

5.5 Hazardous Materials Handling

5.5.1 Introduction

This section evaluates the potential effects on human health and the environment from the storage and use of hazardous materials in conjunction with the Carlsbad Energy Center Project (CECP). 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 that environment and on human health from CECP development. In addition, this section discusses the offsite consequence analysis, fire and explosion risk, potential cumulative effects, proposed mitigation measures, and proposed conditions of certification. The agencies involved and agency contact names, as well as the permits required and the permit schedules are also provided in this section.

Section 5.5.2 presents the LORS applicable to hazardous materials. Section 5.5.3 describes the existing environment that may be affected. Section 5.5.4 identifies potential impacts on the environment and on human health from the CECP site development. Section 5.5.5 addresses potential cumulative effects. Section 5.5.6 presents proposed mitigation measures. Section 5.5.7 provides the proposed Conditions of Certification. Section 5.5.8 describes the agencies involved and provides agency contacts. Section 5.5.9 describes permits required and the permit schedule. Section 5.5.10 provides the references used to develop the section.

5.5.2 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials, including regulated substances, at CECP 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 materials. The LORS applicable to the CECP are summarized in Table 5.5-1.

TABLE 5.5-1
Laws, Ordinances, Regulations, and Standards Applicable to Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
29 CFR 1910 et seq. and 1926 et seq.	Requirements for equipment used to store and handle hazardous materials.	USEPA and Cal-OSHA	5.5.2.1.1
49 CFR Parts 172, 173, and 179	Provides standards for labeling and packaging of hazardous materials during transportation.	CHP and DOT	5.5.2.1.2
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.	County of San Diego Department of Environmental Health HMD	5.5.2.1.3

TABLE 5.5-1
Laws, Ordinances, Regulations, and Standards Applicable to Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
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.	County of San Diego Department of Environmental Health HMD	5.5.2.1.3
Section 311, EPCRA (Pub. L. 99-499, 42 USC 11021) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370)	Requires that either MSDSs for all hazardous materials or a list of all hazardous materials be submitted to the SERC, LEPC, and San Diego Department of Environmental Health HMD	County of San Diego Department of Environmental Health HMD	5.5.2.1.3
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.	County of San Diego Department of Environmental Health HMD	5.5.2.1.3
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 AST 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.	RWQCB	5.5.2.1.5
Clean Air Act	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 CECP 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.	USEPA	5.5.2.1.4

TABLE 5.5-1
Laws, Ordinances, Regulations, and Standards Applicable to Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
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.	DOT	5.5.4.6
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 in places of employment; 8 CCR Section 5160 et seq. Establishes minimum standards for the use, handling, and storage of hazardous substances in all places of employment, and addresses hot, flammable, poisonous, corrosive, and irritant substances.	County of San Diego Department of Environmental Health HMD	5.5.2.2.1
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.	Cal-OSHA	5.5.2.2.2
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	County of San Diego Department of Environmental Health HMD	5.5.2.2.3
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 AST 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.	RWQCB	5.5.2.2.4
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.	OEHHA	5.5.2.2.5

TABLE 5.5-1
Laws, Ordinances, Regulations, and Standards Applicable to Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
California Fire Code, Article 80	Includes provisions for storage and handling of hazardous materials.	County of San Diego Department of Environmental Health HMD	5.5.2.2.6
California Public Utilities Commission (CPUC) General Order Nos. 112-E and 58-A	Specifies standards for gas service and construction of gas gathering, transmission, and distribution piping systems.	CPUC	5.5.4.6
Local			
San Diego County Code Section 68.905	Incorporates by reference the CA HSC Division 20, Chapter 6.11 which requires the facility to operate as a unified program facility. CECP will operate as a unified program facility and will comply with San Diego County Environmental Health HMD requirements concerning storage and handling of hazardous materials and wastes and will also cooperate with HMD on resolution of environmental issues at the site.	San Diego County Department of Environmental Health, Hazardous Material Division	5.5.2.2.2
City of Carlsbad General Plan (2004) – Public Safety Section	Provides guidance for siting and management of facilities that store, collect, treat, dispose or transfer hazardous waste and hazardous materials. CECP will comply with the City's Hazardous Materials stipulations as put forth in the City of Carlsbad General Plan, Public Safety Section	San Diego County Department of Environmental Health, Hazardous Material Division and Carlsbad Fire Department	5.5.2.2.2

Notes:

AST = Aboveground Storage Tank
 CA OEHHA = California Office of Environmental Health Hazard Assessment
 Cal-OSHA = California Occupational Safety and Health Administration
 CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
 CFR = Code of Federal Regulations
 CHP = California Highway Patrol
 CWA = Clean Water Act
 CUPA = Certified Unified Program Agency (in this case, the San Diego County Fire Department)
 EHS = extremely hazardous substance
 EPCRA = Emergency Planning and Community Right-to-Know Act

HMBP = Hazardous Materials Business Plan
 HMD = Hazardous Material Division
 LEPC = local emergency planning committee
 MSDS = Material Safety Data Sheet
 Pub. L. = Public Law
 RMP = Risk Management Plan
 RQ = Reportable Quantity
 SARA = Superfund Amendments and Reauthorization Act
 SERC = state emergency response commission
 SPCC = Spill Prevention Control and Countermeasure Plan
 TPQ = Threshold Planning Quantity
 TQ = Threshold Quantity
 USC = United States Code
 USEPA = U.S. Environmental Protection Agency

5.5.2.1 Federal LORS

Hazardous materials are governed under Title 29 of the US Code, Titles 29, 40, and 49 of the Code of Federal Regulations, and are generally covered by the Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601 et seq.)(CERCLA), the Resource Conservation and Recovery Act (RCRA), 42 USC 6901 et seq., the Clean Air Act (CAA), 42 USC 7401 et seq., and the Clean Water Act (CWA) 33 USC 1251 et seq.

5.5.2.1.1 29 CFR 1910 et seq. and 1926 et seq.

These sections contain requirements for equipment used to store and handle hazardous materials for the purpose of protecting worker health and safety. These regulations also address requirements for equipment necessary to protect workers in emergencies. They are designed primarily to protect worker health, but also contains requirements that affect general facility safety. The California regulations contained in Title 8 (California equivalent of 29 CFR) are generally more stringent than those contained in Title 29. The administering agency for the above authority is OSHA and the California Division of Occupational Safety and Health (Cal-OSHA).

5.5.2.1.2 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 for transporting hazardous materials in tank cars (179). The administering agency for the above authority is the CHP and DOT.

5.5.2.1.3 CERCLA

The Superfund Amendments and Reauthorization Act of 1986 (SARA), an amendment to CERCLA, governs hazardous materials. The applicable part of SARA for CECP 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 present at facilities in local communities. The law provides primarily 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 their TPQs are found in Appendices A and B of 40 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 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). 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.

The administering agencies for the above authority are the USEPA, Region 9, the National Response Center, and the County of San Diego Department of Environmental Health Hazardous Material Division (HMD). The County of San Diego Department of Environmental Health HMD is a Certified Unified Program Agency (CUPA).

5.5.2.1.4 Clean Air Act

Regulations (40 CFR Part 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, 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. Aqueous ammonia is a listed substance and its TQ for solutions of 20 percent and greater is 20,000 pounds of solution.

5.5.2.1.5 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 Part 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 storm water management and NPDES permitting, is described in Section 5.15, Water Resources.

5.5.2.1.6 Natural Gas Pipeline Construction and Safety

Title 40 of the CFR, 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.

5.5.2.1.7 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 Section 5.14, Waste Management, and the Occupational Safety and Health Act (OSHA), which is discussed in Section 5.16, Worker Health and Safety.

5.5.2.2 State LORS

California laws and regulations relevant to hazardous materials handling at CECP 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).

5.5.2.2.1 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 ; and 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, and establishes minimum standards for the use, handling, and storage of hazardous substances in all places of employment.

5.5.2.2.2 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 a Hazardous Materials Business Plan (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.

5.5.2.2.3 Health and Safety Code Section 25531

California Health and Safety Code, Section 25531, et seq., and the California Accidental Release Prevention Program (CalARP) regulate the registration and handling of regulated substances. Regulated substances are any chemicals designated as an extremely hazardous substance by the USEPA as part of its implementation of SARA Title III. Health and Safety Code Section 25531 overlaps or duplicates some of the requirements of SARA and the CAA. Facilities handling or storing regulated substances at or above TPQs must register with their local CUPA and prepare an RMP, formerly known as a Risk Management and Prevention Program. The CalARP is found in Title 19, CCR, Chapter 4.5. The TPQ for ammonia is 500 pounds. Portions of the aqueous ammonia process that can be demonstrated to have a partial pressure of the regulated substance in the mixture (solution), under the handling or storage conditions, (which is less than 10 millimeters of mercury) do not count toward the threshold.

5.5.2.2.4 Aboveground Petroleum Storage Act

The California Health and Safety Code Sections 25270 to 25270.13 ensure compliance with the federal CWA. The law applies to facilities that operate a petroleum AST with a capacity greater than 660 gallons or combined ASTs capacity greater than 1,320 gallons or oil-filled equipment where there is a reasonable possibility that the tank(s) or equipment may discharge oil in 'harmful quantities' into navigable waters or adjoining shore lands. If a facility falls under these criteria, it must prepare a SPCC plan. The CECP facility will store over 1,320 gallons of petroleum products and will prepare a SPCC plan.

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

This California law requires the State to identify chemicals that cause cancer and reproductive toxicity, contains requirements for informing the public of the presence of these chemicals, and prohibits discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically by California's Office of Environmental Health Hazard Assessment. Some of the chemicals to be used at the facility are on the cancer-causing and reproductive-toxicity lists of the Act.

5.5.2.2.6 Natural Gas Pipeline Construction and Safety

The CPUC 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.

5.5.2.2.7 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. The administering agency for the above authority is the County of San Diego Department of Environmental Health HMD, jointly with the City of Carlsbad's Fire Department.

5.5.2.3 Local LORS

The San Diego Department of Environmental Health HMD is the designated Certified Unified Program Agency (CUPA) and is responsible for administering HMBPs, Hazardous Materials Management Plans, SPCC Plans, and RMPs filed by businesses located in the County. The San Diego Department of Environmental Health HMD is also responsible under the CUPA program for underground storage tank compliance. In addition, the San Diego Department of Environmental Health HMD is responsible for ensuring that businesses and industry store and use hazardous materials safely and in conformance with various regulatory codes. The San Diego Department of Environmental Health HMD 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.

5.5.2.4 Other Codes

The design, engineering, construction, and operation of hazardous materials storage and dispensing systems will be in accordance with 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. The CHP can issue permits and specify the route for hazardous material delivery.
- State Building Standard Code, Health and Safety Code Sections 18901 to 18949 – Incorporates the Uniform Building Code, Uniform Fire Code, and Uniform Plumbing Code.
- The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII

5.5.3 Affected Environment

Land use in the area surrounding the CECP site (discussed in detail in Section 5.6, Land Use) is primarily industrial, commercial, residential, and open space. Sensitive receptors within a 1-mile radius of the project site include 3 schools, 2 day care facilities, and

1 college (EDR, 2007). There are no medical centers, nursing homes, hospitals, arenas, or prisons located within the 1-mile radius. These receptors are listed in Appendix 5.5A, and shown on Figure 5.5-1. The nearest of these receptors, as well as the nearest school to the CECP site is Occupational Training Services, Inc. (College) located approximately 4,224 ft (0.80 mile) to the south of the project site. The nearest hospital/long-term health care facility is Tri-City Medical Center located approximately 7 miles to the north in Oceanside, CA.

5.5.4 Environmental Analysis

Hazardous materials to be used at CECP during construction and operation were evaluated for hazardous characteristics. That evaluation is discussed in this section. Some of these materials will be continuously stored at the project site. 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 5.5-2. Table 5.5-3 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); 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 CECP in quantities exceeding TQs are shown in Table 5.5-4. Health hazards and flammability data are summarized in Table 5.5-5. Table 5.5-5 also contains information on incompatible chemicals (e.g., ammonia). Measures to mitigate the potential effects from the hazardous materials are presented in Section 5.5.6.

TABLE 5.5-2
Use and Location of Hazardous Materials

Chemical	Use	Quantity (gallons/lbs)	Storage Location	State	Type of Storage
Aqueous Ammonia (19% NH ₃ by weight)	Control oxides of nitrogen (NO _x) emissions through selective catalytic reduction	17,000 gallons	Onsite storage tanks (2). (10,000 gallons per tank – tanks filled to a maximum of 85% of volume or 8,500 gallons)	Liquid	Continuously Onsite
Citric Acid	Cleaning reverse osmosis units	Varies as need (approx 100 lbs)	Pallet supported chemical storage bags in protected temporary storage location onsite.	Solid Powder	Initial Startup and Periodically Onsite
Cleaning chemicals/detergents	Periodic cleaning of combustion turbine	Varies as needed (approx 100 gal)	Chemical storage tote or drums at a protected temporary storage location onsite.	Liquid	Continuously Onsite
Diesel No. 2	Fuel for fire pump engine/vehicles	200 gal	Permanent onsite storage in above ground storage tank with secondary containment.	Liquid	Continuously Onsite
General Dispersant – Cyanamer P-70	Antiscalant Dispersant	55 gal	Water Treatment Building	Liquid	Continuously Onsite (?)
Hydraulic Oil	High-pressure combustion turbine starting system, turbine control valve actuators	500 gal	Onsite 55 Gallon Drums	Liquid	Continuously Onsite
Hydrochloric Acid	Reverse Osmosis cleaning	Varies as needed (approx 100 gal)	Water treatment building	Liquid	Continuously Onsite
Laboratory reagents	Water/wastewater laboratory analysis	10 gal liquids 100 lbs solids	Laboratory chemical storage cabinets (stored in original chemical storage containers/bags)	Liquid and Granular Solid	Continuously Onsite
Lubrication Oil	Lubricate rotating equipment (e.g., gas turbine and steam turbine bearings)	40,000 gal	Contained within equipment	Liquid	Continuously Onsite
Mineral Insulating Oil	Transformers/switchyard	80,000 gal	Contained within equipment	Liquid	Continuously Onsite

TABLE 5.5-2
Use and Location of Hazardous Materials

Chemical	Use	Quantity (gallons/lbs)	Storage Location	State	Type of Storage
Oxygen	Welding Gas	880 cubic feet	Maintenance/Warehouse bldg	Gas	Continuously Onsite
Permatreat PC-191	Scale inhibitor for reverse osmosis	400 gal	Water treatment building	Liquid	Continuously Onsite
Sodium Hydroxide (NaOH) (50% solution)	Convert CO ₂ to alkalinity for removal by reverse osmosis	500 gal	Water treatment building	Liquid	Continuously Onsite
Sodium Nitrate	Cleaning of HRSG	Varies as needed (approx 500 lbs)	Outside near each HRSG	Solid	Initial startup and periodically onsite
Sulfur hexafluoride	Switchyard/ switchgear devices	200 lbs	Contained within equipment	Gas	Continuously Onsite
Trisodium Phosphate (Na ₃ PO ₄) (e.g., NALCO 7208)	Boiler water alkalinity control	400 gal	Cycle chemical feed building	Liquid	Continuously Onsite

TABLE 5.5-3
Carlsbad Energy Center Project 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 ^d	Prop 65
Aqueous ammonia	Aqueous ammonia (19%)	7664-41-7 (NH3)	17,000 gal	100 lb	100 lb	500 lb	500 lb (state)	No
Citric acid	Citric acid	77-92-9	100 lb	e	e	e	e	No
Cleaning chemicals/detergents	Various	None	100 gal	e	e	e	e	No
Diesel No. 2	Oil	None	200 gal	42 gal ^f	42 gal ^f	e	e	Yes
Cyanamer P-70	Proprietary	Proprietary	55 gal	e	e	e	e	No
Hydraulic oil	Oil	None	500 gal	42 gal ^f	42 gal ^f	e	e	No
Hydrochloric acid (reverse osmosis cleaning)	Hydrochloric acid (30%)	7647-01-0	100 gal	5,000 lb	16,667 lb	e	e	No
Laboratory reagents (liquid)	Various	None	10 gal	e	e	e	e	No
Laboratory reagents (solid)	Various	None	100 lb	e	e	e	e	No
Lubrication oil	Oil	None	40,000 gal	42 gal ^f	42 gal ^f	e	e	No
Mineral insulating oil	Oil	8012-95-1	80,000 gal	42 gal ^f	42 gal ^f	e	e	Yes
Oxygen	Oxygen	7782-44-7	880 cubic feet	e	e	e	e	No
Permatreat PC-191	Proprietary mixture	Proprietary	400 gal	e	e	e	e	No
Sodium hydroxide (50% solution)	Sodium hydroxide 50%	1310-73-2	500 gal	1,000 lb	2,000 lb	e	e	No
Sodium nitrate	Sodium nitrate	7631-99-4	500 lb. initially and once every 3 to 5 years	e	e	e	e	No

TABLE 5.5-3
Carlsbad Energy Center Project 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 ^d	Prop 65
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	200 lb	e	e	e	e	No
Trisodium phosphate	Sodium phosphate, tribasic	7601-54-9	400 gal	5,000 lb	5,000 lb	e	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% 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 TQ is Threshold Quantity from 19 CCR 2770.5 (state) or 40 CFR 68.130 (federal)

^e No reporting requirement. Chemical has no listed threshold under this requirement

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

TABLE 5.5-4
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.	<p>Occupational Exposures PEL = 35 mg/m³ OSHA TLV = 18 mg/m³ ACGIH TWA = 25 mg/m³ NIOSH STEL = 35 mg/m³</p> <p>Hazardous Concentrations IDLH = 500 ppm LD50 = 350 mg/kg - oral, rat ingestion of 3 to 4 mL may be fatal</p> <p>Sensitive Receptors ERPG-1 = 25 ppm ERPG-2 = 200 ppm ERPG-3 = 1,000 ppm</p>

Notes:

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

LD50 = Dose lethal to 50 percent of those tested

LDLO = Lowest published lethal dose

mg/kg = Milligrams per kilogram

mg/m³ = Milligrams per cubic meter

NIOSH = National Institute of Occupational Safety and Health

PEL = OSHA permissible exposure limit for 8-hour workday

REL = Reference Exposure Level

ppm = parts per million

STEL = Short-term exposure limit, 15-minute exposure

TCLO = Lowest published toxic concentration

TLV = ACGIH threshold limit value for 8-hour workday

TWA = NIOSH time-weighted average for 8-hour workday

TABLE 5.5-5
Toxicity of Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability*
Aqueous ammonia	Colorless liquid with pungent odor	<i>Corrosive: Irritation to permanent damage</i> 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
Citric acid	Translucent crystals	None.	None.	Non-flammable
Cleaning chemicals/detergents	Liquid	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels
Diesel No. 2	Oily, light liquid	May be carcinogenic.	Sodium hypochlorite. Oxidizers.	Flammable
General dispersant (Cyanamer P-70)	Straw-colored liquid with ammonia odor	May irritate eyes and skin.	Strong acids and oxidizing agents.	Non-flammable
Hydraulic oil	Oily, dark liquid	Hazardous if ingested.	Sodium hypochlorite. Oxidizers.	Combustible
Hydrochloric acid	Colorless, pungent, fuming liquid	<i>Strongly Corrosive and Toxic: Toxic by</i> ingestion. Strong irritant to eyes and skin.	Metals, hydroxides, amines, alkalis.	Non-flammable
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. Oxidizers.	Flammable
Mineral insulating oil	Oily, clear liquid	Minor health hazard.	Sodium hypochlorite. Oxidizers.	Can be combustible, depending on manufacturer
Oxygen	Colorless, odorless, tasteless gas	Therapeutic overdoses can cause convulsions. Liquid oxygen is an irritant to skin.	Hydrocarbons, organic materials.	Oxidizing agent; actively supports combustion
Permatreat PC-191	Mix of phosphonates	May cause irritation with prolonged contact	Strong oxidizing agents, strong acids	Not Flammable
Sodium hydroxide (50%)	Clear yellow liquid	<i>Corrosive: Irritant to tissue in presence of</i> moisture; strong irritant to tissue by ingestion.	Water, acids, organic halogens, some metals.	Non-flammable

TABLE 5.5-5
Toxicity of Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability*
Sodium nitrate	Colorless crystals	<i>Toxic: Mildly toxic by ingestion.</i>	Acetic anhydride, aluminum powder, antimony powder, barium thiocyanate, cyanides, bitumen, boron phosphide, magnesium, metal amidosulfates, organic matter, perosyformic acid, sodium hypophosphite, wood.	Non-flammable
Sulfur hexafluoride	Colorless gas with no odor.	Hazardous if inhaled.	Disilane.	Non-flammable
Trisodium phosphate	Colorless crystals.	<i>Corrosive and Toxic: Toxic by ingestion.</i> Irritant to tissue.	None.	Non-flammable

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

* Per DOT 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.

5.5.4.1 Construction Phase

Hazardous materials to be used during construction of the CECP 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.

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.

During construction of the project and its 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 section. Handling procedures for the non-CalARP regulated hazardous materials to be used onsite during construction are presented in Section 5.5.6.1.

5.5.4.2 Operations Phase

Several hazardous materials, including one acutely hazardous and regulated substance (aqueous ammonia) will be stored at the generating site during CECP operation. Aqueous ammonia will be stored in amounts above the California Accidental Release Prevention Program (CalARP) threshold quantity. 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 5.5-5. Table 5.5-5 also contains information on incompatible chemicals (e.g., ammonia). Mixing incompatible chemicals can generate toxic gases. Measures to keep incompatible chemicals separated include separate storage and containment areas and/or berming (see Section 5.5.6).

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 serious potential for effects on the environment and/or human health.

The CECP facility will store the 19-percent aqueous ammonia solution in two stationary aboveground storage tanks. The capacity of the tanks will be approximately 10,000 gallons each, however each tank will only be filled to a maximum of 85 percent of the tank capacity or 8,500 gallons. The tanks will be surrounded by covered secondary concrete containment structures fitted with two 4.5 foot square drainage grates each. Each tank will be provided with its own secondary concrete containment area capable of holding the full contents of the tanks, plus rainwater accumulation approximating a 24-hour period from a 25-year storm event.

Aqueous ammonia will be delivered to CECP by truck transport. The truck unloading area will be located on a concrete 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 one or two deliveries of ammonia per month, with a maximum of five deliveries per month during peak operation. The ammonia unloading area will be a bermed area approximately 1 foot deep.

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 5.16, Worker Health and Safety). The results of an Offsite Consequences Analysis presented in Section 5.5.4.3, 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.

The remaining materials in Table 5.5-3 are also considered to be hazardous, but they pose less threat to humans than aqueous ammonia. 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.

5.5.4.3 Offsite Consequence Analysis

Because there is human activity in the vicinity of the CECP, 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 one of the aqueous ammonia storage tanks was punctured and the entire contents of the tank were released into a secondary containment structure located beneath the tank. A second release scenario could occur during unloading of the tanks, however in this instance the ammonia would be directed to the secondary containment structure located beneath the tank and would result

in similar offsite impacts. 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 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 5.5B.

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 108 degrees Fahrenheit (°F), which represents the highest temperature recorded in the past 3 years.

Using these parameters, the ammonia plume was predicted – using a height of 1.6 meters – to extend approximately 36.1 meters (118.6 feet) from the ammonia storage tank at a concentration of 150 ppm. At a concentration of 75 ppm, the distance was 40.9 meters (134.1 feet) from the tank (see Table 5.5-6). The assumptions used in the ammonia analysis include the following:

- Ammonia emissions are assumed to occur over 1 hour, representing an evaporating pool of 8,500 gallons of a 19 percent ammonia solution
- An ammonia storage temperature of 108°F
- A covered secondary containment structure fitted with two 4.5 foot square drainage grates

TABLE 5.5-6
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
2000 ppm (risk of lethality)	14.0 (46.1)	19.8 (64.8)
300 ppm (OSHA’s IDLH)	21.1 (69.2)	32.2 (105.6)
150 ppm (EPA/CalARP toxic endpoint)	24.3 (79.8)	36.1 (118.6)
75 ppm (CEC Significance Value)	27.3 (89.7)	40.9 (134.1)

Notes:

The complete Offsite Consequence Analysis may be found in Appendix 5.5B.

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 CECP property boundary,

located 50.31 meters (165.1 feet) from the center of the western ammonia tank storage area, at the nearest point and 55.62 meters (182.5 feet) from the center of the eastern 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.

5.5.4.4 Fire and Explosion Risk

Table 5.5-3 describes the flammability for the hazardous materials that will be onsite. Article 80 of the California Fire Code requires all hazardous materials storage areas to be equipped with a fire extinguishing system and also requires ventilation for all enclosed hazardous material storage areas.

Aqueous ammonia, which constitutes the largest quantity of hazardous materials stored onsite, is incombustible in its liquid state. Under normal storage conditions, ammonia would not evaporate to the atmosphere because it is contained in a sealed tank that maintains the ammonia in a state that precludes evaporation. In the unlikely event that a release were to occur, ammonia could evaporate directly to the atmosphere. Ammonia vapor is combustible only within a narrow range of concentrations in air. The evaporation rate of aqueous ammonia is similar to water, which is sufficiently low such that the lower explosive limit of 15 percent (or 15,000 ppm) will not be reached.

The plant machinery lubrication oil is flammable. In accordance with Article 80 of the California Fire Code, the storage area for the lubrication oil would be equipped with a fire extinguishing system and the lubrication oil would be handled in accordance with an HMBP approved by the San Diego County Department of Environmental Health HMD jointly with the Carlsbad Fire Department and the CEC. With proper storage and handling of flammable materials in accordance with the California Fire Code and the site-specific HMBP, the risk of fire and explosion at the generating facility would be minimal.

The natural gas fuel the facility will use is flammable and could leak from the pipeline that brings the gas from the main Southern California Edison distribution pipeline. Natural gas is composed mostly of methane, but also may contain ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, 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. Natural gas, therefore, poses a risk of fire and explosion if an accidental release were to occur. However, the risk of a fire and/or explosion would be reduced through compliance with applicable codes, regulations, and industry design/construction standards.

The federal safety and operating requirements for natural gas pipelines are contained in Title 49 of the CFR, Parts 190 through 192. These requirements vary according to population density and land use; the pipeline classes are defined as follows:

- Class 1 includes pipelines in locations with 10 or fewer buildings intended for human occupancy.
- Class 2 includes pipelines in locations with more than 10, but fewer than 46 buildings intended for human occupancy.

- Class 3 includes pipelines in locations with more than 46 buildings intended for human occupancy, or where the pipeline is within 100 yards of any building or small well-defined outside area occupied by 20 or more people on at least 5 days per week for 10 weeks in any 12-month period.
- Class 4 includes pipelines in locations where buildings with 4 or more stories aboveground are prevalent.

The project's pipeline will use the Encina Power Station's existing natural gas pipeline connector. This pipeline is designed to meet Class 3 service and meets California Public Utilities Commission (CPUC) General Order 112-E and 58-A standards, in addition to the federal requirements for gas pipeline construction and safety.

Oxidizers will be stored onsite that could contribute to a fire or explosion hazard. This includes oxygen in compressed gas cylinders. This material will be segregated from flammables and combustibles during storage.

In January 2004, the Carlsbad Fire Department instituted a "Boundary Drop" in which the closest available units are dispatched regardless of jurisdictional boundaries. The Boundary Drop enhanced existing mutual aid agreements to create seamless delivery of fire, rescue and Emergency Medical Services in the region. (City of Carlsbad, 2007).

The Carlsbad Fire Department has a total of 6 fire stations within the City. The nearest fire station to the project site is Station 1 located at 1275 Carlsbad Village Drive. The station is approximately 1.75 miles away and would provide the first response to a fire at the project site. The Carlsbad Fire Department does not have a Hazardous Materials Station; however, the Fire Department employs many firefighters who are hazardous materials trained specialists. The Carlsbad Fire Department would be the initial responder to assess a hazardous materials accident. If additional help is needed, the Carlsbad Fire Department would coordinate with Camp Pendleton and/or the San Diego City Fire Department through their mutual aid agreements. Camp Pendleton is closer and would most likely respond to a hazardous materials accident (City of Carlsbad Fire Department, 2007).

5.5.5 Cumulative Effects

A cumulative impact refers to a project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code § 21083; CCR tit. 14, §§ 15064(h), 15065(c), 15130, and 15355).

There are multiple projects within the City of Carlsbad and adjacent to the CECP site that may have a cumulative effect on CECP. These projects include the Carlsbad Seawater Desalination Plant, I-5 North Coast Corridor, multiple Capital Improvement Projects, and the Flower Fields Area. These projects are on various different schedules of completion. Refer to Section 5.6, Land Use, for a more detailed discussion of cumulative projects.

Existing laws and regulations address the handling of hazardous materials and the transportation and use of aqueous ammonia, an acutely hazardous material, and will ensure that hazardous materials at the CECP are safely managed. There are several nearby facilities

as shown in table 5.5-7 below that use and store regulated substances in quantities large enough to warrant a Risk Management Plan.

TABLE 5.5-7
Facilities Near CECP with Risk Management Plans

Facility Name	Regulated Substance Stored	Distance to CECP Site
Cabrillo Power I LLC Encina Power Station 4600 Carlsbad Blvd. Carlsbad, CA	19% Aqueous Ammonia	Adjacent to Western boundary of CECP
Carlsbad City Swim Complex 3401 Monroe Street Carlsbad, CA	Chlorine	1.6 miles Northeast of CECP
Maerkle Dam Chlorination Station 5203 Sunny Creek Road Carlsbad, CA	Chlorine	3.5 miles East of CECP
Meadowlark Water Reclamation Plant 7941 Cortina Street Carlsbad, CA	Chlorine	6.4 miles Southeast of CECP

Source: McCabe, 2007

Due to the distance and chemical use of the Carlsbad City Swim Complex, Maerkle Dam Chlorination Station and Meadowlark Water Reclamation Plant, a simultaneous release of chemicals from CECP and one of these facilities is unlikely, and therefore the Cumulative Effects are very low. The Encina Power Station is adjacent to the CECP facility; however the offsite consequence analysis for CECP identifies the 75 ppm as remaining onsite. Therefore, a simultaneous release of ammonia from two or more sources would not cause a hazardous cumulative concentration of this chemical. Existing laws and regulations will thus ensure that the project's incremental effect is not cumulatively considerable.

5.5.6 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.

5.5.6.1 Construction Phase

The hazardous materials that would be used during project construction present a relatively low public health risk, but could contaminate surface water or groundwater if a release occurred. Use of best management practices (BMPs) would reduce the potential for the release of construction-related fuels and other hazardous materials to storm water and receiving waters as discussed in Section 5.15, Water Resources. BMPs prevent sediment and storm water contamination from spills or leaks, control the amount of runoff from the CECP site, and require proper disposal or recycling of hazardous materials.

Construction service personnel will follow general industry health, safety, and environmental standards for filling and servicing construction equipment and vehicles. The

standards are designed to reduce the potential for incidents involving the hazardous materials. They 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 containers used to store hazardous materials will be inspected at least once per week for signs of leaking or failure.
- All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

In the unlikely event of a spill, the spill may need to be reported to the appropriate regulatory agencies and cleanup of contaminated soil could be required. 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 there is a large spill from a service or refueling truck, contaminated soil will be placed into barrels or trucks by service personnel for offsite disposal at an appropriate facility in accordance with law. If a spill involves hazardous materials quantities equal to or greater than the specific RQ (42 gallons for petroleum products), all federal, state, and local reporting requirements will be followed. In the event of a fire or injury, the local fire department will be called.

5.5.6.2 Operation Phase

During CECP operation, various hazardous materials and one regulated substance will be stored onsite as shown in Table 5.5-1. Table 5.5-2 presents information about these materials, including trade names, chemical names, CAS numbers, maximum quantities onsite, RQs, CalARP TPQs, and status as a Proposition 65 chemical (a chemical known to be carcinogenic or cause reproductive problems in humans). Health hazards and flammability data are summarized for these materials in Table 5.5-3, which also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia). Table 5.5-4 describes the toxicity of the regulated substance and hazardous materials. Listed below are mitigation measures for minimizing the public health risks associated with hazardous material and regulated substance handling during facility operation.

5.5.6.3 Aqueous Ammonia

Aqueous ammonia will be used in a selective catalytic reduction (SCR) process to control NO_x emissions created in the combustion chambers of the combustion turbines. The SCR system will include catalyst modules, an ammonia storage system, and an ammonia injection system. The aqueous ammonia, stored as a liquid solution of 19 percent ammonia and 81 percent water, will be injected into the turbine exhaust housing upstream of the catalyst modules. The rate of injection will be controlled by a monitoring system that uses sensors to determine the correct quantity of ammonia to feed to the injection system.

The aqueous ammonia will be delivered to the CECP site by one 6,500 gallon tanker truck, once or twice a month, with a maximum of five trucks per month during peak operation. The ammonia will be stored in two ASTs with a 10,000-gallon capacity (filled to a maximum of 85% of the total volume or 8,500 gallons), contained within a secondary containment system, as required by the Uniform Fire Code. This containment system includes a bermed containment area surrounding the tank. The aqueous ammonia storage tank will be equipped with continuous tank level monitors, automated leak detection system, temperature and pressure monitors and alarms, and excess flow and emergency block valves.

Ammonia is a regulated substance under the federal CAA pursuant to 40 CFR 68 (Subpart G) and the CalARP pursuant to Health and Safety Code Sections 25331 through 25543.3. The California program is similar to the federal program but is more stringent in some areas.

In accordance with CalARP regulations, an RMP will be prepared for the ammonia tank. The RMP will include a hazard assessment to evaluate the potential effects of an accidental release, a program for preventing an accidental release, and a program for responding to an accidental release. The specific components of the RMP include:

- Description of the facility
- Accident history of the facility
- History of equipment used at the facility
- Design and operation of the facility
- Site map(s) of the facility
- Piping and instrument diagrams of the facility
- Seismic analysis
- Hazard and operability study
- Prevention program

- Consequence analysis
- Offsite consequence analysis
- Emergency response
- Auditing and inspection
- Record keeping
- Training
- Certification

The RMP will be filed with the County of San Diego Department of Environmental Health HMD, the designated CUPA for the project site. The RMP will cover regulated substances that can produce toxic clouds when inadvertently released. 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.

A Process Safety Management (PSM) plan will not be required under OSHA, because the OSHA regulations apply only to aqueous ammonia solutions above 44 percent (29 CFR Part 199). The requirements for a PSM plan are very similar to those for an RMP although an OCA is not required for the PSM. The RMP may be sufficient to also meet the requirements of a PSM plan, if required.

5.5.6.4 Other Hazardous Materials

All hazardous materials will be handled and stored in accordance with applicable codes and regulations specified in Section 5.5.6. Specific requirements of the California Fire Code that reduce the risk of fire or the potential for a release of hazardous materials that could affect public health or the environment include:

- Provision of an automatic sprinkler system for indoor hazardous material storage areas.
- Provision of an exhaust system for indoor hazardous material storage areas.
- Separation of incompatible materials by isolating them from each other with a noncombustible partition.
- Spill control in all storage, handling, and dispensing areas.
- Separate secondary containment for each chemical storage system. The secondary containment is required to hold the entire contents of the tank plus the volume of water for the fire suppression system that could be used for fire protection for a period of 20 minutes in the event of a catastrophic spill.

In addition, an HMBP is required by CCR Title 19 and the Health and Safety Code (Section 25504). The HMBP will include a revised inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. Specific topics currently addressed in the plan include:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material)
- Site map

- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The revised HMBP will be filed with the County of San Diego Department of Environmental Health HMD, the designated Certified Unified Program Agency (CUPA) for the project site, and will be updated annually in accordance with applicable regulations.

In accordance with emergency response procedures specified in the HMBP, designated personnel will be trained as members of a plant hazardous material response team, and team members will receive the first responder and hazardous material technical training to be developed in the HMBP, including training in appropriate methods to mitigate and control accidental spills. For emergency spills, the City of Carlsbad Fire Department has three firefighters trained to a Hazardous Materials Specialist level who have completed formal training in Hazardous Materials Incident Response. The HazMat Team 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 City of Carlsbad Fire Station No. 1, located at 1275 Carlsbad Village Drive, is the nearest station to the proposed project site. In addition, the City of Carlsbad Fire Department has mutual-aid agreements with Camp Pendleton and the San Diego City Fire Department.

5.5.6.5 Transportation/Delivery of Hazardous Materials

Hazardous materials and one regulated substance will be delivered periodically to the facility. As discussed in Section 5.12, Traffic and Transportation, transportation of hazardous materials will comply with all California Department of Transportation, USEPA, U.S. Department of Transportation (DOT), DTSC, CHP, and California State Fire Marshal regulations. 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. Aqueous ammonia, a regulated substance, will be delivered to the CECP site, and transported in accordance with Vehicle Code Section 32100.5, which regulates the transportation of hazardous materials that pose an inhalation hazard. In addition, ammonia will only be transported along approved transportation routes. The approved route would be via I-5 to Cannon Road and then to Carlsbad Boulevard for entrance to the site.

A transportation risk analysis was also prepared for this project to determine the risk of delivering ammonia to CECP (Appendix 5.5C). The risk of an incident occurring during a calendar year that would result in 10 or more fatalities is 0.017/million miles x 93.6 miles, or 1.59 in one million. The risk of an accident occurring in any year that would result in 33 or more fatalities is 0.0027/million miles x 93.6 miles, or 0.25 in one million. The CEC uses a significance threshold of 1 in 100,000 (or 10 in 1,000,000) for a risk of 10 fatalities and a threshold of 1 in 1,000,000 for a risk of 100 fatalities (CEC, 2001). Both of the project's risk estimates (1.59 and 0.25 in one million) are at least 6 times below the CEC thresholds. Therefore, the risk of exposure to aqueous ammonia during transport to the CECP site is not significant.

5.5.6.5.1 Petroleum Products

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

CECP will store up to 40,000 gallons of turbine lubrication oil onsite. The nearest waterway is Aqua Hedionda Lagoon, which is approximately 750 feet from the project site. Therefore, a SPCC plan will be prepared for CECP.

5.5.6.5.2 Security Plan

In addition to standard industrial business security measures, the Applicant will be preparing a security plan that will include the following elements:

- Descriptions of the site fencing and security gate
- Evacuation procedures
- A protocol for contacting law enforcement in the event of conduct endangering the facility, its employees, its contractors, or the public
- A fire alarm monitoring system
- Measures to conduct site personnel background checks, including employee and routine onsite contractors consistent with state and federal law regarding security and privacy
- A site access protocol for vendors
- A protocol for hazardous materials vendors to prepare and implement security plans as per 49 CFR 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks as per 49 CFR Part 172, Subpart I

The plan will also include a demonstration that the perimeter security measures will be adequate. The demonstration may include one or more of the following:

- Security guards
- Security alarm for critical structures
- Perimeter breach detectors and onsite motion detectors
- Video or still camera monitoring system

5.5.6.5.3 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.

5.5.6.6 Monitoring

In accordance with applicable federal, state, and local regulations, site personnel would regularly inspect all hazardous materials handling facilities for compliance with applicable regulations and would ensure that any deficiencies were promptly repaired. In addition, the facility would be subject to regular inspections by the Carlsbad Fire Department, which would ensure compliance with appropriate regulatory requirements for hazardous materials and regulated substances handling.

5.5.7 Proposed Conditions of Certification

While the potential impacts from the handling and use of hazardous materials at the CECP site are less than significant, the following conditions of certifications are proposed for the CECP by the Applicant to ensure that such impacts remain below the level of significance.

HAZ-1 The Applicant shall not use any hazardous material in any quantity or strength not listed in AFC Tables 5.5-2 and 5.5-3 unless reviewed in advance by the San Diego County Environmental Health HMD and approved in advance by the Compliance Project Manager (CPM).

Verification: The Applicant shall provide to the CPM, in the Annual Compliance Report, a list of all hazardous materials contained at the facility. If any changes are requested, the Applicant shall do so in writing, with a copy to the San Diego County Environmental Health HMD, at least 30 days before the change is needed, to the CPM for approval.

HAZ-2 The Applicant shall provide an RMP and a Hazardous Materials Business Plan (HMBP), (that shall include the proposed building chemical inventory as per the UFC) to the San Diego County Environmental Health HMD and the CPM. The Applicant shall include all recommendations of the San Diego County Environmental Health HMD and the CPM in the final documents. A copy of the final plans, including all comments, shall be provided to the San Diego County Environmental Health HMD and the CPM.

Verification: At least 60 days prior to construction of hazardous materials storage facilities and control systems, the Applicant shall provide the final plans (RMP and HMBP) listed above and accepted by the San Diego County Environmental Health HMD to the CPM for approval.

HAZ-3 The Applicant shall develop and implement a Safety Management Plan (SMP) for delivery of ammonia. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of aqueous ammonia with incompatible hazardous materials.

Verification: At least (60) sixty days prior to the delivery of aqueous ammonia to the ammonia storage tanks, the Applicant shall provide an SMP as described above to the CPM for review and approval.

HAZ-4 The aqueous ammonia storage facility shall be designed and built to either the ASME Pressure Vessel Code and ANSI K61.6 or to API 620. In either case, the storage tank shall be protected by a secondary containment basin capable of holding 125 percent of the storage volume or the storage volume plus the volume associated with 24 hours of rain assuming a 25-year storm, and shall be covered so that only drain holes or spaces or vents are open to the atmosphere. The aqueous ammonia tanker truck transfer pad shall be designed so that any spill drains to the covered secondary containment structure. The final design drawings and specifications for the ammonia storage tank, the tanker truck transfer pad, and secondary containment basin shall be submitted to the CPM.

Verification: At least sixty (60) days prior to delivery of aqueous ammonia to the facility, the Applicant shall submit final design drawings and specifications for the ammonia storage tank, the tanker truck transfer pad, and secondary containment basin(s) to the CPM for review and approval.

HAZ-5 The Applicant shall direct all vendors delivering aqueous ammonia to the site to use only tanker truck transport vehicles, which meet or exceed the specifications of DOT Code MC-307.

Verification: At least sixty (60) days prior to receipt of aqueous ammonia onsite, the Applicant shall submit copies of the notification letter to supply vendors indicating the transport vehicle specifications to the CPM for review and approval.

HAZ-6 The Applicant shall direct all vendors delivering any hazardous material to the site to use only the route approved by the CPM.

Verification: At least sixty (60) days prior to receipt of any hazardous materials onsite, the Applicant shall submit to the CPM for review and approval, a copy of the letter to be mailed to the vendors. The letter shall state the required transportation route limitation.

HAZ-7 The Applicant shall ensure that the portion of the natural gas pipeline owned by the project undergo a complete design review and detailed inspection every 30 years after initial installation and each 5 years thereafter.

Verification: At least thirty days prior to the initial flow of gas in the pipeline, the Applicant shall provide a detailed plan to accomplish a full and comprehensive pipeline design review to the CPM for review and approval. This plan shall be amended, as appropriate, and submitted to the CPM for review and approval, not later than one year before amended the plan is implemented.

HAZ-8 After any significant seismic event in the area where surface rupture occurs within one mile of the pipeline, the gas pipeline portion owned by the project shall be inspected by the Applicant.

Verification: At least thirty days prior to the initial flow of gas in the pipeline, the Applicant shall provide to the CPM a detailed plan to accomplish a full and comprehensive pipeline inspection of that portion of the pipeline owned by the project in the event of an earthquake for review and approval. This plan shall be amended, as appropriate, and submitted to the CPM for review and approval, at least every five years.

HAZ-9 The natural gas pipeline shall be designed to meet CPUC General Order 112- D&E and 58 A standards, or any successor standards, and shall be designed to meet Class III service. The pipeline will be designed to withstand seismic stresses and will be leak surveyed annually for leakage. The Applicant shall incorporate the following safety features into the design and operation of the natural gas pipeline: (1) butt welds will be x-rayed and the pipeline will be pressure tested prior to the introduction of natural gas into the line; (2) the pipeline will be surveyed for leakage annually; (3) the pipeline route will be marked to prevent rupture by heavy equipment excavating in the area; and (4) valves will be installed to isolate the line if a leak occurs.

Verification: Prior to the introduction of natural gas into the pipeline, the Applicant shall submit design and operation specifications of the pipelines to the CPM for review and approval.

HAZ-10 Ammonia sensors shall be installed, operated, and maintained around the aqueous ammonia storage tank and tanker truck transfer pad. The number, specific locations, and specifications of the ammonia sensors shall be submitted to the CPM.

Verification: At least sixty (60) days prior to delivery of aqueous ammonia to the facility, the Applicant shall submit final design drawings showing the number, location, and specifications of the ammonia sensors to the CPM for review and approval.

HAZ-11 At least 30 days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Site Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area
2. Security guards
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages onsite or offsite
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency
6. Evacuation procedures

Verification: At least thirty (30) days prior to commencing construction, the Applicant shall notify the CPM that a site-specific Construction Site Security Plan is available for review and approval.

HAZ-12 In order to determine the level of security appropriate for this power plant, the Applicant shall prepare a Vulnerability Assessment and submit that assessment as part of the Operations Security Plan to the CPM for review and approval. The Vulnerability Assessment shall be prepared according to guidelines issued by the North American Electrical Reliability Council (NERC, 2002), the U.S. Department of Energy (DOE, 2002), and the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002). Physical site security shall be consistent with the guidelines issued by the NERC (Version 1.0, June 14, 2002) and the DOE (2002) and will also be based, in part, on the use, storage, and quantity of hazardous materials present at the facility. The Applicant shall also prepare a site-specific Security Plan for the operational phase that shall be made available onsite to the CPM for review and approval. The Applicant shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented will be determined by the results of the Vulnerability Assessment but in no case shall the level of security be less than that described as below (as per NERC, 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least 8 feet high.
2. Main entrance security gate, either hand operable or motorized.
3. Evacuation procedures.
4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency.
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages onsite or offsite.
6.
 - a. A statement (refer to sample, attachment 'A') signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy.
 - b. A statement(s) (refer to sample, attachment 'B') signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.
7. Site access controls for employees, contractors, vendors, and visitors.

8. Requirements for Hazardous Materials vendors to prepare and implement security plans as per 49 CFR 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks as per 49 CFR Part 1572, Subparts A and B.
9. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate and the ammonia storage tank.
10. Additional measures to ensure adequate perimeter security consisting of either:
 - a. Security guards present 24 hours per day.
 - b. 7 days per week.

or

Power plant personnel onsite 24 hours per day, 7 days per week and **all** of the following:

1. The CCTV monitoring system required in number 9 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100 percent of the perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate from a monitor in the power plant control room
2. Perimeter breach detectors **or** onsite motion detectors

The Applicant shall fully implement the security plans and obtain CPM approval of any substantive modifications to the security plans. The CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the Applicant.

Verification: At least 30 days prior to the initial receipt of hazardous materials onsite, the Applicant shall notify the CPM that a site-specific Vulnerability Assessment and Operations Site Security Plan are available for review and approval.

5.5.8 Involved Agencies and Agency Contacts

Several agencies regulate hazardous materials, and they will be involved in regulating the hazardous materials stored and used at CECP. 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 CECP the primary local agencies with jurisdiction will be the San Diego County Department of Environmental Health, HMD and the City of Carlsbad Fire Department. The persons to contact at the local agencies are shown in Table 5.5-8.

TABLE 5.5-8
Agency Contacts for Hazardous Materials Handling

Issue	Agency	Contact
Certified Unified Program Agency (CUPA) for Hazardous Materials Inventory and Emergency Business Plan and Risk Management Plan	County of San Diego, Dept. of Environmental Health, Hazardous Materials Division 1255 Imperial Ave. 3rd Floor San Diego, CA 92101 (619) 338-2222	Michael Vizzier, Chief (619) 338-2395 michael.vizzier@sdcounty.ca.gov
Fire Department Permits	City of Carlsbad Fire Department 2650 Orion Way Carlsbad, CA 92010 (760) 931-2141	Jim Weigand, Fire Marshall (760) 602-4661 jweig@ci.carlsbad.ca.us
Hazardous Materials Response	San Diego County, Department of Environmental Health, Hazardous Materials Division 1255 Imperial Ave. 3rd Floor San Diego, CA 92101 (619) 338-2222	Nick Vent, Supervisor (619) 338-2372 Nick.vent@sdcounty.ca.gov

5.5.9 Permits Required and Permit Schedule

San Diego County Department of Environmental Health, HMD and the City of Carlsbad require the following permits listed in Table 5.5-9 to be obtained before hazardous materials are stored onsite.

TABLE 5.5-9
Permits and Permit Schedule for Hazardous Materials Handling

Permit	Agency Contact	Schedule
Hazardous Materials Inventory and Emergency Business Plan	San Diego Department of Environmental Health HMD 1255 Imperial Ave. 3rd Floor San Diego, CA 92101 (619) 338-2222 Mark McCabe (619) 338-2543 mark.mccabe@sdcounty.ca.gov	30 Days prior to start of operations
California Accidental Release Prevention Program (Risk Management Plan)	San Diego Department of Environmental Health HMD 1255 Imperial Ave. 3rd Floor San Diego, CA 92101 (619) 338-2222 Mark McCabe (619) 338-2543 mark.mccabe@sdcounty.ca.gov	90 days prior to start to operations

5.5.10 References

California Energy Commission (CEC). 2001. California Energy Commission, Final Staff Assessment for the Contra Costa Power Plant Unit 8 (00-AFC-1), Hazardous Materials Management section. March 2, 2001.

City of Carlsbad Fire Department. 2007. www.carlsbadca.gov/fire/fire2.html. Viewed on July 26, 2007.

Environmental Data Resource Inc. (EDR). 2007. EDR Offsite Receptor Report. Carlsbad Energy Center Project. July 30, 2007.

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.

McCabe, Mark. 2007. San Diego County Environmental Health Department HMD. Email Communication with John Putrich/CH2M HILL. August.

NOAA. 2004. Evaporation Calculator.
<http://archive.orr.noaa.gov/cameo/evapcalc/evap.html>

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.



- ★ Target Property
- ⌄ Roads
- ⌄ Waterways
- Environmental or Public Receptor
- ⌄ Federal Lands Linear Features
- ⌄ Federal Lands Area

0 1/4 1/2 1 Miles



FIGURE 5.5-1
SENSITIVE RECEPTORS NEAR CECP
 CARLSBAD ENERGY CENTER PROJECT
 CARLSBAD, CALIFORNIA

Source: Environmental Data Resources, Inc., 2007