

8.12 Hazardous Materials Handling

8.12.1 Introduction

This subsection evaluates the potential effects on human health and the environment from the storage and use of hazardous materials in conjunction with the AES Highgrove Project. It presents the laws, ordinances, regulations, and standards (LORS) applicable to hazardous materials, describes the existing environment that may be affected, and identifies potential impacts on the environment and human health. The subsection also discusses the offsite migration modeling protocol, fire and explosion risk, potential cumulative impacts, and proposed mitigation measures.

8.12.2 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials and acutely hazardous materials at the Highgrove site are governed by federal, state, and local laws. Applicable laws and regulations address the use and storage of hazardous materials to protect the environment from contamination; they are also intended to protect facility workers and the surrounding community from exposure to hazardous and acutely hazardous materials. The LORS applicable to the Highgrove Project are summarized in Table 8.12-1.

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards

| LORS | Applicability | Conformance (Section No.) |
|--|--|--|
| Federal CERCLA/SARA/EPCRA | | |
| Section 302, EPCRA (Pub. L. 99-499, 42 USC 11022) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370) | Requires one time notification if extremely hazardous substances are stored in excess of TPQs. | An HMBP will be prepared for submittal to the CUPA. (Section 8.12.8.4.2). |
| Section 304, EPCRA (Pub. L. 99-499, 42 USC 11002) Emergency Planning And Notification (40 CFR 355) | Requires notification when there is a release of hazardous material in excess of its RQ. | An HMBP will be prepared to describe notification and reporting procedures (Section 8.12.8.4.1). |
| Section 311, EPCRA (Pub. L. 99-499, 42 USC 11021) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370) | Requires that either material safety data sheets (MSDSs) for all hazardous materials or a list of all hazardous materials be submitted to the State Emergency Response Commission (SERC), Local Emergency Planning Committee (LEPC), and San Bernardino County Fire Department | The HMBP to be prepared will include a list of hazardous materials for submission to agencies (Section 8.12.8.4.1) |

TABLE 8.12-1

Applicable Laws, Ordinances, Regulations, and Standards

| LORS | Applicability | Conformance (Section No.) |
|---|---|---|
| Section 313, EPCRA (Pub. L. 99-499, 42 USC 11023) Toxic Chemical Release Reporting: Community Right-To-Know (40 CFR 372) | Requires annual reporting of releases of hazardous materials. | The HMBP to be prepared will describe reporting procedures (Section 8.12.8.4.1). |
| Section 112, Clean Air Act Amendments (Pub. L. 101-549, 42 USC 7412) Chemical Accident Prevention Provisions (40 CFR 68) | Requires facilities that store a listed hazardous material at a quantity greater than the TQ to develop a Risk Management Plan. The facility will not have aqueous ammonia in concentrations greater than 20 percent in excess of the federal threshold quantity of 20,000 pounds. However, it will have greater than 500 pounds of a 19 percent solution of aqueous ammonia which exceeds the California TQ under the CalARP program (see state requirements below). | An RMP will not be required under the CAA because the Highgrove Project will not store regulated substances above federal TQs. However the state's CalARP program requirements will require an RMP for aqueous ammonia because the state's TQ is lower than the federal one. (Section 8.12.8.4.2) |
| Section 311, Clean Water Act (Pub. L. 92-500, 33 USC 1251 et seq.) Oil Pollution Prevention (40 CFR 112) | Requires preparation of an SPCC plan if oil is stored in a single aboveground storage tank with a capacity greater than 660 gallons or if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons. | An SPCC will be prepared (Section 8.12.8.4.3) |
| Pipeline Safety Laws (49 USC 60101 et seq.) Hazardous Materials Transportation Laws (49 USC 5101 et seq.) Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR 192) | Specifies natural gas pipeline construction, safety, and transportation requirements. | The natural gas pipeline will be constructed in accordance with 49 CFR requirements (Section 8.12.8.1) |

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards

| LORS | Applicability | Conformance (Section No.) |
|--|---|---|
| California | | |
| Health and Safety Code, Section 25500, et seq. (HMBP) | Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities. | An HMBP will be prepared for submittal to the CUPA (Section 8.12.8.4.1) |
| Health and Safety Code, Section 25531 through 25543.4 (CalARP) | Requires registration with local CUPA or lead agency and preparation of an RMP if regulated substances are handled or stored in excess of TPQs. | An RMP will be prepared for submittal to the CUPA (Section 8.12.8.2) |
| Health and Safety Code, Section 25270 through 25270.13 (Aboveground Petroleum Storage Act) | Requires preparation of an SPCC plan if oil is stored in a single aboveground storage tank with a capacity greater than 660 gallons or if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons. | An SPCC plan will be prepared (Section 8.12.8.4.3) |
| Health and Safety Code, Section 25249.5 through 25249.13 (Safe Drinking Water and Toxics Enforcement Act) (Proposition 65) | Requires warning to persons exposed to a list of carcinogenic and reproductive toxins and protection of drinking water from same toxins. | The site will be appropriately labeled for chemicals on the Proposition 65 list. (Section 8.12.8.4.4) |
| California Public Utilities Commission (CPUC) General Order Nos. 112-E and 58-A | Specify standards for gas service and construction of gas gathering, transmission, and distribution piping systems. | Construction of the natural gas pipeline will comply with the standards specified in these General Orders (Section 8.12.8.1) |
| Local | | |
| City of Riverside Municipal Code – Title 9, Chapter 9.48 | Requires filing of a hazardous materials business plan with the fire department | An HMBP will not be required because hazardous materials will not be stored in quantities exceeding reporting thresholds during construction of the gas pipeline within the City limits (Section 8.12.8.4.1) |
| Riverside County Ordinance 651.3 | Requires preparation of a Hazardous Materials Certificate of Registration and Hazardous Materials Business Plan for storage of hazardous materials. | A Hazardous Materials Certificate of Registration and HMBP will not be required because hazardous materials will not be stored in quantities exceeding reporting thresholds during construction of the gas pipeline in unincorporated areas of the County. (Section 8.5.7.3.1). |

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards

| LORS | Applicability | Conformance (Section No.) |
|---|--|---|
| Riverside County Ordinance 651.3, Section 9 | Requires preparation of a Risk Management Plan for regulated substances. | An RMP is not necessary because regulated substances will not be used for construction of the gas pipeline in quantities exceeding RMP thresholds in the unincorporated area of Riverside County. (Section 8.5.7.3.1). |
| Riverside County Ordinance 787.2 Fire Code | Requires proper storage and handling of hazardous materials. | Riverside County Fire Code will be followed for design and construction of the hazardous materials handling facilities in the unincorporated areas of Riverside County during construction of the gas pipeline (Section 8.5.7.4). |

Notes:

| | | | |
|---------|--|---------|--|
| Cal ARP | California Accidental Release Program | MSDS | Material Safety Data Sheet |
| CAA | Clean Air Act [Amendments] | Pub. L. | Public Law |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act | RMP | Risk Management Plan |
| CFR | Code of Federal Regulations | RQ | Reportable Quantity |
| CWA | Clean Water Act | SARA | Superfund Amendments and Reauthorization Act |
| CUPA | Certified Unified Program Agency | SERC | state emergency response commission |
| EHS | extremely hazardous substance | SPCC | Spill Prevention Control and Countermeasure Plan |
| EPCRA | Emergency Planning and Community Right-to-Know Act | TPQ | Threshold Planning Quantity |
| HMBP | Hazardous Materials Business Plan | TQ | Threshold Quantity |
| LEPC | local emergency planning committee | USC | United States Code |

8.12.2.1 Federal

Hazardous materials are governed under Title 29 of the US Code, Titles 29, 40, and 49 of the Code of Federal Regulations, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Clean Air Act (CAA), and the Clean Water Act (CWA).

8.12.2.1.3 CERCLA

The Superfund Amendments and Reauthorization Act (SARA) amends CERCLA and governs hazardous substances. The applicable part of SARA for the proposed project is Title III, otherwise known as the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA). Title III requires states to establish a process for developing local chemical emergency preparedness programs and to receive and disseminate information on hazardous substances present at facilities in local communities. The law provides primarily for planning, reporting, and notification concerning hazardous substances. Key sections of the law are:

- Section 302 – Requires one time notification when extremely hazardous substances (EHSs) are present in excess of their TPQs. EHSs and their TPQs are found in Appendices A and B to 40 Code of Federal Regulations (CFR) Part 355.

- Section 304 – Requires immediate notification to the local emergency planning committee (LEPC) and the state emergency response commission (SERC) when a hazardous material is released in excess of its RQ. If a CERCLA-listed hazardous substance RQ is released, notification must also be given to the National Response Center in Washington, D.C. (RQs are listed in 40 CFR Part 302, Table 302.4). These notifications are in addition to notifications given to the local emergency response team or fire personnel.
- Section 311 – Requires that either material safety data sheets (MSDSs) for all hazardous materials or a list of all hazardous materials be submitted to the SERC, LEPC, and local fire department.
- Section 313 – Requires annual reporting of hazardous materials released into the environment either routinely or as a result of an accident.

8.12.2.1.4 Clean Air Act

Regulations (40 CFR 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities that store a Threshold Quantity (TQ) or greater of listed regulated substances to develop a Risk Management Plan (RMP), including hazard assessments and response programs to prevent accidental releases of listed chemicals. Section 112(r)(5) of the CAA discusses the regulated substances. These substances are listed in 40 CFR 68.130.

8.12.2.1.5 Clean Water Act

The Spill Prevention Control and Countermeasures (SPCC) program under the CWA is designed to prevent or contain the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Regulations under the CWA (40 CFR 112) require facilities to prepare a written SPCC Plan if they store oil and its release would pose a threat to navigable waters. The SPCC program is applicable if a facility has a single oil aboveground storage tank (AST) with a capacity greater than 660 gallons, total AST storage greater than 1,320 gallons, or underground storage capacity greater than 42,000 gallons.

8.12.2.1.6 Natural Gas Pipeline Construction and Safety

Title 40 of the Code of Federal Regulations, parts 190 through 192, specifies safety and construction requirements for natural gas pipelines. Part 190 outlines pipeline safety procedures, Part 191 requires a written report for any reportable incident, and Part 192 specifies minimum safety requirements for pipelines.

8.12.2.1.7. Other

Other related federal laws that address hazardous materials but do not specifically address their handling are the Resource Conservation and Recovery Act (RCRA), which is discussed in Subsection 8.13, and the Occupational Safety and Health Act (OSHA), which is discussed in Subsection 8.7.

8.12.2.2 State

California laws and regulations relevant to hazardous materials handling at the Highgrove Project site include Title 8 of the California Code of Regulations, Health and Safety Code Section 25500 (hazardous materials), Health and Safety Code Section 25531 (acutely

hazardous materials), and the Aboveground Petroleum Storage Act (petroleum in aboveground tanks).

8.12.2.2.1 Health and Safety Code Section 25500

This law is found in the California Health and Safety Code, Section 25500, et seq., and in the regulations contained in 19 CCR Section 2620, et seq. The law requires local governments to regulate business storage of hazardous materials in excess of certain quantities. The law also requires that entities storing hazardous materials be prepared to respond to releases. Those using and storing hazardous materials are required to submit an HMBP to their local administering agency (i.e., CUPA). They must also report releases to their CUPA and the Governor's Office of Emergency Services. The threshold quantities for hazardous materials are 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases measured at standard temperature and pressure.

8.12.2.2.3 Health and Safety Code Section 25531

This law regulates the registration and handling of regulated substances, per California Health and Safety Code, Section 25531, et seq. Regulated substances are any chemicals designated under 40 CFR 68.130 as part of the CAA's Accidental Release Prevention Program or designated by the state of California under its CalARP program. Facilities handling or storing regulated substances at or above threshold quantities (TQs) must register with their local CUPA and, if requested, must prepare an RMP.

8.12.2.2.4 Aboveground Petroleum Storage Act

This law is found in the Health and Safety Code at Sections 25270 to 25270.13 and is intended to ensure compliance with the federal CWA. The law applies if a facility has an AST with a capacity greater than 660 gallons or a combined AST capacity greater than 1,320 gallons and if there is a reasonable possibility that the tank(s) may discharge oil in "harmful quantities" into navigable waters or adjoining shore lands. If a facility falls under these criteria, it must prepare an SPCC Plan. The law does not cover AST design, engineering, construction, or other technical requirements, which are usually determined by local fire departments.

8.12.2.2.5 Safe Drinking Water and Toxics Enforcement Act (Proposition 65)

This law identifies chemicals that cause cancer and reproductive toxicity, informs the public, and prevents discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically. The Act is administered by California's Office of Environmental Health Hazard Assessment. Some of the chemicals to be used at the Highgrove Project facility are on the cancer-causing lists of the Act.

8.12.2.2.6 California Fire Code, Article 80 and others

The code includes provisions for storage and handling of hazardous materials. There is considerable overlap between this code and Chapter 6.95 of the California Health & Safety Code. The fire code, however, contains independent provisions regarding fire protection and neutralization systems for emergency venting [see Section 80.303, D (compressed gases)]. Article 4 establishes hazardous materials storage thresholds above which a permit is required. Article 79 presents requirements for combustible and flammable liquids.

8.12.2.2.7 Natural Gas Pipeline Construction and Safety

The California Public Utilities Commission enforces General Order No. 58-A specifying standards for natural gas service in the State of California, and General Order No. 112-E specifying rules governing the design, construction, testing, operation, and maintenance of natural gas gathering, transmission, and distribution piping systems.

8.12.2.3 Local

The San Bernardino County Fire Department is the designated CUPA for the proposed plant site and is responsible for administering HMBPs/HMMPs, SPCC plans, and RMPs filed by businesses located in the county. The Fire Department is also responsible under the CUPA program for underground storage tank compliance. In addition, the CUPA is the regulatory body for all hazardous waste generated in the County (see Section 8.14, Waste Management). The CUPA is responsible for ensuring that businesses and industry store and use hazardous materials safely and in conformance with various regulatory codes. The CUPA performs inspections at established facilities to verify that hazardous materials are properly stored and handled and that the types and quantities of materials reported in a firm's HMBP are accurate. The City of Grand Terrace does not have LORS that apply to Hazardous Materials Handling.

Similarly, as described above, the pipeline construction is addressed by State LORS. In addition, hazardous materials storage requirements promulgated by the City of Riverside and Riverside County are similar to State requirements under the California Health and Safety Code and the California Fire Code.

8.12.2.4 Other Codes

The design, engineering, and construction of hazardous materials storage and dispensing systems will be in accordance with all applicable codes and standards, including the following:

- California Vehicle Code, 13 CCR 1160, et seq. – Provides the CHP with authority to adopt regulations for the transportation of hazardous materials in California.
- State Building Standard Code, Health and Safety Code Sections 18901 to 18949 – Incorporates the Uniform Building Code (UBC), Uniform Fire Code, and the Uniform Plumbing Code.
- American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII.
- American National Standards Institute (ANSI) K61.1.

8.12.3 Affected Environment

The project site is located in an industrially zoned area of the City of Grand Terrace in San Bernardino County (Figure 2.1-1). Identification of sensitive receptor facilities (such as schools, day-care facilities, convalescent centers, or hospitals) within 6 miles of the project site was performed by Environmental Data Resources Inc. (EDR). The nearest sensitive receptors would be a proposed high school, Colton Joint Union High School #3, which would be located across Taylor Street (with the nearest classrooms about 1,000 feet to the southeast of the project site) and Pico Park located 0.20 mile due east of the site. In addition,

Immanuel Baptist School and Preschool, the Highgrove Elementary School, and the Highgrove United Methodist Church are each located approximately 0.60 mile from the site.

Sensitive receptors within a 6-mile radius of the project site are provided in the EDR report in Appendix 8.6A. It also contains a description of the receptors.

8.12.4 Potential Environmental and Human Health Effects

Hazardous materials to be used at the Highgrove Project during construction and operation were evaluated for hazardous characteristics. That evaluation is discussed in this subsection. Some of these materials will be stored at the generating site continuously. Others will be brought onsite for the initial startup and periodic maintenance (every 3 to 5 years). Some materials will be used only during startup. Hazardous materials will not be stored or used in the gas supply line, water supply line, or electric transmission line corridors during operations. Storage locations are described in Table 8.12-2. Table 8.12-3 presents information about these materials, including trade names; chemical names; Chemical Abstract Service (CAS) numbers; maximum quantities onsite; reportable quantities (RQs); threshold planning quantities (TPQs); threshold quantities (TQs); and status as a Proposition 65 chemical (a chemical known to be carcinogenic or cause reproductive problems in humans). Toxicity characteristics and the exposure level criteria for regulated substances that will be handled at the Highgrove Project facility in quantities exceeding TQs are shown in Table 8.12-4. Health hazards and flammability data are summarized in Table 8.12-5. Table 8.12-5 also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia). Measures to mitigate the potential effects from the hazardous materials are presented in Subsection 8.12.8. Due to the size of these tables, Tables 8.12-2 through 8.12-5 have been moved to the end of this section.

8.12.4.1 Construction Phase

During construction of the project and linear facilities, regulated substances, as defined in California's Health and Safety Code, Section 25531, will not be used. Therefore, no discussion of regulated substance storage or handling is included in this subsection.

Hazardous materials to be used during construction of the project and its associated linear facilities will include gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. There are no feasible alternatives to motor fuels and oils for operating construction equipment. The types of paint required are dictated by the types of equipment and structures that must be coated and by the manufacturers' requirements for coating.

The quantities of hazardous materials that will be onsite during construction are small, relative to the quantities used during operation. Construction personnel will be trained to handle the materials properly. The most likely possible incidents will involve the potential for fuels, oil, and grease dripping from construction equipment. The small quantities of fuel, oil, and grease that might drip from construction equipment will have relatively low toxicity and will be biodegradable. Therefore, the expected environmental impact is minimal.

Small oil spills may also occur during onsite refueling. Equipment refueling will be performed away from water bodies to prevent contamination of water in the event of a fuel spill. Therefore, the potential environmental effects from fueling operations are expected to

be limited to small areas of contaminated soil. If a fuel spill occurs on soil, the contaminated soil will be placed into barrels or trucks for offsite disposal as a hazardous waste. The worst-case scenario for a chemical release from fueling operations would be a vehicle accident involving a service or refueling truck. Handling procedures for the hazardous materials to be used onsite during construction are presented in Subsection 8.12.8.1.

The quantities of hazardous materials that will be handled during construction are relatively small and Best Management Practices (BMPs) will be implemented by contractor personnel. Therefore, the potential for environmental effects is expected to be small.

8.12.4.2 Operations Phase

Several hazardous materials, including one regulated substance, will be stored at the generating site during operation. An RMP will be prepared consistent with the CalARP program requirements. Many of the hazardous materials that will be stored onsite are corrosive and are a threat to humans (particularly workers at the site) if inhaled, ingested, or contacted with the skin. The hazardous characteristics of materials being used at the site are summarized in Table 8.12-5. Table 8.12-5 also contains information on incompatible chemicals. Mixing incompatible chemicals can generate toxic gases. Measures to keep incompatible chemicals separated include separate storage and containment areas and/or berming (see Subsection 8.12.8).

Potential environmental and/or human health effects could be caused by accidental releases, accidental mixing of incompatible chemicals, fires, and injury to facility personnel from contact with a hazardous material. The accidental release of aqueous ammonia might present the most serious potential for effects on the environment and/or human health.

The Highgrove Project facility will store the 19-percent aqueous ammonia solution in a single stationary aboveground storage tank (AST). The capacity of the tank will be approximately 16,000 gallons, but will be limited by regulation to storing a maximum amount of 13,600 gallons (85 percent capacity). The tank will be surrounded by a secondary containment structure capable of holding the full contents of the tank, approximately 1,100 square feet (22 feet by 50 feet).

Aqueous ammonia will be delivered to the plant by truck transport. The truck unloading area will be located on an unloading apron adjacent to the storage tank. The truck unloading area would be surrounded by a berm sufficient to contain the contents of the truck. The use of 19 percent aqueous ammonia will require an average of approximately 4 deliveries of ammonia per month during the peak period.

Pure ammonia (NH_3) is a volatile chemical that is stored under pressure as a liquid and becomes a toxic gas if released. The odor threshold of ammonia is about 5 parts per million (ppm), and minor irritation of the nose and throat will occur at 30 to 50 ppm. Concentrations greater than 140 ppm will cause detectable effects on lung function even for short-term exposures (0.5 to 2 hours).

At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death occurs at concentrations of 2,500 to 7,000 ppm. The hazard to facility workers will be mitigated by facility safety equipment, hazardous materials training, and emergency response planning (see Subsection 8.7, Worker Health and Safety). The results of an Offsite

Consequences Analysis presented in Subsection 8.12.5, Offsite Migration Modeling, show that a release of a 19 percent solution of aqueous ammonia under a worst-case scenario will not cause significant offsite impacts to public health or safety.

Sulfuric acid, an extremely hazardous substance, is a very corrosive chemical that can cause severe harm to humans if ingested, inhaled, or contacted. However, sulfuric acid has a very low vapor pressure and will not readily volatilize upon release. Therefore, the potential for harm to humans offsite is minimal. Sulfuric acid is identified as a regulated substance under the CalARP program, but only if it is concentrated with greater than 100 pounds of sulfur trioxide, if it meets the definition of oleum, or if it is stored in a container with flammable hydrocarbons. The sulfuric acid that will be used at the Highgrove Project facility does not contain more than 100 pounds of sulfur trioxide or meet the definition of oleum. In addition, it will not be stored in a container with flammable hydrocarbons. Therefore, sulfuric acid is not subject to the RMP requirements under CalARP.

The remaining materials in Table 8.12-3 are also considered to be hazardous, but they pose less threat to humans than aqueous ammonia and sulfuric acid. Some materials (citric acid and sodium nitrate) will be used at the site only during initial commissioning and during periodic maintenance (once every 3 to 5 years). Therefore, the potential for environmental or health effects will exist only during those rare occasions when the materials are onsite.

8.12.5 Offsite Consequence Analysis

Because there is human activity in the vicinity of the proposed site, a vulnerability analysis was performed to assess the risk to humans from release of aqueous ammonia. Dispersion modeling was conducted using the SLAB numerical dispersion model (LLNL, 1990).

The worst-case accidental release scenario assumed that the aqueous ammonia storage tank was punctured and the entire contents of the tank were released into the spill vault. An initial ammonia emission rate for an evaporating pool of 19 percent aqueous ammonia solution was calculated pursuant to the guidance given in *RMP Offsite Consequence Analysis Guidance*, EPA, April 1999, and using the “evaporation calculator” provided by the National Oceanic and Atmospheric Administration (NOAA, 2004). An initial ammonia evaporation rate was calculated and assumed to occur for one hour. For concentrated solutions, the initial evaporation rate is substantially higher than the rate averaged over time periods of a few minutes or more since the concentration of the solution immediately begins to decrease as evaporation begins. However, using the initial evaporation rate results in a worst-case ammonia emission rate for the evaporating pool of ammonia. Release rates for ammonia vapor from an evaporating 19-percent solution of aqueous ammonia were calculated assuming mass transfer of ammonia across the liquid surface occurs according to principles of heat transfer by natural convection. The ammonia release rate was calculated using the evaporation calculator, meteorological data listed below and the dimensions of the secondary containment area. The offsite consequence analysis is provided as Appendix 8.12A.

Parameters used to calculate the ammonia emission rates include an atmospheric stability classification of “F,” a wind speed of 1.5 meters/second and a temperature of 116 degrees Fahrenheit (°F), which represents the highest temperature recorded over the past 75 years.

Using these parameters, the ammonia plume was predicted – using a height of 1.6 meters – to extend approximately 12.10 2 meters (39.70 feet) from the ammonia storage tank at a

concentration of 150 ppm. At a concentration of 75 ppm, the distance was 12.22 meters (40.09 feet) from the tank (see Table 8.12-6). The assumptions used in the ammonia analysis include the following:

- A total release of ammonia is assumed to occur over 1 hour, representing an evaporating pool of 13,600 gallons of a 19 percent ammonia solution
- An ammonia storage temperature of 116°F (highest temperature recorded near to proposed site in 75 years)
- A diked secondary containment area of 1,100 square feet (22 feet by 50 feet)

TABLE 8.12-6
Gaseous Ammonia Concentrations in the Event of a Release

| Concentration (ppm) | Distance in meters from Ammonia Tank to Plume Edge (feet) | |
|---------------------------------|---|---------------------------|
| | 0-Meter Receptor Height | 1.6-Meter Receptor Height |
| 300 ppm (OSHA's IDLH) | 10.11 (33.16) | 11.90 (39.04) |
| 150 ppm (AIHA's ERPG) | 10.38 (34.06) | 12.10 (39.70) |
| 75 ppm (CEC Significance Value) | 10.52 (34.51) | 12.22 (40.09) |

Notes:

The complete Offsite Consequence Analysis may be found in Appendix 8.12A.

Distances calculated at ground level and based on the height of the average human (1.6 m).

Based on this conservative modeling analysis, the worst case accident is not expected to result in an offsite concentration greater than 75 ppm at the property fenceline, located about 65 feet west of the ammonia tank storage area, at the nearest point. Since the general public will not be exposed to ammonia concentrations above 75 ppm during a worst-case release scenario, the storage of aqueous ammonia onsite will not pose a significant risk to the public.

8.12.6 Fire and Explosion Risk

As shown in Table 8.12-5, many of the hazardous materials are non-flammable. Aqueous ammonia, which constitutes the largest quantity of hazardous materials onsite (except for the mineral oil in the transformers), is incombustible in its liquid state. Ammonia evaporating as a gas from a leak or spill of the aqueous solution is combustible within a narrow range of concentrations in air. However, the evaporation rate is sufficiently low that the lower explosive limit (LEL) will not be reached. The lubrication oil and diesel fuel are flammable and will be handled in accordance with a HMBP to be approved by San Bernardino Fire Department, Hazardous Materials Division. Hydraulic oil, which is classified as combustible, will also be handled in compliance with the HMBP. With proper storage and handling of flammable materials in accordance with the HMBP, the risk of fire and explosion at the generating facility should be minimal.

The natural gas that will provide the Highgrove Project with fuel for the combustion turbines is flammable and could leak from the supply line that brings gas from the SCGC gas line. The risk of leakage is the normal type of risk encountered with transmitting natural gas via

pipeline. Proper design, construction, and maintenance of the line will minimize leaks and the risk of fire or explosion. The line will be buried primarily in or adjacent to roadways.

Upon discovering that the Colton Joint Unified School District was conducting an environmental review of its Proposed High School Site Number 3, the Applicant commissioned a study to analyze the new proposed gas pipeline in accordance with California Department of Education Pipeline Risk Analysis protocol. The proposed new gas pipeline will run within approximately 1,500 feet of the proposed high school. The analysis specifically addressed the risk of pipeline rupture due to various forms of failures and then evaluated the probability of such occurrence and the potential affect on the school. The study used conservative assumptions based on older pipelines and therefore its results predict a greater probability of pipeline failure than would be expected from a new pipeline constructed to today's stringent pipeline standards. Even with the conservative assumptions, the analysis concluded that due to the relatively small diameter and location of the pipeline will not expose students or school employees to significant hazards associated with operation of the natural gas pipeline. The complete pipeline risk assessment is provided in Appendix 8.12B.

The San Bernardino County Fire Department Station No. 23 in Grand Terrace is the primary response unit and is located 1.7 miles northeast of the site.

8.12.7 Cumulative Impacts

The primary potential cumulative impact from the use and storage of hazardous materials will be a simultaneous release from two or more sites of a chemical that will migrate offsite. Potentially, the two or more migrating releases could combine; thereby posing a greater threat to the offsite population than a single release by any single site.

Hazardous materials that do not migrate, such as sulfuric acid, would not present a potential cumulative impact. The only hazardous material that has the potential to migrate offsite from the Highgrove Project is ammonia vapor released from spilled aqueous ammonia. Based on the offsite consequences analysis (OCA) results for the Highgrove, Project ammonia vapor concentrations are not expected to occur offsite. In the unlikely event that an aqueous ammonia spill occurred at the Highgrove Project at the same time as a chemical spill at another nearby industrial facility, offsite ammonia levels from the Highgrove Project will not be sufficient to cause cumulative impacts.

8.12.8 Proposed Mitigation Measures

The following subsections present measures that the Applicant would implement during project construction and operation phases to mitigate risks in handling hazardous materials, particularly the risk of inadvertent spills or leaks that might pose a hazard to human health or the environment.

8.12.8.1 Construction Phase

During facility construction, hazardous materials stored onsite will include small quantities of paints, thinners, solvents, cleaners, sealants, lubricants, and 5-gallon emergency fuel containers. This subsection describes measures that will be taken to mitigate potential risks from hazardous material usage. Paints, thinners, solvents, cleaners, sealants, and lubricants

will be stored in a locked utility building. These materials will be handled per the manufacturers' directions and will be replenished as needed. The emergency fuel containers will be Department of Transportation (DOT)-approved, 5-gallon safety containers, secured to the construction equipment. The emergency fuel will be used only when regular vehicle fueling is unavailable.

Fuel, oil, and hydraulic fluids will be transferred directly from a service truck to construction equipment tanks and will not otherwise be stored onsite. Fueling will be performed by designated, trained service personnel either before or at the end of the workday. Service personnel will follow standard operating procedures (SOPs) for filling and servicing construction equipment and vehicles. The SOPs, which are designed to reduce the potential for incidents involving the hazardous materials, include the following:

- Refueling and maintenance of vehicles and equipment will occur in designated areas that are equipped with spill control features (e.g., berms, paved surfaces, spill response kits, etc.).
- Vehicle and equipment service and maintenance will be conducted by authorized personnel only.
- Refueling will be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual fuel from the hose.
- Vehicle engines will be shut down during refueling.
- No smoking, open flames, or welding will be allowed in refueling or service areas.
- Refueling will be performed away from bodies of water to prevent contamination of water in the event of a leak or spill.
- When refueling is completed, the service truck will leave the project site.
- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil will be put in containers for offsite disposal as a hazardous waste.
- All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

Small spills will be contained and cleaned up immediately by trained, onsite personnel. Larger spills will be reported via emergency phone numbers to obtain help from offsite containment and cleanup crews. Personnel working on the project during the construction phase will be trained in handling of and the dangers associated with hazardous materials. An onsite health and safety person will be designated to implement health and safety guidelines and contact emergency response personnel and the local hospital, if necessary.

If a spill involves hazardous materials equal to or greater than the specific reportable quantity, all federal, state, and local reporting requirements will be followed. The California

Water Code, Section 13272(f), establishes a reportable quantity of 42 gallons for spills of petroleum products in water bodies. In the event of a fire or injury, the local fire department will be called (San Bernardino County Fire Department Station No. 23, at 22592 City Center Court in the City of Grand Terrace).

8.12.8.2 Operation Phase

During operation, some hazardous materials will be stored onsite. Listed below are management and mitigation measures for minimizing the risks of hazardous material handling during facility operation.

8.12.8.2.1 Aqueous Ammonia

The aqueous ammonia storage and handling facilities will be equipped with a tank level monitor, temperature and pressure monitors and alarms, and excess flow and emergency block valves. Secondary containment will be provided. If there is an inadvertent release from the storage tank, the liquid will be contained within the secondary containment structure.

8.12.8.2.2 Other Hazardous Materials

All hazardous materials will be handled and stored in accordance with applicable codes and regulations. All containers used to store hazardous materials will be inspected regularly for signs of leaking or failure. Incompatible materials will be stored in separate storage and containment areas. Areas susceptible to potential leaks and/or spills will be paved and bermed. Containment areas may drain to a collection area, such as an oil/water separator or a waste collection tank. Piping and tanks will be protected from potential traffic hazards by concrete or pipe-type traffic bollards and barriers.

If a spill involves hazardous materials equal to or greater than the specific reportable quantity all federal, state, and local reporting requirements will be followed. The California Water Code, Section 13272(f), establishes a reportable quantity of 42 gallons for spills of petroleum products in water bodies.

A worker safety plan, in compliance with applicable regulations, will be implemented. It will include training for contractors and operations personnel. Training programs will include safe operating procedures, the operation and maintenance of hazardous materials systems, proper use of personal protective equipment (PPE), fire safety, and emergency communication and response procedures. All plant personnel will be trained in emergency procedures, including plant evacuation and fire prevention. In addition, designated personnel will be trained as members of a plant hazardous material response team; team members will receive the first responder and hazardous material technical training to be developed in the HMBP (Subsection 8.12.8.4). For emergency spills, San Bernardino County Fire Department has a formally trained Hazardous Materials Response Team to provide assistance during a spill cleanup. The County Fire Department will respond and will identify the type and source of the hazardous material, oversee evacuation of people, and confine the spilled material if possible. Cleanup of the material is the responsibility of the facility causing the spill. The San Bernardino County Fire Department Station No. 23 in Grand Terrace is the primary response unit. This station is backed up by the City of Colton Fire Department in Colton California. The Hazardous Materials Response Team is located at the San Bernardino County Fire Department Station No. 74. This response team is also supported by Hazardous Materials Specialists employed by the County (Palkiewicz, 2005).

8.12.8.3 Transportation/Delivery of Hazardous Materials

Hazardous materials will be delivered periodically to Highgrove Project. Transportation will comply with the applicable regulations for transporting hazardous materials, including DOT, U.S. Environmental Protection Agency (USEPA), California Department of Toxic Substances Control (DTSC), CHP, and California State Fire Marshal. Under the California Vehicle Code, the CHP has the authority to adopt regulations for transporting hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery. The key hazardous material that will be delivered to the Highgrove Project site is aqueous ammonia, and the Vehicle Code has special regulations for the transportation of hazardous materials that pose an inhalation hazard (Vehicle Code Section 32100.5). These and other regulations concerning any of the other hazardous materials delivered to the Highgrove Project will be fully satisfied.

8.12.8.4 Schools

The nearest school to Highgrove Project will be the proposed Colton High School #3, which will be located across Taylor Street from the plant. The school facilities located closest to the plant are parking areas and the football field/track complex. The nearest classrooms are about 1,000 feet southeast of the plant. The proposed transport route for regulated materials such as aqueous ammonia, as well as for all other hazardous materials used at the Highgrove Project, would travel down Taylor Street, but would not pass in front of the school class facilities on Main Street.

8.12.8.4 Hazardous Materials Plans

Hazardous materials handling and storage, and training in the handling of hazardous materials will be set forth in more detail in hazardous materials plans that will be developed by the Applicant.

8.12.8.4.1 Hazardous Materials Business Plan

A Hazardous Materials Business Plan (HMBP) is required by Title 19 California Code of Regulations (CCR) and the Health and Safety Code (Section 25504). The plan will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. The topics to be covered in the plan are:

- Facility identification
- Emergency contacts
- Inventory information (for every hazardous material)
- Material Safety Data Sheets (MSDSs) for every hazardous material
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The HMBP will be filed with the San Bernardino County Fire Department, Hazardous Materials Division, the designated CUPA for the project site.

8.12.8.4.2 Risk Management Plan

The requirements for a Risk Management Plan (RMP) are found in California's Accidental Release Prevention Program (CalARP) pursuant to Health and Safety Code Sections 25331 through 25543.3 and in 19 CCR, Section 2735.1 et seq. The California program is similar to the federal RMP program. An RMP is required for regulated substances listed in 19 CCR 2770.5 that exceed designated threshold levels (known as Threshold Quantities or TQs). Under federal regulations, the TQ for aqueous ammonia is 20,000 pounds (for a concentration of 20 percent or greater) and 500 pounds under state regulations regardless of concentration.

The federal TQ will not be triggered by the Highgrove Project because a 19 percent concentration of aqueous ammonia will be used. However, because aqueous ammonia will be stored and used at the Highgrove Project facility in quantities exceeding the state threshold quantity, an RMP will be required, if requested by the local agency.

If requested, an RMP for aqueous ammonia will be filed with the San Bernardino County Fire Department, Hazardous Materials Division, the designated CUPA for the project site. The RMP will include a hazard assessment to evaluate the potential effects of accidental releases; a program for preventing accidental releases; and a program for responding to accidental releases to protect human health and the environment.

The basic elements of an RMP are:

- Management System
- Hazard Assessment
- Prevention Program
- Emergency Response

8.12.8.4.3 Spill Prevention Control and Countermeasure Plan

Federal and California regulations require a Spill Prevention Control and Countermeasures (SPCC) Plan if petroleum products above certain quantities are stored in aboveground storage tanks. Both federal and state laws apply only to petroleum products that might be discharged to navigable waters. If stored quantities are equal to or greater than 660 gallons for a single tank, or equal to or greater than 1,320 gallons total, an SPCC Plan must be prepared. The key elements of an SPCC Plan are:

- Name, location, and telephone number of the facility
- Spill record of the facility and lessons learned
- Analysis of the facility, including:
 - Description of the facilities and engineering calculations
 - Map of the site
 - Storage tanks and containment areas
 - Fuel transfer and storage and facility drainage
 - Prediction and prevention of potential spills
- Spill response procedures
- Agency notification
- Personnel training and spill prevention

The Highgrove Project will store up to 70,000 gallons of turbine lubrication oil onsite. The nearest waterway is the Riverside Canal located on the northwest corner of the site, approximately 40 feet from the proposed power plant.

8.12.8.4.4 Proposition 65

The facility will use lubricating and turbine oils and diesel fuel. These materials are included in the State of California's Prop 65 list of chemicals known to the state to cause cancer. The site will be appropriately labeled for all chemicals on the Proposition 65 list.

8.12.8.5 Monitoring

An extensive monitoring program will not be required because environmental effects during the construction and operation phases of the facility are expected to be minimal. However, sufficient monitoring will be performed during the construction and operation phases to ensure that the proposed mitigation measures are satisfied and that they are effective in mitigating any potential environmental effects.

8.12.9 Involved Agencies and Agency Contacts

Several agencies regulate hazardous materials, and they will be involved in regulating the hazardous materials stored and used at the Highgrove Project facility. At the federal level, the USEPA will be involved; at the state level, the California Environmental Protection Agency (CalEPA) will be involved. However, local agencies primarily enforce hazardous materials laws. For the Highgrove Project, the primary local agency with jurisdiction will be the San Bernardino County Fire Department, Hazardous Materials Division. The persons to contact are listed in Table 8.12-7.

TABLE 8.12-7
Agency Contacts

| Type Material | Agency | Contact | Title | Telephone |
|--|---------------------------------------|--------------|--|----------------|
| Hazardous Materials Business Plan and Risk Management Plan | San Bernardino County Fire Department | Doug Snyder | Supervisor, Hazardous Materials Division CUPA Program | (909) 386-8401 |
| Hazardous Materials Response | San Bernardino County Fire Department | Joe Ashbaker | Supervisor, Hazardous Materials Division Emergency Response Program | (909) 386-8430 |

8.12.10 Permits Required and Permit Schedule

The City of Grand Terrace requires the following permits listed in Table 8.12-8.

TABLE 8.12-8
Permits Required and Permit Schedule for AES Highgrove Hazardous Material Handling

| Permit | Schedule | Applicability |
|---|---|--|
| Unified program facility permit | Prior to storage of hazardous materials at the site. | Requires that businesses obtain permits for hazardous materials storage. |
| Flammable or Combustible Liquids Storage Permit | San Bernardino County Fire Code requires that businesses obtain permits for the use and storage of flammable and combustible liquid wastes. | Prior to storage of flammable or combustible liquid wastes at the site. |

8.12.11 References

Lawrence Livermore National Laboratory (LLNL). 1990. User's Manual for SLAB: An Atmospheric Dispersion Model for Denser-than-Air Releases. Lawrence Livermore National Laboratory. June.

Lewis, R.J. Sr. 1991. *Hazardous Chemical Desk Reference*, 2nd Edition.

National Oceanic & Atmospheric Administration (NOAA). 2004. Evaporation Calculator. <http://archive.orr.noaa.gov/cameo/evapcalc/evap.html>

Palkiewicz, J. 2005. County of San Bernardino Fire Department, Station No. 23, Grand Terrace. Personal communication. April 12.

U.S. Department of Health and Human Services, Public Health Service Centers for Disease Control. National Institute for Occupational Safety and Health. 1990. NIOSH Pocket Guide to Chemical Hazards.

U.S. Environmental Protection Agency (USEPA). 1999. RMP Offsite Consequence Analysis Guidance. April.

TABLE 8.12-2
Use and Location of Hazardous Materials

| Chemical | Use | Storage Location | State | Type of Storage |
|---|---|---|---------------------------|------------------------|
| Aqueous ammonia (19% NH ₃ by weight) | Control oxides of nitrogen (NO _x) emissions through selective catalytic reduction | Outside, west of turbines | Liquid | Continuously onsite |
| Antifreeze | Closed loop cooling systems | Maintenance shop | Liquid | Continuously onsite |
| Antiscalant | Prevent scale in reverse osmosis membranes | Water treatment building | Liquid | Continuously onsite |
| Sodium bisulfite | Reduce chlorine in reverse osmosis feedwater | Water treatment building | Liquid | Continuously onsite |
| Coagulant polymer | Coagulate particles in multimedia filter feedwater | Water treatment building | Liquid | Continuously onsite |
| Cleaning chemicals/detergents | Periodic cleaning combustion turbine | Maintenance shop | Liquid | Continuously onsite |
| Corrosion Inhibitor (NALCO 8305 Plus) | Cooling tower cooling water corrosion inhibitor | Cooling tower chemical feed area | Liquid | Continuously onsite |
| Dispersant (NALCO TRASAR 23263) | Cooling tower cooling water dispersant | Cooling tower chemical feed area | Liquid | Continuously onsite |
| Hydraulic oil | High-pressure combustion turbine starting system, turbine control valve actuators | Contained within equipment | Liquid | Continuously onsite |
| Laboratory reagents | Water/wastewater laboratory analysis | Water treatment building | Liquid and granular solid | Continuously onsite |
| Lubrication oil | Lubricate rotating equipment (e.g., gas turbine bearings) | Contained within equipment | Liquid | Continuously onsite |
| Mineral insulating oil | Transformers/switchyard | Contained within transformers | Liquid | Continuously onsite |
| Non-oxidizing biocide (e.g., NALCO 7330) | Cooling tower biological control, used periodically | Cooling tower chemical feed area | Liquid | Continuously onsite |
| Scale inhibitor (polyacrylate) | Cooling tower scale inhibitor | Cooling tower chemical feed area | Liquid | Continuously onsite |
| Sodium bromide | Cooling tower biocide | Cooling tower chemical feed area | Liquid | Continuously onsite |
| Sodium hypochlorite (NaOCl) | Biocide for circulating water system and process water pretreatment | Water treatment building | Liquid | Continuously onsite |
| Stabilized bromine (e.g., NALCO STABREX ST70) | Biocide for circulating water system | Water treatment building | Liquid | Continuously onsite |
| Sulfur hexafluoride | Switchyard/switchgear devices | Contained within equipment | Liquefied gas | Continuously onsite |
| Sulfuric acid (H ₂ SO ₄) | Circulating water pH control | Near cooling tower chemical feed building | Liquid | Continuously onsite |

TABLE 8.12-3
Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

| Trade Name | Chemical Name | CAS Number | Maximum Quantity Onsite | CERCLA SARA RQ ^a | RQ of Material as Used Onsite ^b | LaFollette Bill TPQ ^c | Prop 65 |
|--|---|---|-------------------------|-----------------------------|--|----------------------------------|---------|
| Aqueous ammonia (19% solution) | Ammonium hydroxide | 1336-21-6 (for NH ₃ -H ₂ O) | 16,000 gal | 100 lb | 500 lb | 500 lb | No |
| Antifreeze | Propylene glycol | 57-55-6 | 55 gal | e | e | e | No |
| Antiscalant | Anti-scalant | None | 200 gal | e | e | e | No |
| Cleaning chemicals/detergents | Various | None | 20 gal | e | e | e | No |
| Coagulant Aid Polymer (e.g., NALCO NALCOLYTE 8799) | Sodium chloride | 7647-14-5 | 400 gal | e | e | e | No |
| | Polyquaternary amine | 20507700000-5062P | | e | e | e | |
| Corrosion Inhibitor (NALCO 8305 Plus) | Cooling tower cooling water corrosion inhibitor | None | 200 gal | e | e | e | No |
| Dispersant (NALCO TRASAR 23263) | Cooling tower cooling water dispersant | 64665-57-2 | 200 gal | e | e | e | No |
| Hydraulic oil | Oil | None | 500 gal | 42 gal ^{f,g} | 42 gal ^{f,g} | e | No |
| Laboratory reagents (liquid) | Various | None | 20 gal | e | e | e | No |
| Laboratory reagents (solid) | Various | None | 100 lb | e | e | e | No |
| Turbine and generator lubrication oil | Oil | None | 20,000 gal | 42 gal ^f | g | e | Yes |
| Mineral transformer insulating oil | Oil | 8012-95-1 | 50,000 gal | 42 gal ^f | g | e | Yes |
| Non-oxidizing biocide (e.g., NALCO 7330) | 5-chloro-2-methyl-4-isothiazolin-3-one (0.3%) | 2682-20-4 | 200 gal | e | e | e | No |
| Scale inhibitors (various) | Polyacrylate | Various | 400 gal | e | e | e | No |
| Sodium bisulfite | Sodium bisulfite (38 to 40%) | 7631-90-5 | 450 gal | 5,000 lb | | e | No |
| Sodium bromide | Sodium hydroxide (1 to 5%) | 1310-73-2 | 200 gal | 1,000 lb | 20,000 lb | e | No |
| Sodium hypochlorite (bleach) | Sodium hypochlorite (10.3 to 12 %) | 7681-52-9 | 400 gal | 100 lb | 1,000 lb | e | No |

TABLE 8.12-3
Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

| Trade Name | Chemical Name | CAS Number | Maximum Quantity Onsite | CERCLA SARA RQ ^a | RQ of Material as Used Onsite ^b | LaFollette Bill TPQ ^c | Prop 65 |
|---|--------------------------------|------------|-------------------------|-----------------------------|--|----------------------------------|---------|
| Stabilized bromine (NALCO STABREX ST70) | Sodium hydroxide (1 to 5%) | 1310-73-2 | 2,000 gal | 1,000 lb | 20,000 lb | ^e | No |
| | Sodium hypobromite (10 to 50%) | 13824-96-9 | | | | | |
| Sulfur hexafluoride | Sulfur hexafluoride | 2551-62-4 | 200 lb | ^e | ^e | ^e | No |
| Sulfuric acid | Sulfuric acid (93 to 98 %) | 7664-93-0 | 400 gal | 1,000 lb | 1,075 lb | ^e | No |

^a Reportable quantity for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [Ref. 40 CFR 302, Table 302.4]. Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.

^b Reportable quantity for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of a reportable chemical, the reportable quantity of the mixture can be different than for a pure chemical. For example, if a material only contains 10 percent of a reportable chemical and the RQ is 100 lb, the reportable quantity for that material would be $(100 \text{ lb}) / (10\%) = 1,000 \text{ lb}$.

^c Threshold Planning Quantity [Ref. 40 CFR Part 355, Appendix A]. If quantities of extremely hazardous materials equal to or greater than TPQ are handled or stored, they must be registered with the local Administering Agency.

^d Some of the chemicals have alternatives, thus the maximum quantity stored onsite can be zero if an alternative chemical is being used.

^e No reporting requirement. Chemical has no listed RQ or TPQ.

^f State reportable quantity for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)].

^g Per the California Regional Water Quality Control Board, they would like all oil spills to surface water reported, even for less than the state reportable quantity of 42 gal.

TABLE 8.12-4
Toxicity, Reactivity, and Flammability of Hazardous and Regulated Substances Stored Onsite

| Hazardous Materials | Physical Description | Health Hazard | Reactive and Incompatibles | Flammability* |
|--|--|--|--|--|
| Aqueous ammonia | Liquid, vapor is colorless gas with pungent odor | Corrosive: Irritation to permanent damage from inhalation, ingestion, and skin contact | Acids, halogens (e.g., chlorine), strong oxidizers, salts of silver and zinc | Liquid is incombustible; vapor is combustible, but difficult to burn |
| Antifreeze | Green, sweet smelling viscous liquid | Causes irritation | Strong oxidizing agents | Combustible |
| Antiscalant | Amber liquid | May cause slight irritation to the skin and moderate irritation to the eyes | None | Nonflammable |
| Cleaning chemicals/detergents | Liquid | Refer to individual chemical labels | Refer to individual chemical labels | Refer to individual chemical labels |
| Coagulant aid polymer (e.g., NALCO NALCOLYTE 8799) | Light yellow liquid | May cause irritation to skin and eyes with prolonged contact | Strong oxidizers | Nonflammable |
| Corrosion inhibitor (NALCO 8305 Plus) | Light yellow liquid, sweet organic odor | Irritant to eyes, skin, and respiratory tract | Strong oxidizers, strong acids, and reactive metals | Nonflammable |
| Dispersant (NALCO TRASAR 23263) | Clear amber liquid | None | None | Nonflammable |
| Hydraulic oil | Oily, dark liquid | Hazardous if ingested | Sodium hypochlorite | Combustible |
| Laboratory reagents | Liquid and solid | Refer to individual chemical labels | Refer to individual chemical labels | Refer to individual chemical labels |
| Lubrication oil | Oily, dark liquid | Hazardous if ingested | Sodium hypochlorite | Flammable |
| Mineral insulating oil | Oily, clear liquid | Minor health hazard | Sodium hypochlorite | Can be combustible, depending on manufacturer |
| Scale inhibitors (polyacrylate) | Yellow green liquid | Corrosive and toxic: slight to moderate toxicity; irritation to skin and eyes | Strong acids | Nonflammable |
| Sodium bisulfite | Yellow liquid | Corrosive: irritation to eyes, skin, and lungs; may be harmful if digested | Strong acids and strong oxidizing agents | Nonflammable |

TABLE 8.12-4
Toxicity, Reactivity, and Flammability of Hazardous and Regulated Substances Stored Onsite

| Hazardous Materials | Physical Description | Health Hazard | Reactive and Incompatibles | Flammability* |
|---|---|--|--|--|
| Sodium bromide | White crystals, granules, or powder; odorless | Causes irritation to skin, eyes, and respiratory tract; can cause damage to central nervous system if ingested | Acids, alkaloid and heavy metal salts, oxidizers, and bromine trifluoride | Nonflammable |
| Sodium hypochlorite (bleach) | Pale green; sweet, disagreeable odor. Usually in solution with H ₂ O or sodium hydroxide | Corrosive and toxic: toxic by ingestion; strong irritant to tissue | Ammonia and organic materials | Fire risk when in contact with organic materials |
| Stabilized bromine (e.g., NALCO STABREX ST70) | Clear, light yellow liquid | Corrosive: irritant to eyes and skin. Harmful if ingested or inhaled | Strong acids, organic materials, sodium hypochlorite | Nonflammable |
| Sulfur hexafluoride | Colorless gas with no odor. | Hazardous if inhaled | Disilane | Nonflammable |
| Sulfuric acid | Colorless, dense, oily liquid | Strongly corrosive: strong irritant to all tissue; minor burns to permanent damage to tissue | Organic materials, chlorates, carbides, fulminates, metals in powdered form; reacts violently with water | Nonflammable |

Data were obtained from Material Safety Data Sheets (MSDSs) and Lewis, 1991.

* Per Department of Transportation regulations, under 49 CFR 173: "Flammable" liquids have a flash point less than or equal to 141° F; "Combustible" liquids have a flash point greater than 141° F.

TABLE 8.12-5
Toxic Effects and Exposure Levels of Regulated Substances

| Name | Toxic Effects | Exposure Levels—Pure NH ₃ |
|--|--|--|
| Aqueous ammonia (19 percent solution) | Toxic effects for contact with pure liquid or vapor causes eye, nose, and throat irritation, skin burns, and vesiculation. Ingestion or inhalation causes burning pain in mouth, throat, stomach, and thorax, constriction of thorax, and coughing followed by vomiting blood, breathing difficulties, convulsions, and shock. Other symptoms include dyspnea, bronchospasms, pulmonary edema, and pink frothy sputum. Contact or inhalation overexposure can cause burns of the skin and mucous membranes, headache, salivation, nausea, and vomiting. Other symptoms include labored breathing, bloody mucous discharge, bronchitis, laryngitis, hemmoptysis, and pneumonitis. Damage to eyes may be permanent, including ulceration of conjunctiva and cornea and corneal and lenticular opacities. | <p>Occupational Exposures:</p> <p>PEL = 35 mg/m³ OSHA TLV = 18 mg/m³ ACGIH TWA = 25 mg/m³ NIOSH STEL = 35 mg/m³</p> <p>Hazardous Concentrations:</p> <p>IDLH = 500 ppm LD₅₀ = 350 mg/kg—oral, rat ingestion of 3 to 4 ml may be fatal</p> <p>Sensitive Receptors:</p> <p>ERPG-1 = 25 ppm ERPG-2 = 200 ppm ERPG-3 = 1,000 ppm</p> |
| ACGIH | American Conference of Government Industrial Hygienists | |
| ERPG | Emergency Response Planning Guideline | |
| ERPG-1 | Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects | |
| ERPG-2 | Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without developing irreversible or serious health effects | |
| ERPG-3 | Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing life-threatening health effects | |
| IDLH | Immediately dangerous to life and health | |
| LD ₅₀ | Dose lethal to 50 percent of those tested | |
| mg/kg | Milligrams per kilogram | |
| mg/m ³ | Milligrams per cubic meter | |
| NIOSH | National Institute of Occupational Safety and Health | |
| OSHA | Occupational Safety and Health Administration | |
| PEL | OSHA permissible exposure limit for 8-hr workday | |
| ppm | parts per million | |
| STEL | Short-term exposure limit, 15-min. exposure | |
| TCLO | Lowest published toxic concentration | |
| TLV | ACGIH threshold limit value for 8-hr workday | |
| TWA | NIOSH time-weighted average for 8-hr workday | |