boundary of the Project site (at UTM coordinates of 505,311 m east, 3,603,289 m north). The maximum acute non-cancer THI from cumulative sources was predicted to be 3.1, the same THI as predicted from the Project alone. The maximum acute THI is located on the eastern boundary of the Project site (at UTM coordinates of 505,311 m east, 3,603,289 m north). All receptors with a predicted acute THI greater than 1 were located along the site boundary or within 8 meters of the boundary. This area encompasses the Project fence line and the southern shoulder of Otay Mesa Road. Members of the public are not expected to be in this area.

The estimated cumulative chronic THI is well below the significance criterion of 1. Since members of the public are not expected to use any portion of the area where the estimated acute THI is above the significance criterion of 1, it is concluded that the emissions from the Project, along with the emissions from the existing CTGs 1 and 2, are not expected to pose a significant non-cancer health risk.

3.8.2.10 Uncertainty in the Public Health Impact Assessment

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

The turbine and black start engine emission rates of individual TACs were derived using vendor data for ammonia slip from the turbine and from emission factors (SDAPCD 2006) for the other air toxics. These emission factors are based on emissions from uncontrolled equipment, thus over-predicting the actual emissions from the turbine and black start engine. Both the short- and long-term turbine emissions were developed assuming the turbine operated at the maximum load for the maximum number of annual operating hours requested in this Amendment. Under actual operating conditions, the turbine may operate less and the average loads will be lower than 100 percent of capacity. Consequently, the emissions used for this HRA are likely to be higher than those that would occur under normal operation of the Project.

The dispersion model used in the HRA contains assumptions that tend to lead toward over-prediction of ground-level contaminant 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 converted or removed through chemical reaction or 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 during plume travel.

The exposure characteristics assessed in the HRA included the assumption that all receptors (including residents) were exposed to turbine and black start engine emissions continuously at the same location for 24-hours per day, 365-days per year, for 70 years. It is extremely unlikely that any resident would actually be subject to such continuous, long-term exposure. This conservative exposure assumption tends to cause risks to be overestimated by the HRA methods used in this analysis.

The toxicity data used in the HRA contain uncertainties resulting from the extrapolation of health effects data from animals to humans. Typically, safety factors are applied when doing the extrapolation. Furthermore, the human population is much more diverse both genetically and culturally than bred experimental animals. The interspecies 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 there is sufficient health protection built into the health effects criteria used in assessments such as this one.

The conservatism introduced at each step in the HRA to compensate for all of these sources of uncertainty is compounded in the predicted health risks. Therefore, the actual risks resulting from exposure to emissions from the Project are expected to be well below the values presented in this analysis.

3.8.2.11 Criteria Pollutants

Emissions of the criteria pollutants (NO_2, CO, SO_2, and PM_{10}) from the Project were modeled and an evaluation of their impacts on air quality is presented in Section 3.1, Air Quality. The federal and state ambient air quality standards (AAQS) specify allowable levels of specific air pollutants that should not be exceeded in order to protect the public health. The results presented in Section 3.1, Air Quality show that the Project will not cause or significantly contribute to exceedances of any state or federal AAQS. Thus, no significant adverse health effects are anticipated to result from Project criteria pollutant emissions.

3.8.3 Mitigation Measures

The criteria pollutant emissions from the Project will be mitigated by the use of BACT and through emissions offsets. A complete discussion of these measures is included in Section 3.1, Air Quality. The toxic pollutant emissions from the proposed gas turbine will also be mitigated by the exclusive use of natural gas fuel. In addition, pollution control technologies employed to control criteria pollutants, specifically, the CO oxidation catalyst on the combustion turbine, will also have the effect of significantly reducing organic TACs, such as those listed in Table 3.8-1. Emissions of toxic pollutants from the black start engine are negligibly small (see Table 3.8-3), owing to the limitation on their operations to just a few hours per year.

The HRA presented in the foregoing subsections shows that the long-term cancer and non-cancer health effects impacts of the Project, as proposed, will be well below the significance thresholds identified in Section 3.8.2.6, Health Effects Significance Criteria. The acute health index was predicted to be higher than the significance threshold of 1, at a few receptors along the Project fence line, where public presence is not expected. The TAC emissions from the turbine were estimated using AP-42 emission factors that assume no controls on the turbine; this will greatly over-predict the emission rates of the TACs, thus over-predicting the health impacts. Therefore, no further mitigation of emissions from the Project is anticipated to protect public health.

3.8.4 Consistency with LORS

The relevant LORS that have been established to protect public health are identified in Table 3.8-7, provided below. This table also summarizes the agencies that are principally responsible for public health, as well as the general category(ies) of public health concerns regulated by each of these agencies. Project conformance to each applicable LORS related to public health is also presented in this table, as well as references to the locations in this document where each of these issues is addressed. Points of contact with the primary agencies responsible for public health are identified in Section 3.8.4.1, Involved Agencies and Agency Contacts.

TABLE 3.8-7
SUMMARY OF COMPLIANCE WITH PUBLIC HEALTH LORS

Authority	Administering Agency	Requirement	Project Compliance
Clean Air Act (CAA)	USEPA CARB SDAPCD	Protect public from unhealthful exposure from air pollutants.	Based on the results of the risk assessment, air toxics do not exceed acceptable levels in areas where the public presence is expected (Section 3.8, Public Health). Emissions of criteria pollutants will be minimized by applying BACT to the facility. Increases in emissions of criteria pollutants will be fully offset (Section 3.1, Air Quality).
California Public Resource Code § 25523(a); 20 CCR § 1752.5, 2300-2309, and Division 2 Chapter 5, Article 1, Appendix B, Part(1)	CEC	Assure protection of environmental quality, requires quantitative HRA.	The HRA in Section 3.8, Public Health, of this Amendment satisfies this requirement.
California Clean Air Act, TAC Program, H&SC § 39650, et seq.	SDAPCD with CARB oversight	Requires quantification of TAC emissions, use of BACT, and preparation of an HRA	The Project will not cause unsafe exposure to TACs based on results of HRA (Section 3.8, Public Health), and has performed a BACT assessment (Section 3.1, Air Quality).

TABLE 3.8-7
SUMMARY OF COMPLIANCE WITH PUBLIC HEALTH LORS
(CONTINUED)

Authority	Administering Agency	Requirement	Project Compliance
H&SC, Part 6, § 44300 et seq. (Air Toxics "Hot Spots")	SDAPCD with CARB/OEHHA oversight	Regulates public exposure to air toxics. Requires inventory of TACs and HRA.	The HRA presented in Section 3.8, Public Health, of this Amendment satisfies this requirement.
H&SC § 41700	SDAPCD with CARB oversight	Prohibits emissions in quantities that adversely affect public health, other businesses or property.	Section 3.1, Air Quality, and the HRA (Section 6.8, Public Health) presented in this Amendment satisfy this requirement.
SDAPCD Rule 1200	SDAPCD	Toxic Air Contaminants - New Source Review	The HRA presented in Section 3.8, Public Health, of this Amendment satisfies this requirement.
SDAPCD Rule 1210	SDAPCD	Toxic Air Contaminant Public Health Risks - Public Notification and Risk Reduction	The HRA presented in Section 3.8, Public Health, of this Amendment satisfies this requirement.

Notes:

OES = Office of Emergency Services

BACT = Best Available Control Technology

3.8.4.1 Involved Agencies and Agency Contacts

Agency contacts regarding public health assessment of the Project are as listed in Table 3.8-8, below.

TABLE 3.8-8
AGENCY CONTACTS FOR PUBLIC HEALTH ASSESSMENT

Agency	Contact/Title	Telephone
California Energy Commission	Keith Golden Air Quality Specialist 1516 Ninth Street Sacramento, CA 95814 Ramesh Sundareswaran Public Health Specialist 1516 Ninth Street Sacramento, CA 95814	(916) 654-4287 (916) 654-4287
California Air Resources Board	Mike Tollstrup 1001 I Street Sacramento, CA 95814	(916) 322-6026
San Diego Air Pollution Control District	Archi dela Cruz 10124 Old Grove Road San Diego, CA 92131	(858) 586-2732

3.8.4.2 Permits Required and Permit Schedule

The Permit to Operate (PTO) to be issued by the SDAPCD and the CEC's final decision to this Amendment will serve as the principal approvals required to ensure Project impacts to public health will be within acceptable levels. Award of the Authority to Construct permit is expected to occur within 3 to 6 months after submittal of complete application materials to SDAPCD.

3.8.5 References Cited

Cal/EPA & OEHHA. 2003. Air Toxics Hot Spots Program Risk Assessment Guidelines – The Air Toxics Hot Spots Program Guidance Manual for EPA Preparation of Health Risk Assessments.

Cal/EPA & OEHHA. 2003. Air Toxics Hot Spots Risk Assessment Guidelines, Part II: Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels.

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

California Energy Commission. 2001. Larkspur Energy Facility Conditions of Certification. Located at http://www.energy.ca.gov/sitingcases/peakers/larkspur/documents/01_Larkspur_SA.PDF

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

San Diego Air Pollution Control District (SDAPCD). 2002. Air Quality in San Diego, http://www.sdapcd.org/air/reports/reports.html.

SDAPCD. 2004. Emission Calculations Procedures, http://www.sdapcd.org/toxics/emissions/emissions.html.

SDAPCD. 2006. Supplemental Guidelines for Submission of Air Toxics "Hot Spots" Program Health Risk Assessments (HRAs).

U. S. Environmental Protection Agency (EPA). 1995. AP-42 Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition. January.

URS. 2007. Modeling Protocol for the Larkspur 3 Project, San Diego County, California. Prepared by URS on behalf of the Larkspur LLC for submittal to the San Diego Air Pollution Control District, USEPA and the California Energy Commission.

Wildflower Energy, Application for Certification Pursuant to the 21-Day Emergency Permitting Process Larkspur Energy Facility San Diego, California, March 7, 2001.

3.8.6 Conditions of Certification

Please refer to Section 3.1, Air Quality for a discussion of required changes to the 2001 AFC Conditions of Certification.