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6.8 PUBLIC HEALTH AND SAFETY

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, NO_2, SO_2, CO, VOC, and PM_{10}, is examined in Section 6.1, Air Quality. A limited number of hazardous materials will be used during normal operations at the Project. These are discussed further in Section 6.14, Hazardous Materials. Only aqueous ammonia will be stored on site in sufficient quantity to require a hazardous material offsite consequence analysis. Accordingly, this section addresses the potential public exposure to an accidental release of aqueous ammonia during normal operations. The details of the Public Health analysis are contained in the following sections:

- Section 6.8.1, Affected Environment, describes the local environment surrounding the Project Site. Topographical information is provided. Sensitive receptors within a 3-mile radius of the Project Site are identified in Figure 6.8-1, Sensitive Receptors within 3 miles of the Project Site.
- Section 6.8.2, Environmental Consequences, discusses the potential public health consequences of the Project. The HRA approach is described. The Project's emissions of toxic pollutants are discussed and the potential impacts of these emissions are evaluated. The results of the HRA show that the maximum incremental offsite cancer risk from the Project will be 1.891 in 1 million. This is well below the cancer risk significance threshold of 10 in 1 million. The results of the assessment also show that the chronic total hazard index (THI) and the acute THI are 0.0106 and 0.818, respectively. The estimated chronic and acute total health hazard indices are below the significance criteria of 1.
- Section 6.8.3, Aqueous Ammonia Hazard Assessment, describes the hazardous material offsite consequence analysis. The parameters characterizing a catastrophic accidental release of aqueous ammonia are discussed. The results of the offsite consequence analysis show that the distance to the toxic end point from a catastrophic tank failure is less than 0.2 mile from the aqueous ammonia storage area.
- Section 6.8.4, Cumulative Impacts, addresses the cumulative impacts.
- Section 6.8.5, Mitigation Measures, discusses mitigation measures.
- Section 6.8.6, LORS, describes all applicable LORS.
- Section 6.8.7, Involved Agencies and Agency Contacts, lists the agency contacts used to conduct the public health risk assessment.
- Section 6.8.8, Permits Required and Permit Schedule, lists the permits required and provides the permit schedule.
- Section 6.8.9, References, lists the references used to conduct the public health risk assessment.

6.8.1 Affected Environment

The Project Site is located in Imperial County, California, northeast of the Town of Niland. The Project Site is situated within an undeveloped portion of the Property already owned by IID. The land use within a 3-mile radius of the Project consists primarily of cultivated farmlands, and is considered rural for the purposes of conducting the air quality modeling within the HRA.

The Project's two combustion gas turbine stacks would exhaust combustion gases at 60 feet above grade elevation, which is approximately 105 feet bsl. 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 6.1-1, Topography within a 6- and 10-mile Radius of the Project Site**.** Topographical features above the stack exhaust point from the emergency fire water pump and black start engine are also shown in Figure 6.1-1**.**

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 Niland Family Health Center, located about 0.5 mile southwest of the Project. The nearest residence is approximately 1,560 feet due east of the Project fence line. All sensitive receptors located within a 3-mile radius of the Project are shown in Figure 6.8-1, Sensitive Receptors within 3 miles of the Project Site; however, the health risk assessment approach treated all receptors as sensitive receptors.

6.8.2 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 THI over 1.0 or an acute THI over 1.0. Also, uncertainties in the HRA are discussed and other potential health impacts are described.

6.8.2.1 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). The OEHHA 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 the inventorying of air toxics emissions from individual facilities, as well as requirements for risk assessment and public notification of potential health risks.

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

First, hazard identification was performed to determine the potential health effects that may be associated with Project emissions. The purpose was to identify whether pollutants emitted from the plant could be characterized as potential human carcinogens or associated with other types of adverse health effects. From the OEHHA guidelines, a list of pollutants with potential cancer and noncancer health effects associated with the emissions from specific sources of the Project are presented in Table 6.8-1, Toxicity Values Used to Characterize Health Risks.

TABLE 6.8-1
TOXICITY VALUES USED TO CHARACTERIZE HEALTH RISKS

Compound	Sources of Emissions	Inhalation Cancer Potency Factor (mg/kg-day)-1	Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)
Diesel particulate (PM_{10})	Diesel fire water pump engine	1.1E+00	5.0E+00	--
Ammonia	Turbine stacks	--	2.0E+02	3.2E+03
1,3-Butadiene	Turbine, black start engine stacks	6.0E-01	2.0E+01	--
Acetaldehyde	Turbine, black start engine stacks	1.0E-02	9.0E+00	--
Acrolein	Turbine, black start engine stacks	--	6.0E-02	1.9E-01
Benzene	Turbine, black start engine stacks	1.0E-01	6.0E+01	1.3E+03
Ethylbenzene	Turbine, black start engine stacks	--	2.0E+03	--
Formaldehyde	Turbine, black start engine stacks	2.1E-02	3.0E+00	9.4E+01
Hexane	Turbine stacks	--	7.0E+03	--
Propylene	Turbine, black start engine stacks	--	3.0E+03	--
Propylene oxide	Turbine stacks	1.3E-02	3.0E+01	3.1E+03
Toluene	Turbine, black start engine stacks	--	3.0E+02	3.7E+04
Xylenes	Turbine, black start engine stacks	--	7.0E+02	2.2E+04
Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	Turbine, black start engine stacks	3.9E-01	--	--
Benzo(a)pyrene	Turbine, black start engine stacks	3.9E+00	--	--
Benzo(b)fluoranthene	Turbine, black start engine stacks	3.9E-01	--	--
Benzo(k)fluoranthene	Turbine, black start engine stacks	3.9E-01	--	--
Chrysene	Turbine, black start engine stacks	3.9E-02	--	--
Dibenz(a,h)anthracene	Turbine, black start engine stacks	3.9E-01	--	--
Indeno(1,2,3-cd)pyrene	Turbine, black start engine stacks	3.9E-01	--	--
Naphthalene	Turbine, black start engine stacks	1.2E-01	9.0E+00	--

Notes:

-- = not applicable
mg/kg-day = milligrams per kilogram per day
$\mu g/m^3$ = micrograms per cubic meter
PM_{10}= particulate matter less than 10 micrometers in diameter
REL= reference exposure levels

Second, an exposure assessment was conducted to estimate the extent of potential public exposure to the 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 6.1, Air Quality, and the modeling protocol submitted for the Project (URS 2006).

Third, 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 noncancer risks. The OEHHA guidelines provide potency factors and RELs for an extensive list of toxic air contaminants. 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 and dairy cows. For the calculation of cancer risk, the duration of exposure to Project emissions was assumed to be 24 hours per day, 365 days per year, for 70 years, at all receptors.

Fourth, 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 noncancer health risks for 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 given in Section 6.7, Noise Technical Report.

6.8.2.2 Construction Phase Emissions

Due to the relatively short duration of the Project’s construction phase (i.e., approximately 9 months), significant long-term public health effects are not expected. To ensure worker safety during actual construction, safe work practices will be followed. A detailed analysis of the potential environmental impacts due to criteria pollutant emissions during construction and control of these emissions is discussed in Section 6.1, Air Quality.

6.8.2.3 Operational Phase Emissions

Facility operations were evaluated to determine whether particular substances will be used or generated that may cause adverse health effects if released to the air. The primary sources of potential emissions from facility operations are the natural-gas-fired CTGs and the ammonia slip-stream from the SCR control system used to minimize emissions of NO_x. Secondary sources of potential emissions from the facility are the emergency diesel fire water pump engine and natural gas-fired black start engine, both of which will normally be operated only for short periods in testing mode to ensure their operability if needed. The substances emitted from these sources (with associated toxicological information) are shown in Table 6.8-1, Toxicity Values Used to Characterize Health Risks. These potential air toxic species were identified in the

California Air Toxics Emission Factor (CATEF) Version 1.2 database (CARB 1996), which contains air toxic emission factors calculated from source test data that have been collected for the Air Toxics Hot Spots Program. All air toxic species associated with natural gas turbines equipped with SCR and CO catalyst and natural gas internal combustion engines for which cancer potency factors and/or chronic or acute RELs have been established are included in Table 6.8-1. In addition, ammonia emissions associated with potential ammonia slip from the turbine SCR system were also included, as well as diesel particulate emissions, which would only result from operation of the diesel internal combustion engine used to drive the plant fire pump.

Annual turbine emissions were estimated by assuming that both turbines would operate simultaneously under full load conditions (100 percent load) for the 3,200 hours per year, including startups, shutdowns and maintenance operations. IID will accept permit conditions limiting facility operations of each combustion turbine to no more than this number of operating hours. Turbine stack parameters (i.e., exit temperature and velocity) for the full load condition were used in the model to assess the hourly and annual ground-level impacts and health risks.

For both maximum hourly and annual emission rates, the maximum natural gas consumption rate of 396.1 MMBtu per hour per turbine was used. The maximum natural gas consumption rate for the black start engine of 10.5 MMBtu per hour was used. The black start engine is expected to be tested for one hour every month. Emergency diesel fire water pump emissions were estimated assuming that this equipment would run at its full rated capacity (173 hp) for half an hour per week for emergency preparedness. Actual emergency use of the black start engine and the emergency diesel fire water pump were not included.

Emission factors for the natural gas-fired turbines (with SCR and CO catalyst emission controls) and the black start internal combustion engine were obtained from the California ARB CATEF Database (CARB 1996). The emission factors from CATEF were in units of pounds per million cubic feet (lb/MMcf) of natural gas fuel usage, which were divided by the higher heating value of the natural gas (1024 Btu/scf) to arrive at an emission factor in units of pounds per million British thermal units (lb/MMBtu), which was then 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 6.8-2, Emission Rates from Operation of Natural-Gas-Fired Combustion Turbines with CO-Oxidation Catalyst and SCR. The emission factors and estimated maximum hourly and annual black start engine emissions are summarized in Table 6.8-3, Emission Rates from Operation of Natural-Gas Internal Combustion Black Start Engine.

An emission factor for the emergency diesel fire water pump for diesel particulate matter of 0.09 grams per horsepower-hour was provided by the prospective equipment vendor. The emission factors and estimated maximum hourly and annual emissions from the fire water pump are summarized in Table 6.8-4, Emission Rates from Operation of the Emergency Diesel Fire Water Pump Engine.

TABLE 6.8-2
EMISSION RATES FROM OPERATION OF NATURAL-GAS-FIRED COMBUSTION TURBINES WITH CO-OXIDATION CATALYST AND SCR

Chemical Species	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMcf)	Maximum Hourly Emissions per Turbine[1] (lb/hr)	Annual Emissions Per Turbine[1,2] (lb/yr)
Ammonia	5 ppm	5 ppm	2.94[3]	9.41E+03[1]
1,3-Butadiene	1.30E-07	1.33E-04	5.14E-05	1.65E-01
Acetaldehyde	4.99E-04	5.11E-01	1.98E-01	6.33E+02
Acrolein	6.77E-05	6.93E-02	2.68E-02	8.58E+01
Benzene	4.61E-05	4.72E-02	1.83E-02	5.84E+01
Ethylbenzene	5.57E-05	5.70E-02	2.20E-02	7.06E+01
Formaldehyde	6.71E-03	6.87E+00	2.66E+00	8.50E+03
Hexane	3.73E-04	3.82E-01	1.48E-01	4.73E+02
Propylene	1.95E-03	2.00E+00	7.74E-01	2.48E+03
Propylene oxide	5.73E-05	5.87E-02	2.27E-02	7.27E+01
Toluene	1.64E-04	1.68E-01	6.50E-02	2.08E+02
Xylenes	6.11E-05	6.26E-02	2.42E-02	7.75E+01
Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	1.31E-07	1.34E-04	5.18E-05	1.66E-01
Benzo(a)pyrene	8.95E-08	9.16E-05	3.98E-05	1.32E-01
Benzo(b)fluoranthene	6.56E-08	6.72E-05	2.60E-05	8.32E-02
Benzo(k)fluoranthene	6.56E-08	6.72E-05	2.60E-05	8.32E-02
Chrysene	1.46E-07	1.50E-04	5.80E-05	1.86E-01
Dibenz(a,h)anthracene	1.31E-07	1.34E-04	5.18E-05	1.66E-01
Indeno(1,2,3-cd)pyrene	1.31E-07	1.34E-04	5.18E-05	1.66E-01
Naphthalene	7.70E-06	7.88E-03	3.05E-03	9.75E+00

Notes:
[1] See Appendix B, Air Quality Data, for detailed emission calculations. Natural gas fuel heat rate assumed at 1,024 Btu/scf.
[2] Annual emissions calculations based on 3,200 operating hours per year for each turbine, including startups, warm-ups, shutdowns and maintenance operations.
[2] Based on estimated ammonia slip from NO_x control (5 ppmvd at 15 percent oxygen).
CO = carbon monoxide
lb/hr = pounds per hour
lb/yr = pounds per year
lb/MMBtu = pounds per million British thermal units
lb/MMcf = pounds per million cubic feet
SCR = selective catalytic reduction
PAH = polycyclic aromatic hydrocarbons

TABLE 6.8-3
EMISSION RATES FROM OPERATION OF NATURAL-GAS INTERNAL COMBUSTION BLACK START ENGINE

Chemical Species	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMcf)	Maximum Hourly Emissions[1,2] (lb/hr)	Annual Emissions[1,2,3] (lb/yr)
1,3-Butadiene	4.05E-04	4.15E-01	4.26E-03	5.12E-02
Acetaldehyde	2.56E-03	2.62E+00	2.69E-02	3.23E-01
Acrolein	1.57E-04	1.61E-01	1.65E-03	1.98E-02
Benzene	2.53E-04	2.59E-01	2.66E-03	3.19E-02
Ethylbenzene	1.12E-04	1.15E-01	1.18E-03	1.42E-02
Formaldehyde	2.04E-02	2.09E+01	2.15E-01	2.58E+00
Propylene	1.18E-02	1.21E+01	1.24E-01	1.49E+00
Toluene	3.85E-04	3.94E-01	4.05E-03	4.86E-02
Xylenes	9.42E-04	9.65E-01	9.91E-03	1.19E-01
Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	9.69E-08	9.92E-05	1.02E-06	1.22E-05
Benzo(a)pyrene	3.79E-09	3.88E-06	3.99E-08	4.78E-07
Benzo(b)fluoranthene	7.79E-08	7.98E-05	8.20E-07	9.84E-06
Benzo(k)fluoranthene	1.18E-08	1.21E-05	1.24E-07	1.49E-06
Chrysene	2.20E-08	2.25E-05	2.31E-07	2.77E-06
Dibenz(a,h)anthracene	3.79E-09	3.88E-06	3.99E-08	4.78E-07
Indeno(1,2,3-cd)pyrene	1.06E-08	1.09E-05	1.12E-07	1.34E-06
Naphthalene	3.03E-05	3.10E-02	3.19E-04	3.82E-03

Notes:

[1] Emission factors obtained from the CATEF database for 4-stroke lean-burn >650 hp natural gas internal combustion engines with no controls.

[2] See Appendix B, Air Quality Data, for detailed emission calculations. Fuel heat rate assumed at 1,024 Btu/scf.

[3] Annual emissions based on one hour of test operations per month (12 hours per year).

lb/hr = pounds per hour
lb/yr = pounds per year
lb/MMBtu = pounds per million British thermal units
lb/MMcf = pounds per million cubic feet

TABLE 6.8-4
EMISSION RATES FROM OPERATION OF THE EMERGENCY DIESEL FIRE WATER PUMP ENGINE

Chemical Species	Emission Factor (g/hp-hr)	Emission Factor Source	Maximum Hourly Emissions[1] (lb/hr)	Annual Emissions[1,2,3] (lb/yr)
Diesel particulate (PM_{10})	0.09	Engine manufacturer	1.71E-02	8.92E-01

Notes:
[1] Emission factors of 0.09 grams of particulate emissions per horsepower-hour was supplied by the prospective equipment vendor.
[2] Hourly emissions based on one-half of test operations.
[3] Annual emissions based on one-half hour of test operations per week (52 tests per year).
g/hp-hr = grams per horsepower hour
lb/hr = pounds per hour
lb/yr = pounds per year
PM_{10} = particulate matter less than 10 micrometers in diameter

6.8.2.4 Model Input Parameters

The HRA was conducted using worst-case emissions (short- and long-term) from all sources at the Project. Cancer and chronic noncancer health effects were estimated using the annual turbine, black start engine and fire water pump emission estimates. Acute noncancer health effects were estimated using the worst-case maximum hourly emissions for both turbines, the black start engine, and the fire water pump, although it is unlikely that all 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 6.1, Air Quality, and the modeling protocol submitted for the Project (URS 2006). The ISCST3 model uses the turbine, black start engine and fire water pump 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 calculated ground-level concentrations for each chemical species. Meteorological data for the years 1991-1995 (the same years used in the air quality analysis in Section 6.1, Air Quality) were used in the HRA. Risk values were modeled for all sensitive receptors within 3 miles of the Project and all grid and 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 California Air Resource Board's (CARB) HARP model. The pollutant-specific cancer potency factors and RELs used in the HRA were listed in Table 6.8-1, Toxicity Values Used to Characterize Health Risks. 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.

6.8.2.5 Calculation of Health Effects

Adverse health effects are expressed as cancer or noncancer 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. 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 the approach is to produce a worst-case estimate of potential cancer risk. Noncancer 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 noncancer 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.

6.8.2.6 Health Effects Significance Criteria

Various state and local agencies provide different significance criteria for cancer and noncancer 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.

6.8.2.7 Estimated Lifetime Cancer Risk

The maximum incremental cancer risk resulting from Project emissions was estimated to be 1.891 in 1 million. The maximum cancer risk was located on the northern facility boundary of the site at the elevation of the facility (receptor located at UTM coordinates 639,909 m east, 3,679,360 m north), as shown in Figure 6.8-2, Incremental Lifetime Cancer Risk Predicted with HARP. Figure 6.8-2 also shows the one in a million cancer risk isopleth, the area in which HARP predicted an excess cancer risk of greater than one in a million. The sensitive receptor with highest predicted cancer risk is a residence located immediately east of the facility across Cuff Road (640,451 m east, 3,679,404 m north); the maximum incremental cancer risk at this location was estimated to be 0.266 in 1 million. Table 6.8-5, Estimated Cancer Risk and Acute and Chronic Total Hazard Indices, presents the results of the HRA for the Project operations for cancer, chronic, and acute health risks. All HARP model files are contained on the CD Rom that is supplied separately with this application.

TABLE 6.8-5
ESTIMATED CANCER RISK AND 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
1.891 excess risk in 1 million	0.0106 total hazard index	0.818 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 the Project's emissions will not pose a significant health risk to any populations potentially exposed to these emissions.

6.8.2.8 Estimated Chronic and Acute Total Hazard Indices

The maximum chronic THI resulting from Project emissions was estimated to be 0.0106. The location of the maximum estimated chronic THI is approximately 4 miles northeast of the site (the receptor is located at UTM coordinates of 647,338 m east, 3,682,252 m north). This receptor is in an unpopulated area with terrain that is gradually sloping upward from the Project facility. The sensitive receptor with the highest impact, is a residence located immediately east of the facility across Cuff Road (at 640,451 m east, 3,679,404 m north); the maximum chronic THI at this receptor was estimated to be 0.00190.

The maximum acute THI resulting from Project emissions was estimated to be 0.818 at a location on the western boundary of the site (UTM coordinates 639,634 m east, 3,679,283 m north). The sensitive receptor with the highest predicted acute THI impact is a residence located immediately east of the facility across Cuff Road (at 640,420 m east, 3,679,344 m north); the maximum acute THI at this location was estimated to be 0.132. Table 6.8-3, Emission Rates from Operation of Natural-Gas Internal Combustion Black Start Engine, presents the detailed noncancer results of the HRA for the Project operations.

The estimated chronic and acute THIs are both well below the significance criterion of one. Thus, it is concluded the Project's emissions will not pose a significant health risk to any populations potentially exposed to these emissions.

6.8.2.9 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 emission rates of individual toxic air contaminants were derived using vendor data for ammonia slip and from emission factors (CARB 1996) for the other air toxics. Both the short- and long-term turbine emissions were developed assuming all turbines operated at the maximum load for the maximum number of annual operating hours requested in this application. Under actual operating conditions, the turbines 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 proposed gas turbine plant.

The dispersion models used in health risk assessments contain 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, black start engine, and fire water pump emissions continuously at the same location for 24 hours per day, 365 days per year, for 70 years. It is

extremely unlikely that any resident would actually be subject to such continued, long-term exposure. The conservative exposure assumption tends to cause risks to be over estimated 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 intraspecies variability among humans is expected to be much greater than in laboratory animals. With all of the uncertainty in the assumptions used to extrapolate toxicity data, significant measures are taken to ensure that 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.

6.8.2.10 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 6.1, Air Quality. The federal and state NAAQS specify allowable levels of specific air pollutants that should not be exceeded in order to protect the public health. The results presented in Section 6.1 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 the Project's criteria pollutant emissions.

6.8.3 Aqueous Ammonia Hazard Assessment

The Clean Air Act and the California Accidental Release Program (CalARP) regulations require an assessment of the hazards associated with an accidental release of a regulated substance such as ammonia. However, because of the size of the ammonia storage tank (12,000 gallons) and the concentration of the material (19 percent aqueous solution), the facility is not required to prepare a federal Risk Management Plan (RMP).

The Certified Unified Program Agency (CUPA) that administers the state CalARP program in Imperial County is the Department of Toxic Substances Control of the Imperial County Environmental Health Department. It is assumed that risk management will be required for the aqueous ammonia unloading, storage and handling facilities at the Project, because the amount of ammonia that will be stored at this facility exceeds the CalARP threshold for this chemical. However, this decision is at the discretion of the CUPA. In any case, a hazard assessment that includes an analysis of the worst-case accidental aqueous ammonia release scenario, as defined under CalARP Program Level 1, was prepared and the results are presented below.

6.8.3.1 Hazard Assessment Parameters

The model used to analyze worst-case and alternative aqueous ammonia accidental release scenarios is SCREEN3, which has been provided by the USEPA for preliminary screening analyses of routine or upset emissions of contaminants to the atmosphere. The model was used

with all standard USEPA defaults. In both the worst-case scenario, the entire contents of the 12,000-gallon storage tank is assumed to be released due to a tank rupture. The alternative accidental release scenario examines the release of the entire contents of a tanker truck, 8,000 gallons of aqueous ammonia. Extreme weather and dispersion conditions that maximize evaporate ammonia emissions are assumed in the worst-case and more typical conditions in the alternative case. Model inputs and outputs can be found in Appendix B, Air Quality Data. Table 6.8-6, Modeling Parameters for Evaluation of Worst-Case and Alternative Aqueous Ammonia Release Scenarios, provides a summary of the parameters used in the aqueous ammonia hazard assessment.

TABLE 6.8-6
MODELING PARAMETERS FOR EVALUATION OF WORST-CASE AND ALTERNATIVE AQUEOUS AMMONIA RELEASE SCENARIOS

Parameter	Worst-Case Scenario	Alternative Scenario
Ambient temperature (°F)	116	77
Atmospheric stability class	6 (very stable)	4 (neutral)
Wind speed (m/sec)	1.5	3.0
Urban/rural dispersion	Rural	Rural
Ammonia containment area (ft^2)	1,000	1,000
Effective surface area with mitigation[1] (ft^2)	93.1	93.1
Ammonia vapor pressure in containment basin (mm Hg)	190	148
Ammonia emission rate (lb/min)[1]	4.035	2.502

[1] Mitigated emissions calculated with plastic balls in the aqueous ammonia containment basin to minimize spill surface area available for evaporation.
°F = degrees Fahrenheit
ft^2 = square feet
m/sec = meter per second
mm/Hg = millimeters per mercury
lb/min = pounds per minute

6.8.3.2 Worst-Case and Alternative Scenario Release Analyses

The aqueous ammonia storage tank to be located at the facility has a storage capacity of 12,000 gallons. The worst-case release would be a rupture of this tank thereby releasing 12,000 gallons of 19 percent aqueous ammonia solution. The ammonia storage system includes an above ground containment structure around the storage tank that was accounted for in the analysis. To mitigate the exposure to the atmosphere of the spilled aqueous ammonia either plastic balls that float on top of the aqueous ammonia in the above ground containment area or an underground containment vault have been proposed. The floating balls reduce the exposed surface area of aqueous ammonia to 9 percent of the above ground containment area. In the event of a release in which the underground vault exists, the aqueous ammonia would flow into the vault through a grate approximately 42 inches in diameter. The size of this grate is approximately 1 percent of the above ground containment area. The mitigation measure used in the worst-case and alternative scenario analyses were the floating balls, since they reduce emissions the least. The results of the worst-case release analysis indicate that the USEPA toxic endpoint for a 12,000-gallon aqueous ammonia release under extreme dispersion conditions

would be at a distance of approximately 820 feet, measured from the point of release (storage tank location) to the point at which the ambient ammonia concentration from the accidental release falls to just 200 ppm. The alternative accidental release scenario examined the release of an entire 8,000-gallon tanker truck. The unloading area is designed to drain any accidental release of aqueous ammonia quickly into the containment area surrounding the storage tank. The distance to the toxic endpoint for the alternative scenario with the same mitigation as the worst-case is 190 feet. It should be noted that ammonia vapor has a density of 0.60 the density of air (much lighter) and would immediately rise above ground level in the event of a release, thereby reducing some of the inhalation risk. This lessening of ground-level concentration is not accounted for in the SCREEN3 model.

Results for all modeled scenarios expressed in terms of maximum distances to different health effect thresholds are shown in Table 6.8-7, Results of Hazardous Assessment Modeling for Worst-Case and Alternative Aqueous Ammonia Release Scenarios.

TABLE 6.8-7
RESULTS OF HAZARDOUS ASSESSMENT MODELING FOR WORST-CASE AND ALTERNATIVE AQUEOUS AMMONIA RELEASE SCENARIOS

Health Criteria			Predicted Distance Worst-Case Scenario (feet)	Predicted Distance Alternate Scenario (feet)
Level	Concentration			
	ppm	mg/L		
Lethal	2,000	1.4	213	49
IDLH	300	0.21	646	151
USEPA toxic endpoint (former ERPG-2)	200	0.14	820	190
STPEL	75	0.052	1,457	328

Note: Results in this table reflect mitigated emissions with plastic balls in the aqueous ammonia containment basin to minimize the spill surface area available for evaporation.

Note: Definition of Health Levels

Lethal. The lethal concentration is 2,000 ppm by volume averaged over 30 minutes.

Immediately Dangerous to Life and Health (IDLH). The IDLH concentration is averaged over 30 minutes and was chosen by the NIOSH to ensure that workers can escape without injury or irreversible health effects from an IDLH exposure. Exposure to ammonia at or above the IDLH poses a threat of death or immediate or delayed permanent adverse health effects or prevents escape from the impacted environment.

United States Environmental Protection Agency (USEPA) Toxic Endpoint. The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action. Determined by the American Industrial Hygiene Association (AIHA) and averaged over 1 hour.

Short-Term Public Emergency Limit (STPEL). The STPEL is set by the National Research Council at 75 ppm by volume averaged over 30 minutes. The CEC uses this concentration as a guideline to determine the potential for significant impact. Exposure above this level poses significant risk of adverse health impacts on sensitive members of the general public.

ppm = parts per million
mg/L = milligrams per liter

6.8.3.3 Offsite Impacts to the Population

A site visit and an examination of relevant maps were used to determine the potentially exposed population from the worst-case release scenario described in the previous section. The radial distance for the worst-case scenario to the endpoint is 0.155 mile. Figure 6.8-3, Worst-Case Accidental Aqueous Ammonia Release Scenario Distance to Toxic End Point and Short-Term

Public Emergency Limit (STPEL), provides a map showing the 0.155-mile worst-case release radial impact area to the toxic end point of 200 ppm and the radial impact area to STPEL of 75 ppm. As shown in this figure, there are no residences, businesses or sensitive receptors within this distance from the proposed aqueous ammonia storage facility at the Project. The same is true for the STPEL value of 75 ppm that has frequently been used as a significance criterion by CEC.

6.8.3.4 Mitigation and Emergency Response

The results presented above reflect the assumed use and maintenance of plastic balls in the ammonia storage tank containment area to minimize evaporation in the event of a spill. Alternatively, an underground containment vault has been proposed into which the released aqueous ammonia would drain, further limiting the evaporation of the aqueous ammonia in the event of a spill. Based on the results of the offsite consequence analysis modeling presented above, no further mitigation is necessary.

Depending on the discretion of the Imperial County CUPA, the facility may be required to prepare a detailed emergency response plan under CalARP Program Level 1. However, the facility will prepare the state-required Business Emergency Plan (BEP), and, in the event of a large accidental release of ammonia, the Niland Fire Department will act as the first responder. IID personnel will perform “awareness duties” only, which means that once the ammonia spill or release is discovered, operating personnel will make the proper notifications and set the emergency procedures in motion.

Additional information on the chemicals stored and used on the Project Site, associated potential impacts, and potential accidental chemical releases is included in Section 6.14, Hazardous Materials.

6.8.4 Cumulative Impacts

All potential sources of hazardous materials and toxic air containment (TAC) within 1 mile of the Project were examined to determine if there might be any cumulative impacts due to accidental releases or TAC emissions. The GSWC filtration plant to the east of the Project used to store chlorine gas, but not longer stores any hazardous materials, thus there is no additional health risk to the public from this facility. South of the Project there is a tank farm owned by Kinder Morgan that stores diesel, gasoline and jet fuel (JP-4), all non-RMP regulated substances. In addition, no TAC sources are located there, therefore no additional health risk is expected from this facility. The railroad that passes to the south of the Project occasionally carries small quantities of hazardous materials. There is a low probability that an accidental release of one of these substances might occur as the train passes Niland. If such an event were to occur, the release would likely be confined to a small area. Therefore, no additional health risk is expected from the transport of hazardous materials on the railroad. Accordingly, no greater release of toxic chemicals than those described and analyzed in this section, are likely to occur, and additional modeling to evaluate cumulative impacts on human health is unwarranted

6.8.5 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 6.1,

Air Quality. The toxic pollutant emissions from the proposed gas turbines 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 catalysts on the combustion turbines, will also have the effect of significantly reducing organic toxic air contaminants, such as those listed in Table 6.8-1, Toxicity Values Used to Characterize Health Risks. Emissions of toxic pollutants from the black start engine and the emergency diesel fire water pump are negligibly small (see Table 6.8-3, Emission Rates from Operation of Natural-Gas Internal Combustion Black Start Engine, and Table 6.8-4, Emission Rates from Operation of the Emergency Diesel Fire Water Pump Engine), owing to the limitation on their operations to just a few hours per year.

The health risk assessment presented in the foregoing subsections shows that the health effects impacts of the Project as proposed will be well below the significance thresholds identified in Section 6.8.2.6, Health Effects Significance Criteria. Therefore, no further mitigation of emissions from the Project is required to protect public health.

6.8.6 Laws, Ordinances, Regulations, and Standards

The relevant LORS that have been established to protect public health are identified in Table 6.8-8, Summary of Compliance with Public Health LORS. 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. The conformity of the Project to each of the LORS applicable to public health is also presented in this table, as well as references to the 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 6.8.7, Involved Agencies and Agency Contacts.

TABLE 6.8-8
SUMMARY OF COMPLIANCE WITH PUBLIC HEALTH LORS

Authority	Administering Agency	Requirement	Niland Gas Turbine Plant Project Compliance
Clean Air Act (CAA)	USEPA CARB ICAPCD	Protect public from unhealthful exposure from air pollutants.	Based on the results of the risk assessment, air toxics do not exceed acceptable levels (Section 6.8, Public Health and Safety). Emissions of criteria pollutants will be minimized by applying BACT to the facility. Increases in emissions of criteria pollutants will be fully offset (Section 7.0, Alternatives Considered).

TABLE 6.8-8
SUMMARY OF COMPLIANCE WITH PUBLIC HEALTH LORS

Authority	Administering Agency	Requirement	Niland Gas Turbine Plant Project Compliance
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 6.8, Public Health and Safety, of this SPPE satisfies this requirement.
H&SC § 25500-25542; 10 CR § 2720-2734	Imperial County CUPA	Requires a business plan and RMP where acutely hazardous materials are stored.	The Project will prepare a RMP for aqueous ammonia.
California Clean Air Act, TAC Program, H&SC § 39650, et seq.	ICAPCD 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 6.8, Public Health and Safety), and has performed a BACT assessment (Section 6.1, Air Quality).
H&SC, Part 6, § 44300 et seq. (Air Toxics “Hot Spots”)	ICAPCD with CARB/OEHHA oversight	Regulates a business plan and public exposure to air toxics. Requires inventory of TACs and HRA.	The HRA presented in Section 6.8, Public Health and Safety, of this SPPE satisfies this requirement.
H&SC § 41700	ICAPCD with CARB oversight	Prohibits emissions in quantities that adversely affect public health, other businesses or property.	Section 6.1, Air Quality, and the HRA (Section 6.8, Public Health and Safety) presented in this SPPE satisfy this requirement.
ICAPCD Rule 216	ICAPCD	Requires use of TBACT for major sources.	This is not a major source thus TBACT will not be required.
ICAPCD Rule 309	ICAPCD	Requires annual fees for the Air Toxic "Hot Spots" (AB2588)	The HRA presented in Section 6.8, Public Health and Safety, of this SPPE and the payment of fess to ICAPCD satisfy these requirements.
ICAPCD Rule 407	ICAPCD	No source shall cause injury, detriment, nuisance or annoyance to the public, which could endanger their comfort, repose, health and safety, or property.	Section 6.1, Air Quality, and the HRA (Section 6.8, Public Health and Safety) presented in this SPPE satisfy this requirement.
ICAPCD Rule 1002	ICAPCD	California Airborne Toxic Control Measures (ATCM).	Section 6.8, Public Health and Safety, of this SPPE satisfies this requirement.

Notes:
BACT = Best Available Control Technology
CARB = California Air Resources Board
CEC = California Energy Commission
EHD = Environmental Health Department
HRA = Health Risk Assessment
ICAPCD = Imperial County Air Pollution Control District
OEHHA = Office of Environmental Health Hazard Assessment
OES = Office of Emergency Services
RMP = Risk Management Plan
SPPE = Small Power Plant Exemption
TAC = Toxic air contaminant
TBACT = Toxic Best Available Control Technology
USEPA = United States Environmental Protection Agency

6.8.7 Involved Agencies and Agency Contacts

Agency contacts regarding public health assessment of the Project are as listed in Table 6.8-9, Agency Contacts for Public Health Assessment.

TABLE 6.8-9
AGENCY CONTACTS FOR PUBLIC HEALTH ASSESSMENT

Agency	Contact/Title	Telephone
California Energy Commission	Keith Golden Air Quality Specialist 1516 Ninth Street Sacramento, CA 95814	(916) 654-4287
California Air Resources Board	Mike Tollstrup 1001 I Street, Sacramento, CA 95814	(916) 322-6026
Department of Toxic Substances Control Imperial County Environmental Health Department	Yvonne Sanchez CUPA Manager 5796 Corporate Avenue Cypress, CA 90630-4732	(714) 484-5417
Imperial County Air Pollution Control District	Reyes Romero Deputy Air Pollution Control Officer 150 South 9th Street El Centro, CA 92243-2801	(760) 482-4606
Imperial Certified Unified Program Agency (CUPA)	Alan Hsu Department of Toxic Substances Control 301 Heber Avenue Calexico, CA 92231	(760) 768-7132

6.8.8 Permits Required and Permit Schedule

The Project will be required to submit a RMP to the Department of Toxic Substances Control Imperial CUPA, which must be approved prior to the introduction and storage of aqueous ammonia to the site. The Permit to Operate (PTO) to be issued by the ICAPCD and the CEC's final decision on this SPPE application will serve as the principal approvals required to ensure that the Project's impacts to public health will be within acceptable levels. Award of the Authority to Construct (ATC) permit is expected to occur within 3 to 6 months after submittal of complete applications to ICAPCD.

6.8.9 References

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.

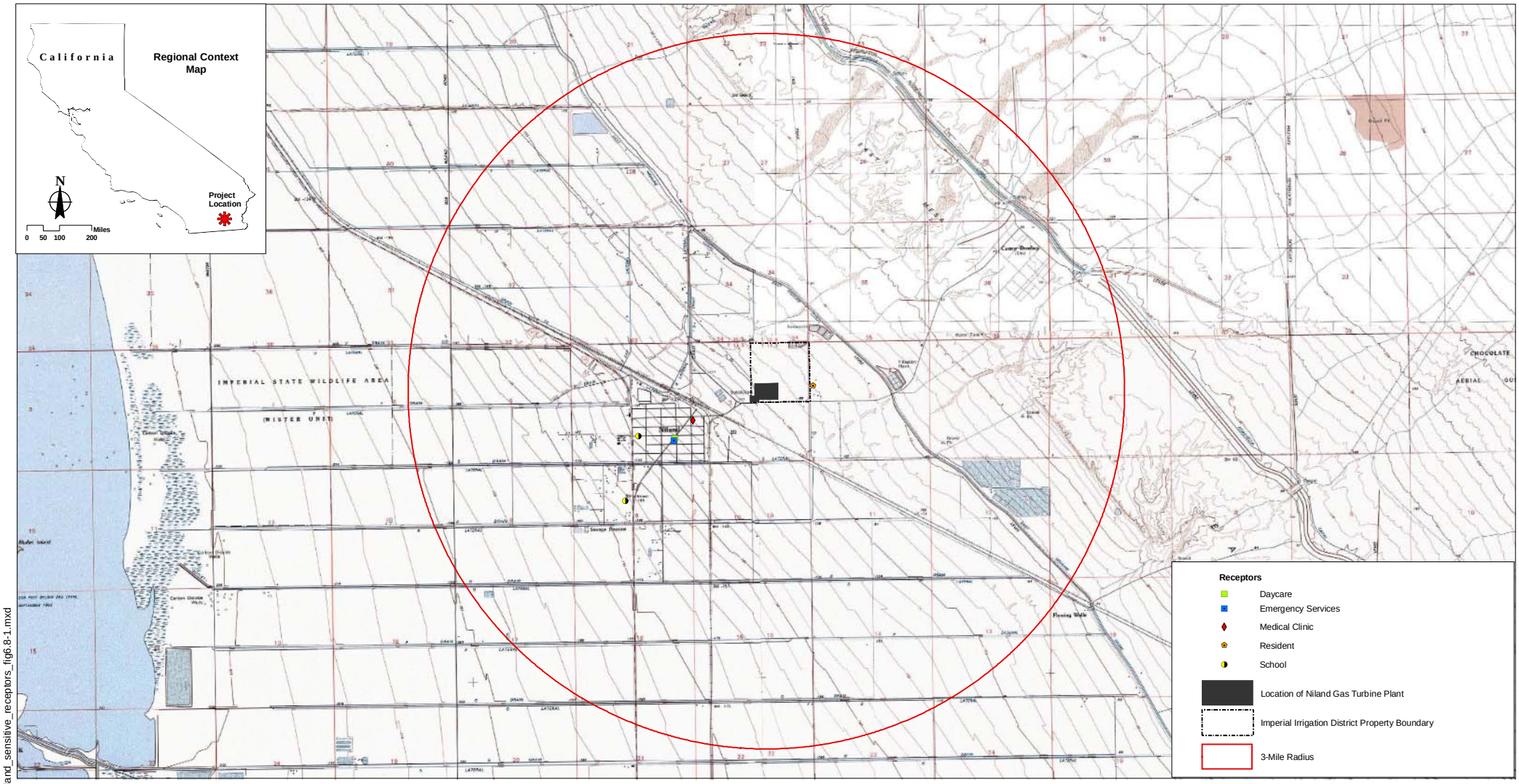
_____. 2003. Air Toxics Hot Spots Program Risk Assessment Guidelines – The Air Toxics Hot Spots Program Guidance Manual for EPA Preparation of Health Risk Assessments.

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

_____. 2005. Air Toxics Hot Spots Risk Assessment Guidelines, Part II: Technical Support Document for Describing Available Cancer Potency Factors.

California Air Resources Board (CARB). 1996. California Air Toxics Emission Factor (CATEF) Database, Version 1.2.

URS Corporation. 2006. Revised Modeling Protocol for the Niland Gas Turbine Plant. Prepared by URS on behalf of the Imperial Irrigation District for submittal to the Imperial County Air Pollution Control District and the California Energy Commission. January.



G:\gis\projects\1577\22238280\mxds\niland_sensitive_receptors_fig6.8-1.mxd

0 1000 2000 3000 4000 Feet

SCALE: 1" = 2000' (1:24,000)

N

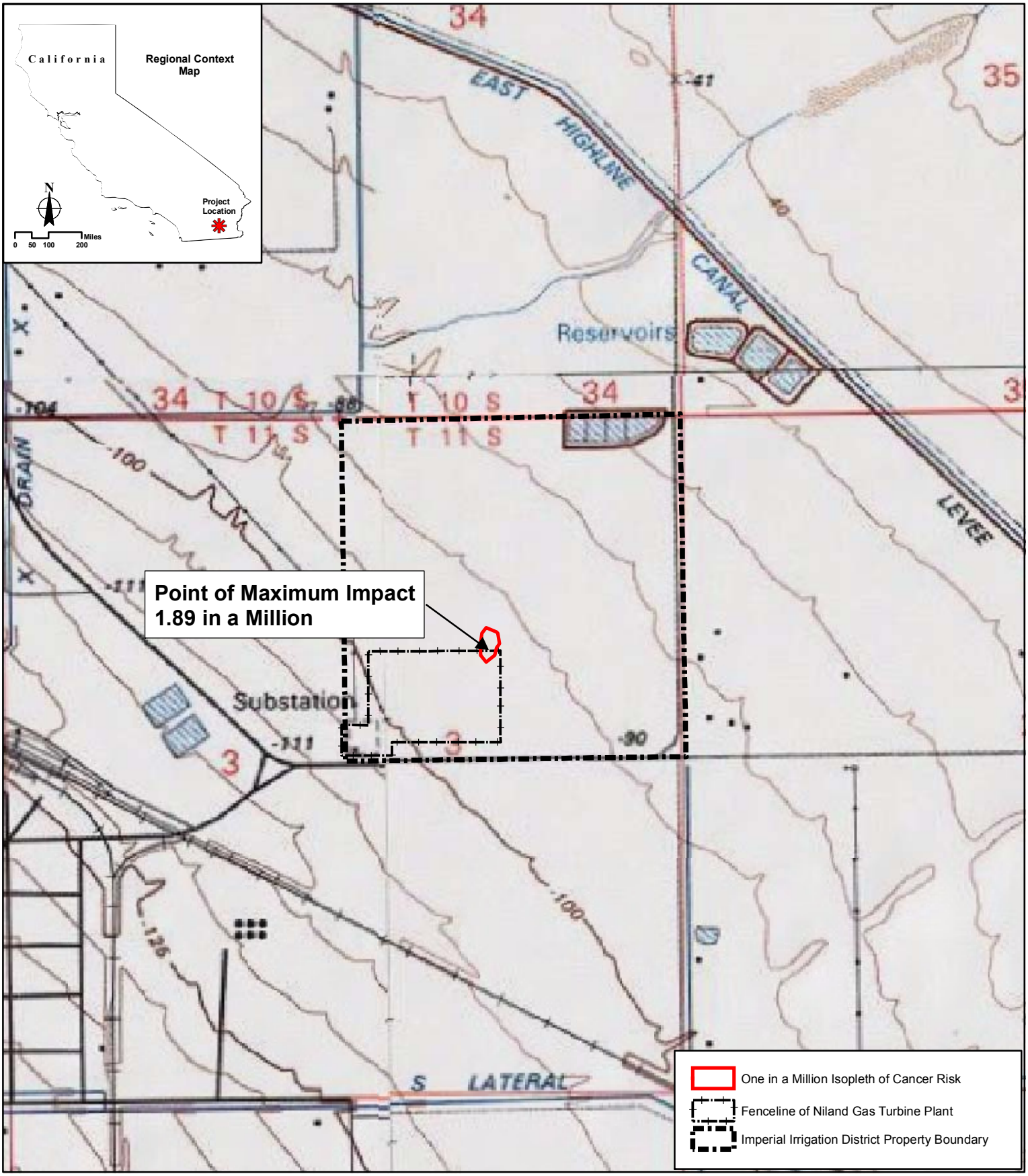
SOURCES:
USGS (7.5 Niland, Wister, Iris, Iris Wash quads);
Imperial Irrigation District (site plan).

Sensitive Receptors within 3 Miles of the Project Site

Niland Gas Turbine Plant
Imperial Irrigation District

URS

FIGURE 6.8-1



G:\gis\projects\1577\22238280\mxds\niland_cancer_risk_fig6.8-2.mxd

0 250 500 1,000 Feet

SCALE: 1" = 1000'

N

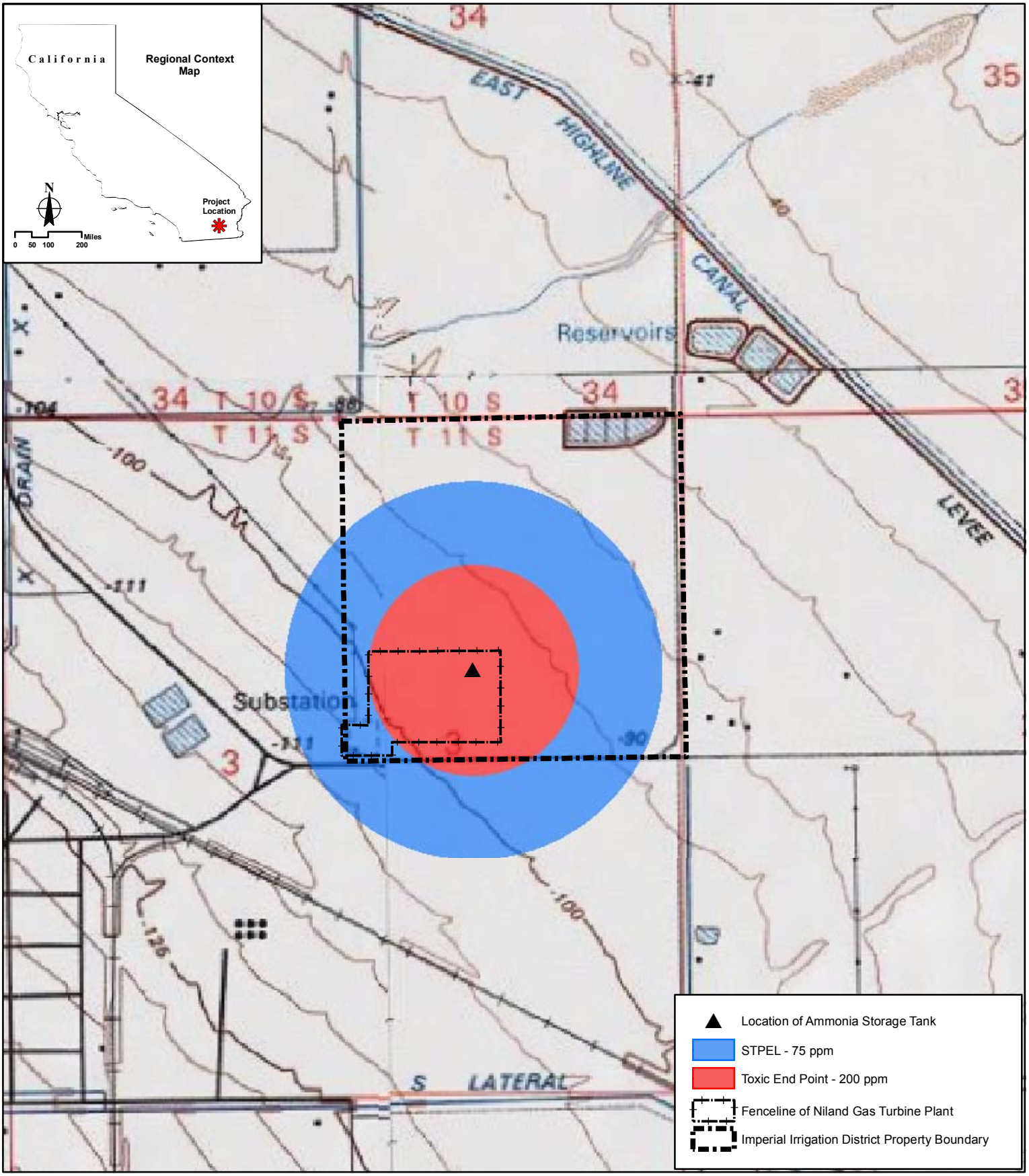
SOURCES:
USGS (7.5 Niland, Wister, Iris, Iris Wash quads);
Imperial Irrigation District (site plan).

Incremental Lifetime Cancer Risk Predicted with HARP

Niland Gas Turbine Plant
Imperial Irrigation District

URS

FIGURE 6.8-2



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Worst-Case Accidental Aqueous Ammonia Release Scenario
Distance to Toxic End Point and STPEL

0 250 500 1,000 Feet
SCALE: 1" = 1000'

N

SOURCES:
USGS (7.5 Niland, Wister, Iris, Iris Wash quads);
Imperial Irrigation District (site plan).

Niland Gas Turbine Plant
Imperial Irrigation District

URS

FIGURE 6.8-3