5.15 HAZARDOUS MATERIALS HANDLING

This section presents a discussion and evaluation of potential impacts from hazardous materials handling for the entire PEF Facility (existing PEF and PEF Expansion) because much of the infrastructure, including hazardous materials storage facilities, will be shared. Hence, hazardous materials handling is evaluated on a site-wide basis.

The PEF Expansion consists of a 160 MW natural gas-fired, simple cycle. The additional Expansion area will comprise of approximately two acres, located entirely within the existing PEF 31-acre site boundary. The PEF Expansion requires no modification to the existing PEF offsite linear facilities (e.g., electric transmission line, fuel gas supply line, or water supply line). The PEF Expansion will use the existing PEF administration and control, warehouse and shop, and water treatment buildings. Site access and onsite roadways are common with the existing PEF. Figure 3.1-1 of this application depicts the new facilities required for the PEF Expansion project within the footprint of the existing PEF.

5.15.1 Environmental Setting

The proposed PEF Expansion site is located in southern Kern County. The site vicinity is predominantly undeveloped with the exception of active and abandoned oil exploration, gravel quarrying, and farming operations. Oil fields are located approximately one mile north of the plant site. There are no schools, hospitals, residences, or other sensitive receptors within five miles of the site. Also, no known urban development is presently planned within five miles of the site, as described in Section 5.9, Land Use. Residences in the vicinity of the fuel gas pipeline route(s) are shown on Map 5.9-1 of Section 5.9 of 99-AFC-7, included for reference as part of Attachment H of this application.

5.15.2 Environmental Consequences

This section identifies potential impacts to the environment from construction and operational activities related to the handling of hazardous material. The following sources are referenced in support of the identification and assessment of hazardous materials within 99-AFC-7 and this AFC section: *Sax's Dangerous Properties of Industrial Materials* (Lewis, 1992) and the *NIOSH Pocket Guide to Chemical Hazards*, (National Institute for Occupational Safety [NIOSH], 1997).

5.15.2.1 <u>Construction Phase</u>

The only hazardous materials expected to be used onsite during construction are gasoline, diesel fuel, oil, lubricants, solvents, adhesives, and paint materials. There are no feasible alternatives to these materials for the operation of construction vehicles and equipment, or for painting and caulking of enclosures and equipment. Welding gases (i.e., acetylene and oxygen) are also likely to be used onsite in small volumes. No acutely hazardous materials, other than small volumes of acetylene, will be used or stored onsite during construction.

The potential for significant environmental impacts from hazardous material incidents during construction is minimal. Only small volumes of hazardous materials will be onsite during construction. In addition, trained maintenance and service personnel will be handling these materials when they are used. The most likely incidents involving these materials are dripping of gasoline, diesel fuel, oil, hydraulic fluid, and lubricants from vehicles or equipment. The worst-case scenario is an accident involving the release of one of these materials from a service vehicle during equipment maintenance or fueling. The risk of such an occurrence will be mitigated through the emergency response training program and procedures. These materials have low acute toxicity, and long-term or cumulative impacts will be avoided by cleaning up spills when they occur. In the case of a large spill, contaminated soil will be placed into barrels or roll-off bins by service personnel for subsequent evaluation and offsite disposal. Handling procedures for hazardous chemicals onsite during construction activities are referenced in Section 5.15.3.

5.15.2.2 Operational Phase

During operation of the generating plant (existing PEF and PEF Expansion), hazardous materials will be used and stored onsite. As shown in Table 3.4.10-1 and 3.4.10-2, some of the major hazardous materials to be stored and/or used at the site include:

- Anhydrous ammonia for the Selective Catalytic Reduction (SCR) air pollution control system
- Insulating and lubricating oils for the electric equipment and rotating equipment (Note that transformer oils do not contain PCBs.)
- Liquid carbon dioxide for fire suppression and generator purging
- Hydrogen for generator cooling
- Hydrochloric acid for HRSG cleaning
- Diesel fuel oil for operating a fire water pump
- Sulfuric acid for pH control of cooling towers
- Sodium hydroxide for pH control of cooling towers
- Neutralizing amine for boiler water treatment

- Bromine biocide and biodispersant for cooling water
- Scale inhibitors for cooling water
- Polymer for water treatment

Management of these materials to reduce potential releases is referenced in Section 5.15.3.

In addition, small quantities (typically less than five gallons) of paints, oils, solvents, pesticides, and cleaners, similar to the types purchased in retail hardware stores, will also be stored and used at the site.

Natural gas will be continuously delivered to the facility via a pressurized natural gas pipeline and will not be stored onsite.

5.15.2.2.1 Fire and Explosion Risks. Two flammable gases, natural gas and hydrogen, will be used in the power generation process. Minor amounts of other gases used for maintenance activities may also be stored onsite. Details on the uses of these gases are provided in the following paragraphs.

Natural Gas. Natural gas will be delivered via the existing 13.49-mile 20-inch diameter pipeline connecting the existing PEF to the 42-inch diameter Kern River/Mojave Pipeline. The existing pipeline is of sufficient capacity to serve the PEF Expansion with no further modification. As a result, the potential impacts presented by the PEF natural gas pipeline do not appear to be significant. Additionally, since no storage of natural gas will occur at the facility, the risk of explosion or fire at the facility is similar to the risk posed by the pipeline and is not significant.

Hydrogen. Hydrogen will be used as a combustion turbine coolant for the PEF and PEF Expansion projects. A maximum of 10,000 cubic feet of hydrogen may be stored onsite at any one time. A portion of the hydrogen will be contained on site within the cooling systems for the generators and associated piping. The balance of the hydrogen will be stored onsite to provide for replacement and make-up consumption of hydrogen. The gas will either be stored in an approved aboveground tank or in approved individual gas cylinders. The tank or cylinders will be stored outside near the combustion turbine generators and away from electrical lines and other potential ignition sources, as required by the applicable building and fire codes. If hydrogen is stored in cylinders, they will be stored upright, chained to a supporting structure, and protected from vehicular impact and other impacts by bollards constructed of steel pipe filled with concrete and set in concrete or equivalent. If the hydrogen is stored in a tank, it will also be protected from vehicular impact. The risks and potential impacts presented by the quantity of hydrogen can be compared to the risks and potential impacts of natural gas delivered to the site by pipeline discussed previously. Based on the fact that the hydrogen tank will hold a smaller finite volume of an explosive gas, it is reasonable to conclude that the risk presented by hydrogen at the facility is not as great as the risk from natural gas at the facility. As a result, the potential impacts presented by the proposed hydrogen tank do not appear to be significant.

Other Gases. Other gases to be stored and used at the facility may include gases typically used for shop welding (maintenance activities) and emissions monitoring (equipment calibration gases). These gases include acetylene, argon, carbon monoxide, nitric oxide, nitrogen and oxygen. The potential impacts presented by the use of these gases at the facility do not appear to be significant based on the following:

- A limited quantity of each gas will be stored at the facility.
- The gases will be stored in DOT-approved safety cylinders secured to prevent upset and physical damage.
- Incompatible gases (e.g., flammable gases and oxidizers) will be stored separately.
- The gases will be stored in multiple standard-sized portable cylinders (in contrast to larger cylinders), generally limiting the quantity of gas released from an individual cylinder failure to less than 200 cubic feet.

5.15.2.2.2 Acutely Hazardous Materials. Since 1986, to prevent accidental releases of hazardous materials and to reduce their potential impact on the public and environment, California had laws requiring a business that used materials defined as acutely hazardous materials in certain quantities to develop a Risk Management and Prevention Program (RMPP). In 1996, pursuant to Section 112(r) of the federal Clean Air Act, the U.S. EPA created the Risk Management Program (RMP). In September 1996, Senate Bill (SB) 1889 was enacted to change the California Health and Safety Code (CHSC) § 25531 et. seq., replacing the state RMPP requirements with the federal RMP requirements. Pursuant to SB1889, the California Office of Emergency Services (OES) was required to adopt implementing regulations and to seek and maintain delegated authority for the federal program. The new California implementation program is called the California Accidental Release Prevention (CalARP) Program. The CalARP Program is a merging of the federal and state programs for the prevention of accidental release of regulated toxic and flammable substances. The CalARP Phase I Final Regulations were approved on November 16, 1998 (CCR Title #19, Division 2, Chapter 4.5).

The final CalARP Program regulations provide two sets of regulated substances lists: one for federal regulated substances and one for state regulated substances.

- Section 2770.5 – Tables 1 and 2 of Section 2770.5 list federal regulated substances and threshold quantities for accidental release prevention, including flammable substances. Anhydrous ammonia, hydrogen, hydrochloric acid, and cyclohexylamine are examples of chemicals on this list.
- Section 2770.5 – Table 3 of Section 2770.5 lists state regulated substances and threshold quantities for accidental release prevention. Anhydrous ammonia, sulfuric acid and cyclohexylamine are examples of chemicals included on this list.

An RMP is required for any facility that stores more than a threshold quantity of a regulated substance on site.

With the exception of anhydrous ammonia, which will be stored onsite for the SCR system for emissions control, none of the chemicals proposed for use by the PEF and PEF Expansion are regulated substances subject to the requirements of the CalARP Program. Regulated substances besides ammonia that may be used and stored at the facility will not be stored and used in any larger quantities than that already analyzed in the 99-AFC-7. The 99-AFC-7 identified hydrogen, sulfuric acid, and cyclohexylamine as other hazardous materials that will be on site. The quantities were determined to be under the regulated threshold quantities under the CalARP Program.

Anhydrous ammonia will be stored in quantities that exceed the applicable thresholds. The federal regulated substances list identifies a threshold of 10,000 pounds for anhydrous ammonia and the state regulated substance list identifies a threshold of 500 pounds for ammonia. The maximum storage capacity for anhydrous ammonia proposed to be used as part of the SCR pollution control system for the existing PEF and PEF Expansion is unchanged from the existing 60,000 gallons (or more than 300,000 pounds). The proposed quantity exceeds both the federal and state threshold quantity and therefore an RMP would be required.

Since anhydrous ammonia would exceed the CalARP thresholds, an offsite consequences analysis (OCA) for accidental releases of anhydrous ammonia was conducted and is presented in Section 5.15.2.3.

5.15.2.2.3 <u>Other Hazardous Materials</u>. No adverse environmental impacts are anticipated related to other hazardous materials used at the facility. Only small quantities of paints, oils, solvents, pesticides, and cleaners, typical of those packaged for retail consumer use, will be present during operation of the facility. Small volumes of petroleum products associated with construction equipment will be onsite during construction. Long-term or cumulative impacts will be avoided by cleaning up any accidental spills of these materials as soon as they occur.

5.15.2.2.4 Material Safety Data Sheets. Material Safety Data Sheets for the hazardous materials will be kept onsite as required by 29 CFR 1910 OSHA Hazard Communication rules and regulations.

5.15.2.3 Offsite Consequences Analysis for Anhydrous Ammonia

This section presents an OCA and evaluation of potential acute public health impacts from an accidental release of acutely hazardous materials. An evaluation of materials to be stored and used onsite was made against both the federal and state lists of hazardous materials regulated under the federal RMP and CalARP requirements. Both programs require an OCA if maximum storage quantities of regulated substances exceed the threshold quantities identified previously. The only material that has the potential to be stored and used onsite in excess of federal or state thresholds is anhydrous ammonia.

Consistent with the CalARP program, an OCA was performed for two hypothetical accidental release scenarios: worst-case and alternative scenarios. The U.S. EPA has specified that the worst-case release scenario must be "the release of the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest distance to an endpoint" (40 CFR 63.3). The alternative release scenario is the condition that is more likely to occur. However, even the probability of the alternative scenario actually happening is extremely low.

Det Norske Veritas conducted an OCA for the ammonia to be stored at the PEF (Det Norske Veritas, Inc., 2004) and examined potential impacts for the worst-case and alternative scenarios. The two release scenarios, methodology, and results are presented below.

5.15.2.3.1 Release Scenarios. The existing PEF has two 30,000-gallon anhydrous ammonia storage tanks that are used for the SCR systems. Potential accidental release scenarios due to anhydrous ammonia handling and use include losses from the storage tanks, losses during unloading to the storage tanks, losses in the ammonia delivery system from the storage tank to the vaporizer, and losses of vaporized ammonia during delivery to the SCR catalyst beds. While the anhydrous ammonia is stored as a liquid, once released into the atmosphere, the ammonia would change into a gas and be dispersed into the air.

For the worst-case scenario, the largest quantity of ammonia to be released would result during the unlikely event that one of the 30,000-gallon storage tanks had a sudden and complete failure, releasing all its contents into the atmosphere. While the capacity of the storage tank is 30,000-gallons, the tank cannot be filled to capacity in order to allow for the expansion of the anhydrous ammonia from temperature changes. As a result, the Det Norske Veritas study assumed the tank was 80 percent filled for the worst-case release scenario. As per

CalARP requirements for a worst-case release of a gas, the total contents of the tank was assumed to be released in 10 minutes.

For the alternative scenario, the study examined a more likely event where a 3-inch vapor line connected to an ammonia storage tank failed resulting in a hole in the line through which the ammonia would escape. The study conservatively assumed that the release could not be controlled for two hours.

5.15.2.3.2 Ammonia Health Criteria. Short-term exposures to airborne ammonia can cause skin, eye, and upper respiratory irritation. At extremely high concentrations ammonia can be life threatening. For the worst-case and alternative release scenarios, the Det Norske Veritas study estimated the greatest distance from a release to a "toxic endpoint" for anhydrous ammonia. The toxic endpoint is a concentration defined by the U.S. EPA and CalARP Regulations and based on either the American Industrial Hygiene Associations Emergency Response Planning Guidelines Level 2 (ERPG-2) or the U.S. EPA's Technical Guidance for Hazards Analysis (U.S. EPA, 1987). Appendix A of the California Code of Regulations Title 19, Division 2, Chapter 4.5, Subchapter 1 lists the toxic and flammable endpoints for various regulated substances. The endpoint defined for anhydrous ammonia is 200 ppm (0.14 mg/l) and is based on the ERPG-2. The ERPG-2 value is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing any irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

5.15.2.3.3 Modeling Methodology. The Det Norske Veritas study used the Process Hazard Analysis Software Tool (PHAST) Version 6.4 to model distance from the theoretical ammonia release to the toxic endpoint. The model uses Det Norske Veritas' Unified Dispersion Model (UDM), which has been validated and used by companies and governments worldwide. To estimate potential impacts from the release, the model requires several inputs including, but not limited to, release height, receptor height, toxic endpoint, and meteorological conditions (ambient temperature, wind speed, atmospheric stability). For both the worst-case and alternative scenarios, the release was treated as a horizontal release at an elevation of one meter. The distance to toxic endpoint of 200 ppm at an elevation of 1 meter was modeled for both scenarios.

The dispersion characteristics of a release are influenced by meteorological conditions. For example, low wind speeds and stable atmospheric conditions inhibit pollutant dispersion, resulting in higher pollutant concentrations. Consistent with the CalARP requirements, the ambient temperature was taken as 25 °C or 77 °F for both scenarios. CalARP regulations also require that the worst-case scenario assume a conservative wind speed of 1.5 m/s and an atmospheric stability of F. As shown in Table 5.15-1, atmospheric stability of F is considered moderately stable. According to the CalARP requirements, the alternative scenario can use more typical wind speeds and atmospheric stability. For the analysis, Det Norske Veritas used a 1.5 m/s wind speed and an F atmospheric stability not only for the worst-case scenario but also for the alternative scenario. In reality, the combination of meteorological conditions is not as severe as assumed in the analysis. Based on 1964 meteorological data from Bakersfield, supplied by the San Joaquin Valley Unified Air Pollution Control District (refer to the Air Quality Study, the most prevalent stability class is D (neutral) and the most prevalent wind speeds are between 4.61-6.91 mph (4-6 knots; 2.1-3.1 m/s). The most prevalent wind speed-stability class combination is F stability and 4.61-6.91 mph winds (4-6 knots; 2.1-3.1 m/s). Wind roses from the 1964 meteorological data are as they were presented in Figures 5.15-1 through 5.15-7 of 99-AFC-7.

TABLE 5.15-1
ATMOSPHERIC STABILITY CLASSES

Class	Stability
A	Very unstable
B	Moderately unstable
C	Slightly unstable
D	Neutral
E	Slightly stable
F	Moderately stable
G	Very stable

Table 5.15-2 summarizes the parameters used for the worst-case and alternative release scenarios.

TABLE 5.15-2
MODELING PARAMETERS

Parameter	Worst-Case Scenario	Alternative Scenario
Chemical	Anhydrous Ammonia	Anhydrous Ammonia
Release Duration	10 minutes	120 minutes
Release Elevation	1 meter	1 meter
Receptor Height	1 meter	1 meter
Toxic Endpoint	200 ppm	200 ppm
Ambient Temperature	25 °C	25 °C
Wind Speed	1.5 m/s	1.5 m/s
Atmospheric Stability Class	F	F

5.15.2.3.4 <u>Discussion of OCA Results.</u> Based on the approach described above, the distance from the ammonia storage tank to the toxic endpoint for the worst-case and alternative release scenarios were predicted to be 0.83 miles and 0.24 miles, respectively. Figure 5.15-1 shows these distances overlaid on a map of the facility and surrounding area. The figure assumes that the ammonia has an equal probability to disperse in any direction. The nearest residences and schools are approximately 5 miles from the facility.

Therefore, the analysis demonstrates that the theoretical worst-case and alternative release scenarios would not have a significant impact on sensitive receptors. Workers in the vicinity of the ammonia truck unloading area could be exposed to potentially lethal concentrations of ammonia gas in the unlikely event of an accidental ammonia release. The project design includes measures to reduce the likelihood and consequences of an accidental ammonia release. Also, workers at the PEF will be trained to avoid and respond to accidental releases of hazardous materials, including ammonia. The proposed project design and worker safety training limit the hazard due to an accidental ammonia release to an acceptable level.

5.15.2.4 <u>Cumulative Impacts</u>

The use of hazardous materials at the expanded PEF (both existing PEF and PEF Expansion projects) is not expected to have a significant cumulative environmental impact related to hazardous materials usage.

5.15.3 Mitigation Measures

The Applicant proposes to apply the applicable Conditions of Certification for the existing PEF to the PEF Expansion. The Conditions of Certification for 99-AFC-7 are included in Section 9.0 of this application. With the implementation of these Conditions of Certification, no significant unavoidable, adverse impacts from hazardous materials handling are anticipated to occur from construction or operation of the PEF Expansion.

<u>Monitoring</u>. Because environmental impacts caused by construction and operation of the facility are expected to be minimal, an extensive monitoring program is not required. Visual monitoring during construction and operation will be performed to determine compliance with, and the effectiveness of, the proposed mitigation procedures.

During operation of the existing PEF and PEF Expansion, environmental impacts from management of hazardous materials will be minimized by implementation of the agreed upon mitigation measures. Monitoring of the ongoing effectiveness of the measures will be performed by onsite environmental staff under the supervision of the facility manager. This ongoing monitoring will be used to update operating procedures and plans to minimize facility environmental impacts.

5.15.4 LORS Compliance

The LORS applicable to the PEF Expansion in the context of hazardous materials handling are discussed in Section 7.0 LORS of this application. The PEF and PEF Expansion will comply with all LORS pertaining to hazardous materials.

5.15.5 References

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U.S. EPA, 1987. Technical Guidance for Hazard Analysis, Emergency Planning for Extremely Hazardous Substances, December 1987.

Woodward-Clyde Consultants. 1994. Safety and Reliability Analysis, Mojave Northward Expansion Project, Application for Certificate of Public Convenience and Necessity. Response to data request, submitted to the Federal Energy Regulatory Commission in April 1994.

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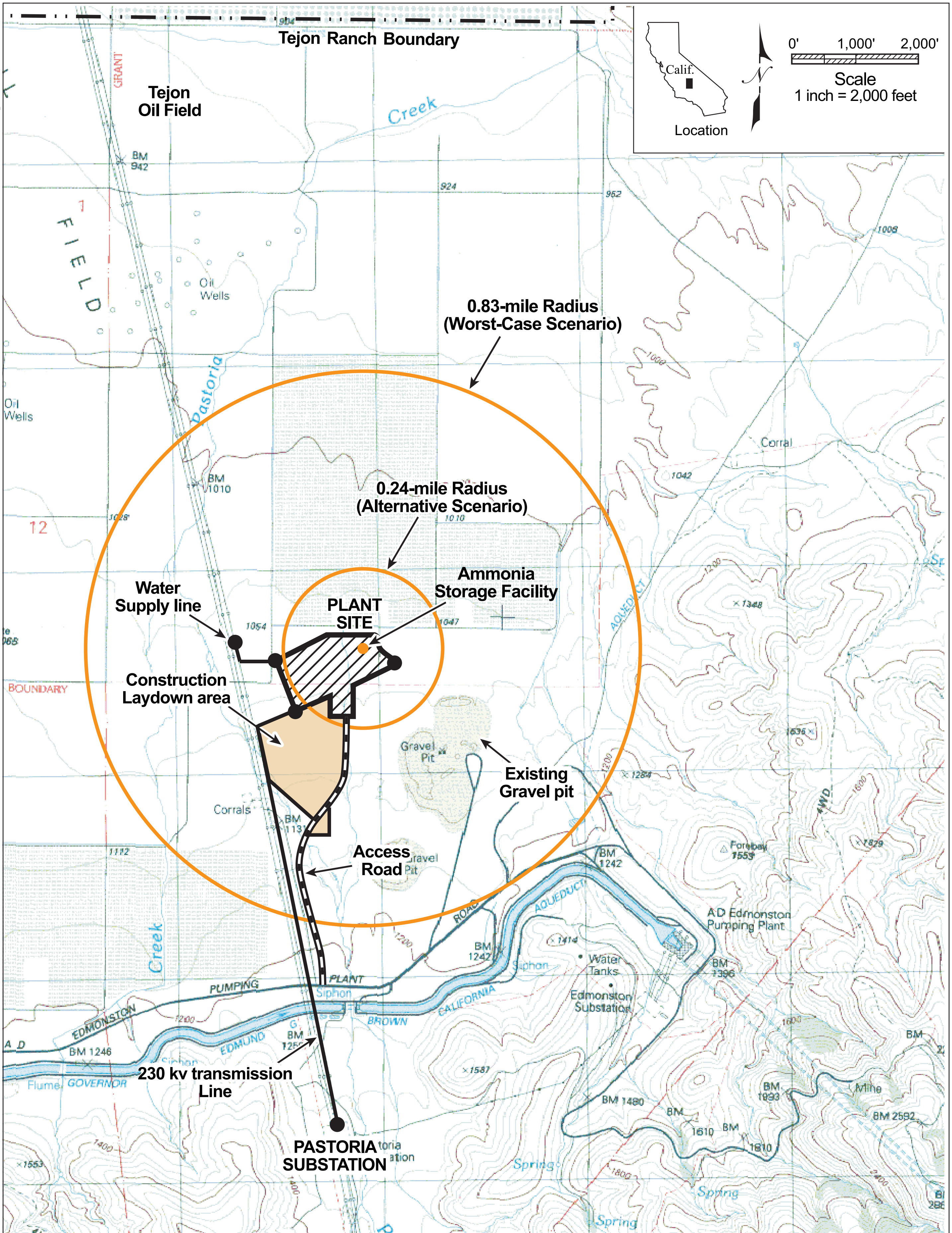

Pastoria Energy Facility Expansion

Source: *U.S.G.S. 7.5' topographic quadrangle:* Pastoria Creek, CA Copyright (c) 1997 Horizons Technology, Inc.

Figure 5.15-1. DISTANCE TO TOXIC ENDPOINT FOR WORST-CASE AND ALTERNATIVE RELEASE SCENARIOS

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