8.12 Hazardous Materials Handling

8.12.1 Introduction

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

- Demolition of the existing site building, foundations and paved surface,
- Grading of site and installation of new foundations, piping and utility connections,
- Fourteen (14) nominal 8.4 MW (gross) Wartsila model 20V34SG natural gas-fired reciprocating engine – generator sets,
- Fourteen (14) state-of-the-art air pollution control systems representing Best Available Control Technology (BACT), one system per each of the 14 engines, consisting of a selective catalytic reduction (SCR) unit for oxides of nitrogen (NOx) control and an oxidation catalyst unit for carbon monoxide (CO) and precursor organic compounds (POC) control,
- Fourteen (14) approximately 70-foot tall stacks, each with a separate continuous emissions monitoring system (CEMS),
- Acoustically-engineered main building enclosing all 14 engines,
- Closed loop cooling system consisting of multiple fan-cooled radiator assemblies outside of the main engine building,
- Two 10,000 gallon (each) aqueous (19% by weight) ammonia storage tanks and handling system serving the SCR units,
- One raw water storage tank, approximately 35,000 gallons,
- One nominal 225–kW diesel-fired emergency black start generator,
- One (1) either electric or 7.15 MMBtu/hr natural gas-fired heater (BAAQMD exempt), used for heating of the natural gas fuel to the reciprocating engines,
- Miscellaneous ancillary equipment,
- Pre-existing onsite water and wastewater service interconnections,
- Onsite 115 kV switchyard including switchgear and step-up voltage transformers,
- Approximately 1.1-mile 115 kV single-circuit transmission line interconnecting to PG&E's Eastshore Substation,
- Approximately 200-foot offsite natural gas line connection to PG&E Line 153,

- Chain-link security fencing enclosing the facility with a secured entrance on Clawiter Road, and
- 4.65-acre temporary construction laydown and parking area located immediately across Clawiter Road from the Eastshore site.

This section evaluates the potential effects on human health and the environment from the storage and use of hazardous materials relating to the Eastshore facility. Section 8.12.2 presents the laws, ordinances, regulations, and standards (LORS) applicable to hazardous materials, Section 8.12.3 describes the existing environment that could be affected, and Section 8.12.4 identifies potential impacts of Eastshore on that environment and on human health and safety. Section 8.12.5 discusses the offsite migration modeling protocol, Section 8.12.6 discusses fire and explosion risk. Section 8.12.7 investigates potential cumulative impacts, and Section 8.12.8 presents proposed mitigation measures. Section 8.12.9 describes the agencies involved and provides agency contacts. Section 8.12.10 describes permits required and the permit schedule. Section 8.12.11 provides the list references.

8.12.2 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials, including regulated substances, at Eastshore 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 materials. The LORS applicable to Eastshore are summarized in Table 8.12-1.

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards (see abbreviation list at end of table)

LORS	Purpose	Applicability (AFC Section Explaining Conformance)
Federal		
29 CFR 1910 *et seq* and 1926 *et seq.*	Requirements for equipment used to store and handle hazardous materials.	Section 8.7, Worker Health and Safety
49 CFR Parts 172, 173, and 179	Provides standards for labeling and packaging of hazardous materials during transportation.	Section 8.10, Traffic and Transportation
CERCLA/SARA		
Section 302	Requires certain planning activities when Extremely Hazardous Substances (EHS) are present in excess of TPQ. Eastshore will have ammonia in excess of the TPQ.	An HMBP will be prepared to describe planning activities (Section 8.12.8.4.2).
Section 304	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	Requires MSDS for every hazardous material to be kept onsite and submitted to SERC, LEPC, and the local fire department.	The HMBP to be prepared will include MSDSs and procedures for submission to agencies (Section 8.12.8.4.1).
Section 313	Requires annual reporting of releases of hazardous materials.	The HMBP to be prepared will describe reporting procedures (Section 8.12.8.4.1).

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards (see abbreviation list at end of table)

LORS	Purpose	Applicability (AFC Section Explaining Conformance)
Clean Air Act (CAA)	Requires an RMP, if listed hazardous materials (designated as "regulated substances") are stored at or above a TQ.	An RMP will not be required under the CAA because Eastshore 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 TQ (Section 8.12.8.4.2).
Clean Water Act (CWA)	Requires preparation of an SPCC plan if oil is stored above certain quantities.	An SPCC Plan will be prepared (Section 8.12.8.4.3).
State		
8 CCR Section 339; Section 3200 *et seq.*, Section 5139 *et seq.* and Section 5160 *et seq.*	8 CCR Section 339 lists hazardous chemicals relating to Hazardous Substance Information and Training Act; 8 CCR Section 3200 *et seq.* and 5139 *et seq.* address control of hazardous substances; 8 CCR Section 5160 *et seq.* Addresses hot, flammable, poisonous, corrosive, and irritant substances.	Section 8.7, Worker Health and Safety
Health and Safety Code, Section 25500, et seq.	Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities.	An HMBP will be prepared (Section 8.12.8.4.1).
CalARP Program. Health and Safety Code, Section 25531 through 25543.4	Requires registration with local CUPA or lead agency and preparation of an RMP if regulated substances are handled or stored in excess of TQs	After registration of regulated substances with the CUPA, i.e., the City's Fire Department, Hazardous Materials Division (HMD), an RMP will be required for ammonia (Section 8.12.8.4.2). Eastshore will handle and store ammonia above the 500-pound TQ. Sulfuric acid is a regulated substance under the CalARP program only if it meets the definition of oleum or is concentrated and contains greater than 100 pounds of sulfur trioxide or is stored in a container with flammable hydrocarbons. Eastshore will not use any forms of sulfuric acid regulated under CalARP. Stored quantities of hydrogen will not exceed the TQ.
Aboveground Petroleum Storage Act	Requires entities that store petroleum in ASTs in excess of certain quantities to prepare an SPCC Plan.	An SPCC Plan will be prepared (Section 8.12.8.4.3).
California Fire Code, Article 80 and others. California Fire Code, Article 80 and others.	Includes provisions for storage and handling of hazardous materials.	Section 8.7, Worker Health and Safety

TABLE 8.12-1
Applicable Laws, Ordinances, Regulations, and Standards (see abbreviation list at end of table)

LORS	Purpose	Applicability (AFC Section Explaining Conformance)
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).
Local		
City of Hayward, Municipal Code, Chapter 3, Article 8	Requires entities that store or handle hazardous materials or wastes to apply for a hazardous materials storage permit through submittal of a HMBP.	Hazardous materials that will be stored or handled at Eastshore will be properly characterized, as included in the HMBP.

AST	Aboveground Storage Tank
CalARP	California Accidental Release Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CUPA	Certified Unified Program Agency
EHS	Extremely hazardous substance
HMBP	Hazardous Materials Business Plan
LEPC	Local Emergency Planning Committee
MSDS	Material Safety Data Sheet
RMP	Risk Management Plan
RQ	Reportable Quantity
SARA	Superfund Amendments and Reauthorization
SERC	State Emergency Response Commission
SPCC	Spill Prevention Control and Countermeasures
TPQ	Threshold Planning Quantity
TQ	Threshold Quantity
USC	United States Code

8.12.2.1 Federal

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

8.12.2.1.1 29 CFR 1910 et seq. and 1926 et seq. These regulations discuss the equipment required to store and handle hazardous materials to maintain worker health and safety, as well as to protect workers in cases of emergency. Although they are directed toward maintaining worker health and safety, they also pertain to the general facility safety. The California regulations contained in Title 8 (California equivalent of 29 CFR) are usually more stringent than those contained in Title 29. The administering agency for the above authority is the EPA and Cal OSHA.

8.12.2.1.2 49 CFR Parts 172, 173, and 179. These regulations provide standards for labels, placards, and markings on hazardous materials shipments by truck (Part 172), standards for packaging hazardous materials (Parts 173), and standards for transporting hazardous materials in tank cars (179). The administering agency for the above authority is the California Highway Patrol and U.S. Department of Transportation.

8.12.2.1.3 CERCLA. The Superfund Amendments and Reauthorization Act of 1986 (SARA), an amendment to CERCLA, governs hazardous materials. The applicable part of SARA for Eastshore 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 materials at facilities in local communities. The law provides for planning, reporting, and notification concerning hazardous materials. Key sections of the law are:

- Section 302—requires that certain emergency planning activities be conducted when extremely hazardous substances (EHSs) are present in excess of their threshold planning quantities (TPQs). EHSs and TPQs are found in Appendices A and B of 40 CFR Part 355.
- Section 304 requires immediate notification of the Local Emergency Planning Committee (LEPC) and the State Emergency Response Commission (SERC) when a hazardous material is released in excess of its reportable quantity (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). The local emergency response team or fire personnel must also be notified.
- 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.

The administering agencies for the above authority are the USEPA, Region IX, the National Response Center, and the City of Hayward's Fire Department, Hazardous Material Division (HMD). The City's Fire Department HMD is a Certified Unified Program Agency (CUPA).

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 to store a threshold quantity (TQ) or greater of listed regulated substances to develop a risk management plan (RMP), including hazard assessments, prevention programs, 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. The SPCC program is administered by the local CUPA. Compliance with other elements of the CWA, such as stormwater management and NPDES permitting, is described in Section 8.14.

8.12.2.1.6 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 Section 8.13, and the Occupational Safety and Health Act (OSHA), which is discussed in Section 8.7.

8.12.2.2 State

California laws and regulations relevant to hazardous materials handling at Eastshore include Title 8 of the California Code of Regulations, Health and Safety Code Section 25500 (hazardous materials), Health and Safety Code Section 25531 (regulated substances), and the Aboveground Petroleum Storage Act (petroleum in aboveground tanks).

8.12.2.2.1 8 CCR Section 339; Section 3200 et seq., Section 5139 et seq. and Section 5160 et seq. 8 CCR Section 339 lists hazardous chemicals relating to Hazardous Substance Information and Training Act ; 8 CCR Section 3200 et seq. and 5139 et seq. address control of hazardous substances; 8 CCR Section 5160 et seq. addresses hot, flammable, poisonous, corrosive, and irritant substances.

8.12.2.2.2 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) could 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 act identifies chemicals that cause cancer and reproductive toxicity, requires that the public be informed of such harmful chemicals, 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 Eastshore are on the cancer-causing lists of the act.

8.12.2.2.6 California Fire Code, Article 80 and others. This code provides 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. The administering agency for the above authority is the City of Hayward Fire Department HMD.

8.12.2.3 Local

Local agencies are usually responsible for administering hazardous materials requirements and ensuring compliance with federal and state laws. The City of Hayward Fire Department HMD has jurisdiction over hazardous materials storage and handling practices. The local requirements that pertain to hazardous materials are discussed below.

8.12.2.3.1 City of Hayward Municipal Code, Chapter 3, Article 8, Hazardous Materials Storage. This municipal code requires entities that store or handle hazardous materials to apply for a hazardous material storage permit. To obtain a permit, a business must submit a HMBP that includes an inventory of hazardous materials, a contingency plan, and a training plan.

8.12.2.4 Other Codes

The design, engineering, and construction of hazardous materials storage and dispensing systems will comply 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 to transport hazardous materials in California.
- State Building Standard Code, Health, and Safety Code Sections 18901 to 18949 incorporate 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 Eastshore site is in an industrial area of the City of Hayward, Alameda County, California (Figure 2.1-1). Identification of sensitive receptor facilities (e.g., schools, daycare facilities, convalescent centers, or hospitals) within 6 miles of the project site was performed by Environmental Data Resources Inc. (EDR). The nearest sensitive receptor is the Life Chiropractic College located 0.2 mile from the project site at 25001 Industrial Boulevard in Hayward. In addition, Eden West Convalescent Hospital, Ochoa Intermediate School, Courtyard Care Center, and Eden Gardens Elementary School are located approximately 0.7

mile from the site. Two hospitals, Kaiser Foundation Hospital and St. Rose Hospital, are located approximately 1.6 miles from the site.

Sensitive receptors within a 6-mile radius of the Eastshore site are provided in the EDR report in Appendix 8.1D. It also contains a description of the receptors.

8.12.4 Potential Environmental and Human Health Effects

Hazardous materials that would be used during construction and operation were evaluated for hazardous characteristics. Some of these materials will be continuously stored at the generating site. Others will be brought onsite for the initial startup and be maintained 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 on 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 to cause reproductive problems in humans). Toxicity characteristics and the exposure level criteria for regulated substances 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., ammonia and strong oxidizers). Measures to mitigate the potential effects of hazardous materials are discussed in Section 8.12.8. Because of 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 Eastshore and linear facilities, regulated substances, as defined in California's Health and Safety Code, Section 25531, will not be used. Therefore, there will be no discussion of regulated substance storage or handling.

Hazardous materials to be used during construction of Eastshore 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 would depend on the types of equipment and structures that must be coated, and manufacturers' requirements for coating.

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

Small oil spills could 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. Procedures for handling hazardous materials during construction are presented in Section 8.12.8.1.

The quantities of hazardous materials that will be handled during construction are relatively small and best management practices (BMP) will be implemented by contractor personnel. Therefore, the potential for environmental effects is expected to be minimal.

8.12.4.2 Operations Phase

Several hazardous materials, including one regulated substance (aqueous ammonia), will be stored in amounts above the threshold quantity 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 onsite) if inhaled, ingested, or contacted with the skin. The hazardous characteristics of materials that would be used onsite are summarized in Table 8.12-5. Table 8.12-5 also contains information on incompatible chemicals (e.g., ammonia and strong oxidizers). Mixing incompatible chemicals can generate toxic gases. Measures to keep incompatible chemicals separated include separate storage and containment areas or berming (Section 8.12.8).

Potential environmental and 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 could have adverse effects on the environment and human health.

Eastshore will have 19-percent aqueous ammonia solution in two stationary aboveground storage tanks. The capacity of each tank will be approximately 10,000 gallons. The tanks will be surrounded by secondary containment structures capable of holding the full contents of the tanks, plus rainwater accumulated for a 24-hour period from a 25-year storm event. The tanks will be provided with their own separate secondary containment area of approximately 2,520 square feet (72 feet by 35 feet).

Aqueous ammonia will be transported to the plant by truck. Two possible suppliers are AirGas in Dixon, California, and Hill Brothers in San Jose, California. The truck unloading area will be on an unloading apron adjacent to the storage tank. The floor of the unloading apron will be sloped to a drain that empties into the secondary containment area. The use of 19 percent aqueous ammonia will require an average of approximately 3 deliveries per month. The ammonia unloading area will be a bermed area approximately 26 feet by 10 feet and 6 inches.

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 Section 8.7, Worker Health and Safety).

The remaining materials in Table 8.12-3 are also considered to be hazardous, but they pose less threat to humans than aqueous ammonia. Some materials, such as citric acid 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 infrequent occasions when the materials are onsite.

8.12.5 Offsite Consequence Analysis

Because there is human activity near the Eastshore site, an offsite consequence analysis will be performed during the Application for Certification (AFC) process. The analysis will assess the risk to humans at various distances from the site if a spill or rupture of one of the aqueous ammonia storage tanks were to occur or if a spill from the supply truck were to occur while refilling the storage tank. The modeling protocol for the offsite consequences analysis for ammonia is in Appendix 8.12A.

The worst-case accidental release scenario assumes that one of the aqueous ammonia storage tanks is punctured and the entire contents spills into a catch basin or bermed area located beneath the tank. Parameters used to calculate the initial ammonia emission rate include an atmospheric stability classification of "F," a wind speed of 1.5 meters/second and the highest recorded temperature in the project area in the past three years.

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 EHD. 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 Eastshore with fuel for the internal combustion engines is flammable and could leak from the supply line that brings gas from PG&E line 153 pipeline 765. Natural gas is composed mostly of methane, but could contain ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, tasteless, and is lighter than air. Methane is flammable when mixed in air at concentrations of 5 to 14 percent, which is also the detonation range. Therefore, natural gas poses a risk of fire and explosion if an accidental release were to occur, but the risk of a fire or explosion would be reduced through compliance with applicable codes, regulations, and industry design and construction standards.

The closest fire station is approximately 1 mile from the project site and is located at 1401 West Winton Avenue, Hayward, California.

8.12.7 Cumulative Impacts

The 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 would migrate offsite. Two or more migrating releases combined could pose a greater threat to the offsite population than a single release by any single site. Hazardous materials that do not migrate, such as lubricating oils, would not be a cumulative impact. The hazardous material with the potential to migrate offsite is aqueous ammonia. To determine the potential for cumulative impacts, other sites in the vicinity that store and use ammonia must be identified and analyzed. Other chemicals in the vicinity with the ability to migrate offsite that could combine or interact with released ammonia must be also identified and analyzed.

Other facilities in the City of Hayward handle and store ammonia. Ammonia is sometimes used for refrigeration, making it a fairly common chemical in an industrial area such as the City of Hayward. The closest facility of record handling ammonia is Berkeley Farms, Inc., a dairy production facility located at 25500 Clawiter Road in Hayward. This facility is approximately 1/4 mile from Eastshore and uses anhydrous ammonia for refrigeration (Murphy, 2006). Simultaneous releases from this facility and the Eastshore facility could cause cumulative impacts, if the migrating clouds merged. Based on typical offsite consequences analysis (OCA) results for similar facilities and the distance to Berkeley Farms, Inc., a simultaneous release of ammonia from Eastshore and Berkeley Farms, Inc., would not be expected to result in combined ambient air ammonia concentrations above the CEC's significance level of 75 parts per million.

8.12.8 Proposed Mitigation Measures

The following sections 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 section 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 according to the manufacturers' directions and will be replenished, as needed. The emergency fuel containers will be the U.S. 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 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).
- 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 by emergency phone to obtain help from offsite containment and cleanup crews. Personnel working 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 (City of Hayward Fire Station #6 at 1401 West Winton Avenue in Hayward).

8.12.8.2 Operation Phase

During Eastshore 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 according to 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 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 that complies 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 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 (Section 8.12.8.4). For emergency spills, City of Hayward Fire Department personnel are trained to the First Responder level. If the spill is identifiable, and is easily contained and cleaned up, the Hayward Fire Department will use the proper absorbents and contain and clean up the spill. If the spill is large, unidentifiable, or the Fire Department personnel are unable to contain or clean the spill, they will contact the Alameda County HazMat Team for containment and cleaning (Valencia, 2006). The City of Hayward has a mutual aid agreement with Alameda County for hazardous material spills (Simon, 2006). The City of Hayward Fire Station No. 6, located at 1401 West Winton Ave, is the nearest station to the Eastshore site (Burke, 2006).

8.12.8.3 Transportation/Delivery of Hazardous Materials

Hazardous materials will be delivered periodically to Eastshore. Transportation will comply with the applicable regulations for transporting hazardous materials, including DOT, U.S. Environmental Protection Agency (EPA), 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 Eastshore is aqueous ammonia, and Vehicle Code Section 32100.5 regulates transportation of hazardous materials that pose an inhalation hazard. Eastshore would comply with regulations concerning transport of hazardous materials.

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 City of Hayward's Fire Department HMD, the designated CUPA for Eastshore.

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 the California Code of Regulations (CCR) Title 19, 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 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 Eastshore because a 19 percent concentration of aqueous ammonia will be used. However, because aqueous ammonia will be stored and used at Eastshore in quantities exceeding the state threshold quantity, an RMP will be required.

An RMP for aqueous ammonia will be filed with the City's Fire Department HMD, 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

Eastshore will store about 18,000 gallons of clean and used reciprocating engine lubrication oil onsite. The nearest waterway is the San Francisco Bay, which is approximately 1.75 miles from the project site. An SPCC Plan will be prepared for the project.

8.12.8.4.4 Proposition 65. The facility will use lubricating oils, mineral 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 Eastshore. 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 Eastshore, the primary local agency with jurisdiction will be the City's Fire Department HMD. The persons to contact are listed in Table 8.12-6.

TABLE 8.12-6
Agency Contacts for Eastshore Hazardous Materials Handling

Issue	Agency	Address	Person Contacted	Telephone
Certified Unified Program Agency (CUPA) for Hazardous Materials Inventory and Emergency Business Plan and Risk Management Plan	City of Hayward, Fire Department Hazardous Materials Office	777 B Street, 1st Floor, Hayward, CA 94541	Hugh Murphy, Hazardous Materials Program Coordinator	(510) 583-4924
Hazardous Materials Emergency Response Team	City of Hayward, Fire Department	1401 West Winton Ave Hayward, CA	Paul Valencia, Operations Chief	(510) 583-4950
Hazardous Materials Emergency Response Team	Alameda County Health Care Services Hazardous Materials Response Team	1131 Harbor Bay Parkway Alameda, CA 94502-6577	David Lord, Deputy Fire Chief, Hazmat Response Team Supervisor	(510) 618-3490

* Hazardous Materials Response Team will respond to 9-1-1 calls for hazardous materials releases, but the site has to provide spill cleanup team or contractor.

8.12.10 Permits Required and Permit Schedule

The City of Hayward and Alameda County require the following permits listed in Table 8.12-7.

TABLE 8.12-7
Permits Required and Permit Schedule for Eastshore Hazardous Material Handling

Permit	Schedule	Applicability	Agency Contact
Hazardous Materials Business Plan	30 days prior to start of operations	Applies to all hazardous materials exceeding reporting thresholds	Hugh Murphy, Hazardous Materials Program Coordinator 777 B Street, 1st Floor, Hayward, CA 94541
California Accidental Release Prevention Program (Risk Management Plan)	90 days prior to start of operations	Applies to aqueous ammonia because it will exceed the TQ of 500 pounds	Hugh Murphy, Hazardous Materials Program Coordinator 777 B Street, 1st Floor, Hayward, CA 94541
Application for Alternative Storage Method	30 days prior to start of operations	Applies to aboveground storage tanks containing flammable or combustible materials.	Hugh Murphy, Hazardous Materials Program Coordinator 777 B Street, 1st Floor, Hayward, CA 94541
Hazardous Materials Storage Permit/Unified Permit	30 days prior to start of operations	Applies to facilities with hazardous material storage	Hugh Murphy, Hazardous Materials Program Coordinator 777 B Street, 1st Floor, Hayward, CA 94541

8.12.11 References

Burke, J. 2006. Comments from John Burke, Fire Chief, City of Hayward. July 13.

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

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

Murphy, H. 2006. Personal communication between Hugh Murphy, City of Hayward HMD and Sarah Madams/CH2M HILL. August 22.

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

Simon, Ph. 2006. Personal communication between Phil Simon, Fire Department, City of Hayward and Sarah Madams/CH2M HILL. August 10.

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 (EPA). 2005. Envirofacts Data Warehouse and Applications. URL: http://oaspub.epa.gov/enviro.

_____. 1999. RMP Offsite Consequence Analysis Guidance. April.

Valencia, P. 2006. Personal communication between Paul Valencia, Fire Department, City of Hayward and Sarah Madams/CH2M HILL. August 24.

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	2x10,000 gal storage tanks	Liquid	Continuously Onsite
Biocide	Biocide for diesel fuel	Hazmat Storage Locker	Liquid	Continuously Onsite
Citric Acid	Chemical cleaning of piping	Hazmat Storage Locker	Powder	Commissioning and periodically during operation
Cleaning Chemicals/Detergents	Periodic cleaning of engines	Hazmat Storage Locker	Liquid	Continuously Onsite
Corrosion Inhibitor	Cooling water corrosion inhibitor	Hazmat Storage Locker	Liquid	Continuously Onsite
Diesel Fuel	Emergency black start generator	Tank	Liquid	
Hydraulic Oil	Engine/Generators	Storage Room	Liquid	Continuously Onsite
Lubrication Oil	Engine lubricating oil	Main and used lube oil tank	Liquid	Continuously Onsite
Lubrication Oil	Coolant for electrical generator's bearings	Tank	Liquid	Continuously Onsite
Mineral Insulating Oil	Transformers/switchyard	Extra Not stored on site	Liquid	Continuously Onsite
Oxidation Catalyst Panels	Catalyst panels for reduction of CO	In reactor vessels only	Solid	Continuously Onsite
SCR Panels	Catalyst panel for reduction of NO_x	In reactor vessels only	Solid	Continuously Onsite
Sulfuric Acid (H_2SO_4) (in batteries)	Sealed batteries	In batteries only	Liquid	Continuously Onsite

TABLE 8.12-3
Eastshore Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[f]	Prop 65
Aqueous ammonia	Aqueous ammonia (19 percent)	7664-41-7 (NH_3)	20,000 gal	100 lb	100 lb	500 lb	500 lb (state)	No
Biocide	Diethylene glycol, monomethyl ether (80 to 85 percent)	111-77-3	1 gal	[d]	[d]	[d]	[d]	No
	2-Thiocyanomethylthio benzothiazole (1 to 5 percent)	21564.17-0						
	Methylene BisThiocyanate (1 to 5 percent)	6317-18-6						
Citric acid (pipe pickling solution)	Citric acid	77-92-9	Will vary during construction up to 200 lb, not on site during operations	[d]	[d]	[d]	[d]	No
Cleaning chemicals/detergents	Various	None	Various up to 50 gal	[d]	[d]	[d]	[d]	No
Corrosion Inhibitor			50 gal	[d]	[d]	[d]	[d]	No
Diesel No. 2 (black start)	Fuel Oil	None	100 gal	42 gal[e]	42 gal[e]	[d]	[d]	Yes
Hydraulic oil	Oil	None	50 gal	42 gal[e]	42 gal[e]	[d]	[d]	No
Lube Oil	Zinc (0.03 percent)	7440-66-6	About 18,000 gal	42 gal[e]	42 gal[e]	[d]	[d]	No
	Phosphorodithoic acid, O, O-Di C1-14-Alkyl Esters, Zinc Salts (0.33%)	68649-42-3						
	Poly Butenyl Succinimide (1-5 percent)							
Mineral insulating oil	Lubricating Oil	8012-95-1	About 20,000 gal	42 gal[e]	42 gal[e]	[d]	[d]	Yes
Sulfuric acid (in sealed batteries)	Sulfuric Acid (93 percent)	7664-93-9	In batteries only	1,000 lb	1,075 lb	1,000 lb	[d,g]	No

TABLE 8.12-3
Eastshore Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[f]	Prop 65

[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 and safety must be reported.

[b] Reportable quantity for materials as used onsite. Because 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 pounds, the reportable quantity for that material would be (100 pounds)/(10 percent) = 1,000 pounds

[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] No reporting requirement; chemical has no listed threshold under this requirement.

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

[f] TQ is Threshold Quantity from 19 CCR 2770.5 (state) or 40 CFR 68.130 (federal)

[g] There is a state TQ of 1,000 pounds for sulfuric acid that does not apply to this form of sulfuric acid

TABLE 8.12-4
Toxic Effects and Exposure Levels of Regulated Substances Exceeding TQs

Name	Toxic Effects	Exposure Levels
Aqueous Ammonia (19% 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, and 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.	Occupational Exposures PEL = 35 mg/m^3 OSHA TLV = 18 mg/m^3 ACGIH TWA = 25 mg/m^3 NIOSH STEL = 35 mg/m^3 Hazardous Concentrations IDLH = 500 ppm LD_{50} = 350 mg/kg - oral, rat ingestion of 3 to 4 mL may be fatal Sensitive Receptors ERPG-1 = 25 ppm ERPG-2 = 200 ppm ERPG-3 = 1,000 ppm

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
LDLO	Lowest published lethal dose
mg/kg	Milligrams per kilogram
mg/m^3	Milligrams per cubic meter
NIOSH	National Institute of Occupational Safety and Health
PEL	OSHA permissible exposure limit for 8-hr workday
REL	Reference Exposure Level
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

TABLE 8.12-5
Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials	Physical Description	Health Hazard	Reactive & 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
Biocide (Bioguard)	Liquid	Corrosive: Irritation to permanent damage from inhalation, ingestion, and skin contact	Strong oxidizing agents	Combustible
Cleaning Chemicals/Detergents	Liquid	Refer to individual chemical labels	Refer to individual chemical labels	Refer to individual chemical labels
Corrosion Inhibitor				
Diesel Fuel	Liquid with petroleum odor	Eye and skin irritation	Strong acids and strong oxidizing agents	Combustible
Hydraulic Oil	Oily, dark liquid	Hazardous if ingested	Sodium hypochlorite	Combustible
Lubrication Oil	Oily, dark liquid	Hazardous if ingested	Sodium hypochlorite	Flammable
Medium Oil	Amber colored liquid	Eye and skin irritation	Strong oxidizers	Combustible
Mineral Insulating Oil	Oily, clear liquid	Minor health hazard	Sodium hypochlorite	Can be combustible, depending on manufacturer
Mineral Lubricating Oil	Oily, clear liquid	Minor health hazard	Sodium hypochlorite	Can be combustible, depending on manufacturer
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 (MSDS) and Lewis, 1991. MSDSs provided as Appendix 8.12B.

* 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.