4.9 HAZARDS AND HAZARDOUS MATERIALS

4.9.1 INTRODUCTION TO HAZARDS AND HAZARDOUS MATERIALS

4.9.1.1 FERC Licensed Lands

This section of the Draft EIR describes hazards at or posed by Pacific Gas and Electric Company's facilities in the Shasta, DeSabla, Drum, Motherlode, and Kings Crane-Helm Regional Bundles. Specifically, this section describes (a) the primary types of hazards associated with the hydroelectric structures and operations, (b) the handling, use, and disposal of hazardous materials and wastes, (c) potential site contamination from hazardous substances, (d) hazard prevention measures regarding facility safety, fire safety, public safety, and worker safety, (e) emergency action plans (EAPs), and (f) additional hazards-related information specific to each hydroelectric project within the five Regional Bundles, such as abandoned mine lands and dam inundation zones.

Both the public and hydroelectric personnel may be exposed to hazards posed by the facilities and associated water bodies, as well as hazards posed by flooding, fire, exposure to hazardous substances, and hazards associated with recreational activities on land and water. In addition, hydroelectric personnel often work around heavy machinery and equipment, such as dam and spillway gates, and electrical equipment such as generators, power lines, and transformers. The remote locations of many of the facilities may contribute to hazardous conditions due to relatively long distances from emergency services. In addition, unknown hazards, such as those associated with historical mining activities, may be present on or in the vicinity of FERC Lands and Watershed Lands.

4.9.1.2 Watershed Lands

The majority of Watershed Lands in the Shasta, DeSabla, Drum, Motherlode, and Kings Crane-Helm Regional Bundles are remote and undeveloped. Most of the hazards associated with these areas are natural hazards, such as fire, proximity to wildlife, and landslides and rock slides. Some of the Watershed Lands also have man-made hazards associated with them, such as hazards created by timber management, and historical mining activities on or in the vicinity of the lands. General uses of the Watershed Lands are discussed in the Bundle discussions. In some cases, the remote locations of the facilities may contribute to hazardous conditions due to relatively long distances to emergency services.

Overall, however, exposure to hazards of the public, recreationists, and employees on the Watershed Lands is much more limited than exposure to hazards within FERC Licensed Areas. This is due to the fact that on the whole, the Watershed Lands are accessed much less frequently, contain few public recreation sites, contain few structures, and are not used as storage sites for hazardous materials (PG&E Co., 1996). Hazards associated with the ongoing timber harvest activities are closely regulated by the Timber Harvest Plans (THPs), which include identification of hazards and mitigation measures to protect against and/or eliminate the hazard.

Some of the Watershed Lands or other lands in the vicinity have been used historically for mining operations. Mining activities may have created hazards on or near certain Watershed Lands. For example, hidden or abandoned structures and linear features such as tunnels and mine shafts may exist on or near the Watershed Lands, and mercury[1] used for ore extraction in past gold mining operations may have impacted areas on or near the Watershed Lands (PG&E Co., 1996b).

As described further in this section, there is an extensive regulatory structure in place, which helps protect public health and safety, and public and private property from hazards posed by the hydroelectric projects and the Watershed Lands. This section also describes measures that Pacific Gas and Electric Company takes to reduce, eliminate, and manage existing hazards associated with all features of the hydroelectric projects, some of which may be located on the Watershed Lands.

4.9.2 SYSTEM-WIDE REGULATORY CONTEXT

4.9.2.1 Federal and State Regulations and Policies

Federal and State regulations pertaining to the handling, use, and disposal of hazardous materials and wastes, and hazard prevention measures regarding facility safety, fire safety, public safety, and worker safety are summarized in Table 4.9-1.

4.9.2.2 Regional Regulations and Policies

Regional regulations and policies pertaining to hazards and hazardous materials are presented in Section 4.9.4, Regional and Local Setting and Regulatory Context.

4.9.3 SYSTEM-WIDE SETTING

FERC and the California Department of Water Resources' (DWR) Division of Safety of Dams (DSOD) regulate the safety of hydroelectric facilities.[2] To protect public and worker safety, and public and private property, the safety of hydroelectric facilities and operations is extensively regulated by numerous Federal, State, and local agencies. State and Federal regulations governing the hydroelectric facilities are discussed in Section 4.9.2, regional and local regulations are discussed in the Regional Bundle discussions in Section 4.9.4. Facility safety, fire safety, public safety, and worker safety issues are discussed below, as well as issues concerning hazardous materials and potential site contamination, abandoned mine lands, and dam inundation zones.

1 Mercury is a hazardous substance that has the potential to be toxic to humans and/or biological resources if soil disturbance occurs either through natural methods (such as erosion), or through construction activities that disturb impacted soils.

2 In addition, to assist licensees, FERC's Office of Hydropower Licensing publishes a handbook entitled "Engineering Guidelines for the Evaluation of Hydropower Projects," which provides technical details and specifications for compliance with dam safety regulations. DSOD similarly publishes a handbook entitled "Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs," which incorporates sections of the California Water Code and the California Code of Regulations that have been adopted by the DWR

Table 4.9-1 Summary of Federal and State Laws and Regulations Relating to Hazards

Laws	Purpose	Approach	Implementing Agencies	Coverage
• Dam Safety	• Ensure life and property safety from possible dam failure	• Determine structural safety of dams and ensure that emergency procedures are prepared in case of dam failure • Dam inundation zone mapping	• Federal Energy Regulatory Commission • U.S. Army Corps of Engineers • California Department of Safety of Dams	• Dams not exempted by FERC • Dams in DSOD jurisdiction over 25 feet in height and that impound at least 50 acre feet of water
• Hazardous Materials Handling and Emergency Response • California Assembly Bill 2185 (Business Plan Act)	• Regulate hazardous materials storage and emergency response planning • Public "right to know"	• Hazardous materials handlers prepare business plans that provide inventory, facility diagram, and training and emergency response plans • Certified Unified Program Agencies prepare local area emergency response plans	• California Office of Emergency Services (adopts regulations and approves area emergency response plans) • Certified Unified Program Agencies (local implementation)	• Hazardous materials managed in quantities at or above 55 gallons, 200 pounds, or 200 cubic feet (and less in some cases) • Materials in transit and lubricating oils are exempt
• Fire and Building Codes • Uniform Building Code • Uniform Fire Code • Local codes	• Ensure fire safety and prevention • Regulate hazardous materials for fire safety	• Model standards (International Conference of Building Officials and International Fire Code Institute)	• State Fire Marshal (adopts state regulations) • Local fire and building agencies (adopt state codes whole or in part)	• Hazardous materials defined in Uniform Fire Code Article 9
• Emergency Planning and Community Right to Know • Superfund Amendments and Reauthorization Act, Title III	• Public "right to know" • State and local planning for extremely hazardous substances releases	• Emergency planning requirements • Requirements for Material Safety Data Sheets	• U.S. Environmental Protection Agency (establishes requirements) • Local emergency response agencies (respond to emergencies)	• Products with hazardous ingredients (must have Material Safety Data Sheets) • "Extremely" hazardous substances
• Accidental Release Prevention • Federal Accidental Release Prevention laws • California Accidental Release Prevention law	• Prevent disastrous releases through Risk Management Planning	• Facilities register, prepare and implement Risk Management Plans for regulated substances that involve accident modeling and risk reduction measures • Local Certified Unified Program Agency and public review of Risk Management Plans	• U.S. Environmental Protection Agency (adopts regulations) • California Office of Emergency Services (adopts state regulations in conformance with federal standards) • Certified Unified Program Agencies (local implementation)	• "Regulated substances" based on quantities and accident risks

Table 4.9-1 Summary of Federal and State Laws and Regulations Relating to Hazards

Laws	Purpose	Approach	Implementing Agencies	Coverage
• Release Reporting and Response • Various federal and state laws	• Minimize exposure and contamination through prompt release reporting and response • Implement release prevention elements to minimize incidents	• Require release prevention, reporting, and response planning and programs • Define quantities and circumstances of unauthorized releases that require reporting and response	• National Response Center, U.S. Environmental Protection Agency, U.S. Department of Transportation, and U.S. Coast Guard • California Office of Emergency Services • Local fire districts and emergency responders	• Hazardous materials and waste discharges • Releases threatening human health, safety, or the environment
• Hazardous Waste • Resource Conservation and Recovery Act • California Hazardous Waste Control Law	• Regulate hazardous waste generators, transporters, and transfer, storage, and disposal facilities • "Cradle to grave" responsibility • Source reduction	• Technical standards for hazardous waste management • Transport manifests • "Corrective action" cleanups • "Tiered" permitting for hazardous waste treatment	• California Department of Toxic Substances Control (administers federal and state requirements) • Certified Unified Program Agencies (locally administer generator standards and lower permitting tiers)	• Hazardous wastes, acutely hazardous wastes, and "universal wastes" (subject to lesser requirements) • On-site hazardous waste management • Treatment, storage, and disposal facilities • Recycling
• Toxic Cleanups • Comprehensive Environmental Responsibility Compensation and Liability Act (Superfund) • Superfund Amendments and Reauthorization Act	• Locate, assess, and cleanup contaminated sites • Fund cleanups through responsible parties or public moneys • Report releases of hazardous chemicals	• Removal and remedial actions • Remedial investigation/ feasibility studies • National Priorities List	• U.S. Environmental Protection Agency • California Department of Toxic Substances Control • Local agencies (in some cases)	• Sites contaminated by substances not covered by the Resource Conservation and Recovery Act rank high for hazards on National Priorities List • Reportable quantities of released hazardous chemicals
• California Superfund • Hazardous Materials Account Act	• Provide a 10% share to fund cleanups at sites on the National Priorities List • Accelerate cleanups at sites not on the National Priorities List	• Identify and rank sites for cleanup • Remedial Action Plans • Require standards for groundwater cleanup that vary by Regional Water Quality Control Board	• California Department of Toxic Substances Control • State Board of Equalization	• Sites that qualify for the National Priorities List • State sites in addition to those on the National Priorities List

Table 4.9-1 Summary of Federal and State Laws and Regulations Relating to Hazards

Laws	Purpose	Approach	Implementing Agencies	Coverage
• Pollution Prevention and Waste Management • Federal pollution prevention Act • California Pollution Prevention Programs	• Reduce environmental and health hazards through waste minimization and improved waste management • Stimulate industrial pollution prevention strategies • Multimedia pollution prevention	• Technology, educational programs, and assistance • Source reduction reporting on Superfund Amendments and Reauthorization Act Title III Form R	• U.S. Environmental Protection Agency • California Department of Toxic Substances Control • Other state and local agencies	• Hazardous wastes • Activities that pollute air, water, and land • Facilities subject to Toxic Release Inventory reporting Form R
• Water Quality • Clean Water Act • California Porter-Cologne Water Quality Control Act • California Oil and Hazardous Substances Spill Prevention and Response Act	• Protect surface water and groundwater quality • Regulate point source discharges and storm water runoff • Spill prevention and response	• Issue National Pollutant Discharge Elimination System permits • Issue Waste Discharge Requirements • Spill prevention and prohibition of unauthorized releases • Develop Regional Basin Plans for hydrogeologic regions	• U.S. Environmental Protection Agency (establishes national framework) • State Water Resources Control Board and Regional Water Quality Control Boards • Local storm water agencies	• Discharges to navigable waters • Industrial discharges • Storm water discharges
• Storage Tanks • Federal Underground Storage Tank Law • Resource Conservation and Recovery Act (hazardous waste tanks) • California Aboveground Petroleum Storage Act	• Regulate underground and aboveground storage tanks to prevent and remediate releases • Regulate tanks storing hazardous wastes	• Construction and monitoring standards for new tanks; upgrades for existing tanks • Report releases to Regional Water Quality Control Board within 24 hours • Financial responsibility for cleanups • Registration and licensing of underground storage tank service providers	• State Water Resources Control Board (adopts regulations) • U.S. Environmental Protection Agency and Regional Water Quality Control Boards (oversee underground storage tank cleanup programs and inspect aboveground storage tanks) • Certified Unified Program Agencies (local implementation)	• Underground storage tanks storing hazardous materials and wastes (including petroleum) • Aboveground storage tanks storing petroleum
• Polychlorinated Biphenyls (PCBs) • Toxic Substances Control Act • Resource Conservation and Recovery Act	• Prevent exposures to PCBs • Regulate PCB storage and record-keeping	• Control the use, marking, and disposal of PCBs as of 1976	• U.S. Environmental Protection Agency	• PCBs • PCB-containing materials

Table 4.9-1 Summary of Federal and State Laws and Regulations Relating to Hazards

Laws	Purpose	Approach	Implementing Agencies	Coverage
• Asbestos • Toxic Substances Control Act • Occupational Safety and Health Act • Clean Air Act • California asbestos laws	• Prevent exposures to asbestos • Regulate asbestos removal and abatement • Survey and manage asbestos in schools	• Identify sites with asbestos hazards • Regulate removal and encapsulation • License contractors • Train workers • Restrict the manufacture of asbestos-containing materials • Ban new uses as of July 1989	• U.S. Environmental Protection Agency • Occupational Safety and Health Administration • California Division of Occupational Safety and Health • California Department of Toxic Substances Control • Local air districts	• Asbestos • Asbestos-containing materials • Asbestos removal contractors • Property owners
• Lead • Housing and Community Development Act • Toxic Substances Control Act • Resource Conservation and Recovery Act and California Hazardous Waste Control Law • Clean Air Act and California air quality laws • Labor laws	• Prevent exposure to lead with emphasis on worker and child safety • Regulate lead removal and disposal • Minimize lead emissions to air	• Identify and abate lead in housing • Require training and certification of lead abatement contractors and workers	• U.S. Environmental Protection Agency and California Department of Health Services (Toxic Substances Control Act requirements) • Occupational Safety and Health Administration and California Division of Safety and Health (contractor and worker standards)	• Lead, lead-based paint, and lead contamination • Housing with potential contamination • Lead abatement contractors and workers • Workers and children with high levels of lead in their blood
• Worker Safety • Occupational Safety and Health Act • California worker safety laws	• Ensure safe and healthy workplaces • Require workplace disclosure of hazardous substances • Require employee training tailored to workplace duties	• Require Injury and Illness Prevention Plans • Establish Hazard Communication Standard for workers (training regarding Material Safety Data Sheets and container labeling, etc.)	• U.S. Occupational Safety and Health Administration (sets standards) • California Division of Occupational Safety and Health (administers federal and state laws)	• Most employers • Workplaces with hazardous substances • Cleanup sites • Hazardous substances, including carcinogens
• Hazardous Materials Transportation • Federal hazardous materials transportation laws (including U.S. postal regulations) • Resource Conservation and Recovery Act • California Vehicle Code	• Ensure safe transport of hazardous materials and wastes • Require spill response planning, notification, and cleanup	• Carrier and vehicle registration • Shipping papers, labels, and placards • Vehicle inspections • Routing restrictions • Employee training	• U.S. Department of Transportation • U.S. Environmental Protection Agency • California Department of Transportation • California Highway Patrol • Local planners, sheriff, and police	• Transport of materials in defined hazard classes • Hazardous waste transport

Table 4.9-1 Summary of Federal and State Laws and Regulations Relating to Hazards

Laws	Purpose	Approach	Implementing Agencies	Coverage
Air Quality Clean Air Act California air quality laws	• Protect and enhance air quality • Identify toxic air contaminants and "toxic hot spots" • Protect ozone layer and control acid rain • Prevent catastrophic releases	• Set National Ambient Air Quality Standards • Control emissions from stationary and vehicular sources • Define hazardous air pollutants • Establish Maximum Achievable Control Technologies	• U.S. Environmental Protection Agency (sets national standards and approves State Implementation Plans) • California Air Resources Board (oversees mobile sources) • Local Air Districts (oversees stationary sources)	• Nitrogen oxides, particulate matter, carbon monoxide, lead, ozone, and sulfur dioxide emissions • Hazardous air pollutants emissions • Toxic air contaminants emissions

Sources: EIP Associates; Jon Elliott and David Weinsoff, Touchstone Environmental, Specialty Technical Publishers, 1998.

4.9.3.1 Facility/Dam Safety

FERC Facility/Dam Safety Inspections

Federal regulations authorize FERC to review the construction, operation, maintenance, use, and modification of hydroelectric facilities for the purpose of protecting safety. In addition, FERC conducts annual inspections of operations at powerhouses and other facilities.

All dams in FERC-licensed projects are assigned by FERC a Low, Significant, or High Hazard Potential Classification. The hazard potential is determined in accordance with the U.S. Army Corps of Engineers (USCOE) regulations for inspection of non-Federal dams (USACE, 1979). The hazard potential classifications are based on the potential loss of life, extent of urban development, and potential degree of economic loss. FERC annually inspects dams that are assigned a High or Significant Hazard Potential Classification, and inspects dams assigned a Low Hazard Potential Classification every two or three years, depending on the size of the dam and the associated storage capacity.

In addition, Federal regulations require that dams that are assigned a High Hazard Potential Classification, or that exceed a certain height or storage capacity, be inspected every five years by an independent consultant specially trained in dam safety. The scope of the inspections and safety review are summarized in a report addressing such topics as geologic and seismic considerations, instrumentation, field inspection, spillway adequacy, structural stability, adequacy of maintenance and methods of operation, conclusions and recommended corrective measures. Observations or recommended corrective measures of significance are addressed in the bundle discussions in Section 4.9.4.

In addition to regulating physical structures, FERC also regulates facility operations for safety. FERC may, for example, restrict the amount, rate, and timing of water releases, and regulate reservoir levels to prevent dangerous spills. The requirements are tailored to the design and location of each facility and the conditions downstream.

DSOD Facility/Dam Safety Inspections

The DSOD regulates all dams in California that are 25 feet or more in height or that impound 50 acre-feet or more in water storage capacity, including dams within FERC boundaries that are not regulated by FERC. These dams must meet earthquake stability, spillway capacity, and design flood criteria. The frequency of inspection by DSOD is dependant on the dam's hazard classification. The dams are numerically rated on a scale of one to four based on reservoir capacity, dam height, downstream evacuation potential, and property damage potential. In addition, the dams are alphabetically rated on a scale of A to D based on the age of the dam, general condition and type of the dam, and the dam's geologic and seismic site condition. For example, a dam with a hazard rating of 1A has the least potential hazards, while a dam with a hazard rating of 4D is considered to have the most potential hazards. Dams within DSOD's

jurisdiction are inspected for safety at least once per year, and up to four times per year, based on the hazard rating. Table 4.9-2 provides a matrix that determines the frequency of DSOD facility inspections.

Table 4.9-2 Frequency of DSOD Dam Safety Inspections

		Condition of Dam			
		A	B	C	D
Damage Potential	1	One per year	One per year	One per year	One per year
	2	One per year	One per year	Two per year	Two per year
	3	One per year	Two per year	Two per year	Four per year
	4	Two per year	Two per year	Four per year	Four per year

Source: DSOD, Classification of Dams as to Damage Potential and Condition, Revised 5/99.

Facility Operations and Maintenance

Pacific Gas and Electric Company provides, on a regular basis, updates and bulletins regarding operations and maintenance (O&M) of their facilities. The updates include standard operating procedures (SOPs), best management practices (BMPs), and general outlines of State regulations and company policies and requirements. These O&M procedures apply to machinery upkeep, dam and reservoir structures, hazardous material storage and disposal, and habitat protection. Distribution of the O&M procedures ensures that company BMPs and policies are distributed to employees and supervisors. Compliance with these O&M procedures helps to reduce potential facility hazards.

Water Conveyance Facilities

Water conveyance facilities are not subject to as high a level of regulatory oversight as the project dams. In order to assure safe and reliable operation, the water conveyance facilities are inspected and maintained at various frequencies depending on the type of structure and their exposure to the elements. For example, closed conduits such as tunnels have a high degree of reliability and are infrequently affected by natural causes. Whereas, open conduits, such as earthen and lined earthen canals and flumes, are more vulnerable to effects such as rock or tree fall, earth movement, debris restrictions, snow, ice, etc. Inspections of water conveyance facilities are performed both by helicopter and on-foot.

The service life and maintenance for various water conveyance facilities depend on the type of construction, the exposure to the weather conditions, the normal usage and service conditions, the extent of routine repair, and improvements. Typical service lives for the various water conveyance facilities, as well as typical maintenance and repair for the various types of facilities are shown on Table 4.9-3.

Table 4.9-3 Typical Water Conveyance Facilities Service Lives and Maintenance Activities

Structure	Service Life	Typical Maintenance and Repair Activities
Earthen and rock canals	More than 50 years	Remove debris and sediment Repair and/or replace selected sections of gunite lining Improve drainage Improve stability
Wooden flume structures	About 30 years	Repair and/or replace selected section of deteriorated wooden lining and/or structural members
Gunite lining	About 30 years	Not reported
Lennon Flume sheets	About 30 years	Replace deteriorated metal flume sheet Install coating Repair and/or replace selected sections of wooden support structures
Steel elevated structures	More than 30 years	Not reported
Concrete Flumes	More than 50 years	Repair deteriorated or weathered concrete Repair deteriorated and leaking joints
Tunnels	More than 50 years	Repair deteriorated or weathered concrete Grout to fill voids behind concrete lining
Steel Penstocks	More than 50 years	Replace seal or packing at joints Repair leaks and/or cracks Paint

Ref.: PG&E Co. Data Request No.: HydroCEQA66_ED_Aspen-037_001

The water conveyance facilities are routinely patrolled and monitored during normal operation. Routine maintenance and repairs are made to address leakages, geological hazards, tree fall hazards, and debris to ensure continue operation of the facilities. The facilities are inspected during Pacific Gas and Electric Company's annual outage to assess the condition and needs for repair and improvements.[3]

Pacific Gas and Electric Company has installed many safety systems throughout the facilities, including water conveyances. Monitoring equipment has been installed to provide instantaneous information on water levels and other physical conditions. Some monitoring instruments are read in the field, while other instruments send data automatically via the SCADA system to switching centers that are staffed 24 hours a day. In addition, Pacific Gas and Electric Company personnel conduct regular physical inspections of all facilities, which include seismic monitoring.

3 PG&E Data Request No.: HydroCEQA66_ED_Aspen-037_001, Answer 1 (f). Note: An inventory of the types of water conveyance facilities associated with the project is provided in the PEA, Volume 8, Appendix A-1 – Facility Descriptions, under the heading "Description of Assets for Power Generation." For more information on Pacific Gas and Electric Company maintenance activities, please see Pacific Gas and Electric Company's response to Data Requests HydroCEQA_ED_RI-001_007 and HydroCEQA27_ED_Aspen-010_001. Specifically refer to Hydro Bulletins 29, 35, 40, 43, 45, 48, 62, 63, 82, 85, 86, PG-G090, PG-G091, PG-G092 for more information about water conveyance maintenance activities.

4.9.3.2 Public Safety

Public Safety Plan

To protect public safety, FERC requires each licensee to maintain and implement a FERC-approved Public Safety Plan that identifies required safety devices and procedures. The specific requirements are determined on a project-by-project basis, given the unique characteristics of the sites, facilities, and public uses. The safety measures fall into five general categories:

- Education and information (such as literature, video tapes, and public announcements);
- Warning devices (such as signs, lights, buoys, and alarms);
- Restraining devices (such as fences, guards, trashracks, and boat barriers);
- Escape devices (such as ladders, life preservers, portages, ramps, and nets); and
- Operating procedures (such as safe gate-opening procedures and ramping rates).

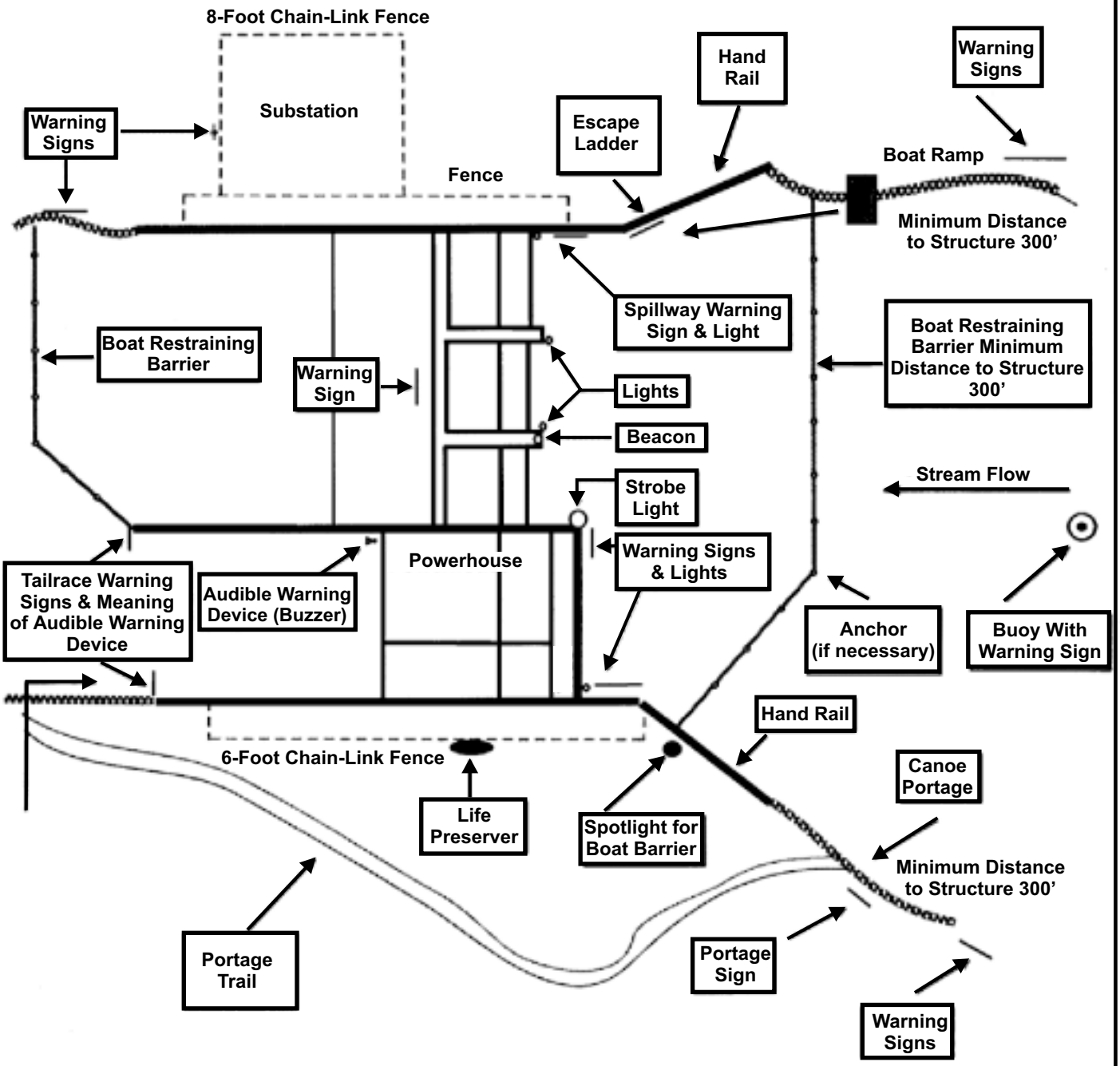
The plans are updated regularly to reflect changing conditions, including increases in public use. In general, the Public Safety Plans are not complex, and consist of a list of each safety device at the facility and a schematic drawing showing the general location of each device (FERC, 1992b). FERC inspects for compliance with the Public Safety Plans during its Environmental and Public Use Inspections (EPUIs). Figure 4.9-1 provides an example of a typical hydropower dam showing locations of public safety facilities.

Environmental and Public Use Inspections

FERC is required to conduct EPUIs for all licensed facilities at least every six years. In practice, FERC conducts these inspections every three to five years. During the inspections, FERC reviews all environmental, recreational, cultural, and public use aspects of the licenses, including public safety, and the use of hazardous materials. During these inspections, compliance with and the adequacy of the Public Safety Plans are reviewed. The most recent and available EPUIs are summarized in the Bundle discussions in Section 4.9.4.

Emergency Action Plans (EAPs)

Unless specifically exempted by FERC, all licensees must maintain an EAP for emergencies related to a sudden release of water from a dam or other water-retaining structure. Within a FERC license, some dams may be exempt from having an EAP. An EAP is required to include actions to prevent emergency conditions, notification procedures, and an inventory of response capabilities and emergency resources. EAPs are specifically designed to provide early warning to upstream and downstream inhabitants, property owners, and operators of water-related facilities, recreational users, and others who might be affected. FERC requires that EAPs be kept up-to-date and tested annually. Personnel are to be trained in the notification and response procedures. Dam failure inundation maps are generally included as a component of an EAP. In the State of California, the Office of Emergency Services (Cal OES) has EAPs on file for Pacific Gas and Electric Company's FERC-licensed projects.



Hydrodivestiture EIR

Figure 4.9-1

Typical Hydropower Dam Showing Location of Public Safety Facilities

Aspen Environmental Group

Dam Failure Inundation Maps

The Cal OES dam failure inundation mapping and emergency procedures program applies to dams meeting specific requirements under Sections 6002, 6003 and 6004 of the California Water Code. This program encompasses inundation mapping, inundation map waivers, and emergency procedures. Dam inundation maps as prepared by the Licensee and submitted as part of the Emergency Action Plans, are maintained on file with Cal OES in accordance with Section 8589.5 of the California Government Code (a portion of the Emergency Services Act; CAL OES). Generally, dam failure inundation maps provide a topographic map delineating the extent of the down-gradient inundation zone, or the area that would be impacted (covered) by water downstream of a dam should it fail. Inundation zone scenarios are presented as a dam-break condition under either Fair Weather, or Probable Maximum Flood (PMF) conditions. A Fair Weather Dam-Break Condition is assumed to occur when the reservoir is at normal maximum water surface elevation and capacity, and normal stream flow is prevailing. A Probable Maximum Flood (PMF) Dam-Break Condition is assumed to occur when the reservoir is at normal maximum water surface compounded by a storm event producing the maximum inflow possible. In cases where the theoretical Fair Weather and PMF Conditions result in approximately the same downstream effects, FERC's Guidelines for Emergency Action Plans, dated November 1998, specify that it is sufficient to represent the two conditions as the same, or only as the Fair Weather Condition.

Inundation zone maps indicate where water levels within the inundation zone would be at various time intervals after a dam has failed (e.g., area X would be 23 feet under water within 30 minutes after dam failure). The bundle discussions in Section 4.9.4 indicate whether or not dams within specific FERC licenses have existing dam inundation zone maps (CAL OES). As discussed above, dam inundation maps are generally included as a component in EAPs. The specific magnitude of floods resulting from dam failure and the geographic areas potentially affected by flood waters are summarized in the bundle discussions in Section 4.9.4. The inundation zone information provided in section 4.9.4 shows the consequences that could potentially occur, given the current setting and developments, if the dam were to fail.

4.9.3.3 Worker Safety

Cal OSHA regulates worker health and safety concerns[4]. In compliance with Cal OSHA regulations, Pacific Gas and Electric Company maintains worker safety plans and procedures for all of its hydroelectric facilities. Such plans and procedures include an Illness and Injury Prevention Program (IIPP), Code of Safe Work Practices, and Hazard Communication Manual.

Illness and Injury Prevention Program

The IIPP applies to all of the hydroelectric facilities and includes specific practices, rules, and work procedures designed to ensure a safe work environment for employees and contractor personnel.

4 See, 8 Cal. Code Regs.

The IIPP requires safety training, safety preparation prior to starting work, audits and inspections, and emergency response capabilities. As part of the IIPP, the Code of Safe Work Practices applies to all employees and covers topics such as first aid, live line work methods, and safety at hydroelectric and telecommunication facilities. The Hazard Communication Manual is also required by Cal OSHA and provides worker safety information for personnel working with hazardous materials.

Hazardous Waste Manual

Pacific Gas and Electric Company provides its employees who manage hazardous wastes with a comprehensive guide on the handling, storage, and transportation of non-hazardous, hazardous, and extremely hazardous wastes in compliance with State and Federal regulations. The manual is written for supervisors who are responsible for facilities or activities that produce hazardous wastes. The guidance provided in the Hazardous Waste Manual clarifies ambiguities regarding "legal" definitions of what constitutes hazardous wastes. Because the laws and regulations regarding hazardous waste management change, the manual is updated periodically (PG&E Co., 1996b).

4.9.3.4 Hazardous Materials and Waste

A variety of hazardous materials are used in the daily operations of the hydroelectric facilities. These materials include lubricating oils, paint, solvents, lead acid batteries, and fuels for vehicles and aircraft. Most of the materials are stored at a powerhouse or service center. Small amounts of hazardous materials may be stored at remote locations, such as valve houses, or on storage platforms for cloud-seeding supplies. Most of the hazardous materials are consumed during use and thus little hazardous waste is generated. The only acutely hazardous material that is reportedly used at the hydroelectric facilities is the sulfuric acid in lead-acid batteries (PG&E Co., 1996b). The batteries are used at some powerhouses for start-up and emergency power. The batteries are also used in company vehicles and aircraft.

Facilities that store above-threshold amounts of hazardous materials must prepare and maintain business plans that include information on how the materials are stored and used, and emergency response plans[5]. In general, Pacific Gas and Electric Company maintains various guidance documents to direct workers in emergency situations. Pacific Gas and Electric Company's Hazardous Waste Manual regulates day-to-day O&M activities involving the use of hazardous materials and waste.

5 Cal. Health and Safety Code § 25505, 19 Cal. Code Regs., Division 2, Chapter 4, Article 4; and SARA Title III, § 312.

Facility Environmental Emergency Plans

Facility Environmental Emergency Plans (FEEPs) are required for staffed facilities. The purpose of the FEEP is to provide the procedures and other directives to be carried out in the event of fire, explosion, earthquake, accidental release of hazardous materials or waste, or any other similar emergency. The FEEP is designed to minimize hazards to human health, property, and the environment from any unplanned release of hazardous wastes in the air, soil, or water, and has been prepared in accordance with state and federal regulations as set forth in 40 CFR Part 265 and Titles 19 and 22 of the California Code of Regulations (CCR).

Hazardous Materials Business Plans

Hazardous Materials Business Plans (HMBPs) are required for unstaffed facilities. Similar to the FEEP, the purpose of the HMBP is to provide procedures and other directives to be carried out in the event of fire, explosion, earthquake, accidental release of hazardous materials or waste, or any other similar emergency. The HMBP is designed to minimize hazards to human health, property, and the environment from any unplanned release of hazardous wastes in the air, soil, or water, and has been prepared in accordance with Title 19 of the CCR and pertinent sections of the California Health and Safety Code.

Modified Hazardous Materials Business Plans

Modified HMBPs are required for unstaffed and remote gauging stations and cloud-seeding stations that store small amounts of hazardous materials. Common materials used for cloud seeding operations may include materials such as silver iodide and solid carbon dioxide. A Modified HMBP is similar to a HMBP, as described above.

Hazardous Waste Management Plan

At select locations where hazardous wastes are stored for short periods until they are collected and disposed of, the FEEPs and HMBPs include a Hazardous Waste Management Plan to ensure that each facility complies with all local, State, and Federal regulations applicable to hazardous waste generation, accumulation, transportation, and disposal[6]. This plan is written in accordance with CFR Titles 40 and 49, as well as CCR Title 22.

Spill Prevention Control and Countermeasure Plans

At many of the staffed powerhouses and service centers, underground and aboveground storage tanks are used to store dielectric fluid and fuels for vehicles and aircraft. In accordance with federal regulations, Spill Prevention Control and Countermeasure (SPCC) Plans are maintained for tanks with capacities above prescribed thresholds. In general, SPCC Plans provide facility descriptions, types of fluids and liquids stored on-site, and discuss spill histories and determine spill potential.

6 22 Cal. Code Regs. and CFR Titles 40 and 49.

The plans are prepared in accordance to the provisions stated in 40 CFR parts 112, 302, and portions of Part 761. In addition, SPCC Plans identify facility deficiencies and suggest improvements to existing facilities, with regards to underground and aboveground storage tanks. The adequacy of the SPCC Plan is also evaluated in FERC's EPUIs. For those hydroelectric facilities with SPCC certifications expiring in the year 2000, the SPCC plans are being updated and recertified. There are no outstanding facility modifications resulting from the 1999 or prior SPCC plans (PG&E Co., 2000a).

4.9.3.5 Fire Safety and Explosive Materials

Fire Safety

Forestland fire prevention and protection in California is a very important issue due to the high risks resulting from hot dry summers, periodic drought conditions, high timber and watershed values, and the urbanization of many portions of the forestland areas. Private forestland fire protection in California is generally the responsibility of the California Department of Forestry & Fire Protection (CDF). These areas are referred to as State Responsibility Areas (SRA) and are defined by the CDF as follows:

Land exclusive of cities and Federal lands regardless of ownership, classified by the State Board of Forestry as areas in which the primary financial responsibility for preventing and suppressing fires is that of the State. These are lands covered wholly or in part by timber, brush, undergrowth or grass, whether of commercial value or not, which protect the soil from erosion, retain runoff of water or accelerate percolation, and lands used principally for range or forage purposes.

In order to consolidate these areas of legal responsibility into larger blocks that can be more efficiently protected, the CDF "swaps" portions of SRA lands with other agencies (primarily the U.S. Forest Service). The results of this "balancing" of protection services is that the CDF is typically responsible for fire protection for the mid to low elevation forestlands where greater amounts of private property occurs while the Forest Service takes the lead on the higher elevation lands.

All of Pacific Gas and Electric Company's forested watershed lands are in areas that have the potential for catastrophic wildfires. The least potential would occur in the upper elevation properties, above 7,000 feet. These areas have large breaks in the forest due to rock outcroppings and have very little brush, which can act as a "ladder" and spread fire into the upper tree canopy.

Fire protection is carried out by large number of dispersed state and Federal firefighting units that staff-up considerably in the fire season and are supplemented as needed by California Youth Authority (CYA) and inmate crews. These dispersed fire fighting units depend upon early detection and quick response to provide their best fire fighting advantage and this is accomplished by maintaining a series of State and Federal lookouts throughout California's forestland and the rapid deployment of aerial fire fighting resources.

Fire prevention responsibilities on California's forestland also falls primarily upon the CDF. This is accomplished through public awareness advertising, burning permit requirements and forest practice regulations. Areas of forestland under active THPs are subject to a number of special regulations that are administered by the CDF aimed at wild fire prevention. These regulations include the following:

- Lopping, burning, or removal of slash created by timber operations on the THP area, around structures and along roads that are accessible to the general public.
- Broadcast and pile burning limited to non-fire season periods and the conditions set forth in a project burning permit issued by the CDF.
- Before the start of operation, but not later than April 1st each year, a fire suppression resources inventory is required to be submitted to the CDF by the timberland owner. This inventory will include a listing of all of the equipment and personnel that the land owner has available and how the personnel can be contacted.
- Roads must be kept passable for emergency equipment during the fire season.
- Contractors working on THPs must have "fire boxes" on site that contain basic fire fighting equipment.
- The timber operator is required to conduct diligent aerial or ground inspection within the first two hours after cessation of timber felling, yarding, or loading each day during periods of high fire danger.

Transmission lines leading from the powerhouses and switchyards may pose fire hazards. To minimize the risk, Pacific Gas and Electric Company implements specific fire prevention standards and procedures. For example, Pacific Gas and Electric Company clears brush from around energized electrical equipment annually and periodically trims trees. Additional procedures are documented in Pacific Gas and Electric Company's Fire and Risk Control Manual (PG&E Co., 1995).

Explosive Materials

At Pacific Gas and Electric Company facilities, explosive materials for blasting large rocks that have fallen into the canal system, and cannot otherwise be extracted, are stored at certain service centers. The materials are stored in special bunkers for explosive materials. The materials are handled in accordance with the regulations of the U.S. Bureau of Alcohol, Tobacco and Firearms (BATF), and transported in accordance with the regulations of the U.S. Department of Transportation (DOT) and California Department of Transportation (Caltrans).

Explosive materials are also associated with historical mining activities. The most widely used explosives in mining have been black powder, dynamite, and ammonium nitrate with fuel oil. Black powder was used exclusively in the 1800s, but was gradually replaced by dynamite in the 1900s. Black powder may be found in cans, kegs, or bags, and dynamite, usually manufactured as sticks approximately eight inches long and one inch in diameter, may be packed in wooden or cardboard boxes. Numerous mining and historic mining activities have occurred on and within the

vicinity of FERC and Watershed Lands. If "old" explosives are identified upon discovery of a known or unknown mining site, extreme care should be taken, as these materials can explode if disturbed (Cal EPA, 1998).

4.9.3.6 Potential Site Contamination

Phase I Environmental Site Assessments for FERC Licensed Areas

Pacific Gas and Electric Company has performed Phase I Environmental Site Assessments (ESAs) at most of the hydroelectric facilities and portions of the FERC Licensed Areas proposed for ownership transfer to identify the presence or likely presence of hazardous substances in structures, soil, or groundwater. As a component of the Phase I ESAs conducted at portions of the FERC Licensed Lands proposed for ownership transfer, CDM reviewed various environmental regulatory databases using summary reports generated by VISTA Information Solutions, Inc. (VISTA).[7] The VISTA reports identified existing documentation relating to environmental incidents not only within the FERC Licensed Areas, but also in surrounding areas including Watershed Lands. The databases searched, and related search distances from the investigated properties, are those suggested by ASTM as follows:

Federal Databases:

- National Priorities List (NPL) – one mile;
- Resource Conservation and Recovery Act (RCRA) Corrective Actions (CORRACTS) and treatment, storage, and disposal (TSD) facilities – one mile;
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) – 1/2 mile;
- RCRA Violations/Enforcements – 1/4 mile;
- Toxic Release Inventory Database (TRIS) – 1/4 mile;
- Emergency Response Notification System (ERNS) – 1/8 mile; and
- RCRA Registered small or large generators of hazardous waste -1/8 mile.

State of California, Regional, and County Databases:

- State Superfund (SPL) Calsites Database: Annual Workplan Sites – one mile;
- State equivalent CERCLIS list (SPL) – 1/2 mile;
- Landfills (SWLF) Sold Waste Information System (SWIS) and Solid Waste Assessment Test (SWAT) – 1/2 mile;
- Leaking underground storage tanks (LUST) – 1/2 mile;
- Sites with deed restrictions – 1/2 mile;
- State index of properties with hazardous waste (CORTESE) – 1/2 mile;
- Toxic Pits cleanup facilities – 1/2 mile;
- Registered underground and aboveground storage tanks –1/4 mile.

In addition to the databases described above, other regional databases, such as the RWQCB's Office of Underground Storage Tanks and CalEPA's LUST list were consulted. The environmental

7 Some of the Phase I ESAs prepared for the project were not prepared by CDM and may not have used VISTA as their database search company; however, per ASTM Standards, an environmental database search, using the radiuses identified above, must be performed. Since the various database companies utilize the same Federal, State, and regional databases, their search results should produce the same number and type of facilities.

listings identified in the VISTA database searches (if any) were evaluated with respect to their potential to adversely impact the FERC Licensed Areas. However, if an environmental listing met any one of the following four criteria, the listing was not investigated further and was not discussed in CDM's Phase I ESAs: (1) mislocated or unmapable listing beyond the ASTM search criteria; (2) sites listed as only soil media impacted and at a distance from the FERC Licensed Area that would preclude contaminant migration to the site; (3) sites hydraulically downgradient of the FERC Licensed Areas with respect to surface and groundwater flow; and (4) site remediation has been completed and site closure has been approved by the regulatory agencies.

The Phase I ESAs were performed in conformity with the standards of the American Society for Testing and Materials (ASTM) (ASTM, 1994), and included reviews of regulatory files and other documentation, site walk-throughs, and interviews with people familiar with the site and past and present operations. In general, the sites were assessed for recognized environmental conditions with respect to hazardous substances, solid waste/non-hazardous waste, PCBs, asbestos-containing materials, storage tanks, herbicides and pesticides, water, wastewater, storm water, and lead-based paint.

For the purpose of the Phase I ESAs, the portion of the FERC Licensed Areas that was investigated includes, but is not limited to, system features such as powerhouses, switchyards, canals, flumes, tunnels, pipes, diversion dams, forebays and penstocks, construction yards, and recreational facilities.

Material Recognized Environmental Conditions

A "recognized environmental condition" is the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum product into structures on the property or into the ground, groundwater, or surface water of the property. The term is not intended to include *de minimus* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies (ASTM, 1994).

Although a recognized environmental condition may require investigation or remediation, Camp Dresser and McKee (CDM), the authors of the Phase I ESAs, characterized certain conditions as "material recognized environmental conditions," if they may, in CDM's opinion, require extensive investigation and/or extensive remedial efforts to address. The following project- and bundle-specific sections list those facilities with material recognized environmental conditions. At some facilities, Pacific Gas and Electric Company has already conducted remediation; in other cases, Pacific Gas and Electric Company is still evaluating the condition to determine an appropriate course of action. Information describing site remediation activities, if any, are presented in the regional bundle discussions. Phase I ESAs to ASTM Standards have not been conducted for the

associated Watershed Lands. Section 4.9.3.7 discusses the environmental assessments conducted on associated Watershed Lands.

Asbestos/PCBs/Lead-Based Paint

Asbestos Containing Materials

Asbestos, a naturally occurring fibrous material, was used for years in many building materials for its fireproofing and insulating properties. Loose insulation, ceiling panels, and brittle plaster are potential sources of friable (easily crumbled) asbestos. Nonfriable asbestos is generally bound to other materials such that it does not become airborne under normal conditions. Any activity that involves cutting, grinding, or drilling during building renovation or demolition or relocation of underground utilities could release friable asbestos fibers unless proper precautions are taken. Inhalation of airborne fibers is the primary mode of asbestos entry into the body, making friable materials the greatest potential health risk. Asbestos-related health problems include lung cancer and asbestosis.

Asbestos is regulated both as a hazardous air pollutant under the Clean Air Act and as a potential worker safety hazard under the authority of OSHA. These regulations prohibit emissions of asbestos from asbestos-related demolition or construction activities, require medical examinations and monitoring of employees engaged in activities that could disturb asbestos, specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers, and require notice to Federal and local government agencies prior to beginning renovation or demolition that could disturb asbestos.

Asbestos is present at many of the hydroelectric facilities. It was once commonly used as insulation in wiring, siding on buildings, insulation in walls, mastic under floor tiles, and as conduit at powerhouses. The insulation in wiring, coated with a non-asbestos material and found in walls, is generally friable. Asbestos-insulated wiring coated on the exterior with a non-asbestos material can be safely handled by employees, as long as it is not stripped of its insulation. The other sources of asbestos are generally non-friable if in good condition. Pacific Gas and Electric Company employees follow the procedures in the California Code of Regulations, Title 8, Section 1529, when they encounter asbestos-containing materials. Maintenance activities that require removing material potentially containing friable asbestos are contracted to qualified contractors. Information regarding the site-specific presence of asbestos containing materials at the project facilities is provided in the Phase I ESAs performed by CDM.

Polychlorinated Biphenyls

Low concentrations of polychlorinated biphenyls (PCBs) are present at some facilities. They were widely used in the utility industry until 1978 when they were banned from distribution in the United States. PCBs at Pacific Gas and Electric Company's hydroelectric facilities are limited to dielectric fluid in electrical equipment and joint sealants in some canals and dam faces. Pacific Gas and

Electric Company hydroelectric facilities have no electrical equipment subject to Federal regulations that has tested over 500 parts per million (ppm) PCB, the threshold amount for additional notification to local fire responders.

In 1997, Pacific Gas and Electric Company discovered PCBs in the caulking of some canal and dam joint sealants. Upon the discovery of PCBs, Pacific Gas and Electric Company notified the appropriate regulatory agencies in July 1998. Pacific Gas and Electric Company subsequently analyzed surface waters downstream of its facilities and conducted laboratory tests to assess the potential for leaching of PCBs from the caulking[8]. Since then, Pacific Gas and Electric Company has modified its work procedures and now inspects all joint sealants during routine inspections for cracking, shrinking, or discoloration. Any sealant that is deteriorating is removed and disposed of in accordance with Federal and State requirements. Information regarding the site-specific presence of PCBs at the project facilities is provided in the Phase I ESAs performed by CDM. The hydroelectric department has also adopted specific work procedures in Pacific Gas and Electric Company Substation Bulletin 8A-2 for handling, sampling, reporting, storing, and disposing of PCBs (PG&E Co., 1999b).

Lead-Based Paint

Lead is a naturally occurring metallic element. Among its numerous uses and sources, lead can be found in paint, water pipes, solder in plumbing systems, and in soils around buildings and structures painted with lead-based paint. Excessive exposure to lead can result in the accumulation of lead in the blood, soft tissues, and bones. Because lead accumulates in the body, exposure to low levels of lead can also be harmful. In 1978 the Federal government required the reduction of lead in house paint to less than 0.06 percent (600 parts per million). However, some paints manufactured after 1978 for industrial uses or marine uses legally contain more than 0.06 percent lead. Because of its toxic properties, lead is regulated as a hazardous material. Inorganic lead is also regulated as a toxic air contaminant. Inspection, testing, and removing (abating) of lead-containing building materials must be performed by State-certified contractors who are required to comply with applicable health and safety and hazardous materials regulations.

According to the Phase I ESAs performed for the hydroelectric facilities located within FERC Licensed Areas, based on the ages of the former and existing site facilities (facilities constructed prior to 1978), lead-based paints likely were used. Painted buildings and metal structures, as well as windows located in hydroelectric facility buildings, potentially have coatings of lead-based paint or lead-based glazing compounds. Lead-based paint exists as a hazard if the painted surfaces are deteriorated and exhibit characteristics such as flaking, dusting, or chipping.

8 For results of the testing, see Bates Nos. HPG 478485-478490 and HPG 414772-414777 for Pacific Gas and Electric Company letters to EPA and State agencies with conclusions.

4.9.3.7 Environmental Assessments of associated Watershed Lands

Pacific Gas and Electric Company has performed Environmental Assessments for the associated Watershed Lands (Pacific Gas and Electric Company-owned properties associated with, but outside of, FERC project boundaries). The associated Watershed Lands were added to the project in the March 27, 2000 Supplemental PEA. GeoMatrix Consultants, Inc. (GeoMatrix) conducted these assessments to identify significant environmental features that may exist on the associated Watershed Lands, such as abandoned or active mines, hazardous material sites, and landfills[9]. Databases and informational sources that were reviewed for the environmental assessments included the following: a U.S. Bureau of Mines database of mine locations obtained from the USEPA; a regulatory database maintained by EDR, Inc.; USGS aerial photographs; and USGS topographic quadrangles. The data sources discussed above were reviewed by GeoMatrix to identify features and land uses to be field-checked during an aerial reconnaissance. The aerial reconnaissance was performed using helicopters, and consisted of flying to each of the potential environmental features identified during the database review. Field observations were recorded at each feature, as well as additional features that were observed during the aerial reconnaissance[10].

The EDR, Inc. database sites represent a composite of local, State and Federal site listings that vary appreciably in their significance as a potential or existing hazard. For example, amongst the numerous sources of site listings, the EDR, Inc. database includes less significant listings such as those under HAZNET, which simply tracks generators and disposers of hazardous waste utilizing Hazardous Waste Manifest Forms under the guidelines of the State Department of Toxic Substance Control (DTSC). The EDR, Inc. database includes those listed under CORTESE, which identifies public drinking water wells with detectable contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with Underground Storage Tanks (USTs) having a reportable release and all solid waste disposal facilities from which there is known migration. CORTESE is administered by the California Environmental Protection Agency. The EDR Inc. database could include sites listed under the National Priority List (NPL), as administered by the U.S. Environmental Protection Agency. No NPL sites were identified for any of the associated Watershed Lands of Pacific Gas and Electric Company's hydroelectric facilities.

It is also important to note that a facility can be included in more than one of the regulatory databases maintained by EDR, Inc. Upon review of the EDR, Inc. reports, several of the site listings contain contradicting status information. For example, a site was determined "closed" on one database (i.e., Regional LUST list), but was listed as "active" or "not reported" on another

9 The Environmental Assessments performed by GeoMatrix Consultants were not conducted pursuant to ASTM Standard E-1527-97, but followed a specific scope of work stated in the final reports.

10 Aerial review of any EDR, Inc. identified sites was not conducted. The locations of the features observed during the aerial reconnaissance are identified on maps provided in GeoMatrix's reports. The locations were mapped using GPS coordinates. In addition, aerial photographs were taken to visually identify potential environmental sites of concern.

(i.e., State LUST list). In addition, the summaries of facilities on the CORTESE List, which is a compilation of SWRCB and DTSC sites, reported no information regarding contamination status. Therefore, in the absence of an actual file review of a particular facility at either a local, State or Federal regulatory agency level, the contamination status of the facility identified in the EDR, Inc. databases cannot be determined as entirely complete or current. Recommendations for site reviews and the determination of present-day potential impacts to the project areas are provided in Mitigation Measure 4.9.2.

Specific information regarding the database review and aerial reconnaissance regarding mine locations, visually identified hazards, and numbers and characterization of database sites are provided in the bundle discussions. In these discussions database records identified are described as Environmental Regulatory Records (ERRs). This is a generic term used to describe the record results from a variety of database search services, including EDR, Inc. and VISTA searches.

4.9.3.8 Abandoned Mine Lands

Contamination from historic mining operations represents a potential risk to human health and the environment. The five regional bundles discussed in this EIR are all located in parts of the State that are known to have hosted historic mining, and are likely to encompass abandoned mine lands (AML). The hazards associated with AML sites may include, but are not limited to: mine tailings and waste rock that may contain toxic levels of arsenic, mercury, cyanide, or other chemicals; acid-rock drainage; air quality hazards resulting from highly erodable surface fines (e.g., silica dust, asbestos); unstable slopes and steep highwalls; ground slumps and subsidence or surface failure from underground workings (e.g., shafts and slopes); exposed adits (entrances) and shafts; and hazardous structures, machinery, and scrap (Cal Doc, 2000). The California Department of Toxic Substance Control (DTSC) published a document titled Abandoned Mine Lands Preliminary Assessment Handbook in January 1998, which provides basic information for conducting an initial investigation of AML sites. This document was written to aid AML investigator in identifying physical hazards at AML sites and determining whether chemicals are present that may pose a risk to human health or the environment (Cal EPA, 1998).

Important factors in assessing the risk associated with mine waste at AML sites are: (1) the toxicity of the metal (e.g., mercury or arsenic) or mineral (e.g., asbestos), (2) concentration of the chemical of concern, (3) particle size, (4) the ability of the metal to dissolve and be absorbed by the body, (5) frequency and duration of exposure, (6) route of exposure and sensitivity of the person exposed, and (7) the potential of the chemical of concern to bioaccumulate. Metals at low concentrations are necessary for human health, but at high concentrations metals can produce adverse health effects in humans and the environment. Primary metals of concern are arsenic, lead, copper, selenium, nickel, and mercury. The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) has developed fact sheets that describe specific metals and the associated adverse health effects (Cal EPA, 1996).

As discussed above, a U.S. Bureau of Mines database of mine locations obtained from the USEPA was reviewed during an environmental assessment of the Watershed Lands to identify mines on or within a one-eighth mile radius of the boundaries of the associated Watershed Lands. These mines, as well as mines located within FERC license boundaries, were plotted on maps provided in the Environmental Assessments of Associated Lands prepared by GeoMatrix. These locations, if identified, were included on the GeoMatrix's Recon Plan to field verify the presence of mines on associated Watershed Lands and on Pacific Gas and Electric Company-owned property within the FERC license project boundaries. The accuracy of the mine locations included in the USEPA database was not known; therefore, there may be additional or fewer AML sites within the FERC and Watershed Land boundaries. The results of the aerial reconnaissance are included in the regional bundle discussions.

4.9.3.9 Natural Hazards Associated With Project Lands

Asbestos is a term used for several types of naturally occurring fibrous minerals. Chrysotile asbestos is the most common form, but tremolite asbestos is frequently present. Both types are associated with serpentine rock, but tremolite can also occur in certain other common rocks, especially ultramafic rocks near faults. In general, ultramafic rock is situated along the western foothills of the Sierra Nevada. It should be noted, however, that the presence of ultramafic rocks does not necessarily indicate asbestos is present. Site-specific studies performed prior to earth-disturbing activities would be needed to clearly delineate and identify asbestos-containing materials.

Undisturbed, serpentine rock and soils derived from it do not present a substantial health risk, unless fibers from weathered or eroded material are carried in runoff and deposited elsewhere. Fibers may become airborne when the ground dries. When disturbed by human activity, however, asbestos can be released into the air and become a health hazard. Dust from unpaved roads and construction activities that result in crushing or grading of serpentine rock or soils. Once airborne, asbestos fibers may be present in ambient air for long periods of time.

Asbestos poses a health risk as airborne fibers may become lodged in the respiratory or digestive tract and cause health problems. Breathing high levels of asbestos fibers can lead to an increase of: lung cancer; mesothelioma, a rare cancer of the lining of the chest and the abdominal cavity; and asbestosis, in which the lungs become scarred with fibrous tissue. Asbestos-related diseases may take decades to appear. Although there has been some scientific disagreement on the specific degree of hazard associated with each type of asbestos, all types of asbestos are considered hazardous by state and federal health professionals. There is not sufficient scientific information to support the identification of an exposure level that would be considered "safe." The most effective way to reduce asbestos risk is to reduce exposure to airborne fibers. For additional information regarding asbestos-containing rocks and soils, consult Section 4.16, Geology, Soils, and Mineral Resources.

4.9.4 REGIONAL AND LOCAL SETTING AND REGULATORY CONTEXT

The following section describes the facilities associated with each regional bundle, the downstream hazard potential of the dams, FERC license articles pertaining to hazards, and plans related to hazards that have been developed for each project. These sections also discuss any project-specific hazard issues, and identify material recognized environmental conditions, abandoned mine lands, and dam failure inundation zones. Descriptions of the project facilities are provided in Chapter 2, Project Description, of this Draft EIR.

4.9.4.1 Shasta Regional Bundle

In accordance with various Federal, State and local regulations, the hydroelectric facilities operated by Pacific Gas and Electric Company are required by FERC to prepare plans to regulate the use and storage of hazardous materials and to ensure public safety. Depending on the characteristics of the hydroelectric facility (e.g., staffed, unstaffed, or remote facility), and unless specifically exempted by FERC or other regulatory authorities, various plans must be maintained by the Licensee for the project. The components of the various plans are described in Section 4.9.3.

Regional Setting

Pacific Gas and Electric Company's hydroelectric facilities in the Shasta Regional Bundle consist of 16 powerhouses located in Tehama and Shasta counties in the northernmost portion of Central Valley and the Cascade Range. Six primary rivers and their tributaries — the Hat Creek, Fall River, Pit River, McCloud River, Battle Creek, and Cow Creek — feed 42 dams and diversions in the Shasta Regional Bundle (PG&E Co., 1999b). Watershed Lands in the Shasta Regional Bundle are located in each of the above-mentioned counties.

The Manton Hydro Service Center provides maintenance and repair support to the hydroelectric systems in the region and serves as a staging area for off-site operations and storage facility for equipment and construction materials. The Manton Hydro Service Center is located approximately 0.25 miles from the Battle Creek FERC 1121 Project area and services the Battle Creek and Kilarc-Cow Creek Projects. The service center is fenced and includes facilities for temporarily storing hazardous wastes and has aboveground storage tanks for vehicle fueling. A SPCC Plan and FEEP have been developed for the Manton Hydro Service Center. Additionally, Phase 1 ESAs were conducted for the service center; no material recognized environmental conditions were reported (PG&E Co., 1999b)

Local Regulations and Polices

The Shasta Regional Bundle is located in Tehama and Shasta counties. The county General Plans have goals related to safety that would be considered in future land use decisions on the Watershed Lands. The county General Plans do not specifically apply to future development within FERC boundaries. The county General Plans discuss fire and seismic hazards, slope stability, flood,

hazardous materials, and other hazard related issues. Some of these General Plans establish priorities for abatement of these hazards. The General Plans do not identify any new specific hazards associated with the project that are not already discussed in this chapter.

Bundle 1:Hat Creek

Hat Creek 1 and 2 (FERC 2661)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, no issues with regard to safety were identified for the Hat Creek 1 and 2 Project (FERC, 1996b). Public safety observations, made during the EPUI, include the following:

- The requirements of the license and the measures provided by the licensee are adequate to protect the public use resources in the project area. The required facilities are well-maintained. One minor maintenance mater was identified during the inspection and by letter dated September 3, 1996, the licensee confirmed that the matter had been corrected.
- The licensee maintains a system of canal flow monitoring stations and alarms to ensure that canal breaks and overtoppings are detected and reported quickly. Quick reaction by the local water systems operators would help reduce the amount of soil erosion and stream sedimentation. Response time by the licensee for such emergencies should be good, given the close proximity of the Burney Service Center to the project.
- The licensee uses double-walled storage tanks, containment berms, oil/water separators, and a variety of absorbent materials at both powerhouses and switchyards to prevent the discharge of oil. The licensee plans to replace the oil-filled circuit breakers with gas-filled breakers.
- The licensee employs a variety of safety devices to protect the public during its use of project lands and waters. These include warning signs, buoy lines, fences, barbed wire, and locks on gates and buildings. The licensee complied with this requirement during this inspection period. The requirements of the license and the measures provided by the licensee are adequate to protect the public during its use of project lands and waters.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Hat Creek 1 and 2 Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Hat Creek 1 and 2 Project are regulated by FERC as well as DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-4.

Table 4.9-4 Dams in the Hat Creek 1 and 2 Project (FERC 2661)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Hat Creek 1 Diversion Dam (Cassel Pond)	None	None	Low	No
Hat Creek 2 Diversion Dam (Baum Lake)	97-109	2C	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, dams, reservoirs, and the appurtenances within the Hat Creek 2 Diversion Dam, based on known information and visual inspections, are judged to be in satisfactory condition for continued use. DSOD dam safety inspections and independent consultant dam safety inspections are not required for the Hat Creek 1 Diversion Dam. Additionally, independent consultant dam safety inspections are not required for the Hat Creek 2 Diversion Dam; however, DSOD dam safety inspections are conducted for this facility (PG&E Co., 1999b).

In addition, an Emergency Action Plan (EAP) is not required for the Hat Creek 1 and 2 Project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Hat Creek Project Dams has not been conducted. Should the dams in the Hat Creek Project ever fail due to facility failure or catastrophic event, the Pit River is the most likely down stream location potentially affected by the inundation waters. There are no developed or inhabited communities immediately downstream from the Hat Creek 1 and 2 facilities.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Hat Creek Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste, as describe in Section 4.9.3. The following plans and reports related to project related hazards and hazardous materials and waste are in place for all of the facilities in the Hat Creek 1 and 2 Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands near the FERC Licensed Areas, as described in Section 4.9.3.6. At the Hat Creek 1 Powerhouse, the ESA identified one material recognized environmental condition: Soil beneath the main transformer and circuit breaker (CB 32) may be affected by dielectric fluid. In addition, dielectric fluid in the main transformer contained polychlorinated biphenyls at concentrations of ten and 23 parts per million in 1980 and 1995, respectively (CDM, 1997t).

Pacific Gas and Electric Company is evaluating the appropriate steps to take regarding this material recognized environmental condition. No material recognized environmental conditions were reported at the Hat Creek 2 Powerhouse (CDM, 1997u).

Environmental Assessments were conducted for the associated Watershed Lands in Bundle 1. The following information from the environmental assessment is related to hazards (GMC, 2000g):

- One USEPA database mine location was identified on the associated Watershed Lands.
- Aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as M1317.
- No ERR sites were located on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Hat Creek 1 and 2 Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 2: Pit River

Pit 1 (FERC 2687)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Pit 1 Project (FERC, 1992a):

- Public safety features include fencing and signing of the switchyard, powerhouse, tailrace, intake, and Forebay dam; warning signs along the tailrace channel, the Pit River channel from the tailrace to Highway 299, at the Forebay and spillway, and the automatic equipment; and safety barriers at the intake and Forebay spillway. There are not barriers at the Fall River and Pit River weirs.

- At SFRO request, the licensee is preparing a public safety plan. The SFRO required in a post-inspection letter dated June 30, 1992 that the licensee provide a safety barrier at the Pit River Weir (an overflow structure). Vertical clearances for the power lines appear adequate.

- Despite warning signs and fencing at the forebay spillway, several children were observed playing in the channel. They left when the inspection party arrived. Graffiti on the sides of the channel also indicates people have often been present in the channel. The licensee's representatives indicated that any spill releases are made manually, and that staff checks the channel to assure the absence of people prior to opening the gates. With the safety barrier described above, the public safety measures will appear to be adequate.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Pit 1 Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Pit 1 Project are regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-5.

Table 4.9-5 Dams in the Pit 1 Project (FERC 2687)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Pit 1 Diversion Dam	97-099	1B	Low	No
Pit 1 Forebay Dam	97-110	3C	High	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, dams, reservoirs, and the appurtenances within the Pit 1 Forebay Dam, based on known information and visual inspections, are judged to be in satisfactory condition for continued use.

Should the dams in the Pit 1 Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-6. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone. A dam-failure analysis was not conducted as part of the EAP for the Pit 1 Diversion Dam.

Table 4.9-6 Theoretical Effects of a Dam Failure – Pit 1 Project (FERC 2687)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (*denotes a landmark with a likely population)
Pit 1 Forebay Dam				
0.00	21.17	12,200	0.40	Pit No. 1 Dam
0.49	10.13	10,900	0.71	SR 299 Bridge
0.62	9.60	10,900	0.71	Bridge Street
0.73	9.06	10,900	0.73	Fall River Weir
0.91	8.15	10,900	0.73	Local Inflow-Pit River
12.73	6.79	10,300	1.66	Begin Pit No. 3 Reservoir
14.23	15.15	9,420	4.98	Pit No. 3 Reservoir
15.71	28.63	10,500	4.98	Pit No. 3 Reservoir
16.46	36.83	10,500	4.98	Pit No. 3 Reservoir
17.83	51.92	9,930	4.98	Pit No. 3 Reservoir
18.31	58.32	9,620	4.98	Pit No. 3 Reservoir
19.67	77.52	7,220	4.98	Pit No. 3 Reservoir
20.39	88.62	4,790	4.98	Pit No. 3 Reservoir

Table 4.9-6 Theoretical Effects of a Dam Failure – Pit 1 Project (FERC 2687)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (*denotes a landmark with a likely population)
21.03	98.52	3,290	4.98	Pit No. 3 Reservoir
21.68		2,700	4.98	Pit No. 3 Dam

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 2687

No communities would be affected by inundation. The flood would not result in failure of any bridges.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.4. There were no identified facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 for the Pit 1 Project (PG&E Co., 2000b). However, in the event of a facility failure, the FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project related hazards and hazardous materials and waste are in place for all of the facilities in the Pit 1 Project, unless otherwise indicated (PG&E Co., 1999b):

- Emergency Action Plan (EAP),
- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas as described in Section 4.9.3. No material recognized environmental conditions were identified at the Pit 1 Powerhouse (CDM, 1997gg).

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC License Area for the Pit 1 Project. The following information from the environmental assessment is related to hazards (GMC, 2000l):

- No USEPA database mines were identified on the associated Watershed Lands
- Aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as M1317
- No ERR sites were located on or within one mile of the associated Watershed Lands

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Pit 1 Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Pit 3, 4, and 5 (FERC 233)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Pit 3, 4, and 5 Project (FERC, 1996d):

- The licensee employs a variety of safety measures to protect the public during its use of project lands and waters. These include locked gates, chain-link fences toped with barbed wire, handrails, warning signs, log booms and boat barriers, marker buoys, and a series of sirens to warn of flow changes below Pit 3 dam
- The licensee also filed a revision of its required Public Safety Plan on August 14, 1995, and the plan was accepted on August 30, 1995. The plan accurately depicts the safety measures and procedures at the project.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Pit 3, 4, and 5 Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Pit 3, 4, and 5 Project are regulated by FERC as well as DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of their hazard ratings is presented in Table 4.9-7.

Table 4.9-7 Dams in the Pit 3, 4, and 5 Project (FERC 0233)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Pit 3 Dam (Lake Britton)	97-098	3B	High	Yes
Pit 4 Dam (Forebay Dam)	97-100	3C	High	Yes
Pit 5 Intake Dam	97-107	2B	High	Yes
Pit 5 Open Conduit Dam	97-108	2B	High	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Pit 3, 4 and 5 Project are considered to be satisfactory for continued use.

Should the dams in the Pit 3, 4, and 5 Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-8. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-8 Theoretical Effects of a Dam Failure – Pit 3, 4, and 5 Project (FERC 0233)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
Pit 3 Dam				
0.00	94.38	476,000	0.15	Pit No. 3 Dam
6.30	57.68	391,000	.83	Upstream Pit No. 4 Reservoir
7.03	82.87	492,800	.83	Pit No. 4 Reservoir
7.55	-	558,600	.87	Pit No. 4 Dam
10.70	48.46	477,000	1.05	Canyon Creek
13.15	41.88	467,5000	1.16	Deep Creek Campground*
1?.87	52.91	458,100	1.4	Pit No. 4 Powerhouse
15.25	63.51	420,900	1.4	Pit No. 5 Reservoir
15.56	-	407,600	1.4	Pit No. 5 Dam
17.57	26.74	407,200	1.44	Downstream of Kinner Falls
20.01	25.42	405,700	1.53	Big Bend*
20.79	27.83	404,200	1.6	Big Bend*
25.05	44.56	382,000	1.95	Bush Bar
25.60	55.00	375,100	1.96	Upstream of James Black Powerhouse
26.04	51.02	373,900	2.00	Pit No. 5 Powerhouse
26.44	60.04	371,500	2.51	Iron Canyon Creek
28.47	108.29	288,400	2.54	Pit No. 6 Reservoir
30.80	170.67	252,000	2.54	Pit No. 6 Reservoir
31.22	-	251,500	2.54	Pit No. 6 Dam
34.00	86.91	231,600	3.12	Upstream Pit No. 7 Reservoir
38.92	211.41	206,200	3.16	Pit No. 7 Reservoir
39.26	-	206,100	3.16	Pit No. 7 Dam
41.26	69.85	195,800	3.58	Pit No. 7 Afterbay
46.06	25.41	175,900	3.81	Upstream of Shasta Lake*
46.06	25.41	175,900	3.81	Flat Creek (Pit River Arm)
71.62	-	6,840	16.90	Shasta Lake*
Pit 4 Dam				
0.00	40.67	126,900	0.09	Pit 4 Dam
3.20	17.49	71,200	.36	Canyon Creek
5.59	15.27	65,400	.56	Deep Creek Campground*
7.31	19.28	60,900	1.07	Pit 4 Powerhouse

Table 4.9-8 Theoretical Effects of a Dam Failure – Pit 3, 4, and 5 Project (FERC 0233)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
7.69	29.25	45,000	1.08	Pit 5 Reservoir
8.40	-	22,200	1.08	Pit 5 Intake Dam
12.45	5.5	22,000	1.39	Big Bend*
17.49	6.99	21,500	1.97	Bush Bar
18.48	19.53	21,000	3.80	Pit 5 Powerhouse
18.88	29.54	21,300	3.80	Iron canyon Creek
20.91	79.52	20,700	3.85	Pit 6 Forebay
23.24	147.53	8,300	3.94	Pit 6 Forebay
23.67	-	7,180	3.94	Pit 6 Dam
26.44	6.99	7,160	4.25	Upstream of Pit 7 Forebay
Pit 5 Dam				
0.00	32.43	46,500	.47	Pit 5 Open Conduit Dam
0.98	9.36	45,800	0.50	Confluence of Pit River
2.27	7.92	47,400	0.60	Big Bend (with Local Inflow)*
7.31	9.82	41,800	1.05	Bush Bar
8.30	15.07	38,600	1.10	Pit 5 Powerhouse
8.60	30.83	38,500	2.07	Pit 6 Reservoir
10.63	70.90	36,000	2.35	Pit 6 Reservoir
12.96	120.90	8,900	2.42	Pit 6 Reservoir
13.38	-	4,500	2.42	Pit 6 Dam

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 233

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***Pit 3 Dam*.**

- Pit 3 Powerhouse and the camp on the right bank would be inundated;
- Road along the river at this reach would be inundated;
- Deep Creek Campground would be inundated;
- Pit 4 Powerhouse would be inundated;
- Some developments near river banks in the town of Big Bend would be inundated;
- The Hillcrest-Big Bend Road Bridge would be temporarily inundated; and
- James Black Powerhouse and Pit 5 Powerhouse would be inundated.

***Pit 4 Dam*.**

- Deep Creek Campground would be inundated.

***Pit 5 Dam*.**

- Pacific Gas and Electric Company Employee Recreation Camp would be approximately five feet underwater.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below (PG&E Co., 2000b). A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information.

- James B. Black Oil Leak: Minor oil leak from James B. Black sump into the Pit River (less than a gallon).
- Pit 5 Oil Spill on Hillside: A landslide at the Pit 5 Project sent a rock through a four-inch metal pipe conveying oil, which had become exposed due to the slide. Approximately 500 gallons penetrated the soil. The contaminated soil was excavated in compliance with Shasta County Environmental Health Department's standards.

The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as describe in Section 4.9.3. The following plans and reports related to project related hazards and hazardous materials and waste are in place for all of the facilities in the Pit 3, 4, and 5 Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP (Pit 4 Powerhouse),
- FEEP (Pit 3 and Pit 5 Powerhouses), and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas. At the Pit 3 Powerhouse, the ESA identified two material recognized environmental conditions. They are listed as follows:

- Releases of dielectric fluid, potentially containing detectable concentrations of PCBs, have contaminated the rock blotter and soil in the containment areas for the main transformer, the distribution transformer, and circuit breakers.

- Releases of dielectric fluid, potentially containing detectable concentrations of PCBs, from breaks in the underground piping have contaminated soil. The piping is located between the electrical equipment in the switchyard and the former aboveground storage tanks used for the interim storage of dielectric fluid (CDM, 1997hh).

No material recognized environmental conditions were reported at the Pit 4 or Pit 5 Powerhouses (CDM, 1997ii; CDM, 1997jj).

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC License Area associated with the Pit 3, 4, and 5 Project. The following information from the environmental assessment is related to hazards (GMC, 2000m):

- Six USEPA database mine locations were identified on or within 1/8 mile of the associated Watershed Lands or the FERC license 233 project (Pit 3, 4, and 5 Project).
- Aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M1308 and M1318. Two possible mines, M1306 and M1309, are sand and gravel mineral locations. Two diatomaceous earth mines, M1307 and M1319, were observed. Evidence of mining was observed at four other locations that were not included in the USEPA database. Seven other features were identified during reconnaissance, including a barn, structure and above ground storage tank, three solid waste areas, former structures, and two large sandpits.
- No ERR sites were located on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Pit 3, 4, and 5 Project, there have been no recent fire events affecting project facilities or Watershed Lands.

McCloud-Pit (FERC 2106)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the McCloud-Pit Project:

- The licensee installed fences, locked gates, and boat barriers to prevent public entry into hazardous areas of the McCloud-Pit Project. Boulders placed on an access road flooded by Iron Canyon Reservoir prevent the mistaken use of the road. Grab chains are provided at the Pit 7 Afterbay Dam. A variety of warning signs alert the public to potential hazards.
- Shoreline and boating access to the afterbay is prohibited due to public safety concerns about the high powerhouse discharges and the steep shoreline slopes. Shoreline access to the Pit 6 and Pit 7 Reservoirs is allowed, but boating is prohibited because of public safety concerns about the peaking mode of operation.
- This facility operates in a "motoring mode," which allows the licensee to bring it on line quickly to meet demand. Discharge from the powerhouse was observed to increase quickly, flooding an exposed gravel bar in the middle of the river in only a few minutes. The licensee analyzed river stage data and

determined that the maximum rate of increase was two feet in ten minutes. The SFRO determined that an alarm system was not necessary, but signs warning of the possible sudden increase in flow in the area were installed.

- Several safety buoys on the boat barrier below the Pit 7 Afterbay Dam were missing. The licensee attempted to replace them, but high flows in the Pit River and low water levels in Lake Shasta created unsafe boating conditions that prevented completion of the task. The licensee reported the task would be completed as soon as possible.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the McCloud-Pit Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the McCloud-Pit Project are regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-9.

Table 4.9-9 Dams in the McCloud-Pit Project (FERC 2106)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
McCloud Dam	97-123	2B	Significant	Yes
Iron Canyon Dam	97-124	3B	Significant	Yes
Pit 6 Dam	97-121	3B	Significant	Yes
Pit 7 Reservoir Dam	97-122	2B	Significant	Yes
Pit 7 Afterbay Dam	None	None	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the McCloud-Pit Project are considered to be satisfactory for continued use.

Should the dams ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-10. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-10 Theoretical Effects of a Dam Failure – McCloud-Pit Project (FERC 2106)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
McCloud Dam				
0.00	126.12	938,500	0.75	McCloud Dam
3.08	48.59	927,800	0.79	Ah-Di-Na*
6.61	52.74	901,200	0.83	Bald Mountain Creek
11.37	51.12	863,100	0.93	McCloud River Club*
22.51	55.30	734,200	1.16	Bollobokka Club
47.73	-	6,780	58.48	Shasta Dam*
Iron Canyon Dam				
0.00	122.91	894,300	0.75	Iron Canyon Dam
0.08	38.84	890,200	0.75	Iron Canyon Creek
4.48	51.39	859,800	0.79	Confluence with Pit River
9.48	176.28	851,800	0.93	Pit 6 Dam
17.51	240.11	1,534,300	1.89	Pit 7 Forebay Dam
19.34	108.88	1,352,800	2.06	Pit 7 Afterbay Dam
22.64	98.64	1,141,800	2.52	Pit River Arm Upstream of Shasta Lake
49.50	3.31	6,880	12.01	Shasta Dam Spillway
Pit 6 Forebay Dam				
0.0	38.91	536,500	0.45	Pit 6 Forebay Dam
7.69	213.72	164,900	0.97	Within Pit No. 7 Reservoir
8.03	15.92	163,900	0.97	Pit No. 7 Forebay
9.86	39.11	133,300	1.34	Pit No. 7 Afterbay Dam
13.16	31.64	87,000	1.96	Pit River Arm U/S of Shasta Lake
40.40	---	740	12.00	Shasta Lake Spillway
Pit 7 Forebay Dam				
0.00	138.40	1,034,900	0.45	Pit 7 Forebay Dam
0.06	85.09	1,034,900	0.47	Pit 7 Afterbay Dam
5.13	76.83	614,700	0.99	Pit River Arm Upstream of Shasta Lake
32.75	-	2,500	11.50	Shasta Lake*

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 2106

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***McCloud Dam*.**

- Ah-Di-Na campground would be inundated.
- McCloud River Club would be inundated.
- Bollibokka Club would be inundated.

***Iron Canyon Dam*.**

- Pit 5 Powerhouse would be inundated, Pit 6 Powerhouse would be inundated.

***Pit 6 Dam*.**

- No communities would be inundated.

Pit 7 Forebay Dam.

- One county bridge would be affected by the flood near the Pit River Arm of Shasta Lake.
- There is a possibility that users of the upstream reservoir would be affected by the negative wave.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.5. There were no identified facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 for the McCloud-Pit Project (PG&E Co., 2000b). However, in the event of a facility failure, the FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project related hazards and hazardous materials and waste are in place for all of the facilities in the McCloud-Pit Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Pit 6, Pit 7, or J.B. Black Powerhouses (CDM, 1997kk; CDM, 1997ll; CDM, 1997w).

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC License Area for the McCloud-Pit Project. The following information from the environmental assessment is related to hazards (GMC, 2000j):

- One USEPA database mine location was identified on or within one-eighth mile of the associated Watershed Lands or the FERC license 2106 project (McCloud-Pit Project). No mining evidence was observed during the aerial reconnaissance.
- No confirmed or possible mines (not included in the USEPA database) were identified visually during aerial reconnaissance.
- The aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as mine M1312. Four other features were observed during the six aerial reconnaissances, including former building structures, two areas with debris piles, and one area with a woodpile and a burn pit.
- No ERR sites were located on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the McCloud-Pit Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 3: Kilarc-Cow Creek

Kilarc-Cow Creek (FERC 0606)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Kilarc-Cow Creek Project:

- Public safety measures include fencing, handrails, signs, locks, and lights. There are no safety barriers; spillway configurations consist of gentle slopes with no steep drop-offs. A pedestrian bridge spans the spillway at Kilarc Forebay.
- The SFRO sent a post-inspection letter dated July 1, 1997. It addressed needed improvements to public safety facilities (a cover over the open concrete well at the back side of the trash rack at Kilarc Canal and warning signs at the Kilarc picnic area. These have been installed.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Kilarc-Cow Creek Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Kilarc-Cow Creek Project are regulated by FERC to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the dams hazard ratings is presented in Table 4.9-11.

According to the most recent EPUI Inspection, dams, reservoirs, and the appurtenances within the Kilarc-Cow Creek Project, based on known information and visual inspections, are judged to be satisfactory for continued use.

Table 4.9-11 Dams in the Kilarc-Cow Creek Project (FERC 0606)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Kilarc Forebay Dam	None	None	Low	No
Cow Creek Forebay	None	None	Low	No
Diversion Dams				
North Canyon Diversion	None	None	Low	No
South Canyon Diversion	None	None	Low	No
Old Cow Creek Diversion	None	None	Low	No
Mill Creek Diversion	None	None	Low	No
South Cow Creek Diversion	None	None	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

Kilarc Forebay and Cow Creek Dams are classified as having low downstream flood hazard potential; therefore, they do not require a five-year independent consultant dam safety inspection. They also are not subject to DSOD dam safety inspections. FERC inspects the dams every three years during its operations inspections, and the project facilities every three to five years during its EPUIs. In addition, an Emergency Action Plan (EAP) is not required for this project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Kilarc-Cow Creek Dams has not been conducted.

In addition, the most recent FERC-EPUI Report did not identify any specific hazards or issues associated with Kilarc-Cow Creek Project dams and reservoirs. DSOD and FERC independent consultant inspections are not required for the Kilarc-Cow Creek Project.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Kilarc-Cow Creek Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3.1. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Kilarc-Cow Creek Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan,

- HMBP,
- FEEP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were reported at the Kilarc or Cow Creek Powerhouses (CDM, 1997z; CDM, 1997k).

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area associated with the Kilarc-Cow Creek Project. The following information from the environmental assessment is related to hazards (GMC, 2000h):

- No USEPA database mine locations were identified on or within one-eighth of a mile of the associated Watershed Lands or the FERC license 606 project (Kilarc-Cow Creek Project).
- Two other features were identified through the aerial photograph review and aerial reconnaissance: a ditch tender's house, and waste disposal consisting of a pile of sheet metal and a drum.
- No ERR sites were located on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Kilarc-Cow Creek Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 4: Battle Creek

Battle Creek (FERC 1121)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Battle Creek Project:

- Public safety measures include fencing, handrails, gates, warning signs, lights, and safety barriers.
- The inspection resulted in several public safety improvements, including the following: the addition of a seasonal safety barrier at the Inskip Diversion Dam spillway, warning signs at the Lake Grace spillway and at the handrail on the walkway on the creek side of the Volta 2 Powerhouse, canal warning signs at the Digger/Cross Country Canal confluence, installation of fencing at the wing walls of the Lake Grace spillway channel at the footbridge, and updating the Public Safety Plan to include facilities at Lake Grace, Lake Nora, Inskip Diversion Dam, Volta 2 Forebay, Volta 2 Powerhouse, Colemen Forebay, and Asbury Pump.
- One outstanding issue remains since the inspection. If the ranch gate precluding public vehicular access to the Coleman Diversion Dam is removed in the future, the overflow spillway of the dam should be equipped with a safety barrier to assure public safety.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Battle Creek Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Battle Creek Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-12.

Table 4.9-12 Dams in the Battle Creek Project (FERC 1121)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
North Battle Creek Reservoir Dam	97-096	2B	Significant	Yes
Macumber Reservoir Dam	97-094	2B	Low	No
Coleman Forebay Dam	97-087	1C	Low	No
Lake Grace Dam	None	None	Low	No
Lake Nora Dam	None	None	Low	No
Diversion Dams				
Inskip Canal Diversion	None	None	Low	No
North Battle Creek Feeder	None	None	Low	No
South Battle Creek Canal Diversion	None	None	Low	No
Eagle Canyon Canal Diversion	None	None	Low	No
Coleman Canal Diversion	None	None	Low	No
Wildcat Canal Diversion	None	None	Low	No
Loomis Mill Canal Diversion	None	None	Low	No
Al Smith Canal Diversion	None	None	Low	No
Keswick Canal Diversion	None	None	Low	No
Lower Mill Creek Canal Diversion	None	None	Low	No
Shingle Creek Canal Diversion	None	None	Low	No
Bramlet-Bristol-Benton Canal Diversion	None	None	Low	No
Upper Ripley Creek Canal	None	None	Low	No
Soap Creek Feeder	None	None	Low	No
Lower Ripley Canal Diversion	None	None	Low	No
Pacific Power Canal Diversion	None	None	Low	No
Asbury Pipeline Diversion	None	None	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Battle Creek Project are considered to be satisfactory for continued use.

Should the dams in the Battle Creek Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-13. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-13 Theoretical Effects Of A Dam Failure – Battle Creek Project (FERC 1121)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
North Battle Creek Dam				
0.0	31.75	29,200	0.40	North Battle Creek Dam
5.38	34.90	25,100	0.70	Macumber Flat*
7.06	25.26	12,800	1.71	Macumber Flat*
8.68	18.71	10,200	2.21	Macumber Flat*
9.13	-	7,540	2.42	Macumber Dam
9.14	9.81	7,540	2.42	Local Inflow
14.18	11.12	7,530	2.88	Al Smith Diversion
16.01	8.25	7,510	2.98	Keswick Canal Diversion
22.40	8.33	7,140	3.28	North Battle Creek Feeder Diversion (local Inflow)
27.48	8.78	6,940	3.53	Eagle Canyon Diversion
30.57	11.80	6,840	3.77	Wildcat Diversion
42.38	12.05	6,670	5.28	1.2 mile Upstream of Coleman Powerhouse
46.68	12.47	6,460	6.22	Coleman Fish Hatchery
53.15	11.49	5,670	8.11	Terminus Near Sacramento River
Maximum Downstream Effects Caused by the Hypothetical Failure of North Battle Creek Dam Under the Peak Maximum Flow (PMF) Conditions				
0.0	19.3	41,500	0.00	North Battle Creek Dam
9.07	14.9	19,800	0.88	Macumber Reservoir

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***North Battle Creek Dam*.** Homes at Macumber Flat would be inundated.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 were provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were

no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Battle Creek Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Battle Creek Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were reported at the Volta 1 and 2, South, Inskip, or Coleman Powerhouses (CDM, 1997zz; 1997aaa; 1997rr; 1997v; 1997j).

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area associated with the Battle Creek Project. The following information from the environmental assessment is related to hazards (GMC, 2000a):

- No USEPA database mine locations were identified on or within 1/8 mile of the associated Watershed Lands or the FERC Licensed 1121.
- The first of two ERR sites, the Shingletown Transfer Station, is located within one mile of associated Watershed Lands and is listed as a solid waste disposal facility or landfill. Waste accepted at the facility includes construction/demolition debris, mixed municipal waste, and tires. The site is permitted to receive up to 100 cubic yards per day.
- The second of two ERR sites, the Millseat Facility, consists of a Trout Farm and is located within associated Watershed Lands; it is considered a minor threat to water quality with respect to its fishery operations.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Battle Creek Project, there have been no recent fire events affecting project facilities or Watershed Lands.

4.9.4.2 DeSabla Regional Bundle

In accordance with various Federal, State and local regulations, the hydroelectric facilities operated by Pacific Gas and Electric Company are required by FERC to prepare plans to regulate the use and storage of hazardous materials and to ensure public safety. Depending on the characteristics of

the hydroelectric facility (e.g., staffed, unstaffed, or remote facility), and unless specifically exempted by FERC or other regulatory authorities, various plans must be maintained by the Licensee for the project. The components of the various plans are described in Section 4.9.3.

Regional Setting

Pacific Gas and Electric Company's hydroelectric facilities in the DeSabla Regional Bundle consists of 15 powerhouses located in Lassen, Plumas, and Butte counties. Five rivers — North Fork Feather River, West Branch Feather River, Butt Creek, Bucks Creek, and Butte Creek — feed 46 dams and diversions in the DeSabla Region. The DeSabla Regional Bundle contains the three non-FERC facilities, which include Bundle 5 - Hamilton Branch, and Lime Saddle and Coal Canyon facilities in Bundle 8.

Watershed Lands located in the DeSabla Regional Bundle are in the above mentioned counties and located primarily adjacent to project facilities. A small parcel of Watershed Lands is located in Tehama County; this land is associated with Bundle 8 - Butte Creek.

Three Hydro Service Centers provide maintenance and repair support to the hydroelectric facilities in the region. The Hydro Service Centers include Rodgers Flat, Camp 1, Canyon Dam, and the Prattville Weather Station.

The Rodgers Flat Hydro Service Center is located approximately 0.1 miles from the Rock Creek-Cresta FERC Project boundary. The service center includes facilities for the temporary storage of hazardous wastes and underground storage tanks. The Rodgers Flat Hydro Service Center has a SPCC Plan and a FEEP. A Phase I ESA was conducted for the service center; no material recognized environmental conditions were reported (CDM, 1998a).

Camp 1 Hydro Service Center is located adjacent to the DeSabla Forebay, within the DeSabla-Centerville FERC Project boundary. The service center includes facilities for the temporary storage of hazardous wastes and an aboveground storage tank for vehicle fueling. The Camp 1 Hydro Service Center has an SPCC Plan and a FEEP. An underground storage tank for fueling of gasoline-operated vehicles was removed from the Camp 1 Service Center in 1998 and replaced with an aboveground storage tank. In 1998, Pacific Gas and Electric Company was required to perform site testing to bring closure to its removal of a 6,000-gallon underground diesel and gasoline tank. Pacific Gas and Electric Company had discovered during the tank removal that an unknown quantity of diesel and gasoline had been released. In addition to the removal of soil in the immediate vicinity of the excavated tank, Pacific Gas and Electric Company conducted subsequent sampling of soil and groundwater. Results of those tests determined that no additional soil removal was necessary, and that groundwater was not affected. The Phase I ESA conducted for the service center did not report material recognized environmental conditions (CDM, 1998b).

The Canyon Dam Service Center is located at the Canyon Dam of Lake Almanor, within the Upper North Fork Feather River FERC Project boundary. The service center includes facilities for temporarily storing hazardous wastes. The Canyon Dam has both an SPCC Plan and a FEEP.

The Prattville Weather Station is located near the southwest shores of Lake Almanor, within the Upper North Fork Feather River FERC boundary. The weather station provides administrative support and materials storage for weather monitoring and weather modification activities. The service center has a modified hazardous materials business plan.

Local Regulations and Policies

The DeSabla Regional Bundle is located in Lassen, Plumas, and Butte counties. As indicated above, a small parcel of Watershed Lands within Bundle 8 - Butte Creek, is located within Tehama County. The county General Plans have policies related to safety that would be considered in future land use decisions on the Watershed Lands. The county General Plans do not specifically apply to future development within FERC boundaries. The county General Plans discuss fire and seismic hazards, slope stability, flood, hazardous materials, and other hazard related issues. Some of these General Plans establish priorities for abatement of these hazards. The General Plans do not identify any new specific hazards associated with the project that are not already discussed in this chapter.

Bundle 5: Hamilton Branch

Hamilton Branch (non-FERC)

Hazards and Relevant Issues Associated with Worker and Public Safety. Although the Indian Ole Dam and other facilities associated with the Hamilton Branch Powerhouse are not subject to FERC Licensing and EPUI inspections, Pacific Gas and Electric Company has installed safety features where appropriate, such as warning signs and fences.

There were no third party incidents resulting in bodily injury or death, between January 1, 1995 and August 2000, in the Hamilton Branch Project (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The Indian Ole Dam is regulated by the DSOD to assure its safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the applicable hazard ratings is presented in Table 4.9-14 (PG&E Co., 1999c). Because this is a non-FERC facility, this dam is not subject to FERC Operations Inspections or the independent consultant dam safety inspections.

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, dams, reservoirs, and the appurtenances within the Hamilton Branch Project, based on known information and visual inspections, are judged to be satisfactory for continued use.

Table 4.9-14 Dams in the Hamilton Branch Project (non-FERC)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Mt. Meadows Reservoir Dam (Indian Ole Dam)	97-113	2B	Low	No
Hamilton Branch Diversion Dam	None	None	Low	No
Spring Creek Diversion Dam	None	None	Low	No
Clear Creek Diversion Dam	None	None	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA

An Emergency Action Plan (EAP) is not required for this project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Hamilton Branch Project dams has not been conducted.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co. 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Hamilton Branch Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Hamilton Branch Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan, and
- HMBP.

A Phase I ESA was conducted for the powerhouse. No material recognized environmental conditions were reported at the Hamilton Branch Powerhouse (CDM, 1997s).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Hamilton Branch Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 6: Upper North Fork Feather River

Upper North Fork Feather River (FERC 2105)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Upper North Fork Feather River Project:

- The licensee has provided a variety of measures to protect the public during its use of project lands and waters. The measures include fences topped with barbed wire, locked gates, and boat barriers to prevent entry into hazardous areas; and warning signs and marker buoys to alert the public to the dangers present in these areas.
- The licensee has also placed warning signs at the commercial resorts, and has required the owners to install safety devices on the log booms used to control boat wakes in their marinas.
- The safety measures provided by the licensee are generally adequate to protect the public during its use of project lands and waters. Several safety devices observed during the inspection needed repair or replacement. A few warning signs appeared worn and faded; a safety fence at a quarry site on the Lake Almanor shoreline was in poor repair; and some of the log booms at the commercial marinas were not adequately marked.
- The licensee was asked in the August 18, 1997, letter to address these public safety concerns. The licensee's letter dated September 30, 1997, gave a schedule for completing these items. The February 18, 1998 telephone call asked for confirmation that the work had been completed.

Third party incidents resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 are summarized as follows (PG&E Co., 2000b):

- June 28, 1996, Canyon Dam, one injury - no description available.
- December, 23, 1996, Belden Forebay, one fatality - fatal helicopter accident.
- June 14, 1999, Big Bend, one injury and one fatality - no description available.
- April 28, 2000, Caribou, four fatalities - no description available.
- June 29, 2000, Lake Almanor, two injuries - no description available.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths. The information only indicates these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Upper North Fork Feather River Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-15.

Table 4.9-15 Dams in the Upper North Fork Feather River Project (FERC 2105)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Lake Almanor/Canyon Dam	93-003	4C	High	Yes
Butt Valley Dam	93-000	3A	High	Yes
Belden Forebay Dam (Caribou Afterbay)	97-120	3A	High	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the North Fork Feather River Project are considered to be satisfactory for continued use.

Lake Almanor is restricted to a maximum water surface elevation of 4,494 feet, Pacific Gas and Electric Company datum (six feet below the spill crest). The restriction was established by DWR – Division of Safety of Dams (DSOD) in 1976 based on their review and approval of the seismic stability evaluation of Canyon Dam (Lake Almanor). In accordance with the Certificate of Approval from DSOD for maintaining maximum water levels within safe and approved ranges, the maximum water surface elevation is also limited to not exceed 4,490 feet, unless certain environmental conditions are met. These include safety measures to monitor leakage weirs and piezometers daily when the reservoir surface elevation exceeds 4,490 feet, measures to prevent avian botulism, periodic disposal of dead trees along the lakeshore as needed, and minimizing maintenance activities around Osprey nest trees and platforms (PG&E Co., 2000b).

Should the dams in the Feather River Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the areas listed in Table 4.9-16. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-16 Theoretical Effects of a Dam Failure – Upper North Fork Feather River Project (FERC 2105)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
Lake Almanor/Canyon Dam				
0.00	108.00	837,600	0.50	Lake Almanor Dam*
5.30	59.09	834,600	0.64	Seneca*
10.10	43.71	832,200	0.75	Caribou Powerhouse
11.20	-	826,100	0.88	Belden Forebay Dam
15.82	55.28	824,900	0.96	Queen Lilly Campground*
16.64	42.13	824,900	0.96	North Fork Campground*

Table 4.9-16 Theoretical Effects of a Dam Failure – Upper North Fork Feather River Project (FERC 2105)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
17.99	43.59	824,500	1.00	Gansner Bar Campground*
18.57	144.14	807,700	1.00	East Branch Feather River
18.99	52.12	823,600	1.02	Little Haven*
19.97	73.24	812,600	1.30	Belden Powerhouse Yellow Creek*
22.87	--	1,409,900	0.73	Rock Creek Dam
25.42	89.37	1,154,700	0.95	Rodgers Flat*
26.87	83.98	1,024,900	1.06	Injun Jim Campground*
27.82	45.61	931,600	1.06	Tobin Resort*
28.63	48.89	928,400	1.09	Rock Crest Camp
29.70	49.19	926,700	1.09	Storrie*
30.30	54.74	926,300	1.12	Bucks Creek Powerhouse
31.21	98.47	924,300	1.14	Rock Creek Powerhouse
33.98	-	911,000	1.30	Cresta Dam
34.01	153.53	911,000	1.31	Butte
36.51	133.50	896,900	1.50	Shady Rest Picnic Area*
38.54	95.03	887,800	1.67	Cresta Powerhouse
40.52	-	877,500	1.75	Poe Dam
41.62	46.82	877,200	1.77	Pulga*
48.35	91.64	872,900	2.18	Poe Powerhouse
49.30	90.92	860,500	2.37	Lake Oroville*
Butt Valley Dam				
0.00	66.30	220,000	0.50	Butt Valley Dam
1.90	20.25	216,800	.058	Confluence with NFFR
2.90	23.96	215,000	0.62	Caribou Powerhouse
4.00	99.77	591,000	.062	Belden Forebay Dam
8.62	46.59	540,300	0.68	Queen Lily Campground*
9.44	35.42	533,300	0.69	North Fork Campground*
10.79	35.63	522,800	0.72	Gansner Bar Campground*
11.37	62.75	386,500	1.06	Confluence with East Branch NFFR
11.79	53.25	313,400	1.07	Little Haven*
12.77	42.60	264,800	1.14	Belden Powerhouse
15.67	-	184,500	1.60	Rock Creek Dam
18.22	42.24	183,100	1.77	Rodgers Flat*
19.27	43.57	181,500	1.91	Injun Jim Campground*
20.62	22.43	179,8000	1.99	Tobin Resort*

Table 4.9-16 Theoretical Effects of a Dam Failure – Upper North Fork Feather River Project (FERC 2105)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
21.43	24.72	179,200	1.99	Rock Crest Camp*
22.50	26.91	178,800	2.04	Storrie*
23.10	29.14	178,600	2.04	Bucks Creek Powerhouse
24.01	50.01	178,200	2.11	Rock Creek Powerhouse
26.78	-	168,800	2.41	Cresta Dam
29.31	70.95	164,900	2.79	Shady Rest Picnic Area*
31.34	47.69	162,600	3.06	Cresta Powerhouse
33.32	-	158,000	3.22	Poe Dam
34.42	19.53	157,900	3.26	Pulga*
41.15	32.41	155,200	3.57	Poe Powerhouse
42.10	32.64	152,700	3.57	Lake Oroville*
Maximum Downstream Effects Caused by the Hypothetical Failure of Butt Valley Dam Under the Peak Maximum Flow (PMF) Condition				
0.00	96.2	287,800	0.50	Butt Valley Dam
1.90	32.1	291,300	0.52	Confluence with NFFR
2.90	38.2	284,400	0.55	Caribou Powerhouse
4.00	171.3	747,200	0.60	Belden Forebay Dam
8.62	51.0	674,600	0.65	Queen Lily Campground*
9.44	40.9	667,700	0.66	North Fork campground*
10.79	39.7	657,200	0.68	Gansner Bar Campground*
11.37	99.8	787,800	0.80	Confluence with East Branch NFFR
11.79	72.9	779,100	0.83	Little Haven*
12.77	64.8	716,500	0.94	Belden Powerhouse
15.67	129.1	917,100	1.11	Rock Creek Dam
18.22	70.1	666,400	1.31	Rodgers Flat*
19.27	73.0	667,200	1.40	Injun Jim Campground*
20.62	76.3	614,200	1.40	Tobin Resort*
21.43	53.2	589,000	1.44	Rock Crest Camp
22.50	56.0	583,900	1.47	Storrie*
23.10	61.9	581,900	1.50	Bucks Creek Powerhouse
24.01	81.3	578,300	1.53	Rock Creek Powerhouse
26.78	122.1	550,800	1.70	Cresta Dam
29.31	109.6	537,600	2.00	Shady Rest Picnic Area*
31.34	83.9	530,500	2.12	Cresta Powerhouse
33.32	110.1	542,700	2.20	Poe Dam

Table 4.9-16 Theoretical Effects of a Dam Failure – Upper North Fork Feather River Project (FERC 2105)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
34.42	43.9	542,200	2.30	Pulga*
41.15	34.5	539,000	2.40	Poe Powerhouse/Lake Oroville*
Belden Forebay Dam				
0.00	91.04	282,300	0.17	Belden Dam
4.62	32.93	239,500	0.26	Queen Lily Campground*
5.44	25.24	234,200	0.28	North Fork Campground*
6.79	24.00	223,300	0.30	Gansner Bar Campground*
7.37	36.78	127,200	0.44	East Branch NFFR
7.79	28.33	72,000	0.53	Little Haven*
8.77	23.66	39,300	0.61	Belden Powerhouse
11.67	-	25,400	1.03	Rock Creek Dam
14.22	18.13	24,800	1.32	Rodgers Flat*
15.27	18.30	24,400	1.48	Injun Jim Campground*
16.62	8.77	23,400	1.70	Tobin Resort*
17.43	9.63	23,300	1.70	Rock Crest Camp
18.50	11.02	23,200	1.78	Storrie*
19.10	11.44	23,200	1.78	Bucks Creek Powerhouse
20.01	20.83	23,000	1.84	Rock Creek Powerhouse
22.78	-	18,400	2.31	Cresta Dam
25.31	19.80	18,200	2.64	Shady Rest Picnic Area*
27.34	18.51	18,000	2.89	Cresta Powerhouse
29.32	-	16,300	3.26	Poe Dam
30.42	6.70	16,200	3.35	Pulga*
37.15	9.99	15,400	3.83	Poe Powerhouse
38.10	28.39	15,800	3.52	Lake Oroville*
Maximum Downstream Effects Caused by the Hypothetical Failure of Belden Forebay Dam under the PMF Condition				
0.0	0.17	393900	0.00	Belden Forebay Dam
4.62	38.9	353400	0.10	Queen Lily Campground *
5.44	31.2	347500	0.12	North Fork Campground *
6.79	28.9	337400	0.15	Gansner Bar Campground *
7.37	75.2	570200	0.18	East Branch of NFFR
7.79	66.9	570000	0.21	Little Haven *
8.77	57.9	533900	0.26	Belden Powerhouse
11.67	129.3	970700	0.42	Rock Creek Dam
14.22	69.3	702400	0.54	Rodgers Flat *

Table 4.9-16 Theoretical Effects of a Dam Failure – Upper North Fork Feather River Project (FERC 2105)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
15.27	67.7	608500	0.61	Injun Jim Campground *
16.62	48.7	486000	0.67	Tobin Resort *
17.43	50.8	474200	0.69	Rock Crest Camp *
18.50	53.2	453900	0.73	Storrie *
19.10	56.2	444500	0.75	Bucks Creek Powerhouse
20.01	75.4	488400	0.79	Rock Creek Powerhouse
22.78	125.1	653500	0.95	Cresta Dam
25.31	65.2	600100	1.03	Shady Rest Picnic Area*
27.34	67.2	419400	1.11	Cresta Powerhouse
29.32	110.1	424800	1.25	Poe Dam
30.42	38.5	424200	1.29	Pulga *
37.15	30.3	422400	1.56	Poe PH/Lake Oroville

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***Lake Almanor/Canyon Dam*.**

- A steel-truss bridge that spans the river just upstream of Seneca would wash out, as would a small wooden bridge downstream,
- Caribou Powerhouses would be inundated,
- Caribou Clubhouse and areas below the main road would be inundated, a small steel girder bridge one mile downstream of Belden Forebay dam would wash out,
- Queen Lily Campground would be completely inundated, and a steel girder bridge just upstream of the campground would sustain damage,
- North Fork campground and adjacent road would be inundated, and a steel girder bridge would be damaged,
- Gansner Bar Campground would be inundated, a bridge and the Caribou Trailer park would be inundated,
- Little Haven would be inundated, the steel bridge that spans the NFFR at Belden would be damaged,
- Belden Powerhouse would be inundated,
- Rodgers Flat and a nearby steel bridge would be inundated,

- Injun Jim Campground and a nearby school would be washed out,
- Tobin resort would be inundated and the steel truss railroad bridge would be damaged,
- The concrete bridge at Rock Crest Camp would be damaged,
- SR 70 would be inundated near Rock Crest Camp, houses near the highway at Storrie would be inundated, and the SR 70 steel truss bridge would be damaged,
- Rock Creek Powerhouse would be inundated,
- Cresta Dam would fail, Shady Rest Area would be washed out,
- Cresta Powerhouse and Camp would be inundated,
- The railroad trestle in the vicinity of Pulga would be inundated, and
- Poe Powerhouse would be inundated.

***Butt Valley Dam*.**

- Caribou Powerhouses would be inundated,
- Caribou Clubhouse would be inundated, small steel girder bridge one mile downstream of Belden Forebay Dam would be washed out,
- Queen Lily Campground would be completely inundated, a steel girder bridge just upstream of the campground would sustain damage,
- North Fork Campground would be inundated, a small steel girder bridge in the vicinity would be damaged,
- Gansner Bar Campground would be completely inundated,
- Caribou Trailer Park and nearby bridge would be completely inundated,
- Little haven and SR 70 would be inundated, steel truss bridge at Belden would be damaged,
- Belden Powerhouse would be inundated, concrete bridge at confluence of NFFR and Yellow Creek would be inundated,
- Rodgers Flat and the steel bridge at this location would be inundated,
- Injun Jim Campground and nearby school would be inundated,
- Tobin Resort and low lying parts of SR 70 would be inundated,
- SR 70 near Rock Crest Camp would sustain minor overtopping as would the concrete bridge that accesses the camp,
- SR 70 and steel truss bridge in the vicinity of Storrie would receive some overwashing,
- Bucks Creek Powerhouse, Bucks Creek Powerhouse Road and SR 70 here would be inundated,
- Rock Creek Powerhouse would be inundated,
- Shady Rest Picnic Area would be inundated,

- Cresta Powerhouse and camp would be inundated, and
- Poe Powerhouse would be inundated.

***Belden Forebay Dam*.**

- A small bridge located about one mile below Belden Dam would be washed out,
- Queen Lily, North Fork and Gansner Bar Campgrounds would be inundated,
- A bridge and the Caribou Trailer Park near the confluence with the East Branch would be inundated,
- The community of Little Haven would not be affected,
- Low-lying areas in the community of Belden would be inundated,
- Belden Powerhouse, Rock Creek Dam, Rodgers Flat, Injun Jim Campground, Tobin Resort, Rock Crest Camp, Storrie, would not be effected,
- Could partially inundate Bucks Creek Powerhouse,
- Rock Creek Powerhouse, Shady Rest Picnic Area, Cresta Powerhouse, the community of Pulga would not be affected, and
- Poe Powerhouse could possibly be affected.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below (PG&E Co., 2000b). The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence. Hazardous material releases (if any) associated with the Upper North Fork Feather River Project and water conveyance facilities included the following: Cresta Powerhouse Machinery Leak, failure of submersible pump, ten gallon oil spill was contained by booms placed across powerhouse tailrace.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as describe in Section 4.9.3. The following plans and reports related to project-related to hazards and hazardous materials and waster are in place for all of the facilities in the Upper North Fork Feather River Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP (Belden, Butt Valley, and Oak Flat Powerhouses),
- FEEP (Caribou 1 and 2 Powerhouses), and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were reported at the Butt Valley (CDM, 1997e), Caribou 1 and 2 (CDM 1997f), Oak Flat (CDM, 1997ee), or Belden (CDM, 1997c) Powerhouses.

Environmental Assessments were conducted for the Watershed Lands outside of the FERC Licensed Area for the Upper North Fork Feather River Project. The following information from the environmental assessment is related to hazards (GMC, 2000q):

- Nine USEPA database mine locations were identified on or within one-eighth of a mile of the associated Watershed Lands or the FERC Licensed Area (Upper North Fork Feather River Project).
- Aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M127, M1228, M1280, and M1292. The aerial reconnaissance identified two confirmed mines at the points identified in the USEPA database as mines M1260 and M1281, and possible mines at the points identified as mines M1237, M1251, and M1277. The reconnaissance identified one possible mine that was not included in the USEPA database - R75. Five other features were identified, including a regulatory-approved Pacific Gas and Electric Company PCB affected soil disposal site, borrow pit, a home, and solid waste disposal areas.

Seven ERR sites were identified within one mile of the associated Watershed Lands. The properties include the following:

- Chester High School - The site is identified due to a heater fuel leak, which has since been signed off.
- Super Saver Market - The status of this site was not reported but is listed among sites recognized as having incurred a release of hazardous substance.
- Chester Chevron – The site is identified as having a leaking UST. The status is "signed off, remedial action completed or deemed unnecessary."
- Peterson Logging - The site has been identified on a database of both known and potential hazardous substance sites. The status of the site is, "Does not require DTSC action or oversight activity, referred to other agency lead."
- Almanor Mfg., Inc. - Site screening of soil for this metal fabrication business revealed traces of cadmium, chromium, copper, nickel, and zinc. Groundwater testing in 1990 revealed 900 ug/L of manganese. Between 1988 and 1990, RWQCB issued notices of violation to Almanor Mfg. for failure to submit required monitoring data. The status of the site today is not reported.
- Pacific Airmotive - The status of this site was not reported.
- Lake Cove Resort - The site is listed for a gasoline leak where the aquifer was affected. The status of the site has been "signed off, remedial action completed or deemed unnecessary."

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

In 1984, earth movement and a large rockslide occurred above Caribou 2 Powerhouse. The penstocks to Caribou 1 were partially separated at riveted joints releasing a limited but substantial quantity of water onto the hillside. The Caribou 2 step-up transformers and 230-kV switchyard

apparatus and structures were completely destroyed. Oil from the apparatus containing small amounts of PCBs spilled into the Belden Forebay. Cleanup work commenced immediately after the incident. Cleanup and removal of the spilled oil, removal of the slide debris in the vicinity of the powerhouses, retrieval and removal of the equipment in the reservoir, and partial dredging of the reservoir bottom sediments containing residual low levels of PCBs (< 0.4 ppm) was completed by Pacific Gas and Electric Company in 1984 (PG&E Co., 1984 and PG&E Co., 1992).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Upper North Fork Feather River Project, a recent fire event during August 2000 known as the Storrie Fire, consumed over 27,000 acres of land, some of which included associated Watershed Lands.

Rock Creek-Cresta (FERC 1962)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Rock Creek-Cresta Project:

- The licensee installed and maintains a variety of safety features at the project. These include chain-link fencing, warning signs, handrails, and boater safety barriers. The safety measures provided by the licensee are adequate to protect the public during its use of project lands and waters.
- The FERC San Francisco Regional Office (SFRO) requested by letter dated June 19, 1997, that the licensee address several items noted during the inspection. These included public health concerns at the Shady Rest Stop, the need for a Part 8 sign, and improvements to the existing pollution prevention measures.

There was one third party incident resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 in the vicinity of the Rock Creek-Cresta Project: February 9, 1995, Cresta, one fatality and one injury — a 58 year old male employee of the Union Pacific Railroad Company slipped over the canyon bank and fell into the Feather River; no specifics regarding the one injury were provided (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Rock Creek-Cresta Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-17.

Table 4.9-17 Dams in the Rock Creek-Cresta Project (FERC 1962)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Rock Creek Dam	93-007	3A	High	Yes
Cresta Dam	93-006	3A	Significant	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Rock Creek-Cresta Project are considered to be satisfactory for continued use (PG&E Co., 2000b).

Should the dams in the Rock Creek-Cresta Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-18. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-18 Theoretical Effects of a Dam Failure – Rock Creek-Cresta Project (FERC 1962)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
Rock Creek Dam				
0.00	80.18	652,300	0.06	Rock Creek Dam
2.55	54.12	380,300	0.20	Rodgers Flat*
4.00	51.38	282,900	.032	Injun Jim Campground*
4.95	25.41	238,300	0.38	Tobin Resort*
6.83	29.85	232,900	0.42	Storrie*
7.43	32.46	231,400	0.43	Bucks Creek Powerhouse
8.34	55.07	228,200	0.45	Rock Creek Powerhouse
11.11	-	149,600	0.66	Cresta Dam
13.64	62.89	123,700	1.00	Shady Rest Picnic Area*
15.65	40.72	111,400	1.26	Cresta Powerhouse
17.63	-	101,000	1.44	Poe Dam
18.73	15.18	100,700	1.47	Pulga*
25.46	23.48	93,900	1.80	Poe Powerhouse
26.41	34.04	92,000	1.77	Lake Oroville*
Maximum Downstream Effects Caused by the Hypothetical Failure of Rock Creek Dam Under the PMF Condition				
0.00	149.7	1,306,100	0.02	Rock Creek Dam
2.55	82.6	1,064,200	0.22	Rodgers Flat*
4.00	88.5	935,000	.032	Injun Jim Campground*
4.95	43.9	848,100	0.33	Tobin Resort*
6.83	47.5	839,500	0.35	Storrie*
7.43	52.8	836,600	0.36	Bucks Creek Powerhouse
8.34	63.1	831,700	0.38	Rock Creek Powerhouse
11.11	132.8	806.,300	0.60	Cresta Dam
13.64	74.9	803,000	0.94	Shady Rest Picnic Area*
15.65	60.9	802,000	0.95	Cresta Powerhouse
17.63	84.5	799,000	1.10	Poe Dam

Table 4.9-18 Theoretical Effects of a Dam Failure – Rock Creek-Cresta Project (FERC 1962)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
18.73	53.1	797,000	1.20	Pulga*
25.46	41.5	793,1000	1.30	Poe Powerhouse/Lake Oroville*

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***Rock Creek Dam*.**

- Rodgers Flat and the steel bridge that spans the river in the vicinity would be inundated,
- Injun Jim Campground would be washed out and the school in that area would be inundated,
- SR 70 and bridge at Tobin Resort would experience some flooding,
- The steel truss bridge at Storrie would be subject to minor overtopping,
- Bucks Creek Powerhouse, Bucks Creek Powerhouse Road and SR 70 here would be inundated,
- Rock Creek Powerhouse would be inundated,
- Shady Rest Picnic Area would be inundated,
- Cresta Powerhouse and structures in the vicinity would be inundated,
- Poe Powerhouse would experience slight flooding.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Rock Creek-Cresta Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Rock Creek-Cresta Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP (Cresta Powerhouse),
- FEEP (Rock Creek Powerhouse), and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. The ESAs were grouped by powerhouse. No material recognized environmental conditions were reported at the Rock Creek (CDM, 1997nn) or Cresta (CDM, 1997l) Powerhouses.

The Phase I ESA for Rock Creek Powerhouse identified mineral oil staining on the rock blotter material underlying equipment in the switchyard. In September and October 1998, a contractor was hired to excavate and replace the rock blotter material in the switchyard. During the excavation, soil samples were taken to assess the extent of mineral oil-impacted soils, and tests confirmed the presence of low concentrations of PCBs.

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area for the Rock Creek-Cresta Project. The following information from the environmental assessment is related to hazards (GMC, 2000p):

- Two USEPA database mine locations (M1285 and M1287) were identified within one-eighth of a mile of the Watershed Lands or on Pacific Gas and Electric Company fee property within the FERC license 1962 project boundaries (the Rock Creek-Cresta Project).

- The aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as mine M1287. Evidence of mining was observed at the mining point identified as M1285 (small tailings pile). Both mine locations are outside the Watershed Lands and the FERC license project boundaries. One other feature was identified during the aerial reconnaissance on the Watershed Lands: solid waste consisting of a spoil pile from a tunnel.

- No ERR sites were identified on or within one mile of the Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Rock Creek-Cresta Project, there has been one recent fire event affecting project facilities or Watershed Lands. In 1999, a fire located in the Feather River Canyon burned some of Pacific Gas and Electric Company's property near the Cresta Powerhouse, approximately 500 acres were affected, of which about 400 acres were forested lands (PG&E Co., 2000b).

Poe (FERC 2107)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Poe Project:

- Safety devices installed by the licensee include a boater safety barrier upstream of the Poe Dam spill gates locked gates fences toped with barbed and ribbon wire; and a variety of warning signs at the powerhouse and dam, and along the reservoir shoreline and the bypassed reach of the North Fork Feather River.
- The Public Safety Plan accurately describes the safety measures employed by the licensee.

There were no third party incidents resulting in bodily injury or death in the Poe Project between January 1, 1995, and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The Poe Dam is regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-19.

Table 4.9-19 Dams in the Poe Project (FERC 2107)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Poe Dam	93-005	Not Available	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, dams, reservoirs, and the appurtenances within the Poe Dam, based on known information and visual inspections, are judged to be in satisfactory condition for continued use.

The Poe Dam is classified as having low downstream flood hazard potential; therefore, it does not require a five-year independent consultant dam safety inspection. FERC inspects the dams every two years during its operations inspections, and the project facilities every three to five years during its EPUIs. In addition, an Emergency Action Plan (EAP) is not required for this project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Poe Project has not been conducted.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Poe Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to

project-related hazards and hazardous materials and waste are in place for all of the facilities in the Poe Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Pacific Gas and Electric Company is not required to file an EAP because of the low downstream hazard of the Poe Project (FERC, 1994).

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were reported in that Phase I ESA at the Poe Powerhouse (CDM, 1997mm). However, subsequent investigation at Poe Powerhouse revealed the presence of site contamination. Remediation was performed in 1998, which included removing lubricating oil tanks and piping, insulating oil and piping, impacted soils, the rock blotter from the transformer area, and oil stains from the foundation. Site monitoring at the Poe Powerhouse is continuing.

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area for the Poe Project. The following information from the environmental assessment is related to hazards (GMC, 2000n):

- Five USEPA database mine locations were identified on or within one eighth of a mile of the associated Watershed Lands or the FERC Licensed Area (the Poe Project).
- The aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M84, M127, M164, and M259. A confirmed mine (open hole, timbers and worked material) was observed at the USEPA database mine M175. Three other features were identified during reconnaissance: a home or ranch, a warehouse with heavy equipment and two aboveground tanks, and a communication facility with aboveground propane tanks.
- No ERR sites were located on or within one mile of the Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Poe Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 7: Bucks Creek

Bucks Creek (FERC 619)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the Bucks Creek Project:

- The licensee uses chain-link fences topped with barbed wire to prevent unauthorized entry into hazardous areas, and also uses a variety of warning signs to alert the public to potential dangers in the project area. Boater control buoys are also positioned at appropriate locations in the project reservoirs to encourage compliance with boating safety ordinances.
- Safety barriers comprised of large floats painted a highly-visible orange are positioned upstream of the Bucks Lake, Lower Bucks Lake, and Grizzly Creek Forebay Dam spillways to prevent boats from becoming entrained in spill flows.
- The safety measures provided by the licensee are adequate to protect the public during its use of project lands and waters.
- Two public safety follow-up items were noted. A boom at the Bucks Lake Lodge marina contained partially submerged logs that posed a danger to boaters during periods of reduced visibility. A flow warning sign was missing from the tailrace area of the Grizzly Creek Powerhouse.

There were no third party incidents resulting in bodily injury or death in the Bucks Creek Project, between January 1, 1995, and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Bucks Creek Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-20.

Table 4.9-20 Dams in the Bucks Creek Project (FERC 0619)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Bucks Storage Dam	94-000	3B	High	Yes
Bucks Diversion Dam	94-002	3A	Significant	Yes
Grizzly Forebay Dam	94-003	2A	Significant	Yes
Three Lakes	94-004	2A	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Bucks Creek Project are considered to be satisfactory for continued use (PG&E Co., 2000b).

Should the dams in the Bucks Creek Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the areas listed in Table 4.9-21. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-21 Theoretical Effects of a Dam Failure – Bucks Creek Project (FERC 0619)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
Bucks Lake Dam				
0.00	95.59	421,000	0.51	Bucks Lake Dam
1.45	48.02	418,500	0.52	Bucks Diversion Dam
8.62	40.57	811,800	0.66	Confluence NFFR
8.89	45.90	372,200	1.05	Bucks Creek Powerhouse
9.86	68.23	372,200	1.02	Rock Creek Powerhouse
12.63	-	788,500	0.87	Cresta Dam
15.16	103.54	471,900	1.19	Shady Rest Picnic Area*
17.19	68.62	406,300	1.45	Cresta Powerhouse
19.17	-	536,400	1.40	Poe Dam
20.27	34.68	474,700	1.51	Pulga*
27.00	67.29	400,000	1.87	Poe Powerhouse
27.95	68.01	375,700	2.01	Lake Oroville*
Maximum Downstream Effects Caused by the Hypothetical Failure of Bucks Lake Dam Under the PMF Condition				
0.0	120.0	514,500	0.45	Bucks Lake Dam
1.45	65.9	1,159,600	0.64	Bucks Diversion Dam
8.62	110.9	1,328,000	0.75	Confluence NFFR
8.89	107.1	1,327,000	0.78	Bucks Creek Powerhouse
9.86	121.9	1,326,700	0.80	Rock Creek Powerhouse
12.63	128.9	1,178,900	0.89	Cresta Dam
15.16	116.5	1,130,600	0.99	Shady Rest Picnic Area*
17.19	87.1	1,112,600	1.07	Cresta Powerhouse
19.17	84.5	984,900	1.35	Poe Dam
20.27	57.9	962,500	1.40	Pulga*
27.00	85.4	925,600	1.60	Poe Powerhouse/Lake Oroville
Bucks Diversion Dam				
0.00	73.59	294,700	0.10	Bucks Diversion Dam
7.17	87.70	229,700	0.31	Confluence NFFR
7.44	25.35	112,200	0.31	Bucks Creek Powerhouse
8.41	43.19	111,800	0.32	Rock Creek Powerhouse
11.18	-	70,100	0.53	Cresta Dam
13.71	34.86	63,500	0.78	Shady Rest Picnic Area*
15.74	30.51	59,100	0.98	Cresta Powerhouse
17.72	-	43,800	1.23	Poe Dam
18.82	16.15	43,000	1.33	Pulga*

Table 4.9-21 Theoretical Effects of a Dam Failure – Bucks Creek Project (FERC 0619)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with a likely population)
25.55	17.36	35,400	1.83	Poe Powerhouse
27.50	29.28	35,700	1.81	Lake Oroville*
Maximum Downstream Effects Caused by the Hypothetical Failure of Bucks Diversion Dam under the PMF Condition				
0.00	103.9	416,100	0.10	Bucks Diversion Dam
7.17	132.7	660,400	0.25	Confluence NFFR
7.44	72.6	569,900	0.35	Bucks Creek Powerhouse
8.41	83.1	660,600	0.35	Rock Creek Powerhouse
11.18	122.1	622,600	0.42	Cresta Dam
13.71	78.4	611,400	0.55	Shady Rest Picnic Area*
15.74	65.1	606,900	0.63	Cresta Powerhouse
17.72	110.4	590,200	0.77	Poe Dam
18.82	51.4	589,800	0.77	Pulga*
25.55	35.1	587,000	0.95	Poe Powerhouse/Lake Oroville*
Grizzly Forebay Dam				
0.00	68.59	181,900	0.10	Grizzly Forebay Dam
7.50	41.92	102,200	0.28	Confluence with NFFR
9.80	18.81	19,500	0.95	Shady Rest Picnic Area*
11.65	18.85	18,800	1.16	Cresta Powerhouse
13.63	-	11,900	1.58	Poe Dam
14.73	5.56	11,800	1.68	Pulga*
21.46	4.50	10,900	2.14	Poe Powerhouse/Begin Lake Oroville
Maximum Downstream Effects Caused by the Hypothetical Failure of Grizzly Forebay Dam Under the PMF Conditions				
0.00	98.5	268,700	0.00	Grizzly Forebay Dam
7.50	86.0	484,000	3.20	Confluence with NFFR
9.80	68.3	461,600	3.40	Shady Rest Picnic Area*
11.65	71.5	469,200	3.60	Cresta Powerhouse
13.63	99.2	468,900	3.60	Poe Dam
14.73	46.0	468,800	3.70	Pulga*
21.46	32.2	468,600	3.90	Poe Powerhouse/Lake Oroville

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 619 Bucks Lake

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

***Bucks Lake Dam*.**

- Bucks Creek Powerhouse would be inundated,
- Rock Creek Powerhouse would be inundated,
- Shady Rest Picnic Area and SR 70 in this area would be completely inundated,
- Cresta Powerhouse would be inundated,
- Poe Dam would fail,
- Railroad tracks and bridge at Pulga would be inundated, and
- Poe Powerhouse would be inundated.

***Bucks Diversion Dam*.**

- Bucks Creek Powerhouse would be inundated,
- Rock Creek Powerhouse would be inundated,
- Shady Rest Picnic Area and SR 70 in this area would be inundated, and
- Cresta Powerhouse would be partially inundated.

***Grizzly Forebay Dam*.**

- Confluence with NFFR – SR 70 would be inundated temporarily and damage could potentially occur to the Western Pacific Railroad on the north side of the NFFR.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Bucks Creek Project facilities. Refer to Section 4.16, Geology, Soils, and Minerals, for facility failures resulting from natural hazards such as landslides.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Bucks Creek Project, unless otherwise indicated (PG&E Co., 1999b):

- EAP,
- SPCC Plan,
- HMBP, and
- Public Safety Plan.

A Memorandum of Agreement between Pacific Gas and Electric Company, the City of Santa Clara, and the USFS includes a fire plan for the project (PG&E Co., 1998c).

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3.6. At the Bucks Creek Powerhouse, the ESA identified one material recognized environmental condition. It is listed as follows: Bucks Creek switchyard slid into the North Fork Feather River in the mid-1950s. The potential exists that releases of dielectric fluid occurred, possibly containing detectable concentrations of PCBs, to the Feather River when the switchyard slid into the river and may still be present along the river banks (CDM, 1997d).

Pacific Gas and Electric Company is evaluating the appropriate steps to take regarding this material recognized environmental condition. Potential impacts associated with this type of facility failure could have adversely impacted the downstream water quality and substrate in the North Fork Feather River.

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area for the Bucks Creek Project. The following information from the environmental assessment is related to hazards (GMC, 2000b):

- Three USEPA database mine locations were identified on or within one eighth of a mile of the associated Watershed Lands.
- Aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mine M1217 and M1225. Evidence of mining was observed at the point identified in the USEPA database as mine M1274. One other feature was observed during the aerial reconnaissance: an area with trash and debris behind a resort.
- No ERR sites were located on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Bucks Creek Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 8: Butte Creek

DeSabla-Centerville (FERC 0803)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety were identified for the DeSabla-Centerville Project:

- The licensee has installed chain-link fences topped with barbed wire at various project facilities to prevent public entry into hazardous areas. Numerous warning signs have been placed to alert the public to the dangers of entry into hazardous areas. A log boom at the Philbrook Reservoir spillway serves as a boater restraining barrier.
- The license and the safety measures installed by the licensee are adequate to protect the public.

- One section of the safety boom at the Philbrook Reservoir spillway was partially submerged, and the licensee was asked to install a new section.

One occurrence involving a Pacific Gas and Electric Company worker hospitalization or mortality for the period 1990 to August 2000 is an incident where an employee fell off a canal trail while on patrol resulting in a broken leg and knee on March 30, 2000 (PG&E Co., 2000b).

One third party incident resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 occurred on July 4, 2000 at Philbrook Reservoir, resulting in one fatality - a 60-year old male drowned while fishing on Philbrook Reservoir (PG&E Co., 2000b).

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths. The information only indicates these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the DeSabla-Centerville Project are regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrological events. A summary of the hazard ratings is presented in Table 4.9-22.

Table 4.9-22 Dams in the DeSabla-Centerville Project (FERC 0803)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Round Valley Reservoir	97-009	2C	Low	No
Philbrook Reservoir	97-008	2B	Low	No
DeSabla Forebay	97-005	2C	Low	No
Diversion Dams				
Hendricks Head Dam	None	None	Low	No
Hendricks Diversion	None	None	Low	No
Butte Creek Diversion	None	None	Low	No
Lower Centerville Diversion Dam	None	None	Low	No
French Creek Diversion Dam	None	None	Low	No
Long Ravine Head Dam	None	None	Low	No
Milk Ranch Creek Diversion	None	None	Low	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

Philbrook Dam is classified as having a low downstream flood hazard potential but is subject to annual FERC and DSOD dam safety inspections and independent consultant dam safety inspections every five years. According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Bucks Creek Project are considered to be satisfactory for continued use. In addition, FERC inspects the

project facilities for public safety every three to five years during its EPUIs. In addition, an EAP is not required for this project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Philbrook Dam has not been conducted.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the DeSabla-Centerville Project facilities. Refer to Section 4.16, Geology, Soils, and Minerals Resources, for facility failures resulting from natural hazards such as landslides.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the DeSabla-Centerville Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for all lands within the FERC Licensed Areas, as described in Section 4.9.3. At the Centerville Powerhouse, the ESA identified one material recognized environmental condition: Soil contaminated by gasoline was observed during removal operations of a 550-gallon UST located east of the Middle Switchyard. Analytical results from soil samples collected from the tank site confirmed the presence of petroleum hydrocarbons and lead. The extent of the gasoline release has not been determined (CDM, 1997g).

In 1997, Pacific Gas and Electric Company excavated and re-sampled soils in the former cavity of the Underground Storage Tanks (UST). Subsequent sampling and analytical testing indicated no detectable concentrations of total petroleum hydrocarbons or other compounds. Based on these results, Butte County issued a closure letter in 1997 (Butte County, 1997).

At the Camp 1 Service Center, the Phase I ESA identified one material recognized condition, which is listed as follows: During the removal of a 6,000 gallon UST during 1997, it was observed that unknown quantities of diesel and gasoline had contaminated surrounding soil, and potentially groundwater. Contaminated soil was removed at the time of the excavation.

Subsequent investigations of the Camp 1 Service Center included soil borings and groundwater sampling for a year. Results of soil borings found no detectable levels of hydrocarbons, and results of groundwater monitoring found no detectable concentrations of certain hydrocarbon constituents. The Regional Water Quality Control Board is considering closure of this site.

No material recognized environmental conditions were reported at the Toadtown (CDM, 1997xx) or DeSabla (CDM, 1997n) Powerhouses.

Environmental Assessments were conducted for the associated Watershed Lands outside of the FERC Licensed Area for the DeSabla-Centerville Project. The following information from the environmental assessment is related to hazards (GMC, 2000e):

- Four USEPA database mine locations were identified on or within one eighth of a mile of the Watershed Lands or the FERC License 803 project (the DeSabla-Centerville Project).
- The aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mine M98 and M101. Two USEPA database mines (M206 and M233) were confirmed during aerial reconnaissance. Two other features were identified during reconnaissance: a shelter with possible tank and miscellaneous piled material, including metal and debris.
- One ERR Site, the Pacific Gas and Electric Company Camp 1 Service Center, is located on fee land, and is listed as a result of a diesel fuel spill that affected the aquifer. Remedial action included excavation and removal of contaminated soil. The status of the site is "post remedial action monitoring in progress."

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the DeSabla-Centerville Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Lime Saddle (non-FERC)

The Lime Saddle Powerhouse Project is a non-FERC Pacific Gas and Electric Company facility.

Hazards and Relevant Issues Associated with Worker and Public Safety. Although the dam and other facilities associated with the Lime Saddle Powerhouse are not subject to FERC licensing, Pacific Gas and Electric Company has installed safety features where appropriate, such as warning signs and fences.

There were no third party incidents resulting in bodily injury or death in the Lime Saddle Project between January 1, 1995 and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The Kunkle Reservoir Dam is regulated by the DSOD to assure its safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the applicable hazard ratings is presented in Table 4.9-23 (PG&E Co., 1999c). However, this dam is not subject to FERC Operations Inspections or the independent consultant dam safety inspections.

Table 4.9-23 Dams in the Lime Saddle Project (non-FERC)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Dam Inundation Map
Kunkle Reservoir	97-007	2C	Low	No
Diversion Dams				
Upper Miocene Diversion Dam	None	None	Low	

Source: DSOD, Pacific Gas and Electric Company's PEA

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, dams, reservoirs, and the appurtenances within the Lime Saddle Project (Kunkle Reservoir) are judged to be satisfactory for continued use, based on known information and visual inspections.

An EAP is not required for this project; therefore, a study to determine the downstream flooding due to the hypothetical failure of Lime Saddle Project dam has not been conducted.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There was one facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Lime Saddle Project facilities: a section of the Upper Miocene Canal failed and resulted in the release of a portion of the canal flow, repairs were made to the canal and the area was mitigated.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Lime Saddle Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan, and
- HMBP.

A Phase I ESA was conducted for the powerhouse. No material recognized environmental conditions were reported at the Lime Saddle Powerhouse (CDM, 1997aa).

Environmental Assessments were conducted for the associated Watershed Lands for the Lime Saddle Project. The following information from the environmental assessment is related to hazards (GMC, 2000i):

- Two USEPA database mine locations were identified within one-eighth of a mile of the Watershed Lands or the Lime Saddle Powerhouse project.
- Aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M148 and M149.
- One ERR Site, the Concow School, is located within one mile of associated Watershed Lands, and is listed as a result of a 300-gallon diesel fuel leak. The site was abated by excavation and removal of contaminated soil. The status of the site is "signed off, remedial action completed or deemed unnecessary."

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Lime Saddle Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Coal Canyon (non-FERC)

The Coal Canyon Powerhouse Project is a non-FERC Pacific Gas and Electric Company facility.

Hazards and Relevant Issues Associated with Worker and Public Safety. Although the facilities associated with the Coal Canyon Powerhouse are not subject to FERC Licensing, Pacific Gas and Electric Company has installed safety features where appropriate, such as warning signs and fences.

There were no third party incidents resulting in bodily injury or death in the Coal Canyon Project between January 1, 1995 and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The Coal Canyon Project facilities include the powerhouse, switchyard, penstock, head works, and Middle Miocene Canal. The Middle Miocene Canal conveys water from the tailrace of the Lime Saddle Powerhouse to the Coal Canyon head works. Excess water diverted from the canal is directed to an unnamed creek adjacent to the Lime Saddle Powerhouse, located to the north of the Coal Canyon Powerhouse. There are no dams or reservoir facilities associated with the Coal Canyon Project.

The Coal Canyon Project is not subject to DSOD Inspections, independent consultant inspections, or FERC-EPUI reports. An EAP is not required for this project.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric

Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 was provided by Pacific Gas and Electric Company (PG&E Co., 2000b). There were no facility failures resulting in human harm, environmental damage, or damage to third party lands or improvements associated with the Coal Canyon Project facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Coal Canyon Powerhouse Project, unless otherwise indicated (PG&E Co., 1999b):

- SPCC Plan, and
- HMBP.

A Phase I ESA was conducted for the Coal Canyon Powerhouse. No material recognized environmental conditions were reported at the Coal Canyon Powerhouse (CDM, 1997i).

On June 17, 1998, a leak from the main transformer bank at the Coal Canyon facility resulted in the release of approximately 200 gallons of transformer insulating oil into the bermed, rock blotter of the switchyard. Pacific Gas and Electricity Company verbally notified the State OES and Butte County Environmental Health Department. The released oil contained concentrations of PCBs of less than one part per million. After notifying applicable agencies of their clean-up intentions, Pacific Gas and Electricity Company removed all visibly stained rock down to bedrock.

Environmental Assessments were conducted for the associated Watershed Lands for the Coal Canyon Project. The following information from the environmental assessment is related to hazards (GMC, 2000b):

- Five USEPA database mine locations were identified on or within 1/8 mile of the associated Watershed Lands.

- Aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as mine M225. Evidence of mining was noted at four points identified in the USEPA database as mines M118, M126, M200, and M203. One other feature was identified during reconnaissance: solid waste consisting of miscellaneous debris and a drum.

Three ERR sites were identified within one mile of the associated Watershed Lands. The properties include the following:

- Cherokee Mine – The site is listed as having a potential to be a "moderate threat to water quality … A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply".

- Cherokee Road, Oregon Gulch – The abandoned site is listed among a database of solid waste disposal facilities or landfills. The status of the site is not reported.
- Fred Platt Pest Control 2 – The status of this site is that it "Does not require DTSC action or oversight activity, referred to other lead agency".

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Coal Canyon Project, there have been no recent fire events affecting project facilities or Watershed Lands.

4.9.4.3 Drum Regional Bundle

In accordance with various Federal, State and local regulations, the hydroelectric facilities operated by Pacific Gas and Electric Company are required by FERC to prepare plans to regulate the use and storage of hazardous materials and to ensure public safety. Depending on the characteristics of the hydroelectric facility (e.g., staffed, unstaffed, or remote facility), and unless specifically exempted by FERC or other regulatory authorities, various plans must be maintained by the Licensee for the project. The components of the various plans are described in Section 4.9.3.

Regional Setting

Pacific Gas and Electric Company's hydroelectric facilities in the Drum Regional Bundle consists of 14 powerhouses located in Nevada, Placer, Yuba, and El Dorado counties in the Sierra Nevada, and one powerhouse system located in Mendocino and Lake counties on the Pacific coast of northern California. Five rivers — the North Yuba River, South Yuba River, Bear River, American River, and Eel River — feed 39 dams in the Drum watershed (PG&E Co., 1999b).

Local Regulations and Policies

The land encompassing Pacific Gas and Electric Company's FERC License Areas and associated Watershed Lands in the Drum Regional Bundle is located in Nevada, Placer, Yuba, El Dorado, Mendocino, and Lake counties. The General Plans associated with these counties have goals related to safety and hazards that would be considered in future land use decisions on the associated Watershed Lands. The General Plans do not specifically apply to future development within FERC License Area boundaries. The General Plans written for these counties discuss policies that develop and maintain a high level of safety for people and property in the areas of fire, geologic hazards, natural occurrences, and hazardous materials use.

Bundle 9: North Yuba River

Narrows (FERC 1403)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers at the hydroelectric facilities are protected by a variety of standard practices and regulations, including an IIPP, Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a Public Safety Plan, which typically includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety and reviews the adequacy of the Public Safety Plan every three to five years during its EPUIs.[11]

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

There have been no third-party incidents involving bodily injury or death for the period of January 1, 1995 to August 1, 2000.

Pacific Gas and Electric Company closed the steep tramway trail to the Narrows Powerhouse to reduce the potential for injuries to the public and trail maintenance crews (PG&E Co., 1999b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. There are no Pacific Gas and Electric Company-owned dams associated with the Narrows Project. The Englebright Dam is owned by the U.S. Army Corps of Engineers and is not under DSOD jurisdiction.

Since the dam and associated facilities are the properties of the U.S. Army Corps of Engineers, the inundation maps are the responsibility of the Corps. No inundation map has been prepared for Englebright Dam. The EAP written for Englebright Dam is a notification procedure only.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below. A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information. The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence: Narrows 1 Bypass Valve Failure (1998): A flow limit switch on a bypass valve became stuck and curtailed flows, which resulted in a minimum flow release and ramping rate requirement violation at the Yuba River (for a period of approximately two hours).

11 The EPUI for the Narrows Project was not available for review.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials are in place for the facilities in the Narrows Project, unless otherwise indicated:

- SPCC Plan,
- EAP,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Narrows 1 Powerhouse (CDM, 1997cc).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Narrows Project. The following information from the environmental assessments is related to hazards:

- No USEPA database mine locations were identified on or within a one-eighth mile radius of the Narrows Project boundaries.
- No other features were identified during the aerial reconnaissance.
- No ERR sites were identified on or within a one-mile radius of the Narrows Project boundaries (GMC, 2000k).

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Narrows Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 10: Potter Valley

Potter Valley (FERC 0077)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers at the hydroelectric facilities are protected by a variety of standard practices and regulations, including an IIPP, Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a Public Safety Plan, which typically

includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety every three to five years during its EPUIs.[12]

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

Third party incidents resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 are summarized as follows (PG&E Co., 2000b):

- June 22, 1998, Lake Pillsbury, one fatality – A 44-year old male was found dead in his truck. Cause of death was determined to be drug-induced suicide.
- July 25, 1998, Eel River, one injury – automobile accident.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths. The information only indicates these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Potter Valley Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-24.

Table 4.9-24 Dams In the Potter Valley Project (FERC 0077)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Scott	97-101	3C	High	Yes	Yes
Cape Horn (Van Arsdale)	97-102	2B	Low	Exempt	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Potter Valley Project are considered to be satisfactory for continued use.

Should the dams in the Potter Valley Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-25. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Numerous modifications to Scott Dam have been made over a long period of time to increase its stability and provide additional seismic safety. Pacific Gas and Electric Company conducted

12 The EPUI for the Potter Valley Project was not available for review.

maintenance work on the foundation drainage system at Scott Dam in 1998 (PG&E Co., 1998a). A seismic system that records strong ground motion from earthquakes is located at the dam.

Table 4.9-25 Theoretical Effects of a Dam Failure – Scott Dam, Potter Valley Project (FERC 0077)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
0	120.0	879500	0	Scott Dam
0.2	80	836500	0.1	Concrete Bridge
10.84	95	801400	0.5	Cape Horn Dam
12.14	87.6	790700	0.6	Settlement
20.84	93.3	753700	1	Emandal Resort
40.64	91.9	727500	2.2	Bridge SR 162
47.48	100.4	824300	2.4	Dos Rios
55.70	81.4	829500	2.6	Camp Rest
65.69	92.6	826400	2.9	Bell Springs
70.86	93.8	842800	3	Ramsey
76.24	107.4	856700	3.3	Island Mountain
92.04	88.3	874100	4.4	Burner
94.13	87.8	872100	4.5	Alderpoint
101.93	80.7	875900	4.8	Boehne Butte (Fort Seward)
110.49	97.3	879900	5.2	Oak Glen
110.81	96.8	891100	5.3	Eel Rock
122.4	77.5	886100	5.9	Camp Grant Flat
124.49	82.1	981200	6	Confluence, SF Eel River, Dyerville
128.66	89.1	977100	6.1	Larabee
130.1	92.6	1008600	6.2	Holmes
132.98	89.7	1000000	6.3	Shively
134.88	90.9	1024000	6.4	Pepperwood
139.03	97.9	1031200	6.5	Stafford
139.9	97.9	1063200	6.6	Fleisher Memorial Bridge
143.05	82.2	1130900	6.7	Scotia
144.09	72.1	1164200	6.8	Rio Dell
148.32	64.9	1158500	6.9	St. Pius X Seminary
149.15	59.4	1188400	7.2	Fortuna Nursery School
150.06	59.2	1216500	7.3	Price Creek School
152.96	53.3	1264400	8.3	Rohnerville
154.93	57.5	1244200	8.6	Fortuna
157.49	60.1	1216300	8.8	Fernbridge
162.56	39.6	1200300	9	Cock Robin Island and Cannibal Island; Pacific Ocean

a. Data given are based upon the current setting and developments.

b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.

Source: Emergency Action Plan FERC 0077

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below. A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information. The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence. In 1990, at Potter Valley powerhouse, oil leaked from a turbine bearing housing due to water leak pressure in the bearing. Half a gallon of oil entered the turbine pit and escaped into a drain hole leading to the tailrace of the powerhouse (East Branch Russian River).

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans related to hazards are in place for the Potter Valley Project:

- EAP,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Potter Valley Powerhouse (ERM, 1998).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Potter Valley Project. The following information from the environmental assessment is related to hazards:

- Two USEPA database mine locations (M749 and M750) were identified on or within one eighth of a mile of the Associated Lands or on Pacific Gas and Electric Company fee property within the FERC license 77 project boundaries (Potter Valley Project).

- The aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M749 and M750. M749 is located within Associated Lands, and M750 is located outside of Associated Lands and the FERC license project boundaries. One possible mine (not included in the USEPA database) was identified visually during aerial reconnaissance at R62. Eleven other features were identified during reconnaissance, including cabins and evidence of unauthorized human habitation.

- Five ERR sites were identified on or within one mile of the associated Lands (GMC, 2000o).

Of the five ERR sites, two are reported as having either suspected or as having already incurred environmental contamination. These are summarized as follows:

- Soda Creek Bar & Grocery - Leaking gasoline of unreported quantity resulted in contaminated soil and drinking water wells; the status of this site is not reported.

- Woolley's Garage – This site is listed for having a release of miscellaneous motor vehicle fuels. The status of this site located within FERC Project boundaries (but not on Pacific Gas and Electric Company fee property) is not reported.

Tables and maps providing details and locations of the potential hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Potter Valley Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 11: South Yuba River

Drum-Spaulding (FERC 2310)

Hazards and Relevant Issues Associated with Worker and Public Safety. FERC inspects the project facilities for public safety every three to five years during its EPUIs. According to the most recent EPUI, the following issues with regards to safety and hazardous materials were identified for the Drum-Spaulding Project (FERC, 1996c):

- The licensee is removing the abandoned Upper Boardman Canal. Measures to prevent pollution include secondary containment systems at powerhouses and switchyards, including oil detection equipment or oil-water separators; and periodic canal inspections and a canal alarm system. There have been two canal failures in the last three years at the project. The proposed lack of toilet facilities at White Rock and Blue Lake Reservoirs may create sanitation problems. Proposed Rock Creek Reservoir dam safety repairs may affect riparian vegetation below the dam. The licensee completed resource protection improvements after the inspection.

- The licensee augmented its canal safety program with a complete inventory and assessment to identify additional needed physical protective devices. The licensee also revised its Public Safety Plan at SFRO request. As a result of the inspection, the licensee accomplished numerous public safety improvements.

- Public safety devices in place at the project include safety barriers, warning signs and buoys, fencing, trash racks, grab cables, gates, guardrails, lighting, and secured powerhouses.

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

Third party incidents resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 are summarized as follows (PG&E Co., 2000b):

- April 4, 1995, Wise Headworks near Auburn, one fatality – a fully clothed adult male with a blood alcohol reading of 0.41 was found drowned. It was suspected that entry into the canal probably occurred at night.

- December 5, 1996, Bear River Canal, one fatality – an adult male whose residence was adjacent to the Bear River Canal was found drowned in the Franklin Trashrack.

- June 10, 2000, Lake Valley, one fatality – no description available.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths, the information only indicates that these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Drum-Spaulding Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-26.

Table 4.9-26 Dams in the Drum-Spaulding Project (FERC 2310)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Lake Fordyce	97-28	2C	High	Yes	Yes
Lake Valley	97-32	2B	Significant	Yes	Yes
Kidd Lake	97-25	3C	Significant	Yes	Yes
Lake Spaulding 1, 2, 3	97-29	4B	High	Yes	Yes
Upper Peak	97-47	1C	Significant	Yes	Yes
Lower Peak	97-37	1C	Low	Yes	Yes
Drum Forebay	97-20	2C	High	Yes	Yes
Kelly Lake	97-24	2B	Low	Yes	Yes
Rock Creek	97-43	3D	High	Yes	Yes
Halsey Afterbay	None	None	High	Yes	Yes
Halsey Forebay	97-23	2B	Significant	Yes	Yes
Wise Forebay	None	None	High	Yes	Yes
White Rock	97-49	1C	Low	Exempt	No
Alta Forebay	None	None	Low	Exempt	No
Bear River Diversion	None	None	Low	Exempt	No
Jordan Creek Diversion	None	None	Low	Exempt	No
Lake Valley Canal Diversion	None	None	Low	Exempt	No
Upper Boardman Canal Diversion	None	None	Low	Exempt	No
Towle Canal Diversion	None	None	Low	Exempt	No
South Canal Diversion	None	None	Low	Exempt	No
Upper Rock	97-48	1C	Low	Exempt	No
Lower Rock	None	None	Low	Exempt	No
Culbertson	97-17	1B	Low	Exempt	No
Upper Lindsey	None	None	Low	Exempt	No
Middle Lindsey	97-41	1B	Low	Exempt	No
Lower Lindsey	97-36	1C	Low	Exempt	No
Upper Feeley	97-45	-	Low	Exempt	No
Lower Feeley	97-35	-	Low	Exempt	No

Table 4.9-26 Dams in the Drum-Spaulding Project (FERC 2310)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Upper Blue Lake	97-70	2B	High	Exempt	No
Rucker Lake	97-44	-	High	Exempt	No
Fuller Lake	97-21	-	Low	Exempt	No
Meadow Lake	97-40	-	Low	Exempt	No
Lake Sterling	97-30	-	Low	Exempt	No
Deer Creek Forebay	None	None	Low	Exempt	No
Drum Afterbay	None	None	Low	Exempt	No
Drum Afterbay Toe	None	None	Low	Exempt	No
Main South Yuba Canal Diversion	None	None	Low	Exempt	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Drum-Spaulding Project are considered to be satisfactory for continued use, except for Blue Lake. However, since the report was published the Blue Lake Dam has been replaced making it satisfactory for continued use. Pacific Gas and Electric Company is scheduled to replace Blue Lake Dam during year 2000. Following replacement, the dam will be considered to be satisfactory for continued use (GMC, 2000f).

Should the dams in the Drum-Spaulding Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-27. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
Lake Fordyce Dam				
0	118	497000	0	Lake Fordyce Dam
8.75	37.9	477000	0.27	Lake Spaulding
10.81	-	296000	0.8	Lake Spaulding Dam #1
11.5	17.5	318000	0.81	Jordan Creek
22.79	34.6	317200	1.13	Washington
37.55	41.3	324300	1.9	Bald Mountain
50.36	46.1	350000	2.29	Upstream from Englebright Reservoir

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
Lake Valley Dam				
0	31.5	140700	0	Lake Valley Dam
1.9	32.3	132500	0.65	Unnamed Development
14.05	44.2	165300	0.55	Rawhide Mine
15.15	61.7	214900	0.6	Confluence North Fork American River
29.4	55.8	191900	1.51	Recreation Area near Burnt Flat
34.2	48.4	188900	1.88	Shirttail Canyon Creek
36.75	41.2	185500	2.11	Big Bend
42.55	40.3	173100	2.75	Upstream from Lake Clementine
Kidd Lake Dam				
0	24.38	9250	1[c]	Kidd Lake Dam
0.48	8.29	9070	1.03	Interstate Highway 80
0.61	8.75	8560	1.03	Junction South Yuba River (Kingvale)
4.98	8.04	7950	1.71	Rainbow
5.94	10.7	7890	1.81	Big Bend
6.66	10.61	7780	2.02	Cisco Grove
11.88	140.57	6810	4.24	Lake Spaulding Reservoir
13.64	215.46	2860	4.24	Lake Spaulding Reservoir
13.81	-	2850	4.24	Lake Spaulding Dam
14.23	1.62	3280	4.26	Local Inflow
25.79	2.92	3240	5.21	Washington
53.36	2.71	3200	8.36	Bridgeport
Lake Spaulding Dam No. 1				
0	177	2913000	0	Spaulding Dam No. 1
0.90	53.9	2816000	0.01	Lang Crossing
8.29	92.4	2563000	0.14	Holbrook Flat
11.55	88.2	2401000	0.21	Bridge
11.98	89.3	2367000	0.22	Washington
24.65	113.1	1637000	0.68	Edwards Crossing
26.74	80	1512000	0.73	Bald Mountain
29.08	75.9	1542000	0.78	Purdon Crossing
32.9	93	1520000	0.85	SR 49 Bridge
33.98	93.5	1512000	0.88	Jones Bar
39.55	96.7	1466000	1.02	Bridgeport

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
Lake Spaulding Dam No. 2				
0	32.6	145500	0	Spaulding Dam No. 2
1.4	20.6	188300	0.01	Lang Crossing
8.88	24.8	181500	0.17	Holbrook Flat
11.79	25.8	178800	0.26	Bridge
12.43	25.8	178100	0.28	Washington
25.1	40.1	190600	0.86	Edwards Crossing
27.19	27.6	189400	0.97	Bald Mountain
29.63	29.9	221500	1.04	Purdon Crossing
33.36	22.7	221000	1.17	SR 49 Bridge
34.36	21.1	220800	1.2	Jones Bar
40	35.8	220200	1.4	Upstream from Englebright Reservoir
Lake Spaulding Dam No. 3				
0	67.3	182000	0	Spaulding Dam No. 1
1.55	21.6	221600	0.02	Lang Crossing
9.04	25.5	214000	0.14	Holbrook Flat
11.94	28.2	213000	0.21	Bridge
12.58	28.1	211200	0.23	Washington
25.25	43.1	223200	0.81	Edwards Crossing
27.34	29.8	220600	0.9	Bald Mountain
29.78	29.6	252200	0.96	Purdon Crossing
33.51	25.1	252000	1.07	SR 49 Bridge
34.51	23.5	251600	1.11	Jones Bar
40.15	38.4	250500	1.3	Upstream from Englebright Reservoir
Upper Peak Lake Dam				
0	33.6	10900	0.5[c]	Upper Peak Lake Dam
0.08	26.46	9590	0.72	Lower Peak Lake Reservoir
0.38	37.37	11900	0.72	Lower Peak Lake Dam
1.4	2.12	11400	1.02	US I-80
1.58	2.33	11300	1.05	South Yuba River
1.8	8.93	10800	1.15	Donner Trail School
4.93	9.02	10200	1.55	Rainbow
5.99	12.14	10100	1.71	Big Bend
7.16	11.93	9900	1.81	Cisco Grove
12.38	140.7	8930	4.24	Lake Spaulding Reservoir

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
14.14	215.7	3600	4.24	Lake Spaulding Reservoir
14.31	-	3590	4.24	Lake Spaulding Dam
26.29	2.17	3990	5.2	Washington
53.86	3.1	3940	8.08	Bridgeport
Lower Peak Lake Dam				
0	17.45	5410	0.48[c]	Lower Peak Lake Dam
1	1.12	5040	0.55	US I-80
1.4	4.82	4390	0.68	Donner Trail School
4.53	5.43	3990	1.22	Rainbow
5.59	7.44	3900	1.37	Big Bend
6.76	7.41	3790	1.53	Cisco Grove
11.98	136.89	3120	3.52	Lake Spaulding Reservoir
13.74	214.89	1000	3.52	Lake Spaulding Reservoir
13.91	-	990	3.52	Lake Spaulding Dam
14.33	0.98	1420	3.6	Lateral Inflow plus PH discharge
25.89	1.39	1400	4.95	Washington
53.46	1.53	1370	9.08	Bridgeport
Kelly Lake Dam				
0	14.81	2370	0.5[c]	Kelly Lake Dam
0.7	-	850	1.82	Snowflower Dam
2.1	3.54	840	2.02	¼ Mile Upstream of Confluence with North Fork of the North Fork
3.85	3.92	830	2.15	Lake Valley Canal Diversion
4.3	2.84	830	2.22	Unnamed Development
16.1	4.16	800	3.19	Confluence with North Fork American River Local Inflow
19.2	3.14	1560	3.58	Lovers Leap
30.35	3.69	1550	4.98	Recreation Area Near Burnt Flat. Colfax-Iowa Hill Rd. Suspension Bridge
35.15	3.58	1550	5.68	Shirttail Canyon Creek-Colfax-Forest Hill Road Bridge
37.7	3.31	1550	6.16	Big Bend
43.5	3.4	1430	9.61	Long Point
45.7	-	1330	11.16	Lake Clementine
47.55	-	1300	11.93	North Fork Dam
Halsey Forebay Dam No. 1				
0	10.05	9940	0.251	Halsey Forebay Dam No. 1

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
1.03	12.17	9190	0.32	Confluence with Dry Creek
1.08	-	4660	0.54	Nielsburg Exit
1.18	9.83	4650	0.54	Bowman Road Bridge
1.54	23.58	15730	0.61	Halsey Afterbay
3.31	14.24	8040	0.94	Dry Creek Road
3.65	31.5	20250	1.37	Lakewood Dam
5.26	7.11	15680	1.54	SR 49
5.35	5.41	15680	1.54	Cemetery
7.43	6.37	15070	1.66	Bell Road, Orr Creek
13.34	14.19	13880	1.95	Garden Bar Road
17.71	9.90	7940	3.02	McCourtney Road
19.16	11.01	6500	3.6	Fraser Ranch
21.07	4.89	860	14.39	Terminus, Chamberlain Ranch
Halsey Forebay Dam No. 2				
0	19.07	10990	0.25[c]	Halsey Forebay Dam No. 2
2.74	9.05	9520	0.42	Christian Valley Road
5.55	11.56	7260	0.76	SR 49
6.2	10.46	6440	0.9	Orr Creek Dam
Halsey Afterbay Dam				
0	38	13700	0	Halsey Afterbay Dam
0.42	14.9	11700	0.08	Hanes Road Bridge
1.98	17	25700	0.31	Lakewood Dam
3.59	6.5	21000	0.55	SR 49
5.76	7.2	20300	0.7	Bell Road
11.67	7.4	19100	1	Golden Bar Road
Rock Creek Multi-Arch Dam				
0	27.26	13300	0.11	Rock Creek Dam - Arch
0.33	14.05	12800	0.15	KOA Campground
0.58	-	10400	0.33	SR 49
1	6.23	10400	0.36	Chana H.S. Road
1.8	6.06	10300	0.39	Joeger Road
3.75	5.4	10200	0.52	Downstream of Bell Road
9.66	10.47	9390	0.86	Upstream of Garden Bar Road
14.03	8.96	7390	1.83	McCourtney Road Downstream of Gladding Ranch
15.48	9.68	5460	2.43	Fraser Ranch

Table 4.9-27 Theoretical Effects of a Dam Failure – Drum-Spaulding Project (FERC 2310)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
17.39	4.39	800	12.15	Chamberlain Ranch
Rock Creek Earth Dam				
0	18.27	5140	0.5[c]	Rock Creek Dam – Earth
0.57	9.6	4860	0.63	Rock Creek Road
0.83	10.33	4710	0.71	Rock Creek and SR 49
0.85	6.15	4710	0.71	West of SR 49
1.27	4.4	4640	0.75	Chana H.S. Road
2.07	4.3	4530	0.8	Joeger Road
4.02	3.7	4300	1	Downstream of Bell Road
9.93	6.69	3940	1.45	Upstream of Garden Bar Road
14.3	6.17	3680	2.39	McCourtney Road
15.75	6.5	3390	2.83	Downstream of Gladding Road, Fraser Ranch
North End of Wise Forebay Dam				
0	13.61	3950	.01[c]	North End of Forebay
0.2	4.08	3810	0.11	Terminous, Southern Pacific Railroad
Southeast End of Wise Forebay Dam				
0	13.6	3950	0.1[c]	Southeast End of Forebay
1.23	4.04	3550	0.15	Sewage Disposal
2.41	4.36	3310	0.21	Terminus

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
c. Indicates Time of Maximum Discharge, not Front of Wave.
Source: Emergency Action Plan FERC 2310

The project includes a large number of open and accessible canals and flumes in areas subject to increased public use, thereby posing a safety concern. As a result, public safety is an issue that Pacific Gas and Electric Company continues to address through a variety of measures, including dismantling abandoned facilities, restricting access to dangerous areas, and developing a public safety plan (PG&E Co., 1999c).

The Lake Valley and Rock Creek Dams were upgraded for seismic purposes in the mid-1970s and 1998, respectively. Upgrades to Halsey Forebay Dam were planned for 1999 (PG&E Co., 1998a).

According to Pacific Gas and Electric Company's 1999 Year End Safety Report, the following facility safety issues were identified dams within the Drum-Spaulding project:

- Proposed modifications to Blue Lake Dam include buttressing the downstream slope, providing a filter zone to safely bypass any leakage, and extend the outlet pipe beyond the toe of the buttress. These modifications were completed in the year 2000.
- In response to a DSOD request, Pacific Gas and Electric Company has been asked to inspect or replace the low level outlet pipes at Blue Lake, Kelly Lake, Kidd Lake, Lower and Upper Peak Lake, Lake Sterling, and Upper Feeling Lake Dams.
- Rock Creek Dam (Multiple Arch)-FERC and DSOD ordered the dam to be modified to withstand the cross channel earthquake, and the postulated PMF loading. Construction on the dam is pending FERC's approval of the proposed license amendment.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below (PG&E Co., 2000b). A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information. The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

- Storm Related Canal Damage (1990): Heavy snowfall in February 1990 resulted in severe damage to the Towle, South Yuba, Drum, South, and Wise canals. Mudslides entered the Bear River.
- Bear River Canal Berm Failure (1990): Berm failed on Bear River Canal, backing up water and causing overtopping. Possibly due to two causes: either crack and saturation of the berm, or a third party clearing road on the hillside above the canal caused debris to fall into the canal.
- Towle Canal Station 75 + 95 (1991): During heavy snow a large rock and tree to slid into a wood box flume at Station 75 + 95 on the Towle Canal. This resulted in ten cfs flowing downhill onto Highway 80.
- Chalk Bluff Canal Failure (1992): A slope above Chalk Bluff Canal slid. This slide resulted in damage to the canal and hillside (USFS property). The water from the canal and the slide itself entered Deer Creek. The canal section was rebuilt and the hillside was re-engineered with fill; drainage and was seeded and strawed.
- Bear River Canal Overtopping (1993): A check structure was placed in YB58 in preparation for the Bear River Canal Annual Outage. The canal overtopped for about 45 minutes, causing water to flow into the garage of third party and causing minor damage to the berm.
- Halsey Penstock Uplift (1995): Approximately 300 feet of the Halsey penstock backfill eroded away and three sections uplifted. This occurred because the adjacent PCWA water treatment plant had an uncontrolled water leak saturating the penstock bedding, eroding the fill and floating the sections of penstock.
- Bear River Canal Failure (1995): Approximately 50 feet of the Bear River Canal berm slid down the ravine, flowed through the Bear River Campground and into the Bear River.

- Rock Creek Reservoir Release (1996): Submersible pump leaked ten gallons of oil into the reservoir. A boom was installed.

- Drum Powerhouse and Pittman Spill Debris Flow (1997): Severe storm, saturation of an active slide, and use of the Pittman Spill channel, resulted in a debris flow, which dammed the Bear River, inundated the Drum Powerhouse and filled in the Drum Afterbay. The powerhouse was cleaned out and repaired, the Bear River re-channeled, and the afterbay was dredged.

- Drum Powerhouse Oil Spill (1997): As a result of the 1996/7 storm event and mudslide into the powerhouse, ten gallons of gasoline and 15 gallons oil were released into Drum Afterbay.

- South Yuba Canal (1999): A canal failure at South Yuba Canal resulted in causing damage to Zeibright Mine Road. There was no determined cause for the canal failure.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with state and federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste, as described in Section 4.9.3. The following plans and reports related to project-related hazards and public safety are in place for the facilities in the Drum-Spaulding Project, unless otherwise indicated:

- SPCC Plan,
- EAP,
- HMBP (Deer Creek, Spaulding 1 and 2, and Spaulding 3 powerhouses),
- FEEP (Alta, Drum 1 and 2, Dutch Flat, Halsey, Newcastle, and Wise 1 and 2 Powerhouses), and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas. At Dutch Flat Powerhouse, the ESA identified two material recognized environmental conditions. Pacific Gas and Electric Company is currently evaluating these conditions to determine a reasonable course of action.[13] They are listed as follows:

- Significant releases of dielectric fluid, potentially containing detectable concentrations of PCBs, appear to have occurred in one room in the powerhouse basement identified in this report as the dielectric fluid treatment room.

- Significant releases of dielectric fluid, potentially containing detectable concentrations of PCBs, appear to have occurred at the bases of some of the main transformers located in the switchyard. In addition, potential exists for underground piping associated with dielectric fluid transfer lines in the switchyard to have caused releases (CDM, 1997p).

No material recognized environmental conditions were reported at the Spaulding 1, 2 and 3, Alta, Halsey, Wise 1 and 2, Newcastle, Drum 1 and 2, or Deer Creek Powerhouses (CDM, 1997ss; 1997tt; 1997a; 1997r; 1997ddd; 1997dd; 1997o; 1997m).

13 The Drum Forebay Microwave Station is on the CORTESE list for a leaking underground storage tank. Pacific Gas and Electric Company conducted remedial action at the site and informed the Placer County Air Pollution Control District of completion of the remedial control actions on October 9, 1990.

However, during CDM's Phase I ESA investigation at the Spaulding 1 and 2 Powerhouse, the prior existence of a UST near the boathouse was observed. The Nevada County Department of Environmental Health issued a letter on September 18, 1998, saying "no further action is required at this time." In addition, at the Deer Creek Hydroelectric Generating Facility, CDM's Phase I ESA identified the potential for contamination of soil and groundwater at a historic disposal location northwest of the switchyard as a nonmaterial recognized environmental condition. After investigation by Pacific Gas and Electric Company's Technical and Ecological Services, which involved the excavation of soil and encapsulation of remaining soils, the Nevada County Department of Environmental Health issued a "No Further Action" letter for the site on September 17, 1998.

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Drum-Spaulding Project. The following information from the environmental assessment is related to hazards:

- Thirty-six USEPA database mine locations were identified on or within one eighth of a mile of the associated Lands or on Pacific Gas and Electric Company fee property within the FERC license 2310 project boundaries (Drum-Spaulding Project).
- The aerial reconnaissance did not identify any evidence of mining at 18 of the USEPA database mine locations. Evidence of mining was observed at seven USEPA database mine locations, and possible evidence of mining was observed at the remaining 11 locations. Thirteen confirmed or possible mines (not included in the USEPA database) were identified visually during aerial reconnaissance. Thirty-six other features were identified during reconnaissance, including cabins and homes, solid waste disposal areas, water conveyances, evidence of unauthorized human habitation, former structures, and a borrow pit.
- One hundred three ERR sites were identified on or within one mile of the associated Lands (GMC, 2000b).

Of the 103 ERR sites, only three are reported as being located within associated Watershed Lands or FERC license project boundaries. The balance of sites, are located outside of, but within one mile of the boundaries of the associated Watershed Lands. The three sites located within the boundaries are summarized as follows:

- Holloway Sterling P III, Inc. - The Holloway Sterling site, located on Pacific Gas and Electric Company fee property within FERC license project boundaries, is classified as a facility that stores and transports hazardous waste; no violations were reported.
- Diamond Well Drilling – This site is located within FERC license project boundaries, not on Pacific Gas and Electric Company fee property, and is characterized as a contaminated site that impacts groundwater or has the potential to impact groundwater. The pollutant listed for the Diamond Well site is total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene(s), which are better known as BTEX; however, contamination at the site, if any, was not reported.
- Pacific Gas and Electric Company Rock Creek Yard – This site is located on Pacific Gas and Electric Company fee property, outside Watershed Lands. It is listed as having permitted USTs and is identified as being a small quantity hazardous waste generator (no violations reported). In addition, the Rock Creek Yard is reported for having a leaking gasoline UST that impacted the surrounding groundwater

aquifer. The status of the site is reported as unknown, while also indicating that, "No leak action (was) taken by (the) responsible party after initial report of (the) leak."

The 100 sites reported as being located outside, but within one mile of associated Watershed Lands or FERC license project boundaries, are included in one or more databases under EDR. Inc., and are summarized as follows:

- Two sites where no further remedial action is planned;
- Two sites classified as large quantity hazardous waste generators;
- Thirty-nine sites classified as small quantity hazardous waste generators;
- Three sites identified as having potential or confirmed hazardous substance releases;
- Twenty-five sites listed under the California Hazardous Material Incident Report System (CHMIRS);
- Thirty-six sites listed as either public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, abandoned sites with known toxic material, sites with USTs having a reportable release and all solid waste disposal facilities from which there is known migration;
- Five sites identified as having a potential impact to drinking water;
- One site identified as a state landfill;
- Fifty-one sites with leaking Underground Storage Tanks (UST's);
- Eighty-eight sites with registered USTs;
- Seven sites with registered Above-ground Storage Tanks (ASTs); and
- Four sites with actual or potential impact to groundwater.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5. Fire Safety. For the Drum-Spaulding Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Bundle 12: Chili Bar

Chili Bar (FERC 2155)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers at the hydroelectric facilities are protected by a variety of standard practices and regulations, including an IIPP, Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a Public Safety Plan, which typically

includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public and reviews the adequacy of the Public Safety Reports safety every three to five years during its EPUIs.[14]

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000 (PG&E Co., 2000b).

There have been no third-party incidents involving bodily injury or death for the period of January 1, 1995 to August 1, 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Chili Bar Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-28.

Table 4.9-28 Dams in the Chili Bar Project (FERC 2155)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Chili Bar	97-125	3B	High	Yes	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dam, reservoir and appurtenances within the Chili Bar Project are considered to be satisfactory for continued use.

Should Chili Bar Dam ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-29. The Dam Inundation Map should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-29 Theoretical Effects of a Dam Failure – Chili Bar Dam (FERC 2155)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Maximum Stage (Hours)	Landmark/Location
0	54.86	98300	0.45	Chili Bar Dam
0.42	17.11	96800	0.45	Chili Bar Town
6.36	10.52	58100	0.94	Coloma
8.83	13.81	45900	1.34	Lotus
19.82	15.10	33500	2.8	Upstream of Folsom Lake

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.

14 The EPUI for the Chili Bar Project was not available for review.

Source: Emergency Action Plan FERC 2155
The most recent FERC operation inspection noted that the project dam was in excellent condition, with no signs of structural instability (FERC, 1995).

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. There have been no facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for the Chili Bar Project, unless otherwise indicated:

- SPCC Plan,
- EAP (Including Chili Bar Dam),
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Chili Bar Powerhouse (CDM, 1997h).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Chili Bar Project. The following information from the environmental assessment is related to hazards:

- Nine USEPA database mine locations (M535, M537, M538, M539, M540, M541, M556, M702 and M704) were identified on or within one eighth of a mile of the associated Lands or on Pacific Gas and Electric Company fee property within the FERC license 2155 project boundaries (the Chili Bar Project).

- The aerial reconnaissance did not identify any evidence of mining at the points identified in the USEPA database as mines M538, M541, M556, M702 and M704. Evidence of mining was observed at M535, M537, M539, and possible evidence of mining was observed at M540. All of these mine locations, except M538 which was not confirmed as a mine, are outside the associated Lands and Company fee property within the FERC license project boundaries. One other feature was identified during reconnaissance: a cabin/home located on property referenced as State Board of Equalization (SBE) Number 135-9-2D-10.

- No ERR sites were identified on or within one mile of the associated Watershed Lands (GMC, 2000b).

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5. Fire Safety discussion. For the Chili Bar Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Service Centers

Alta Service Center. The Alta Hydro Service Center is located in the town of Alta on a 1.15-acre parcel. The service center is fenced and includes facilities for storing hazardous materials and temporarily storing hazardous wastes. The facility includes a fueling station of both gasoline and diesel. An SPCC and a FEEP have been developed for the Alta Hydro Service Center. Geomatrix performed a Phase I ESA for the Alta Hydro Service Center in August 2000. Based on the records review and the site reconnaissance of the facility, there are potential recognized environmental conditions at the site, which include the following: potential impacts from historical operations at the site; and potential impacts in the vehicle servicing area and sump. The potential adverse impacts from these environmental conditions have not been confirmed (GMC, 2000w).

Bear Valley Service Center. The Bear Valley Hydro Service Center is located within the Drum-Spaulding Project FERC 2310 boundary near State Highway 20 and Interstate 80. The site has a vehicle fueling station for both gasoline and diesel. A FEEP has been developed for the facility.

Rock Creek Yard Service Center. The Rock Creek Yard Service Center abuts the Wise Canal, a feature of the Drum-Spaulding Project FERC 2310. The service center is fenced and the gate is alarmed after the close of the business day. The facility includes areas for temporarily storing hazardous wastes and hazardous materials. There is also a diesel fueling station at the service center. There are two plans for the facility related to hazards: an SPCC and an FEEP. Weiss and Associates performed a Phase I ESA for the Rock Creek Yard in 1992. The Phase I ESA determined that shallow soil might be impacted with oil at the yard (Weiss Associates, 1992). Geomatrix performed a Phase I ESA for the Rock Creek Yard in August 2000. Supporting the Weiss and Associates' Phase I ESA, the Geomatrix Phase I ESA determined that soils might be adversely impacted from historic operations at the vehicle servicing areas and sumps, as well as in the welding area and from historic excavation areas. The potential adverse impacts from these environmental conditions have not been confirmed (GMC, 2000gg).

4.9.4.4 Motherlode Regional Bundle

In accordance with various Federal, State and local regulations, the hydroelectric facilities operated by Pacific Gas and Electric Company are required by FERC to prepare plans to regulate the use and storage of hazardous materials and to ensure public safety. Depending on the characteristics of the hydroelectric facility (e.g., staffed, unstaffed, or remote facility), and unless specifically exempted by FERC or other regulatory authorities, various plans must be maintained by the

licensee for the project. The components of the various plans are described in more detail in Section 4.9.3.

Regional Setting

Pacific Gas and Electric Company's hydroelectric facilities in the Motherlode Regional Bundle consist of eight powerhouses located in Amador, Tuolumne, Alpine, and Merced counties in the Sierra Nevada. Three rivers — the Mokelumne River, South and Middle Forks of the Stanislaus River, and the Merced River — feed 27 dams in the Motherlode Regional Bundle (PG&E Co., 1999b).

Local Regulations and Policies

The Motherlode Regional Bundle is located in Amador, Tuolumne, Merced, Mariposa, and Calaveras counties. The county General Plans have goals related to safety that would be considered in future land use decisions on the Watershed Lands. The county General Plans do not specifically apply to future development within FERC boundaries. The county General Plans discuss fire and seismic hazards, slope stability, flood, hazardous materials, and other hazard related issues. Some of these General Plans establish priorities for abatement of these hazards. The General Plans do not identify any new specific hazards associated with the project that are not already discussed in this chapter.

Bundle 13: Mokelumne River

Mokelumne River (FERC 0137)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regard to safety and hazards were identified for the Mokelumne River Project (FERC, 1998e):

- The licensee uses a variety of measures to control the hazardous materials used at the project and to prevent their discharge to the environment. These include containment berms at switchyards, contained storage areas in powerhouses, and drip pans and absorbent materials to collect spilled or leaked oil. The measures provided by the licensee are adequate to prevent pollution or erosion problems in the project area.
- The licensee employs measures to prevent sudden releases of water from the project canals that could cause erosion. Self-priming siphons, flow-control gates and spillways are used to prevent the canal from overtopping, and to limit spill to designated channels.
- The licensee has provided numerous public safety measures throughout the project area. These include a variety of warning signs, fences around hazardous areas, and safety barriers upstream of spillways.
- The safety measures provided by the licensee are adequate to protect the public during its use of project lands and waters.

The only occurrence involving a Pacific Gas and Electric Company worker hospitalization or mortality for the period 1990 to August 2000 is an incident where an employee was electrocuted by

falling into energized equipment at Tiger Creek Powerhouse on December 13, 1996 (PG&E Co., 2000b).

Third party incidents resulting in bodily injury or death, occurring between January 1, 1995 and August 2000, are summarized as follows (PG&E Co., 2000b):

- May 18, 1995, Lake Tabeaud, one injury - no description available.
- July 20, 1995, Salt Springs Dam, one injury - a teenager slipped off rock while hiking on a trail near Salt Springs Dam, suffering a broken leg and wrist.
- July 20, 1996, Salt Springs Reservoir, one fatality – a 32-year-old male fishing on the Mokelumne River (north of Salt Springs Reservoir) drowned.
- September 17, 1999, Twin Lake, one fatality – no description available.
- April 11, 2000, road to Tiger Creek Powerhouse, one injury – attempted suicide.
- June 30, 2000, Tiger Creek, one fatality – no information available.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths, the information only indicates that these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Mokelumne River Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-30.

Table 4.9-30 Dams in the Mokelumne River Project (FERC 0137)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Upper Blue Lake	97-70	2B	Significant	Yes	Yes
Bear River	97-61	2B	Significant	Yes	Yes
Lower Bear	97-115	3B	Significant	Yes	Yes
Salt Springs	97-66	3B	High	Yes	Yes
Tiger Creek Regulator	97-104	3B	Significant	Yes	Yes
Tiger Creek Afterbay	97-105	3B	Significant	Yes	Yes
Lake Tabeaud	97-67	3C	High	Yes	Yes
Lower Blue Lake	97-62	2C	Low	Exempt	No
Twin Lake	97-69	2C	Low	Exempt	No
Meadow Lake	97-63	2B	Low	Exempt	No
Tiger Creek Forebay	97-126	2C	Low	Exempt	No
Electra Afterbay	None	None	Low	Exempt	No
Cole Creek Diversion	None	None	Low	Exempt	No
Cole Creek Feeder	None	None	Low	Exempt	No
Bear River Feeder	None	None	Low	Exempt	No

Table 4.9-30 Dams in the Mokelumne River Project (FERC 0137)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Map
Beaver Creek Feeder	None	None	Low	Exempt	No
East Panther Creek	None	None	Low	Exempt	No
West Panther Creek	None	None	Low	Exempt	No
Electra Diversion	97-114	1B	Low	Exempt	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Mokelumne River Project are considered to be satisfactory for continued use.

Should the dams in the Mokelumne River Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-31. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Seismic systems that record strong ground motion from earthquakes are located at the Salt Springs Dam. The project includes one canal with flumes in areas subject to increased public use, thereby posing a safety concern. As a result, public safety is an issue that Pacific Gas and Electric Company continues to address through a variety of measures, including dismantling of abandoned facilities, restricting access to dangerous areas, and developing a public safety plan (PG&E Co., 1999b).

Table 4.9-31 Theoretical Effects of a Dam Failure – Mokelumne River Project (FERC 0137)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
Upper Blue Lake Dam				
0	28.2	16400	0	Upper Blue Lake Dam
1.61	36.4	52300	0.2	Lower Blue Lake
4.45	9.8	49100	0.73	Deer Creek
6.97	6.5	48600	0.97	North Fork Mokelumne River
23.96	10.2	44000	1.95	Salt Springs Reservoir
28.22	301.4	15600	2	Salt Springs Dam
31.69	8.6	15500	2.2	Mokelumne River Campground
45.64	5.6	15500	3.4	Tiger Creek Powerhouse
47.02	107.6	15500	3.6	Tiger Creek Afterbay Dam
50.65	46.0	15500	3.87	West Point Powerhouse

Table 4.9-31 Theoretical Effects of a Dam Failure – Mokelumne River Project (FERC 0137)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
56.52	7.7	15500	4.3	Roaring Camp
62.37	11.4	15400	5.12	Electra Powerhouse
62.83	17.1	15400	5.18	Electra Afterbay Dam
65.74	16.2	15400	5.58	Big Bar
65.83	20.7	15300	5.6	Upstream of Pardee Reservoir
Upper Bear River Dam				
0	43.0	153000	0	Upper Bear River Dam
0.01	6.83	153000	0	Lower Bear Reservoir
2.84	228.5	1345000	0.5	Lower Bear River Dam No 1
7.99	47.6	1323000	0.93	North Fork Mokelumne River
20.28	102.5	1171000	1.39	Tiger Creek Powerhouse
20.66	107.8	1164000	1.41	Tiger Creek Afterbay Reservoir
21.66	157.9	1147000	1.45	Tiger Creek Afterbay Dam
25.29	106.1	1120000	1.55	West Point Powerhouse
31.16	54.8	1088000	1.73	Roaring Camp
37.01	105.1	1023000	1.88	Electra Powerhouse
37.52	102.5	991000	1.95	Electra Afterbay Dam
40.38	65.4	959000	2.08	Big Bar
40.47	57.2	959000	2.09	Upstream of Pardee Reservoir
Lower Bear River Dam No. 1				
0	222.2	1286000	0	Lower Bear River Dam No 1
5.15	46.4	1264000	0.27	North Fork Mokelumne River
17.44	100	1114000	0.73	Tiger Creek Powerhouse
17.82	104.6	1108000	0.74	Tiger Creek Afterbay Reservoir
18.82	157.3	1093000	0.78	Tiger Creek Afterbay Dam
22.45	104.1	1068000	0.88	West Point Powerhouse
28.32	53.5	1037000	1.07	Roaring Camp
34.17	102.5	983000	1.22	Electra Powerhouse
34.68	100.2	947000	1.28	Electra Afterbay Dam
37.54	63.9	912000	1.41	Big Bar
37.63	56.5	912000	1.42	Upstream of Pardee Reservoir
Lower Bear River Dam No. 2				
0	102.2	672000	0	Lower Bear River No. 2
5.19	34.4	645000	0.3	North Fork Mokelumne River
17.48	74.6	575000	0.85	Tiger Creek Powerhouse
17.86	83.1	594000	0.87	Tiger Creek Afterbay Reservoir
18.86	153.8	779000	0.9	Tiger Creek Afterbay Dam

Table 4.9-31 Theoretical Effects of a Dam Failure – Mokelumne River Project (FERC 0137)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
22.49	85.5	669000	1.03	West Point Powerhouse
28.36	41.4	629000	1.23	Roaring Camp
34.21	76.8	582000	1.42	Electra Powerhouse
34.72	77.6	552000	1.47	Electra Afterbay Dam
37.58	50	529000	1.58	Big Bar
37.67	49.5	529000	1.6	Upstream of Pardee Reservoir
Salt Springs Dam				
0	300.2	2713000	0	Salt Springs Dam
3.47	90.1	2632000	0.15	Mokelumne River Campground
17.42	96.8	2182000	0.62	Tiger Creek Powerhouse
17.8	164.1	2172000	0.63	Tiger Creek Afterbay Reservoir
18.8	162.0	2138000	0.67	Tiger Creek Afterbay Dam
22.43	156.6	2051000	0.79	West Point Powerhouse
28.3	146.4	1982000	0.95	Roaring Camp
34.15	139.5	1833000	1.13	Electra Powerhouse
34.68	136.7	1793000	1.17	Electra Afterbay Dam
37.52	86.3	1740000	1.27	Big Bar
37.61	63.5	1739000	1.27	Upstream of Pardee Reservoir
Tiger Creek Regulator Dam				
0	127.3	82300	0	Tiger Creek Regulator Dam
3.39	14.3	46700	0.06	Tiger Creek Powerhouse
3.51	18.8	46400	0.07	Tiger Creek Afterbay Reservoir
8.38	42.4	12600	0.33	West Point Powerhouse
14.25	7.9	11800	0.63	Roaring Camp
20.10	9	10600	1.18	Electra Powerhouse
20.56	14.1	10000	1.23	Electra Afterbay Dam
23.47	12.9	94000	1.38	Big Bar
23.56	17	9400	1.4	Upstream of Pardee Reservoir
Tiger Creek Afterbay Dam				
0	114.2	487900	0	Tiger Creek Afterbay Dam
3.63	83	164800	0.1	West Point Powerhouse
9.5	19.3	121400	0.28	Roaring Camp
15.35	23.8	80200	0.63	Electra Powerhouse
15.86	28.8	66000	0.68	Electra Afterbay Dam
18.72	24.8	53800	0.93	Big Bar
18.81	28.7	53500	0.94	Upstream of Pardee Reservoir
Lake Tabeaud Dam				

Table 4.9-31 Theoretical Effects of a Dam Failure – Mokelumne River Project (FERC 0137)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
0	75.82	120000	0.2	Lake Tabeaud Dam
6.41	31.25	45600	0.56	Town of Jackson
14.67	-	7420	1.42	Jackson Creek Dam
16.79	5.56	7400	1.81	Buena Vista
23.06	7.02	6400	3.64	Terminus-Confluence With Dry Creek

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 0137

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below. A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information. The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

- Tiger Creek Canal Regulator Headgate Failure (1990): The Tiger Creek Regulator Headgate failed, causing Tiger Creek Canal to overtop. Repaired headgate control system, foundation of canal and erosion damage on Pacific Gas and Electric Company land.
- Tiger Creek Canal Overtopping (1994): Tree that fell into canal blocked flow and caused an overtopping, which resulted in erosion of downhill bank on USFS property. Canal was repaired and the bank was stabilized and re-vegetated.
- Tiger Creek Forebay Penstock Headgate Failure (1997): Forebay Headgate closed in error causing the forebay to spill, which created turbidity in the river. Excess flow protection scheme that initiated the headgate closure was redesigned and installed. Provided flushing flows in the river.
- Salt Spring Road Damage (1996-1997): Salt Spring Road on USFS property (project facility) failed in storm of 1997. The road was compacted and brought back to grade with stabilization measures.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste, as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Mokelumne River Project, unless otherwise indicated, which includes the Tiger Creek Hydro Service Center:

- SPCC Plan,
- EAP,
- FEEP, and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. At the Salt Springs Powerhouse, the ESA identified one material recognized environmental condition. It is listed as follows: Poor waste management practices and soil staining were observed at various areas within the storage area for drums and old equipment (CDM, 1997pp).

No remedial actions at the Salt Springs Powerhouse were reported by Pacific Gas and Electric Company. No material recognized environmental conditions were identified for the Tiger Creek, West Point, or Electra Powerhouses (CDM, 1997ww; 1997bbb;1997q). However, as applicable to a related project site, in an August 4, 2000 Addendum to Salt Springs Hydroelectric Generating Facility Phase I ESA, Pacific Gas and Electric Company identified a 10,000-gallon underground storage tank used to store diesel fuel at the Bear River Resort, located at Lower Bear River Reservoir. The Bear River Resort is a lessee of Pacific Gas and Electric Company. The fiberglass tank was removed in September 1999, and minimal amounts of contaminated soils were found. The Bear River Resort subsequently installed a new tank in October 1999.

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Mokelumne River Project. The following information from the environmental assessment is related to hazards:

- Eleven USEPA database mine locations (M18, M69, M70, M71, M72, M297, M340, M351, M363, M367, and M392) were identified within an eighth of a mile of the associated Lands or on Pacific Gas and Electric Company property within the FERC license 0137 project boundaries. Two of these mines (M69 and M71) plot in the same location and are considered the same mine.

- The aerial reconnaissance did not identify any evidence of mining at eight points identified on the USEPA database as mines, including M18 (located on Associated Lands); M340, M351, M363, M367, and M392 (located on Pacific Gas and Electric Company property within FERC license project boundaries); and M69/M71 and M297 (located outside associated Watershed Lands and FERC license project boundaries). Possible evidence of mining was observed at the mining point identified as M70 (located outside the associated Watershed Lands and the FERC license project boundaries). Evidence of mining was observed at the point identified in the USEPA database as mine M72 (located outside the associated Watershed Lands and FERC license project boundaries), and at five other locations — R80, R83, and R86 (located outside associated Watershed Lands and FERC license project boundaries, not on Pacific Gas and Electric Company property). Two other features were identified during the aerial reconnaissance within the associated Watershed Lands: a trailer (unauthorized human habitation) and an area with solid waste (debris, drums, trailers, pipe and a possible fuel tank).

- Four ERR sites were identified on or within one mile of the associated Watershed Lands. The identified properties consist of the following: Moore Creek Mining Company; Caltrans; Pine Grove Dump; and Pine Grove Conservation Camp. These facilities are located outside associated Watershed Lands and FERC license project boundaries (GMC, 2000x). The Moore Creek Mining Company and the Pine Grove Dump are identified on the Cal-Sites database: however, no specific information was available for

either site. Caltrans is listed as a small quantity hazardous waste generator of waste oil and mixed oil; no violations were reported. The Pine Grove Conservation Camp has registered USTs, and is listed for having gasoline contamination at the site. The status of this site was not reported.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Mokelumne River Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 14: Stanislaus River

Spring Gap-Stanislaus River (FERC 2130)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the Public Safety Plan filed by Pacific Gas and Electric Company accurately depicts the type, number, and locations of the measure provided. The safety measures provided by the licensee are adequate to protect the public during its use of project lands and waters (FERC, 1998d).

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

There have been no third-party incidents involving bodily injury or death for the period of January 1, 1995 to August 1, 2000.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Spring Gap-Stanislaus Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-32.

Table 4.9-32 Dams in the Spring Gap-Stanislaus Project (FERC 2130)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam Inundation Maps
Relief	97-80	3C	High	Yes	Yes
Main Strawberry	97-74	3C	High	Yes	Yes
Philadelphia Diversion	None	None	Low	Exempt	No
Sandbar Diversion	None	None	Low	Exempt	No
Stanislaus Forebay	97-83	2B	Low	Exempt	No
Stanislaus Afterbay	None	None	Significant	Exempt	No

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Spring Gap-Stanislaus River Project are considered to be satisfactory for continued use.

Should the dams in the Spring Gap-Stanislaus ever fail due to facility failure or catastrophic event, however, the downstream communities potentially affected by the inundation waters include the following areas listed on Table 4.9-33. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-33 Theoretical Effects of a Dam Failure – Spring Gap–Stanislaus Project (FERC 2130)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Maximum Stage (Hours)	Landmark/Location
Strawberry Dam				
0	110.31	531000	0.5	Main Strawberry Dam
.93	27.11	520900	0.51	Strawberry
2.05	22.39	512000	0.52	BSA Camp
3.65	44.54	501500	0.56	Philadelphia Diversion
13.55	-	240900	1.19	Lyons Dam
25.32	27.52	214700	1.47	Italian Bar
30.80	39.80	188800	1.78	Terminus Upstream of New Melones Reservoir
Relief Dam				
0	99.47	514100	0.5	Relief Dam
4.14	28.83	477800	0.56	Baker Station
9.09	26.31	443000	0.69	Dardanelles Campground
12.13	28.96	433000	0.75	Wagner
17.43		206900	1.11	Donnells Dam
21.74	18.51	203000	1.19	Mill Creek
24.5	30.38	200700	1.23	Smoothwire Creek
25.42	26.76	200400	1.24	Donnells Powerhouse
29.10	198.72	2555100	1.89	Beardsley Dam
30.01	58.42	2487500	1.9	Spring Gap Powerhouse
31.03	59.44	2460900	1.91	Sand Bar Dam
35.69	73.98	2305300	2	NF Stanislaus River
36.61	70.03	2221300	2.01	Stanislaus Powerhouse, Upstream of Melones Reservoir

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 2130

Pacific Gas and Electric Company has adopted a comprehensive Public Safety Plan at the project that consists of a multitude of safety precautions at project powerhouses, reservoirs, afterbays, forebays, and diversion dams. The outlet works for Strawberry Reservoir (also known as Pinecrest Lake) include a public safety audible warning device (horn) to warn recreationists in the stream channel below the dam of the imminent release of water. Public safety inspections by FERC have not identified hazards to the public (PG&E Co., 1999b).

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of facility failures associated with the project's water conveyance facilities for the period of January 1990 to July 2000 is summarized below. A summary of hazardous material releases (if any) associated with project and water conveyance facilities is also included in the following information. The FERC license requires that facilities be maintained and properly repaired after such incidents to avoid recurrence.

- Philadelphia Canal Overtopping (1992): Ice and snow buildup in the Philadelphia Canal caused an overtopping, which resulted in minor erosion on USFS property. Property was seeded and stabilization measures were installed on the downhill side.
- Philadelphia Flume Failure (1993): Philadelphia flume experienced a slide that undermined the flume footings, which resulted in soil erosion and damage to downstream campground facility not owned by Pacific Gas and Electric Company. Repaired flume, performed soil remediation, and cleaned up campground.
- Main Tuolumne Canal J-Flume Failure (1996): Snowstorm brought tree into J-flume resulting in flume failure and spill to USFS property. Repaired flume and re-vegetated the land.
- Camp 9 Road Repairs (1997): Camp 9 (FERC 2130) roads failed due to extreme storm high water flows, which resulted in erosion into New Melones Reservoir. Roads were rebuilt with retaining walls on the downhill side of the road.
- Relief Dam Hydraulic Line Leak (1998): Line developed a crack, which resulted in minor oil spill of less than a gallon to the Stanislaus River. Absorbent booms were applied.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Spring Gap-Stanislaus Project, unless otherwise indicated:

- SPCC Plan,
- EAP,
- FEEP, and
- Public Safety Plan.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Spring Gap or Stanislaus Powerhouses (CDM, 1997uu; 1997vv).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Spring Gap-Stanislaus Project. The following information from the environmental assessment is related to hazards:

- Two USEPA database mine locations (M1443 and M1444) were identified within one eighth of a mile of the associated Watershed Lands or Pacific Gas and Electric Company property within the FERC license 2130 project boundaries.
- The aerial reconnaissance did not identify any evidence of mining at the point identified in the USEPA database as mine M1444 (located on associated Watershed Lands). Evidence of mining was observed (active mine, shacks, and equipment) at the mining point identified as M1443 and at the reconnaissance point R87 — both are located outside associated Watershed Lands and FERC license project boundaries.
- The EDR, Inc. report indicated a leaking underground storage tank at Kennedy Meadows Resort on the associated Watershed Lands. No other ERR sites were identified within one mile of the associated Watershed Lands (GMC, 2000y). The Kennedy Meadows Resort is included for having diesel contamination associated with a leaking UST that impacted only soil. The status of this site was not reported.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Spring Gap-Stanislaus Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Phoenix (FERC 1061)

Hazards and Relevant Issues Associated with Worker and Public Safety. According to the most recent EPUI, the following issues with regards to safety were identified for the Phoenix Project (FERC, 1993):

- The licensee has installed measures to prevent the release of petroleum products, as well as measures to protect the public.
- Additional public safety devises are needed along the bypassed reach of the SFSR and along the flume portion of the Main Tuolumne Canal.
- A chain link fence topped with bared wire and warning signs are employed at the switchyard to prevent unauthorized entry. The licensee also installed a chain link fence topped with barbed wire around the tailrace because of the high-velocity water jet that occurs when the unit trips off-line. Warning signs have been placed to alert the public to this danger.

- There are no safety devices employed along the flume portion of the Main Tuolumne Canal, which poses a potential danger to anyone attempting to enter, cross, or use it as a walkway to access the river canyon. The placement of additional warning signs may deter some use.
- The licensee limits the rate of change of the releases from Lyons Reservoir to 25 percent of the total flow per hour to protect the public, but has limited control of the river during spill from Lyons Reservoir. Significant flow changes can occur during uncontrolled spills and there are no signs at points of public access along the SRSR to alert recreationists that river flows could increase without warning.
- Additional public safety devises are needed along the bypassed reach of the SRSR and along the flume portion of the Main Tuolumne Canal.

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

There have been no third-party incidents involving bodily injury or death for the period of January 1, 1995 to August 1, 2000.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Phoenix Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-34.

Table 4.9-34 Dams in the Phoenix Project (FERC 1061)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plans	Dam Inundation Maps
Lyons	97-73	3B	High	Yes	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Phoenix Project are considered to be satisfactory for continued use.

Should the Lyons Dam ever fail due to facility failure or catastrophic event, however, the downstream communities potentially affected by the inundation waters include the following areas listed on Table 4.9-35. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-35 Theoretical Effects of a Dam Failure – Lyons Dam, Phoenix Project (FERC 1061)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
0	112.31	707900	36 seconds	Lyons Dam
11.77	37.6	471900	12 minutes	Italian Bar

Table 4.9-35 Theoretical Effects of a Dam Failure – Lyons Dam, Phoenix Project (FERC 1061)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location
13.87	39.65	454300	15 min	Upstream of New Melones Reservoir

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 1061

To improve public safety at the project, Pacific Gas and Electric Company installed safety netting around the concrete block at the right abutment of Lyons Dam (PG&E Co., 1999b).

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. There have been no facility failures associated with the Lyons Dam for the period of January 1990 to July 2000.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste, as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for all of the facilities in the Phoenix Project, unless otherwise indicated:

- SPCC Plan,
- EAP (including Lyons Dam),
- FEEP, and
- Public Safety Plan.

Phase I ESAs were conducted for portions of the lands within the FERC Licensed Areas. No material recognized environmental conditions were reported at the Phoenix Powerhouse (CDM, 1997ff).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Phoenix Project. The following information from the environmental assessment is related to hazards:

- No USEPA database mine locations were identified on or within one eighth of a mile of the associated Watershed Lands or on Pacific Gas and Electric Company property within the FERC license 1061 project boundaries.
- The associated Watershed Lands near the Phoenix Project were flown over on June 13, 2000. No features of potential environmental concern were observed during the aerial reconnaissance.
- One ERR site was identified within one mile of the associated Watershed Lands (the Pine View School) (GMC, 2000z). The Pine View School is included on the USEPA's Facility Index System and National Compliance Database. No contamination was reported at this site.

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Phoenix Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 15: Merced River

Merced Falls (FERC 2467)

Hazards and Relevant Issues Associated with Worker and Public Safety. FERC inspects the project facilities for public safety every three to five years during its EPUIs. According to the most recent EPUI, the following issues were presented regarding public safety and hazards (FERC, 1997b):

- Pollution control measures have been provided, but several oil leaks were noted at the spillway gate hoists.
- The licensee has installed safety devises at the dam, and around the powerhouse and switchyard area to prevent public entry into hazardous areas. A boater barrier is located upstream of the dam. Signs warning of fluctuating flows and underwater hazards have been installed at the fishing access area, car-top boat ramp, and downstream of the powerhouse to protect anglers.
- Adequate public safety measures have been provided.

There have been no occurrences of hospitalization or mortality involving Pacific Gas and Electric Company employees for the period 1990 to August 2000.

Third-party incidents resulting in bodily injury or death for the period of January 1, 1995 to August 1, 2000 are summarized as follows: September 21, 1999, Merced Falls, one fatality – no description available.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths. The information only indicates these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Merced Falls Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of their hazard ratings is presented in Table 4.9-36.

Table 4.9-36 Dams in the Merced Falls Project (FERC 2467)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Acton Plan	Dam Inundation Maps
Merced Falls Dam	95-10	2	High	Yes	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Merced Falls Project are considered to be satisfactory for continued use.

Should the Merced Falls Dam ever fail due to facility failure or catastrophic event, however, the downstream communities potentially affected by the inundation waters include the following areas listed in Table 4.9-37. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone.

Table 4.9-37 Theoretical Effects of a Dam Failure – Merced Falls Dam, Merced Falls Project (FERC 2467)[a]

Distance Below Dam (Miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Maximum Stage (Hours)	Landmark/Location
0	23.68	26950	0.1	Merced Falls Dam
3.01	6.79	10130	0.78	Snelling Diversion Dam
5.8	6.81	8970	1.43	Henderson Park
7.10	6.76	8150	1.84	Rock Diversion Dam, Snelling
8.5	5.92	7590	2.26	Rock Diversion Dam, Snelling Road Bridge
12.80	6.43	6840	3.47	SR 59
22	7.74	4740	7.09	Shaffer Bridge
26.8	7.76	4250	8.77	Cressey
33.7	5.72	3390	12.19	Highway 99
53.70	3.12	2160	31.11	Terminus of Routing (at San Joaquin River)

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Source: Emergency Action Plan FERC 2467

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. There have been no reported facility failures associated with the Merced Falls Project.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State

and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place for the facilities in the Merced Falls Project, unless otherwise indicated:

- SPCC Plan,
- EAP,
- HMBP, and
- Public Safety Plan.

Phase I ESAs were conducted for portions of the lands within the FERC Licensed Areas. At the Merced Falls Powerhouse, the ESA identified one potential material recognized environmental condition. Pacific Gas and Electric Company is evaluating the appropriate steps to take regarding this potential material recognized environmental condition: There is the potential for the soil under the site to be adversely impacted by historic disposal activities. There is a potential that the subsurface has elevated heavy metal concentrations due to historical activities dating to the early 1850s (including, but not limited to, placer mining, grist milling, woolen milling, and electrical generation). Metals of concern include mercury, lead, chromium and zinc. The sources of these metals may include gold recovery operations (mercury), disposal and burning of tin containers and flaking lead-based paint (lead), kiln bricks used in boiler furnaces (hexavalent chromium), and galvanized metal (zinc) (CDM, 1997bb).

Environmental Assessments were conducted for the associated Watershed Lands located outside of the FERC Licensed Areas associated with the Merced Falls Project. The following information from the environmental assessment is related to hazards:

- No USEPA database mine locations were identified on or within one-eighth mile of the associated Watershed Lands or on Pacific Gas and Electric Company property within the FERC License 2467 project boundaries.
- The associated Watershed Lands near the Phoenix Project were flown over on June 13, 2000. Significant dredge tailings piles were observed during the reconnaissance and are shown on the USGS topographic map of the associated Watershed Lands, to the west and south.
- No ERR sites were identified within one mile of the associated Watershed Lands (GMC, 2000aa).

Tables and maps providing details and locations of the hazards described above are included in the GeoMatrix environmental assessments.

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in Section 4.9.3.5, Fire Safety. For the Merced Falls Project, there have been no recent fire events affecting project facilities or Watershed Lands.

Service Centers

Tiger Creek Service Center. The Tiger Creek Hydro Service Center is located adjacent to the Tiger Creek Powerhouse within the Mokelumne River FERC Project boundary. The service center includes facilities for temporarily storing hazardous wastes and aboveground storage tanks. Phase I ESAs were conducted at the Tiger Creek Powerhouse; no material recognized environmental conditions were reported (CDM, 1997ww).

4.9.4.5 Kings Crane–Helms Regional Bundle

In accordance with various Federal, State and local regulations, the hydroelectric facilities operated by Pacific Gas and Electric Company are required by FERC to prepare plans to regulate the use and storage of hazardous materials and to ensure public safety. Depending on the characteristics of the hydroelectric facility (e.g., staffed, unstaffed, or remote facility), and unless specifically exempted by FERC or other regulatory authorities, various plans must be maintained by the Licensee for the project. The components of the various plans are described in Section 4.9.3.

Local Setting

Pacific Gas and Electric Company's hydroelectric facilities and watershed lands in the Kings Crane-Helms Regional Bundle consist of 14 powerhouses located in Madera, Fresno, Tulare and Kern counties in the Sierra Nevada. Four primary rivers provide the water resources for the Kings Crane-Helms Bundle consisting of: the North Fork and South Forks of Willow Creek, tributaries to the San Joaquin River for the Crane Valley Project, the San Joaquin River for the Kerckhoff Project, the North Fork Kings River for the Balch, Haas-Kings and Helms Pumped-Storage Projects, the North Fork of the Middle Fork Tule River for the Tule River Project and the Kern River for the Kern Canyon Project (PG&E Co., 1999b).

Local Regulations and Policies

The Kings Crane-Helms Regional Bundle is located in Madera, Fresno, Tulare and Kern counties. The county General Plans have goals related to safety that would be considered in future land use decisions on the Watershed Lands. The county General Plans do not specifically apply to future development within FERC boundaries. The county General Plans discuss fire and seismic hazards, slope stability, flood, hazardous materials, and other hazard related issues. Some of these General Plans establish priorities for abatement of these hazards. The General plans do not identify any new specific hazards associated with the project that are not already discussed in this chapter.

Bundle 16: Crane Valley

Crane Valley (FERC No. 1354)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers are protected by following a variety of standard practices and regulations, including an Injury and Illness

Prevention Plan (IIPP), Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a FERC License-required Public Safety Plan, which typically includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety every three to five years during its EPUIs.

The Public Safety facilities for the Crane Valley Project include fences topped with barbed wire, boat barriers, and locked gates to preclude public entry in hazardous areas, warning signs and buoys are used to alert the recreating public to a variety of hazards that exist in the project area, as well as to identify boating rules and regulations on Bass Lake. The licensee cooperated with local groups and law enforcement agencies to establish a boating plan for Bass Lake to eliminate safety problems created by the high level of use. The plan limits certain activities to specific areas and times, and requires all boaters to obtain a county use permit, to obey speed restrictions near shore and at night, and to travel counter-clockwise around the lake. The county sheriff patrols the lake to enforce the ordinances derived from the plan. According to the most recent EPUI for the period June 24, 1993 to September 14, 1999, only one issue with regard to safety was identified for the Crane Valley Project (FERC, 1999a): A safety chain across the project canal that conveys water to the San Joaquin 1A Powerhouse was too high to grab, and lacks secondary ropes. Grab chains are no longer considered to be adequate for recovery from flowing water. The licensee was asked in the September 27, 1999 letter to replace this chain.

Pacific Gas and Electric Company typically responds to identified safety issues by eliminating the hazards as soon as conditions allow workers to perform the work safely.

With respect to worker safety, there were no occurrences in the Crane Valley Project Bundle involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000.

Third party incidents resulting in bodily injury or death, occurring between January 1, 1995 and August 2000 are summarized as follows (PG&E Co., 2000b):

- August 14, 1995, Bass Lake (Crane Valley Reservoir), one fatality – a drowning victim was found approximately 40 yards from Crane Valley Dam;
- June 23, 1996, Bass Lake, one fatality and three injuries – A boating accident occurred; no details available;
- November 6, 1998, Bass Lake, one fatality – A 34 year-old, intoxicated male drowned after overturning his canoe near The Pines Marina Boat Launch at approximately 12:30 a.m. Two other men safely swam to shore.

The incidents described above do not imply that Pacific Gas and Electric Company was liable for these injuries or deaths. The information only indicates these incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Crane Valley Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard ratings is presented in Table 4.9-38.

Table 4.9-38 Dams in the Crane Valley Project – FERC 1354

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Chilkoot Lake	N/A	N/A	Low	N/A	N/A
Corrine Lake	95-4	1C	Low	N/A	N/A
Bass Lake (Crane Valley)	95-3	3B	High	Yes	Yes
Manzanita Lake	95-12	2B	High	Yes	Yes
San Joaquin #3 Forebay	95-6	2C	Low	N/A	N/A
San Joaquin #2 Forebay	N/A	N/A	Low	N/A	N/A
Chiquito Creek Feeder	N/A	N/A	Low	N/A	N/A
Browns Creek Diversion	N/A	N/A	Low	N/A	N/A
North Fork Diversion	N/A	N/A	Low	N/A	N/A
South Fork Diversion	N/A	N/A	Low	N/A	N/A
San Joaquin 1A Intake	N/A	N/A	Low	N/A	N/A

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Crane Valley Project are considered to be satisfactory for continued use.

Should the dams in the Crane Valley Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-39. The Dam Inundation Maps should be consulted to determine the actual boundaries of the inundation zone. Table 4.9-39 lists flood data for the theoretical most extreme event.

Table 4.9-39 Theoretical Effects of a Dam Failure – Crane Valley Project – FERC 1354[a]

Distance Below Dam (miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Maximum Stage (Hours)	Landmark/Location
0.00	50.43		**Crane Valley Dam – Fair Weather Condition (FERC No. 1354)**	Crane Valley Dam
3.67	45.46		123700	Manzanita Lake
4.49	62.2		119500	Manzanita Lake Dam

Table 4.9-39 Theoretical Effects of a Dam Failure – Crane Valley Project – FERC 1354[a]

Distance Below Dam (miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Maximum Stage (Hours)	Landmark/Location
5.69	21.19		112300	Bridge
5.96	29.34		112200	Town of North Fork
7.39	32.84	111800	111900	North Fork Diversion
30.27	69.7	106200	3.95	Kerckhoff 1 PH
46.89	---	33400	8.61	Friant Dam
Manzanita Lake Dam – Fair Weather Condition				
0.0	18.1	8330	0.10	Manzanita Lake
1.76	12.5	5600	0.42	Town of North Fork & Sewage Treatment Plant
2.87	7.3	5110	0.60	N.F. Diversion Dam
9.28	9.3	3430	1.43	Confluence w/ San Joaquin River

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Note: Only dams with inundation zone maps have analyzed downstream hazard potential.
Source: Cal OES, FERC Licenced Emergency Action Plans.

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

Crane Valley Dam.

- Could affect a bridge located 0.5 miles downstream of the dam,
- Inundate portions of the town of North Fork and the Sewage Plant
- Could inundate Kerckhoff 1 Powerhouse.

Manzanita Lake Dam.

- Would inundate some portions of the community of North Fork and the Sewage Plant

The Emergency Action Plans (EAPs) include provisions to avoid or minimize the effects of a dam failure to communities, life and property if possible. The EAPs identify means for early detection, evaluation and classification of hazardous conditions, define responsibilities of the owner and emergency agencies for notification and response, and include provisions for preparedness under a host of adverse conditions.

Underwater obstacles in reservoirs such as from rocks, stumps or trees in the lakebed can create hazardous conditions for boating. On the other hand, obstacles enhance fish habitat and eagle and osprey foraging in reservoirs. Providing markers and limiting boat speed in certain areas can minimize the hazards created by obstacles for boaters. In the case of Bass Lake, boater safety has been addressed by placement of warning signs and buoys, identifying boating rules and regulations,

and establishing a Boating Plan in cooperation with local groups and law enforcement agencies as described above as part of the Public Safety Plan (PG&E Co., 1999b).

Hazards can be created by sudden or rapidly changing water releases below project dams. Some of the project FERC licenses include conditions limiting the rate of change of flow releases. In the case of the Crane Valley Project, there are no ramping rate conditions.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. A summary of recent failures associated with the Project's water conveyance facilities for the period January 1990 to July 2000 is summarized below (PG&E Co., 2000b):

- San Joaquin Conduit Washout (1995): The earth embankment was undermined and washed out. Sediment carried downslope to natural stream. The slope was re-established with compacted fill. Check dams were installed on the slope and vegetation was installed for erosion control. Natural high flows flushed out sediment from the stream.

- Browns Creek Conduit Rockfall and Overtopping (1998): Rockfall from the hillside during a storm caused the conduit to overtop and fail, causing erosion of the hillside, contributing sediment into stream channel and washing out a small road to a private residence. Pacific Gas and Electric Company repaired the access road, replaced culverts, and removed sediment in the stream channel. The hillside was re-graded to establish a bench for a new flume. Extensive revegetation is planned to avoid future erosion.

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil erosion on lands adjacent to project waterways. In the case of the Crane Valley Project, these conditions do not exist in the current license, but will likely be included when the new license is issued.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for all of the facilities in the Crane Valley Project:

- SPCC Plans (San Joaquin 1A, 2, and 3, and A.G. Wishon Powerhouses)
- HMBP (Crane Valley and San Joaquin 1A Powerhouses)
- FEEP (San Joaquin 2, San Joaquin 3, and A.G. Wishon Powerhouses)

A summary of hazardous material releases associated with the project for the period January 1990 to July 2000 is included in the following information (PG&E Co., 2000b): San Joaquin PH 3 Flood

(1997): Oil was released due to flooding in the powerhouse from a major storm event. Ninety gallons of oil spilled into the North Fork Willow Creek.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. Based on the original report, no material recognized environmental conditions were identified for the San Joaquin 1A, 2, and 3, Crane Valley, or A.G. Wishon Powerhouses (CDM, 1997qq).

On August 4, 2000, Pacific Gas and Electric Company issued an Addendum to its Crane Valley Hydroelectric Generating Facility Phase I Environmental Site Assessment, dated October 1997. The addendum documents the notification to Pacific Gas and Electric Company by Madera County of conditions relating to three leaking underground gasoline storage tanks located at the Pines Resort, a lessee of Pacific Gas and Electric Company's near the Crane Valley Hydroelectric facilities. The Pines Resort removed and replaced the tanks in July 1999, and determined that the gasoline had previously leaked from the tanks affecting soil and groundwater. Portions of the contaminated soil were removed, while contamination still exists in remaining soil and groundwater. The site is being monitored quarterly while an Interim Corrective Action Plan is being prepared to consider additional remediation.

Environmental Assessments were conducted for the approximately 664 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Crane Valley Project. The following information from the environmental assessment is related to hazards:

- Identification of three mine sites, and possibly one additional mine site, all inactive, two of which were gold, one feldspar, the other unknown;
- Identification of a quarry site; and
- Identification of 11 ERR sites, all within one mile of associated Watershed Lands and FERC License Project boundaries, but outside of the boundaries.

Of the 11 ERR sites, four are reported as having either suspected or as having already incurred environmental contamination. These are summarized as follows:

- Minarets Ranger Station - Leaking diesel fuel of unreported quantity resulted in contaminated soil; remediation not discussed in report; leak is considered a minor threat to water quality.
- Sequoia Forest Industries - Leaking diesel fuel of unreported quantity resulted in contaminated soil; remediation consisted of excavation and treatment of the contaminated soil. There is no apparent threat to water quality reported.
- Sequoia Forest Industries – Leaking diesel fuel of unreported quantity resulted in contaminated soil; remediation was completed or deemed unnecessary; and
- The Pines Shell - See description above under Phase I ESAs for The Pines Resort.

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000bb).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Crane Valley Project, there have been no recent fire events affecting project facilities or associated Watershed Lands. A small fire burned approximately 100 acres of Pacific Gas and Electric Company lands at Manzanita Lake in the 1970 (PG&E Co., 2000b).

Bundle 17: Kerckhoff

Kerckhoff (FERC No. 0096)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers are protected by following a variety of standard practices and regulations, including an Injury and Illness Prevention Plan (IIPP), Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a FERC License-required Public Safety Plan, which includes warning signs, barriers, gates and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety every three to five years during its EPUIs. According to the most recent EPUI for the period June 22, 1993 to April 24, 1997, there were no issues or recommended improvements identified with regard to public safety for the Kerckhoff Project (FERC, 1997a).

With respect to worker safety, there were no occurrences in the Kerckhoff Project Bundle involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000 (PG&E Co., 2000b).

With respect to third-party incidents resulting in bodily injury or death, there were no incidents occurring between January 1, 1995 and August 2000.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dam associated with the Kerckhoff Project is highly regulated by FERC and DSOD to assure its safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard rating is presented in Table 4.9-40.

Table 4.9-40 Dams in the Kerckhoff Project – FERC 0096

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Kerckhoff Reservoir	95-8	3C	Low	N/A	N/A

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's

regulations, the dams, reservoirs and appurtenances within the Kerchoff Project are considered to be satisfactory for continued use.

Should the dam in the Kerckhoff Project ever fail due to facility failure or catastrophic event, there are no downstream communities potentially affected by the inundation waters due to its remote proximity, and the waters would be collected downstream in Millerton Lake.

Underwater obstacles in reservoirs such as from rocks, stumps or trees in the lakebed can create hazardous conditions for boating. On the other hand, obstacles enhance fish habitat and eagle and osprey foraging in reservoirs. Providing markers and limiting boat speed in certain areas can minimize the hazards created by obstacles for boaters.

Hazards can be created by sudden or rapidly changing water releases below project dams. Some of the project FERC licenses include conditions limiting the rate of change of flow releases. In the case of the Kerckhoff Project, Article 40 requires the Licensee to operate the project during flood periods in a manner that will not cause peak river flows below Kerckhoff Dam to exceed peak flows that would have occurred in the absence of the project.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. During the period January 1990 to July 2000, there were no failures associated with the Kerckhoff Project's water conveyance facilities (PG&E Co., 2000b).

In the case of the Kerckhoff Project, the water conveyance facilities consist of tunnels separately conveying water from Kerckhoff Reservoir to Kerckhoff Powerhouse Nos. 1 and 2. The closed-conduit nature of the tunnel systems greatly reduces the hazard potential to the public.

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil erosion on lands adjacent to project waterways. In the case of the Kerckhoff Project, the license conditions are as follows:

- Article 19 – Requires that the licensee be responsible for the prevention of soil erosion on lands adjacent to project waterways, and to prevent stream sedimentation and any other form of water pollution;
- Article 35 – Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands and facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous

materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for all of the facilities in the Kerckhoff Project:

- SPCC Plans (Kerckhoff Powerhouses Nos. 1 and 2)
- HMBP

No hazardous material releases associated with the Kerckhoff Project occurred for the period January 1990 to July 2000.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. In the original report, no material recognized environmental conditions were identified for the Kerckhoff Powerhouses Nos. 1 and 2 or associated facilities (CDM, 1997x).

On August 4, 2000, Pacific Gas and Electric Company issued an Addendum to its Auberry Service Center Phase I Environmental Site Assessment, (original dated April 1998). The addendum documents the removal of a 12,000-gallon underground storage tank previously used for storing jet fuel near the Auberry Service Center Helipad. Results of soil sampling indicated no detectable concentrations of total petroleum hydrocarbons as diesel (TPHd). An Underground Storage Tank Closure Report was submitted to the Fresno County Department of Health on July 8, 1999.

Environmental Assessments were conducted for the approximately 84 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Kerckhoff Project. The following information from the environmental assessment is related to hazards.

Of the five ERR sites, two are reported as having either suspected or as having already incurred environmental contamination. These are summarized as follows:

- Abandoned Exxon – Leaking gasoline of unreported quantity resulted in contaminated soil; remediation was completed or deemed unnecessary; and
- Sequoia Forest Industries – leaking diesel fuel of unreported quantity may have resulted in contamination to the aquifer; the reported status is that the pollution is being characterized.

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000bc).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Kerckhoff Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 18: Kings River

Balch Project (FERC No. 0175)

Hazards and Relevant Issues Associated with Worker and Public Safety. Public safety devices associated with the Balch Project include: a safety barrier upstream of the Black Rock Reservoir spillway; a grab-chain array at Balch Afterbay; chain-linked fencing topped with barbed wire at the water intakes and outlets, at the dams, and at the powerhouse and switchyard complex; flow warning signs along the North Fork Kings River; hazard warning signs at the intake, powerhouses and spillways; and handrails at various locations. According to the most recent EPUI for the period August 2, 1994 to July 21, 1998, only one issue with regard to safety was identified for the Balch Project (FERC, 1998b): High flows during the 1997-1998 winter caused some of the chains on the Balch Afterbay safety array to become twisted. The licensee was requested to straighten the chains when water stopped spilling from the afterbay.

Pacific Gas and Electric Company typically responds to identified safety issues by eliminating the hazards as soon as conditions allow workers to perform the work safely.

With respect to worker safety, there were no occurrences in the Balch Project involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000 (PG&E Co., 2000b).

With respect to third-party incidents resulting in bodily injury or death, there were no incidents occurring between January 1, 1995 and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Balch Project are regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard ratings is presented in Table 4.9-41.

Table 4.9-41 Dams in the Balch Project – FERC 0175

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Black Rock Reservoir	95	3B	Significant	Yes	Yes
Balch Afterbay	95-2	2B	Significant	Yes	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Balch Project are considered to be satisfactory for continued use.

Should the dams in the Balch Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-42. The dam inundation maps should be consulted to determine the actual boundaries of the inundation zone. Table 4.9-42 lists flood data for the theoretical most extreme event.

Table 4.9-42 Theoretical Effects of a Dam Failure – Balch Project (FERC 0175)

Distance Below Dam (miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with population)
Balch Diversion Dam – PMF Condition (FERC No. 0175)				
0.0	106.9	450100	0.00	Balch Diversion Dam
4.8	40.6	350800	0.07	Balch Powerhouse
5.12	---	327300	0.10	Balch Afterbay Dam
6.72	26.8	328600	0.15	Balch Camp *
9.69	60.3	705000	0.20	Main Fork Kings River
10.57	63.7	695600	0.25	Kellers Ranch
11.86	65.8	677500	0.30	Kings River Powerhouse
18.49	180.0	643200	0.50	Pine Flat Reservoir
Balch Afterbay Dam – PMF Condition (FERC No. 0175)				
0.0	63.8	174100	0.00	Balch Afterbay Dam
1.6	20.3	173700	0.07	Balch Camp
4.57	54.6	542,000	0.10	Main Fork Kings River
5.45	57.2	540900	0.20	Kellers Ranch
6.74	59.3	541000	0.25	Kings River Powerhouse
13.37	180.0	541800	0.50	Pine Flat Reservoir

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Note: Only dams with inundation zone maps have analyzed downstream hazard potential.
Source: Cal OES, FERC Licenced Emergency Action Plans.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3. During the period January 1990 to July 2000, there were no failures associated with the Balch Project's water conveyance facilities.

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil erosion on lands adjacent to project waterways. In the case of the Balch Project, these conditions exist in the respective licenses as follows:

- Article 19 – Requires the licensee to be responsible for the prevention of soil erosion on lands adjacent to project waterways; and
- Article 35 – Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands, and facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place in the Balch Project:

- SPCC Plans
- FEEP

A summary of hazardous material releases associated with the Balch Project occurring during the period January 1990 to July 2000 is summarized below (PG&E Co., 2000b):

- Balch Turbine Shaft Oil Spill (1993): Oil spilled from the turbine shaft thrust bearing due to equipment failure. Two gallons of oil entered the North Fork Kings River;
- Black Rock Reservoir Oil Spill at Low Level Outlet (1993): Two gallons of oil spilled into the reservoir due to equipment failure at the outlet;
- Balch Turbine Deflector Oil Spill (1995): ten gallons of oil spilled from the turbine deflector hydraulic oil line into the North Fork Kings River;
- Black Rock Reservoir Oil Spill (2000): Oil spilled from a hydraulic line at the low-level outlet due to equipment failure (CDM, 1997b).

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. Two material recognized environmental conditions were identified for the Balch Project occurring at the Balch No. 1 and 2 Powerhouses and described as follows:

- Past releases of dielectric fluid may have occurred from underground piping in the switchyard that may have affected surrounding soil. In addition, these releases may have contained detectable concentrations of PCB and therefore, PCBs may be detectable in the soil surrounding the underground piping which may have been abandoned in-place.
- Past releases of dielectric fluid may have occurred from switchyard electrical equipment (i.e., transformers and circuit breakers) and may have affected underlying soil. In addition, these releases may have contained detectable concentrations of PCB and therefore, PCBs may be detectable in soil underlying the electrical equipment (CDM, 1997b).

Pacific Gas and Electric Company is evaluating the appropriate steps to take regarding these material recognized environmental conditions.

Environmental Assessments were conducted for the land associated with, but outside of, the FERC Licensed Areas associated with the Balch Project. No potential environmental issues were identified for the associated Watershed Lands (GMC, 2000s).

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000bd; GMC 2000be).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Balch Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Haas-Kings River Project (FERC No. 1988)

Hazards and Relevant Issues Associated with Worker and Public Safety. Public safety devices associated with the Haas-Kings River Project include: safety barriers upstream of the Wishon Dam and Courtright Dam spillways; numerous signs around both project reservoirs to warn of possible changes in water levels; and warning signs to alert the public of hazardous areas. Other public safety-related conditions of the FERC License are listed in the next section titled Hazards and Relevant Issues Associated with Project Dams and Reservoirs. According to the most recent EPUI for the period August 4, 1994 to July 21, 1998, the safety devices were found to be performing adequately to protect the public from hazardous conditions. However, FERC identified one operational issue with regard to high flow releases from Wishon Reservoir occurring in July 1998, which needed investigation. This is discussed in the next section titled Hazards and Relevant Issues Associated with Project Dams and Reservoirs (FERC, 1998c).

With respect to worker safety, there were no occurrences in the Haas-Kings Project involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000.

With respect to third-party incidents resulting in bodily injury or death, there was one incident occurring between January 1, 1995 and August 2000 which is described as follows: October 25, 1997, Wishon Dam, one fatality and one injury – a 48-year old male with a 52-year old male passenger was driving his truck on McKinley Grove Road over the crest of Wishon Dam when they collided with another vehicle and rolled down the face of the dam.

The incident described above does not imply that Pacific Gas and Electric Company was liable for an injury or death. The information only indicates the incidents occurred on or near properties that are in the project.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Hass-Kings River Project are regulated by FERC and DSOD to assure their safe

performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard ratings is presented in Table 4.9-43.

Table 4.9-43 Dams in the Haas-Kings River Project (FERC 1988) and Helms Pumped-Storage Project (FERC 2735)

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Courtright Lake	97-119	4B	High	Yes	Yes
Lake Wishon	97-118	4B	High	Yes	Yes
Lake Wishon Auxiliary Dam #1	97-118	4B	Significant	Yes	Yes

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

According to the most recent DSOD Inspection of Dam and Reservoir in Certified Status Reports, and the Independent Consultant's Safety Inspection Report conducted under Part 12 of FERC's regulations, the dams, reservoirs and appurtenances within the Kings River Bundle are considered to be satisfactory for continued use.

Should the dams in the Haas-Kings River Project ever fail due to facility failure or catastrophic event, the downstream locations potentially affected by the inundation waters include the following areas listed in Table 4.9-44. The dam inundation maps should be consulted to determine the actual boundaries of the inundation zone. Table 4.9-44 lists flood data for the theoretical most extreme event.

Table 4.9-44 Theoretical Effects of a Dam Failure – Haas-Kings River Project (FERC 1988) and Helms Pumped-Storage Project (FERC 2735)[a]

Distance Below Dam (miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with population)
Courtright Dam (PMF Condition)				
0.0	261.0	3,702200	0.00	Courtright Dam
6.65	---	3552400	0.30	Wishon Dam
12.36	89.8	3246000	0.33	Cliff Bridge
14.64	---	2976400	0.40	Balch Diversion Dam
19.50	94.7	2944200	0.53	Balch Powerhouse
19.78	---	2942100	0.60	Balch Afterbay Dam
21.48	64.7	2886600	0.70	Balch Camp *
25.18	133.9	3079100	0.75	Kellers Ranch
26.47	129.1	3045700	0.80	Kings River Powerhouse
33.10	190.0	2957900	0.80	Pine Flat Reservoir

Table 4.9-44 Theoretical Effects of a Dam Failure – Haas-Kings River Project (FERC 1988) and Helms Pumped-Storage Project (FERC 2735)[a]

Distance Below Dam (miles)	Maximum Stage (Feet)[b]	Maximum Discharge (cfs)	Time of Front of Wave (Hours)	Landmark/Location (* denotes a landmark with population)
Wishon Dam (PMF Condition)				
0.0	215.30	3508800	0.05	Wishon Dam
1.25	89.85	3243900	0.15	Cliff Bridge
7.97	---	2958800	0.30	Balch Diversion Dam
12.77	90.15	2922700	0.35	Balch Powerhouse
13.09	---	2889500	0.40	Balch Afterbay Dam
14.69	64.58	2874700	0.40	Balch Camp *
17.66	71.60	2896800	0.45	Main Fork Kings River
18.54	131.73	2993900	0.50	Kellers Ranch
19.83	121.17	2948300	0.50	Kings River Powerhouse
26.46	190.0	2826500	1.00	Pine Flat Reservoir
10.57	63.7	695600	0.25	Kellers Ranch
11.86	65.8	677500	0.30	Kings River Powerhouse
18.49	180.0	643200	0.50	Pine Flat Reservoir

a. Data given are based upon the current setting and developments.
b. Maximum Stage in reservoir locations also reflect the normal depth of water resulting from the reservoir inundation.
Note: Only dams with inundation zone maps have analyzed downstream hazard potential.
Source: Cal OES, FERC Licenced Emergency Action Plans.

Given the current setting and developments, if the dams listed below were to fail, the following downstream consequences could potentially occur:

Courtright Dam.

- Cause failure of Wishon, Balch Diversion and Balch Afterbay Dams,
- Flooding in Balch Camp, and
- Inundation of bridges and effects to recreation facilities around Pine Flat Reservoir.

Wishon Dam.

- Cause failure of Balch Diversion and Balch Afterbay Dams,
- Flooding in Balch Camp,
- Flooding of Balch and Kings River Powerhouses, and
- Inundation of bridges and effects to recreation facilities around Pine Flat Reservoir.

The Emergency Action Plans (EAPs) include provisions to avoid or minimize the effects of a dam failure to communities, life and property if possible. The EAPs identify means for early detection, evaluation and classification of hazardous conditions, define responsibilities of the owner and emergency agencies for notification and response, and include provisions for preparedness under a host of adverse conditions.

Underwater obstacles in reservoirs such as from rocks, stumps or trees in the lakebed can create hazardous conditions for boating. On the other hand, obstacles enhance fish habitat and eagle and osprey foraging in reservoirs. Providing markers and limiting boat speed in certain areas can minimize the hazards created by obstacles for boaters. In the case of Courtright and Wishon Reservoirs for the Haas-Kings River Project, boater safety has been addressed by the following License conditions:

- Article 35 - Requires the licensee to clear the reservoir bottoms and keep the reservoir's shorelines free of dead trees;
- Article 36 – Requires the licensee to maintain the water surfaces of the project reservoirs as high as possible and with minimum fluctuation during the major recreation season;
- Article 46 – Requires the licensee to maintain Courtright Reservoir water levels as high as possible on weekends during the recreation season.

Hazards can be created by sudden or rapidly changing water releases below project dams. Some of the project FERC licenses include conditions limiting the rate of change of flow releases. In the case of the Haas-Kings River Project, flow releases are governed by the following flow and ramping rate conditions:

- Article 32 – Requires operation of the project so that inflow to Pine Flat Reservoir is not increased over natural conditions during periods when the storage capacity of Pine Flat Reservoir reserved for flood control is being used; and
- Article 41 – Requires the licensee to avoid sudden release of large flows into channels normally carrying reduced flows, so as to not endanger life, health and property.

As referred to above in the EPUI discussion, FERC is investigating an incident which occurred July 7–10, 1998, where flow releases below Wishon Dam were rapidly increased, and particularly between July 6, and July 7, 1998 when flows were increased from 43 to 3,406 cfs. The incident created concerns for public safety with regard to operational coordination between Pacific Gas and Electric Company's Kings River Bundle and the ACOE's Pine Flat Reservoir. The event led to an Agreement on Sharing Operating Plans at Pine Flat Reservoir During Critical Flood Control Periods, executed on September 29, 1998, between the ACOE, DWR and Pacific Gas and Electric Company.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric

Company's water conveyance facilities is provided in Section 4.9.3. During the period January 1990 to July 2000, there were no failures associated with the Hass-Kings River Project's water conveyance facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for the Hass-Kings River Project:

- SPCC Plans (Haas, and Kings River Powerhouses)
- FEEP (Haas, and Kings River Powerhouses)

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were reported at the Hass-Kings River Project.

Environmental Assessments were conducted for the approximately 270 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Haas-Kings River Project. The following information from the environmental assessment is related to hazards:

- One mine site, the Victory Mine, that previously mined Tungsten using surface techniques, is located within associated Watershed Lands of the Haas-Kings River Project.
- No ERR sites were identified on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000bd; GMC 2000be).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Hass-Kings River Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Helms Pumped-Storage Project (FERC No. 2735)

Hazards and Relevant Issues Associated with Worker and Public Safety. Public safety devices associated with the Helms Pumped-Storage Project include: installation of marker buoys at the submerged intake/discharge structures in Courtright and Wishon Reservoirs when they become a boating hazard, as a result of dropping reservoir water surface; fencing at the Helms Powerhouse Switchyard; and warning signs to provide notice of various hazards. Access to the underground powerhouse is restricted. Other safety measures in the vicinity are part of the Haas-Kings River Project. According to the most recent EPUI for the period August 4, 1994 to July 22, 1998, the

safety devices were found to be performing adequately to protect the public from hazardous conditions (FERC, 1998a).

With respect to worker safety, there were no occurrences in the Helms Pumped-Storage Project involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000.

With respect to third-party incidents resulting in bodily injury or death, there were no incidents occurring between January 1, 1995 and August 2000.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Helms Pumped-Storage Project (FERC No. 2735) are shared with the Haas-Kings River Project (1988). Please refer to the previous section for a discussion regarding the project dams and reservoirs of the Helms Pumped-Storage Project.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3. During the period January 1990 to July 2000, there were no failures associated with the Helms Pumped-Storage Project's water conveyance facilities.

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil erosion on lands adjacent to project waterways. In the case of the Helms Pumped-Storage Project, these conditions exist in the respective licenses as follows:

- Article 19 – Requires the licensee to be responsible for the prevention of soil erosion on lands adjacent to project waterways; and
- Article 35 – Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands, and facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for all of the facilities in the Helms Pumped-Storage Project:

- SPCC Plans (Helms Powerhouse)
- FEEP (Helms Powerhouse)

A summary of hazardous material releases associated with the Helms Pumped-Storage occurring during the period January 1990 to July 2000 is summarized below (PG&E Co., 2000b):

- Helms Pumped Storage Project Transformer Failure and Fire (1997): Equipment malfunction caused an internal short in the transformer and a fire. A small release of oil (five gallons) discharged to Lake Wishon.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were identified for the Helms Pumped-Storage Project.

Environmental Assessments were conducted for the approximately 328 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Helms Pump Storage Project. The following information from the environmental assessment is related to hazards:

- A quarry site was identified during the aerial reconnaissance for the Helms Pumped-Storage Project.
- No ERR sites were identified on or within one mile of the associated Watershed Lands.

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000bd; GMC 2000be).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Kings River Bundle, there have been no recent fire events, other than the Helms Pumped Storage Transformer failure and fire described in the previous section, affecting project facilities or Watershed Lands.

Bundle 19: Tule River

Tule River (FERC No. 1333)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers are protected by following a variety of standard practices and regulations, including an Injury and Illness Prevention Plan (IIPP), Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a FERC License-required Public Safety Plan, which typically includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety every three to five years during its EPUIs. The most recent EPUI for the Tule River Project for the Period May 25, 1993 to September 28, 1999 was not available from FERC's RIMS Website.

With respect to worker safety, there were no occurrences in the Tule River Project involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000.

With respect to third-party incidents resulting in bodily injury or death, there were no incidents occurring between January 1, 1995 and August 2000 (PG&E Co., 2000b).

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Tule River Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard ratings and the potential flood magnitudes if a dam failure were to occur is presented in Table 4.9-43.

Table 4.9-43 Dams in the Tule River Project – FERC 1333

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Tule River Diversion	N/A	N/A	Low	N/A	N/A
Doyle Springs Diversion	N/A	N/A	Low	N/A	N/A
Hossack Creek Diversion	N/A	N/A	Low	N/A	N/A

Source: DSOD, Pacific Gas and Electric Company's PEA, EAPs

The three diversion dams associated with the Tule River Project are not subject to either DSOD or FERC Part 12 Independent Consultant Inspections and Reports. Based on FERC's and DSOD's low hazard ratings for the diversion dams associated with the Tule River Project, failure of the diversion dams would not create a significant public safety hazard.

Underwater obstacles in reservoirs such as from rocks, stumps or trees in the lakebed can create hazardous conditions for boating. On the other hand, obstacles can enhance fish habitat and eagle and osprey foraging in reservoirs. Providing markers and limiting boat speed in certain areas can minimize the hazards created by obstacles for boaters. In the case of the Tule River Project, the area of impounded water behind the diversion dams is too small to accommodate speed boating (PG&E Co., 1999b).

Hazards can be created by sudden or rapidly changing water releases below project dams. Some of the project FERC licenses include conditions limiting the rate of change of flow releases. In the case of the Tule River Project, there is a ramping rate condition as follows: Article 405 – Requires ramping rates below Tule River and Doyle Springs Diversion Dams that must not be reduced by more than 50 percent per hour.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. During the period January 1990 to July 2000, there were no failures associated with the Tule River Bundle's water conveyance facilities.

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil

erosion on lands adjacent to project waterways. In the case of the Tule River Project, the conditions are as follows:

- Article 19 – Requires that the licensee be responsible for the prevention of soil erosion on lands adjacent to project waterways, and to prevent stream sedimentation and any other form of water pollution;
- Article 30 – Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands and facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for all of the facilities in the Tule River Project:

- SPCC Plans (Tule River Powerhouse)
- FEEP

No hazardous material releases associated with the Tule River Project occurred for the period January 1990 to July 2000.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3.6. No material recognized environmental conditions were identified for the Tule River Powerhouse and associated lands (CDM, 1997yy).

Environmental Assessments were conducted for the approximately 31 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Tule River Project. The following information from the environmental assessment in which two ERR sites were identified is related to hazards:

- Gifford's Market – Leaking gasoline of unreported quantity may have resulted in contamination to the aquifer; the reported status is that preliminary site assessment is underway; and
- Rose's Springville Market – Leaking gasoline of unreported quantity may have resulted in contamination to the aquifer; the reported status is that a preliminary site assessment work plan has been submitted.

Tables and maps providing details and locations of the hazards described above are included in the Geomatrix environmental assessments (GMC, 2000t).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Tule River Project, there have been no recent fire events affecting project facilities or associated Watershed Lands.

Bundle 20: Kern Canyon

Kern Canyon (FERC No. 0178)

Hazards and Relevant Issues Associated with Worker and Public Safety. Workers are protected by following a variety of standard practices and regulations, including an Injury and Illness Prevention Plan (IIPP), Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a FERC License-required Public Safety Plan, which typically includes warning signs, barriers, and fencing to prevent entry into hazardous areas. FERC inspects the project facilities for public safety every three to five years during its EPUIs. The Public Safety facilities include fencing and warning signs at the diversion dam, the outflow of the tunnel, and at the powerhouse and substation. According to the most recent EPUI for the period May 25, 1993 to September 28, 1999, all safety measures were considered adequate for the Kern Canyon Project (FERC, 1999b).

With respect to worker safety, there were no occurrences in the Kern Canyon Project involving a Pacific Gas and Electric Company worker that resulted in either hospitalization or mortality during the period 1990 to August 2000. With respect to third-party incidents resulting in bodily injury or death, there were no incidents occurring between January 1, 1995 and August 2000.

Hazards and Relevant Issues Associated with Project Dams and Reservoirs. The dams associated with the Kern Canyon Project are highly regulated by FERC and DSOD to assure their safe performance during normal operating conditions and also under extreme seismic and hydrologic events. A summary of the hazard ratings is presented in Table 4.9-44.

Table 4.9-44 Dams in the Kern Canyon Project – FERC 0178

Dam Name	DSOD Dam Number	DSOD Hazard Rating	FERC Hazard Rating	Emergency Action Plan	Dam-Break Inundation Map
Kern Canyon Diversion	N/A	N/A	Low	N/A	N/A

Source: DSOD, Pacific Gas and Electric Company's PEA,

The one diversion dam associated with the Kern Canyon Project is not subject to either DSOD or FERC Part 12 Independent Consultant Inspections and Reports. Based on FERC's and DSOD's low hazard ratings for the diversion dam associated with the Kern Canyon Project, its failure would not create a significant public safety hazard.

Underwater obstacles in reservoirs such as from rocks, stumps or trees in the lakebed can create hazardous conditions for boating. On the other hand, obstacles can enhance fish habitat and eagle and osprey foraging in reservoirs. Providing markers and limiting boat speed in certain areas can minimize the hazards created by obstacles for boaters. In the case of the Kern Canyon Project, the area of impounded water behind the diversion dam is too small to accommodate speed boating (PG&E Co., 1999b; FERC, 1999b).

Hazards can be created by sudden or rapidly changing water releases below project dams. Some of the project FERC licenses include conditions limiting the rate of change of flow releases. In the case of the Kern Canyon Project, there is no ramping rate condition.

Hazards and Related Issues Associated with Project Water Conveyance Facilities. General information describing the service life and maintenance activities of Pacific Gas and Electric Company's water conveyance facilities is provided in Section 4.9.3.1. During the period January 1990 to July 2000, there were no failures associated with the Kern Canyon Bundle's water conveyance facilities (PG&E Co., 2000b).

Hazards to life and property can be created by failure or rupture of water conveyance facilities. Standard conditions of the project FERC licenses typically include requirements to maintain facilities so as to protect the integrity of project waters, lands and facilities, and to prevent soil erosion on lands adjacent to project waterways. In the case of the Kern Canyon Project, the conditions are as follows:

- Article 19 – Requires that the licensee be responsible for the prevention of soil erosion on lands adjacent to project waterways, and to prevent stream sedimentation and any other form of water pollution; and
- Article 30 – Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands and facilities.

Hazards and Relevant Issues Associated with Project-Related Hazards and Hazardous Materials and Waste. Pacific Gas and Electric Company maintains various plans in accordance with State and Federal regulations to assure proper handling, storage, and spill prevention of hazardous materials and waste as described in Section 4.9.3. The following plans and reports related to project-related hazards and hazardous materials and waste are in place as applicable for all of the facilities in the Kern Canyon Project:

- SPCC Plans (Kern Canyon Powerhouse)
- FEEP

No hazardous material releases associated with the Kern Canyon Project occurred for the period January 1990 to July 2000.

Phase I ESAs were conducted for facilities and portions of land within the FERC Licensed Areas, as described in Section 4.9.3. No material recognized environmental conditions were identified for the Kern Canyon Powerhouse and associated lands (CDM, 1997y).

Environmental Assessments were conducted for the approximately 610 acres of land associated with, but outside of, the FERC Licensed Areas associated with the Kern Canyon Project. No potential environmental issues were identified for the associated Watershed Lands (GMC, 2000s).

Hazards and Relevant Issues Associated with Fire. A general discussion of potential for fire, fire prevention practices, and fire fighting is included in the Section 4.9.3.5, Fire Safety. For the Kern Canyon Project, there have been no recent fire events affecting project facilities or Watershed Lands.

4.9.5 STANDARDS OF SIGNIFICANCE

For the purpose of analysis during this project, an impact would be considered significant if activities following divestiture would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
- Be located on a site where abandoned mine lands or other features have been identified that would create a significant hazard to the public or the environment;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or a dam;
- Expose people to a significant risk of loss, injury, or death resulting from project operations, including rapidly increasing flow releases, facility failures, or hazardous lake level conditions; and
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

4.9.6 ANALYTICAL METHODS

In order to determine the levels of significance presented in this EIR, numerous sources describing hazards and hazardous materials, public safety, historical incidents to humans and project facilities, and existing site conditions were consulted. Based on review of those sources, and from consultation with individuals and agencies familiar with the hydroelectric facilities and their regulatory requirements, the information gathered was compared to the assumptions of the project presented in Chapter 3, Approach to Environmental Analysis. The following information helps to define what was considered to be a potential hazard to persons and the environment.

4.9.6.1 Hazardous Materials

The term "hazardous materials" refers to both hazardous substances and hazardous wastes. “Hazardous materials” include, but are not limited to, hazardous substances, hazardous waste, and

any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment. The California DTSC defines hazardous materials as follows:

> A hazardous material is a substance or combination of substances which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either: (l) cause, or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating irreversible, illness; or (2) pose a substantial present or potential hazard to human health or the environment when not properly treated, stored, transported or disposed of, or otherwise managed.

As part of this project, hazardous materials include, but are not limited to, the following:

- Chemicals listed on the FERC Licensed specific hazardous materials business plans
- Building materials such as asbestos-containing materials or lead-based paint
- Dielectric fluids potentially containing PCBs
- Materials associated with historical mining activities
- Materials associated with facilities located outside the FERC Licensed Areas or associated Watershed Lands that could have impacted the Project Areas
- Natural occurring hazards in soils

4.9.6.2 Hazardous Waste

A hazardous waste is a "solid waste" that exhibits hazardous characteristics. The USEPA has defined the term "solid waste" to include the following: any gaseous, liquid, semi-liquid, or solid material that is discarded or has served its intended purpose, unless the material is excluded from regulation. Such materials are considered wastes whether they are discarded, reused, recycled, or reclaimed.

The EPA classified a waste as hazardous if it (1) is listed on the EPA's list of hazardous waste; and (2) exhibits one or more of the following properties: ignitability (including oxidizers, compressed gases, and extremely flammable liquids and solids), corrosivity (including strong acids and bases,) reactivity (including materials that are explosive or generate toxic fumes when exposed to air or water), or toxicity (including materials listed by EPA as capable of inducing systemic damage in humans or animals) (ACS, 1986). As part of this project, hazardous wastes include, but are not limited to, the following:

- Wastes associated with abandoned mine lands, such as mercury, asbestos, and cyanide, either in solid, liquid, or airborne form; and
- Wastes associated with operation of the hydroelectric facilities, such as oils, fuels, or dielectric fluids.

4.9.6.3 Hazard vs. Risk

Worker and general public health are potentially at risk whenever hazardous materials have been or will be used. It is necessary to differentiate between the "hazard" of these materials and the acceptability of the "risk" they pose to human health and the environment. A hazard is any situation that has the potential to cause damage to human health and the environment. The risk to human health and the environment is determined by the probability of exposure to the hazardous material and the severity of harm such exposure would pose; that is, the likelihood and means of exposure, in addition to the inherent toxicity of a material, determine the degree of risk to human health. For example, a high probability of exposure to a slightly toxic chemical would not necessarily pose an unacceptable health risk, whereas a low probability of exposure to a highly toxic chemical might.

When the risk of an activity is judged acceptable by society in relation to perceived benefits, the activity is judged to be safe. For example, ammonia is a common household chemical whose use has been judged safe in our society. Although it can be hazardous to health, irritating the eyes, respiratory tract and skin, and even causing bronchitis or pneumonia following severe exposures, the risk of such a severe exposure is believed to be low and its benefits as a cleaner and disinfectant are high. Therefore, the use of household ammonia is thought to be a safe activity.

Means of Exposure to Hazardous Materials

Exposure to hazardous materials could occur in the following manners: (1) exposure to soil and/or groundwater contamination during land development or site modifications; (2) improper handling or use of hazardous materials during the course of business, particularly by untrained personnel; (3) failure of storage containment systems; (4) environmentally unsound treatment/disposal methods; (5) transportation accidents; (6) fire, explosion or other emergencies; and (7) exposure to existing soil and/or contaminants throughout the life of the project.

Health Effects of Exposure to Hazardous Materials

The following factors influence the health effects of exposure to hazardous materials: the dose to which the person is exposed; the frequency of exposure; the duration of exposure; the exposure pathway (route by which a chemical enters a person's body); and the individual's unique biological susceptibility.

The means of exposure, as outlined above, would determine the way in which hazardous materials are absorbed into the body and, therefore, the bodily organs or systems affected. The major ways in which toxic materials may enter and be absorbed by the body are through the mouth (ingestion), the skin (penetration) or the lungs (inhalation). How a hazardous material gets into the body and what damage it causes depends on the form or physical properties of the material, i.e., liquid, solid, gas, dust, fibers, fumes or mist. A chemical may be toxic by one route and not another.

Health effects from exposure to toxic materials may be acute or chronic. Acute effects may include reversible or irreversible damage to organs and systems in the body, including death. Chronic effects may also include systemic and organ damage, but chronic effects of particular concern are birth defects, genetic damage and cancer.

4.9.6.4 Worker and Public Safety

Public safety, as referred to in this project, primarily relates to hazards associated with hydroelectric facilities, and preventative measures and safeguards applied to prevent exposure by humans to hazards. The measures employed to promote public safety also help avoid impacts to the environment. Hazardous conditions can arise from a number of sources or causes, potentially causing harm to either workers at the hydroelectric facilities or people currently or proposed to be living or occupying lands nearby the facilities. Conditions that could adversely impact public safety include, but are not limited to, the following:

- Hydroelectric powerhouse equipment failures or releases of hazardous materials
- Exposure to known or unknown contaminated soil or groundwater
- Dam failures or flooding causing significant releases of water
- Obvious or unseen physical features of abandoned mines
- Water conveyance facility failures
- Exposure to energized equipment, fall potential, or rapidly changing flow releases and/or obstructions or hazards for boating and swimming

4.9.6.5 Project Analysis

Throughout this project, the assumptions made in the discussion of impacts included a thorough review of relevant documents that presented physical and chemical conditions of the FERC Licensed Areas and the Watershed Lands, as well as general safety concerns. Documents summarizing the potential site contamination conditions of portions of the FERC Licensed Areas and Contiguous Watershed Lands included the Phase I ESAs and Phase I ESA addendums that were performed by Camp Dresser and McKee, Inc., as well as reports by Pacific Gas and Electric Company disclosing releases of hazardous materials as a result of facility failures or other activities. The Phase I ESAs determined whether or not areas within the FERC Licensed Areas and Contiguous Watershed Lands presented "material recognized environmental conditions"; Pacific Gas and Electric Company responded to some occurrences of those conditions and described activities to reduce soil and/or groundwater contamination to safe levels. The information provided in this EIR identified, to the extent reported, the site conditions that presented significant impacts or less-than-significant impacts. In addition to the Phase I ESA data, environmental assessments performed for the associated Watershed Lands were reviewed to determine the number of abandoned mines throughout the project, the number of off-site locations that could potentially impact the environmental quality of the project lands, and other features observed to be a potential safety concern.

In reviewing hazards associated with dams and reservoirs, existing inspection procedures conducted by FERC and DSOD were reviewed which evaluate the adequacy of facility maintenance, and the ability of the structures to meet all current stability and hydrologic design criteria. In addition, Emergency Action Plans and various dam safety reports prepared by Pacific Gas and Electric Company, FERC, and DSOD were reviewed to determine the significance of recommended improvements to the facilities, and to determine the potential hazard those facilities have on the immediate and downstream areas. Where applicable and available, dam inundation scenarios were reviewed. In addition, various FERC-required reports, such as the EPUIs were reviewed to determine the adequacy of the Public Safety Plans, as they relate to recreational and general public safety concerns. Improvements identified in these reports were identified and discussed. Data was requested from and provided by Pacific Gas and Electric Company to consider recent historical incidents affecting the safety of workers and the public, to understand if any incidents were caused as a result of project operations or inadequate safeguards, and to analyze the effectiveness of existing protective measures and whether they would transfer to the new owners. In addition, facility failures were analyzed. With respect to water conveyance facilities, failures were compared with specific conditions of the FERC Licenses specifying standards for maintenance, and the applicability of Pacific Gas and Electric Company's standard inspection and maintenance practices to transfer to the new owners. Consultation was also made with California OES, DSOD, DTSC, and California Department of Conservation to receive professional opinions of specific safety issues.

In order to determine whether or not the FERC licensed facilities had appropriate safety and management plans to regulate worker safety and hazardous materials, a review of site-specific plans, such as FEEPs, SPCC Plans, HMBPs, Waste Management Plans were reviewed. The presence of these reports was identified.

In reviewing hazards associated with fire, impacts resulting from potential changes in operating practices and land management were analyzed in comparison to existing standard practices and regulations governing activities on forest lands, along with expected motivations of new owners in managing their lands.

4.9.7 INTRODUCTION TO IMPACTS AND MITIGATION MEASURES

For Hazards and Hazardous Materials, the following impacts have been identified:

- Impact 9-1: The project could involve construction modifications to hydroelectric facilities that could expose the public or workers to contaminated soil and/or groundwater or hazardous building materials (Significant).
- Impact 9-2: The project could result in land development that could expose the public or workers to contaminated soil and/or groundwater (Significant).
- Impact 9-3: The project would not substantially increase the transport, storage, or use of hazardous materials at hydroelectric facilities and new land that could be developed (Less than Significant).

- Impact 9-4: The project could increase risks to workers and the public should reservoir levels, water releases, and/or facility maintenance be managed improperly (Significant).
- Impact 9-5: The project could increase risks to public safety from fire hazards should operating practices or land management change (Significant).

Where impacts are significant, mitigation measures are recommended at the conclusion of the analysis of each impact.

4.9.8 IMPACT 9-1: IMPACT, ANALYSIS, AND MITIGATION MEASURES

Impact 9-1: The project could involve minor modifications to hydroelectric facilities that could expose the public or workers to contaminated soil and/or groundwater or hazardous building materials (Significant).

The Phase I ESAs conducted by Pacific Gas and Electric Company for properties in FERC Licensed Areas (including contiguous Watershed Lands) indicated that soil contamination is present at some of the powerhouse and service center sites included in the divestiture. In order to ensure that the new owner is aware of the site conditions and the potential presence of site contamination, Pacific Gas and Electric Company would be required to provide the new owner with the powerhouse-specific Phase I ESAs, the environmental assessments performed on all Watershed Lands, all appropriate information regarding work that has been conducted to remediate material recognized environmental conditions, and other information pertinent to the presence of hazardous materials at the hydroelectric facilities, such as reports identifying the presence of asbestos containing materials, lead-based paint, and PCBs.

The hydroelectric facility modifications are in place and new owners are not expected to initiate major modifications to the powerhouses. However, new owners may initiate minor construction that could expose the workers, and possibly the public, to certain hazards unless background information is shared with the new owner(s). Since potential facility modifications, which could involve soil excavation, facility renovation, or site alteration, could happen following divestiture, identification of all known site hazards is necessary to avoid unprepared or unprotected contact with contaminated soil or groundwater or hazardous materials. Many of the hydroelectric facilities are likely to have asbestos-containing materials and lead-based paint. Asbestos is considered a health-hazard if it is friable and can be inhaled, and lead-based paint is considered a health-hazard if painted surfaces are deteriorated and it can be inhaled or ingested. State regulations require that inspection, testing, and abatement of these materials be performed by State-certified contractors who are required to comply with applicable health and safety and hazardous materials regulations that would reduce potential hazards to less-than-significant levels.

In addition to the site-specific areas of contamination outlined in the Phase I ESAs, Pacific Gas and Electric Company reported numerous facility failures that resulted in releases of hazardous materials, such as fuels or dielectric fluids potentially containing PCBs. Some of the facility failures may have been the source of the material recognized environmental conditions.

Following divestiture, Federal and State authorities would continue to be involved in all phases of investigating the contaminated sites, preparing appropriate plans for remediation, monitoring the remediation activities, and enforcing the related environmental and safety regulations. Based on conclusions made in the Phase I ESAs, contamination associated with the hydroelectric facilities is generally contained to a localized area surrounding the source of contamination, such as transformers, underground or aboveground storage tanks and associated piping, or past disposal areas. However, unless the areas identified with contamination or hazardous materials are not properly characterized, remediated or mitigated, workers and the public at the impacted hydroelectric facilities, regardless of ownership, could be subject to adverse health effects due to exposure to hazardous materials that may be present in soil or groundwater during ground disturbing activities.

4.9.8.1 Impact 9-1: Shasta Regional Bundle

The information provided in Table 4.9-45 summarizes the potential presence of material recognized environmental conditions in the Shasta Regional Bundle, as well as the presence of potential hazards associated with AML sites and sites identified on environmental regulatory databases (ERR sites). Impacts associated with associated Watershed Lands are presented in Impact 9-2; however, the presence of unknown soil and/or groundwater contamination associated with both the AML sites and ERR sites could impact the FERC Licensed Areas and contiguous Watershed Lands.

Within the Shasta Regional Bundle, the Hat Creek 1 Powerhouse (Bundle 1-Hat Creek 1 and 2, FERC 2661) and Pit 3 Powerhouse (Bundle 2-Pit 3, 4, and 5, FERC 0233), were identified as having material recognized environmental conditions. At the Hat Creek 1 Powerhouse, soil beneath the main transformer and circuit breaker may be impacted with dielectric fluid possibly containing PCBs. At the Pit 3 Powerhouse, dielectric fluids potentially containing PCBs have contaminated the soil surrounding the main transformer and around underground piping. Remedial actions were not reported at these locations.

No material recognized environmental conditions, as outlined in the Phase I ESAs, were identified in Bundle 2: Pit 1 (FERC 2687) and McCloud-Pit (FERC 2106); Bundle 3: Kilarc-Cow Creek (FERC 0606); and Bundle 4: Battle Creek (FERC 1121).

Based on the information presented in the table above, considering the presence of material recognized environmental conditions, AML sites, and ERR sites, the potential for exposure to soil and/or groundwater contamination would be a *significant impact* in Bundle 1: Hat Creek; and Bundle 2: Pit River. The potential for exposure to site contamination is considered to be a *less-than-significant impact* for Bundle 3: Kilarc-Cow Creek and Bundle 4: Battle Creek.

4.9.8.2 Impact 9.1: DeSabla Regional Bundle

The information provided in Table 4.9-46 summarizes the potential presence of material recognized environmental conditions in the DeSabla Regional Bundle, as well as the presence of potential

Table 4.9-45 Summary of Site Contamination Potential – Shasta Regional Bundle

Bundle Number	Phase I ESAs Performed [a]	Material Recognized Environmental Condition Identified[a]	Remedial Action Performed[a]	AML Sites Identified[b]		ERR Sites Identified[b]	
				Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands	Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands
Bundle 1: Hat Creek 1 and 2 (FERC 2661)	Yes	Yes	Not Reported	1 mine	1 mine	None	None
Bundle 2: Pit 1 (FERC 2687)	Yes	No	N/A	None	None	None	None
Bundle 2: Pit 3,4, and 5 (FERC 0 233)	Yes	Yes	Not Reported	6 mines	2 mines	None	None
Bundle 2: McCloud-Pit (FERC 2106)	Yes	No	N/A	1 mine	1 mine	None	None
Bundle 3: Kilarc-Cow Creek (FERC 0606)	Yes	No	N/A	None	None	None	None
Bundle 4: Battle Creek (FERC 1121)	Yes	No	N/A	None	None	2 sites	1 site

a The Phase I ESAs were performed for the powerhouses and portions of the FERC Licensed Areas and contiguous Watershed Lands. Potential site contamination associated with AML sites or sites listed on environmental regulatory reports (ERR Sites) identified in the Environmental Assessments of associated Watershed Lands was not determined in the Phase I ESA Reports.

b Remedial action as may be necessary has not been determined in many cases for the AML sites or ERR sites and is discusseed in Impact 9-2. The number of mines listed is the number located within an eighth of a mile radius of the FERC License Project boundaries and associated Watershed Land boundaries. The number of ERR sites listed are within a one-mile radius of those same boundaries.

hazards associated with AML sites and sites identified on environmental regulatory reports (ERR sites). Impacts associated with associated Watershed Lands are presented in Impact 9-2; however, the presence of unknown soil and/or groundwater contamination associated with both the AML sites and ERR sites could impact the FERC Licensed Areas and contiguous Watershed Lands.

Within the DeSabla Regional Bundle, Rock Creek and Poe Powerhouses (Bundle 6, FERC 2107), Bucks Creek Powerhouse (Bundle 7, FERC 0619), Centerville Powerhouse (Bundle 8, FERC 0803) and Coal Canyon Powerhouse (Bundle 8, Non-FERC) were identified as having material recognized environmental conditions. At Rock Creek Powerhouse, insulating oil leaking from equipment into the rock blotter underlying the switchyard, has been remediated by removing and replacing with new rock material.

Table 4.9-46 Summary of Site Contamination Potential – DeSabla Regional Bundle

Bundle Number	Phase I ESAs Performed[a]	Material Recognized Environmental Condition Identified[a]	Remedial Action Performed[a]	AML Sites Identified[b]		EDR Sites Identified[b]	
				Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands	Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands
Bundle 5: Hamilton Branch (non-FERC)	Yes	No	N/A	No Report		No Report	
Bundle 6: Upper North Fork Feather River (FERC 2105)	Yes	No	N/A	9 mines	5 mines	7 sites	None
Bundle 6: Rock Creek-Cresta (FERC 1962)	Yes	Yes	Yes	2 mines	None	None	None
Bundle 6: Poe (FERC 2107)	Yes	Yes	Yes	5 mines	2 mines	None	None
Bundle 7: Bucks Creek (FERC 0619)	Yes	Yes	Not Reported	3 mines	1 mine	None	None
Bundle 8: DeSabla-Centerville (FERC 0803)	Yes	Yes	Yes	4 mines	2 mines	1 site	1 site
Bundle 8: Lime Saddle (non-FERC)	Yes	No	N/A	2 mines	None	1 site	None
Bundle 8: Coal Canyon (non-FERC)	Yes	Yes	Yes	5 mines	1 mine	3 sites	None

a The Phase I ESAs were performed for the powerhouses and portions of the FERC Licensed Areas. Potential site contamination associated with AML sites or sites listed on environmental regulatory databases (EDR Sites) identified in the Environmental Assessments of associated Watershed Lands was not determined in the Phase I ESA Reports.

b Remedial action as may be necessary has not been determined in many cases for the AML sites or EDR sites and is discusseed in Impact 4.9-2. The number of mines listed is the number located within an 1/8 mile radius of the FERC License Project boundaries and associated Watershed Land boundaries. The number of EDR sites listed are within a one-mile radius of those same boundaries.

At Poe Powerhouse, contamination was observed while removing an underground storage tank, associated piping, and soil around a transformer. Environmental monitoring is continuing at Poe Powerhouse.

At Bucks Creek Powerhouse, the switchyard slid into the North Fork Feather River in the mid-1950s, potentially contaminating the river and river bed with dielectric fluid which may have contained PCBs. At the Oroville Scoping meeting for this project, a member of the public noted serious concern that residual PCBs from this accident and the Caribou accident in 1984 may now be present in the sediment of Lake Oroville. In 1992, a sediment study was conducted at the Rock Creek and Cresta Reservoirs to determine the heavy metal concentrations and occurrence of PCBs. Only one detection of the PCBs was found at Cresta Reservoir using a ten parts per billion (ppb) detection level. Cresta Reservoir is downstream from Bucks Creek. The sample was 17 ppb from a depth of over 58 feet, near the base of the sediment column. The other 168 samples taken from the

reservoirs did not contain detectable levels of PCBs. (PG&E Co., 1992) At this time, there are no analytical data showing contamination in Lake Oroville that can be attributed to these accidents (PG&E Co., 1992).

At the Centerville Powerhouse, gasoline and lead from a removed underground storage tank have contaminated the soil near the Middle Switchyard. The extent of contamination has not been determined. At Coal Canyon Powerhouse (Bundle 8, Non-FERC), insulating oil leaking from equipment into the rock blotter underlying the switchyard has been remediated by removing and replacing with new rock material. No material recognized environmental conditions, as outlined in the Phase I ESAs, were identified in Bundle 5: Hamilton Branch (Non-FERC) and Bundle 8: Lime Saddle (Non-FERC).

Based on the information presented in the table above, considering the presence of materially recognized environmental conditions, AML sites, and ERR sites, the potential for exposure to soil and groundwater contamination would be a *significant impact* in Bundle 5: Hamilton Branch; Bundle 6: Upper North Fork Feather, Rock Creek – Cresta, and Poe; Bundle 7: Bucks Creek; and Bundle 8: DeSabla-Centerville, Lime Saddle and Coal Canyon. The potential for exposure to site contamination would be a *less-than-significant impact*. Bundle 5: Hamilton Branch.

4.9.8.3 Impact 9-1: Drum Regional Bundle

The information provided in Table 4.9-47 summarizes the potential presence of material recognized environmental conditions in the Drum Regional Bundle, as well as the presence of potential hazards associated with AML sites and sites identified on environmental regulatory databases (ER sites). Impacts associated with associated Watershed Lands are presented in Impact 9-2; however, the presence of unknown soil and/or groundwater contamination associated with both the AML sites and ERR sites could impact the FERC Licensed Areas and Contiguous Watershed Lands.

Within the Drum Regional Bundle, the Dutch Flat Powerhouse and Rock Creek Yard Service Center were identified as having material recognized conditions, and the Alta Service Center was identified as having potential recognized environmental conditions. All sites are associated with Bundle 11, Drum Spaulding, FERC 2310. At the Dutch Flat Powerhouse, significant releases of dielectric fluid potentially containing PCBs were identified in the basement of the powerhouse, as well as near transformers and piping in the switchyard. At the Rock Creek Service Center, shallow soil may be impacted with oil. At the Alta Service Center, potential contamination may be present as a result of historical operations at the site and in the vehicle service area and sump. Remedial actions were not reported at these locations. No material recognized conditions, as outlined in the Phase I ESAs, were identified in Bundle 9: Narrows; Bundle 10: Potter Valley; or Bundle 12: Chili Bar.

Table 4.9-47 Summary of Site Contamination Potential – Drum Regional Bundle

Bundle Number	Phase I ESAs Performed[a]	Material Recognized Environmental Condition Identified[a]	Remedial Action Performed[a]	AML Sites Identified[b]		EDR Sites Identified[b]	
				Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands	Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands
Bundle 9: Narrows (FERC 1403)	Yes	No	N/A	None	None	None	None
Bundle 10: Potter Valley (FERC 0077)	Yes	No	N/A	2 mines	1 mine	5 sites	1 site
Bundle 11: Drum-Spaulding (FERC 2310)	Yes	Yes	Not Reported	36 mines	19 mines	103 sites	3 sites
Bundle 12: Chili Bar (FERC 2155)	Yes	No	N/A	9 mines	1 mine	None	None

a The Phase I ESAs were performed for the powerhouses and portions of the FERC Licensed Areas. Potential site contamination associated with AML sites or sites listed on environmental regulatory databases (EDR Sites) identified in the Environmental Assessments of associated Watershed Lands was not determined in the Phase I ESA Reports.
b Remedial action as may be necessary has not been determined in many cases for the AML sites or ER sites and is discusseed in Impact 4.9-2. The number of mines listed is the number located within an 1/8 mile radius of the FERC License Project boundaries and associated Watershed Land boundaries. The number of EDR sites listed are within a one-mile radius of those same boundaries.

Based on the information presented in the table above, considering the presence of material recognized environmental conditions, AML sites, or ERR sites, the potential for exposure to soil and/or groundwater contamination would be a *significant impact* in Bundle 10: Potter Valley; Bundle 11: Drum-Spaulding; and Bundle 12: Chili Bar. The potential for exposure to site contamination is considered to be a *less-than-significant impact* for Bundle 9: Narrows.

4.9.8.4 Impact 9-1: Motherlode Regional Bundle

The information provided in Table 9-48 summarizes the potential presence of material recognized environmental conditions in the Motherlode Regional Bundle, as well as the presence of potential hazards associated with AML sites and sites identified on environmental regulatory databases (ER sites). Impacts associated with associated Watershed Lands are presented in Impact 9-2; however, the presence of unknown soil and/or groundwater contamination associated with both the AML sites and ERR sites could impact the FERC Licensed Areas and Contiguous Watershed Lands.

Table 4.9-48 Summary of Site Contamination Potential – Motherlode Regional Bundle

Bundle Number	Phase I ESAs Performed[a]	Material Recognized Environmental Condition Identified[a]	Remedial Action Performed[a]	AML Sites Identified[b]		EDR Sites Identified[b]	
				Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands	Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands
Bundle 13: Mokelumne River (FERC 0137)	Yes	Yes	No	11 mines	6 mines	4 sites	None
Bundle 14: Spring Gap-Stanislaus (FERC 2130)	Yes	No	N/A	2 mines	1 mine	1 site	1 site
Bundle 14: Phoenix (FERC 1061)	Yes	No	N/A	None	None	1 site	None
Bundle 15: Merced Falls (FERC 2467)	Yes	Yes	Not Reported	None	None	None	None

a The Phase I ESAs were performed for the powerhouses and portions of the FERC Licensed Areas. Potential site contamination associated with AML sites or sites listed on environmental regulatory databases (EDR Sites) identified in the Environmental Assessments of associated Watershed Lands was not determined in the Phase I ESA Reports.
b Remedial action as may be necessary has not been determined in many cases for the AML sites or EDR sites and is discusseed in Impact 4.9-2. The number of mines listed is the number located within an 1/8 mile radius of the FERC License Project boundaries and associated Watershed Land boundaries. The number of EDR sites listed are within a one-mile radius of those same boundaries.

Within the Motherlode Regional Bundle, the Salt Springs Powerhouse (Bundle 13-Mokelumne River, FERC 0137) and the Merced Falls Powerhouse (Bundle 15-Merced River, FERC 2467) were identified as having material recognized environmental conditions. At the Salt Springs Powerhouse, poor waste management practices and soil staining were observed in the drum storage area. Pacific Gas and Electric Company has not reported any remedial activities at the Salt Springs Powerhouse.

At the Merced Falls Powerhouse, there is the potential that the soil under the site has been adversely impacted by historic disposal activities associated with mining activities. No remedial actions or addendums to the Phase I ESAs were reported at this location.

No material recognized environmental conditions, as outlined in the Phase I ESAs, were identified in Bundle 14: Stanislaus River (FERC 2130 and FERC 1061).

Based on the information presented in the table above, considering the presence of material recognized environmental conditions, AML sites, and ERR sites, the potential for exposure to soil and/or groundwater contamination would be a *significant impact* in Bundle 13: Mokelumne River; Bundle 14: Stanislaus River; and Bundle 15: Merced River.

4.9.8.5 Impact 9-1: Kings Crane-Helms Regional Bundle

The information provided in Table 4.9-49 summarizes the potential presence of material recognized environmental conditions in the Kings Crane-Helms Regional Bundle, as well as the presence of potential hazards associated with AML sites and sites identified on environmental regulatory databases (ER sites). Impacts associated with associated Watershed Lands are presented in Impact 9-2; however, the presence of unknown soil and/or groundwater contamination associated with both the AML sites and ERR sites could impact the FERC Licensed Areas and contiguous Watershed Lands.

Table 4.9-49 Summary of Site Contamination Potential – Kings Crane-Helms Regional Bundle

Bundle Number	Phase I ESAs Performed[a]	Material Recognized Environmental Condition Identified[a]	Remedial Action Performed[a]	AML Sites Identified[b]		EDR Sites Identified[b]	
				Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands	Total No. of Sites	Sites Within FERC Boundaries or Watershed Lands
Bundle 16: Crane Valley (FERC 1354)	Yes	Yes	Yes	3 mines	2 mines	11 sites	None
Bundle 17: Kerckhoff (FERC 0096)	Yes	Yes	Yes	none	None	5 sites	None
Bundle 18: Kings River (FERC 0175, 1988 & 2735)	Yes	Yes	No	1 mine	1 mine	None	None
Bundle 19: Tule River (FERC 1333)	Yes	No	N/A	none	None	2 sites	None
Bundle 20: Kern Canyon (FERC 0178)	Yes	No	N/A	none	None	None	None

a The Phase I ESAs were performed for the powerhouses and portions of the FERC Licensed Areas. Potential site contamination associated with AML sites or sites listed on environmental regulatory databases (EDR Sites) identified in the Environmental Assessments of associated Watershed Lands was not determined in the Phase I ESA Reports.
b Remedial action as may be necessary has not been determined in many cases for the AML sites or EDR sites and is discussed in Impact 4.9-2. The number of mines listed is the number located within a 1/8 mile radius of the FERC License Project boundaries and Associated Watershed Land boundaries. The number of EDR sites listed are within a one-mile radius of those same boundaries.

Within the Kings-Crane Helms Regional Bundle, the Crane Valley Project (Bundle 16), Kerckhoff Project (Bundle 17) and the Kings River Projects (Bundle 18) were identified as having material recognized environmental conditions. For Bundle 16 at the Pines Resort near Crane Valley Reservoir, soil and groundwater continue to be contaminated with hydrocarbons after removal of three underground gasoline storage tanks. A monitoring program is in-place while an Interim Corrective Action is being prepared to consider future remediation. For Bundle 17, an underground jet fuel tank was removed at the Auberry Service Center. No detectable hydrocarbon

contaminants were found in the surrounding soil. For Bundle 18, dielectric fluid potentially containing PCBs may have leaked from underground piping, transformers or circuit breakers in the switchyard. Remedial actions or addendums to the Phase I ESAs were not reported at either the Bundle 16 or Bundle 18 locations. No material recognized environmental conditions, as outlined in the Phase I ESAs, were identified in Bundle 19: Tule River; or Bundle 20: Kern Canyon.

Based on the information presented in the table above, considering the presence of material recognized environmental conditions, AML sites, and ERR sites, the potential for exposure to soil and/or groundwater contamination would be a *significant impact* in Bundle 16: Crane Valley; and Bundle 18: Kings River. The potential for exposure to site contamination is considered to be a *less-than-significant impact* for Bundle 17: Kerckhoff; Bundle 19: Tule River; and Bundle 20: Kern Canyon.

4.9.8.6 Evaluation of Impact 9-1 to Entire System

Based on the summary of potential site contamination, either from activities originating from operation of the hydroelectric facilities, or from potential site contamination associated with historic mining activities and off-site operations, the potential for exposure of workers and the public to potentially contaminated soil and groundwater is considered to be a *significant impact*.

4.9.8.7 Impact 9-1 Mitigation Measures

Mitigation Measures Proposed as Part of the Project

Pacific Gas and Electric Company will transfer Phase 1 Site Assessments to the new owner(s).

Mitigation Measures Identified in This Report

Mitigation Measure 9-1a: Prior to or concurrent with the transfer of title for Bundles 1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, and 18, Pacific Gas and Electric Company shall provide reports of all contamination surveys, and remedial actions, as well as maps of the areas of contamination, to the new owner(s).

Mitigation Measure 9-1b: Prior to any site modification activities involving soil disturbance at the sites identified as having material recognized environmental conditions, abandoned mines or other ERR sites, or in the event that additional site investigations find evidence of contamination, hazardous materials spills, or some other adverse environmental condition, environmental samples consisting of, but not limited to, a Site Modification Plan shall be prepared to address and mitigate possible effects of the contamination. The Site Modification Plan should be prepared by environmental professionals and include soil and/or groundwater sampling as appropriate. If analyses of environmental samples do not identify the presence of contaminants, no further mitigation is required. If analyses of environmental samples identify contamination that could present a threat to human health and the environment, appropriate state and local agencies shall be

contacted for guidance on how to proceed with site remediation. Site remediation measures shall incorporate, at the very least, the following:

- Specific measures to protect workers and the public from exposure to potential site hazards;
- Certification that the proposed remediation measures would clean up the contaminants, dispose of the wastes, and protect public health in accordance with federal, state, and local requirements;
- Commencement of work in the areas of potential hazards shall not proceed until the site remediation plan has been completed and approved by the regulating agency;
- In the event that features or materials that could present a threat to human health or the environment are discovered or caused during site modification activities, work in that immediate area shall cease immediately. A qualified environmental professional shall evaluate the find and make appropriate recommendations, which shall be followed.

4.9.8.8 Significance After Mitigation

Less than significant.

4.9.9 IMPACT 9-2: IMPACT, ANALYSIS AND MITIGATION MEASURES

Impact 9-2: The project could result in land development that could expose the public or workers to contaminated soil and/or groundwater (Significant).

The environmental assessments performed for the associated Watershed Lands identified locations throughout the Project Lands that are potentially affected by historic mining activities, as well as off-site areas that are included on environmental regulatory databases (ER) and other unauthorized activities observed during an aerial reconnaissance. The accuracy of the mine locations was not known; therefore there may be additional or fewer AML sites within the Watershed Lands, as well as within the FERC Licensed Areas. Locations proposed for development and re-development within all Project Lands could encounter hazards associated with previously unknown AML sites, exposing workers, residents, and the general public to potential physical and chemical hazards.

The ERR sites may consist of leaking underground or aboveground storage tank sites, contaminated landfills, or facilities having contamination as a result of illegal hazardous waste disposal. Conversely, the ERR sites may consist of sites with permitted underground or aboveground storage tanks with no known contamination or facilities that simply store small amounts of hazardous materials.

4.9.9.1 Impact 9-2: Shasta Regional Bundle

As presented in Table 4.9-45, AML sites or environmental regulatory database sites were identified on the associated Watershed Lands in Bundle 1: Hat Creek; Bundle 2: Pit River; and Bundle 4: Battle Creek. No AML sites or ERR sites were identified in Bundle 3: Kilarc-Cow Creek; therefore, the potential of encountering soil or groundwater contamination in Bundle 3 is considered to be a *less-than-significant impact*. However, the potential for encountering hazards such as soil

or groundwater contamination originating from either AML sites or ERR sites is considered to be a *significant impact* in Bundle 1, Bundle 2, and Bundle 4.

4.9.9.2 Impact 9-2: DeSabla Regional Bundle

As presented in Table 4.9-46, AML sites or environmental regulatory database sites were identified on the associated Watershed Lands in Bundle 6: Upper North Fork Feather River; Bundle 7: Bucks Creek; and Bundle 8: Butte Creek. It is unknown whether or not AML sites or ERR sites were identified in Bundle 5: Hamilton Branch, as an environmental assessment was not conducted for the associated Watershed Lands. Since there was no environmental assessment performed for Bundle 5, there may be AML sites and ERR sites within the Associated Watershed Land boundaries. The potential for encountering hazards such as soil or groundwater contamination originating from either AML sites or ERR sites is considered to be a *significant impact* in Bundle 5, Bundle 6, Bundle 7, and Bundle 8.

4.9.9.3 Impact 9-2: Drum Regional Bundle

As presented in Table 4.9-47, AML sites or environmental regulatory database sites were identified on the associated Watershed Lands in Bundle 10: Potter Valley; Bundle 11: Drum Spaulding; and Bundle 12: Chili Bar. No AML sites or ERR sites were identified in Bundle 9: Narrows; therefore, the potential of encountering soil or groundwater contamination in Bundle 9 is considered to be a *less-than-significant impact*. However, the potential for encountering hazards such as soil or groundwater contamination originating from either AML sites or ERR sites is considered to be a *significant impact* in Bundle10, Bundle 11, and Bundle 12.

4.9.9.4 Impact 9-2: Motherlode Regional Bundle

As presented in Table 4.9-48, AML sites or environmental regulatory database sites were identified on the associated Watershed Lands in Bundle 13: Mokelumne River and Bundle 14: Stanislaus River. AML sites or regulatory database sites were not identified in Bundle 15: Merced River; therefore, the potential of encountering soil or groundwater contamination in Bundle 15 is considered to be a *less-than-significant impact*. The potential for encountering hazards such as soil or groundwater contamination originating from either AML or ERR sites is considered to be a *significant impact* in Bundle 13 and Bundle 14 in the Motherlode Regional Bundle.

4.9.9.5 Impact 9-2: Kings Crane-Helms Regional Bundle

As presented in Table 4.9-49, AML sites or environmental regulatory database sites were identified on the associated Watershed Lands in Bundle 16: Crane Valley; Bundle 18: Kings River. AML sites or regulatory database sites were not identified in Bundle 17: Kerchoff; or Bundle 20: Kern Canyon; therefore, the potential of encountering soil or groundwater contamination in Bundle 17 and Bundle 20 is considered to be a *less-than-significant impact*. The potential for encountering hazards such as soil or groundwater contamination originating from either AML or ERR sites is

considered to be a *significant impact* in Bundle 16, and Bundle 18 in the Kings Crane-Helms Region.

4.9.9.6 Impact 9-2: Evaluation of Impact 9-2 to Entire System

Based on the summary of potential site contamination associated with historic mining activities and off-site operations, exposure of workers and the public to potentially contaminated soil and groundwater is considered to be a *significant impact*.

4.9.9.7 Impact 9-2: Mitigation Measures

Mitigation Measures Proposed as Part of the Project

No mitigation measures were identified as part of the project.

Mitigation Measures Identified in This Report

Mitigation Measure 9-2a: Implement Mitigation Measure 9-1a.

Mitigation Measure 9-2b: Implement Mitigation Measure 9-1b.

Mitigation Measure 9-2c: Prior to land development on the Bundles identified as having Abandoned Mine Lands (AML) sites (Bundles 1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16 and 18), an environmental professional shall conduct a site assessment of the area using procedures and guidance established in The California Department of Toxic Substances Control's (DTSC) Abandoned Mine Lands Preliminary Assessment Handbook. Development options shall comply with the conclusions of the site assessments.

4.9.9.8 Level of Significance After Mitigation

Less than significant.

Alternative Mitigation Measure 9-2: As an alternative to Mitigation Measures 9-2a, 9-2b and 9-2c, above, prior to or concurrent with the transfer of title for Bundles 1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16, or 18, there shall be recorded against the Watershed Lands within the bundle conservation easements running with the land and (in an form and substance approved by the CPUC) precluding any further land use development, or expansion of timber harvest or mineral extraction activities.

4.9.10 IMPACT 9-3: IMPACT, ANALYSIS, AND MITIGATION MEASURES

Impact 9-3: The project would not substantially increase the transport, storage, or use of hazardous materials at hydroelectric facilities and new land that could be developed (Less than Significant).

4.9.10.1 Evaluation of Impact 9-3 to Entire System

Throughout the entire system, compliance with Federal, State, and local safety requirements would continue to be enforced. Any changes resulting from the divestiture that is within the safety standards established by FERC and other agencies associated with the operation of the hydroelectric facilities would not cause significant impacts. In addition, Federal, State, and local agencies extensively regulate the transportation, storage, handling, use, and disposal of hazardous materials and wastes. These agencies would continue to provide regulatory oversight of relevant activities throughout the system following divestiture, regardless of the identity of the owner. Furthermore, as Pacific Gas and Electric Company's hydroelectric facilities currently use few hazardous materials, it is not foreseeable that divestiture would result in a substantial increase in the use of hazardous materials or generation of hazardous wastes. A summary of Federal and State regulations pertaining to hazardous materials and waste and safety is presented in Table 4.9-1.

Also throughout the entire system, while there may be variations in how a new owner would operate and maintain the hydroelectric facilities, these variations must follow a set of operational obligations that are prescribed by physical, legal, and regulatory constraints. Although a change in the type, storage, handling, use, or disposal of hazardous materials and wastes is not anticipated as part of the ownership transfer, should the materials differ, they would be highly controlled by numerous Federal, State, and local regulations.

In order to ensure that, upon divestiture, the new owner has all possible information regarding hazardous materials use and storage, Pacific Gas and Electric Company would provide the new owner with its non-privileged plans, permits, informational materials, and training documents pertaining to the use of hazardous materials. These documents shall include, but not be limited to, the Hazardous Materials Business Plans (HMBPs) and Modified HMBPs, permits for underground and aboveground storage tanks, Spill Prevention Control and Countermeasure (SPCC) Plans, Facility Environmental Emergency Plans (FEEPs), Pacific Gas and Electric Company's bulletins discussing asbestos, PCBs, and lead-based paint, and Pacific Gas and Electric Company’s Hazard Communication Manual and Hazardous Waste Manual. Under Federal and State regulations, the new owner would be required to implement and maintain up-to-date HMBPs, FEEPs, and SPCC Plans for its facilities, and to train its employees in the safe handling and use of hazardous materials. Cal OSHA would continue to regulate worker health and safety at the hydroelectric facilities, and would require the new owner to maintain an Illness and Injury Prevention Program (IIPP) for its personnel. As part of the ownership transfer, Pacific Gas and Electric Company would provide the new owner with its worker safety plans, including its IIPP. Based on the numerous State and Federal regulations requiring hazardous material safety plans and worker education, exposure to hazards and hazardous materials associated with operations of the hydroelectric facilities throughout the entire system is considered to be a *less than significant impact*. Due to the extensive coverage of Federal and State regulations, the transportation, storage,

handling, use, and disposal of hazardous materials and waste throughout the entire system is considered to be a *less than significant impact*.

4.9.10.2 Impact 9-3: Mitigation Measures

Mitigation Measures Proposed as Part of the Project

Pacific Gas and Electric would include for provision of operations and maintenance services by knowledgeable and experienced personnel for the first two years of ownership by the new owner(s).

Pacific Gas and Electric would transfer non-privileged public safety and worker health and safety information applicable to the facilities.

Mitigation Measures Identified in This Report

None required.

4.9.10.3 Impact 9-3: Level of Significance After Mitigation

The impact shall remain *less than significant*.

4.9.11 IMPACT 9-4: IMPACT, ANALYSIS AND MITIGATION MEASURES

Impact 9-4: The project could increase risks to workers and the public should reservoir levels, water releases, and/or facility maintenance be managed improperly (Significant).

4.9.11.1 Evaluation of Impact to Entire System

Impacts Associated with Worker and Public Safety

Throughout the entire system, workers at the hydroelectric facilities are protected by a variety of standard operating practices and regulations and plans, such as an Injury and Illness Prevention Plan (IIPP), Code of Safe Work Practices, and a Hazard Communications Manual. The public is protected from various hazards within the project under a FERC License-required Public Safety Plan, which typically includes warning signs, barriers and fencing to prevent entry into hazardous areas. Hazardous areas typically include locations with energized equipment, fall potential, and swift or rapidly changing water conditions. Hazards more specifically associated with dams and reservoirs and water conveyance facilities are discussed below. Since the new owners would be required to maintain and apply the same standard practices and regulations, as applicable to protection of its workers and the public, the impact, as a result of the proposed project, would be *less than significant*.

Impacts Associated with Project Dams and Reservoirs

Following divestiture, regardless of owner, FERC would continue to administer project safety and hazard reduction measures through a number of its standard provisions. These provisions include requiring the licensee to comply with the following:

- Standard and project-specific conditions of the FERC license governing project operations;
- Updating training and procedures for detection, notification and response as part of the Emergency Action Plans (EAPs) for dams where theoretical inundation from a dam-break poses a high or significant hazard to downstream communities or developments; and
- Maintaining Public Safety Plans to provide adequate public warning and safeguards to hazardous facilities and project-specific conditions.

FERC routinely performs field inspections to assure the project is being properly operated and maintained, and to assure that necessary safeguards are in place. These inspections include an annual Operations Inspection and an Environmental and Public Use Inspection (EPUI) every three to five years. During these inspections, FERC inspects the condition of facilities and safeguards, and compliance with license conditions over the period since the last inspection. If FERC finds deficiencies or recommends changes, FERC requires the licensee to perform necessary maintenance and improvements. FERC's annual Operations Inspections typically focus on reviewing the condition of the project dams with high or significant hazard ratings, and to a much lesser degree, performing a limited inspection of some powerhouses and water conveyance facilities. Under FERC's regulations (Part 12), FERC also requires for the high hazard dams for which it administers, an inspection and safety review every five years as prepared by an independent consultant. The scope of the inspections and safety review are summarized in a report addressing such topics as geologic and seismic considerations, instrumentation, field inspection, spillway adequacy, structural stability, adequacy of maintenance and methods of operation, conclusions and recommended corrective measures. Within the scope of the consultant's safety review, as well as FERC and DSOD officials, dams are frequently re-evaluated for changes in seismicity and their ability to remain stable under peak ground accelerations generated by the maximum credible earthquake. As an example of report findings and recommendations, at Blue Lake in the South Yuba River – Bundle 11, it was determined that the dam had stability issues requiring remediation. Pacific Gas and Electric Company replaced the dam in the year 2000.

In addition to FERC's overall project oversight, DSOD provides an additional level of safety oversight, particular to the more potentially hazardous project dams under their jurisdiction. DSOD, at least annually and up to four times per year, performs safety inspections of project dams under their jurisdiction. The nature of FERC's and DSOD's regulatory oversight is to emphasize efforts on those facilities having the greatest potential for human harm, primarily the safety and adequacy of project dams. The regulatory mechanisms summarized above provide assurance that the dams and reservoirs are performing as designed, meet the latest structural and hydrologic requirements, and provide warnings and safeguards to prevent the public from entering hazardous

areas. The regulatory mechanisms for inspection and maintaining public warning devices and safeguards will help guarantee that there is no change with regard to safety in how project dams are structurally maintained and performing.

However, the inspection and Public Safety Plan regulatory mechanisms do not address project operations in any significant detail. Operating requirements are more a function of project-specific license conditions, and possibly other local cooperating agreements, such as for water supply, flood control or recreation, which are consistent with license conditions. Conditions included under the FERC Licenses for controlling the operation of the dams and reservoirs, and safeguards required under the license-related Public Safety Plans, vary significantly as to the level of protection provided against hazards caused by rapidly changing flow releases and/or obstructions or hazards for boating and swimming. Typical FERC License conditions pertaining to reduction of public hazards may include one or more of the following:

- Maintaining lake levels as high as possible during the recreation season
- Specifying a minimum pool elevation or storage capacity
- Requiring clearing of the reservoir lakebed and keeping the shorelines free of dead trees
- Removing floating debris from the reservoirs
- Specifying maximum rates of change for flow releases from a reservoir
- Requiring operation such that flow releases downstream do not exceed natural conditions
- Specifying that sudden releases of large flows into channels normally carrying reduced flows are avoided

In addition, some Public Safety Plans include provisions for the Licensee to place markers in the reservoir to identify boating obstacles as they appear during fluctuating lake level operations.

The review of documented incidents reported by Pacific Gas and Electric Company and through review of FERC's EPUIs do not suggest, for the most part, an inadequacy in public safeguards, as provided by FERC license conditions or the Public Safety Plans. None of the third party incidents described in the Bundle Settings discussions, with exception to Bundle 18, appear to be attributable to project operations or inadequate public safeguards. Only one incident, as described in Section 4.9.4.5 (Bundle 18: Kings River), appears to suggest that inadequate safeguards may have been in-place at the time of the incident. The incident occurred between July 7 and July 10, 1998, when flow releases below Wishon Dam into the North Fork Kings River were rapidly increased, particularly between July 6 and 7 when flows were increased from 43 cfs to 3,406 cfs. The incident in Bundle 18 created concerns regarding public safety and operational coordination between Pacific Gas and Electric Company's Kings River Bundle and the Army Corps of Engineer's Pine Flat Reservoir. The event led to an Agreement on Sharing Operating Plans at Pine Flat Reservoir During Critical Flood Control Periods, executed on September 29, 1998, between the Army Corps of Engineers, Department of Water Resources and Pacific Gas and Electric Company.

The new owner would be subject to the same level of FERC and DSOD inspections and standards for maintaining the dams and reservoirs, as well as being required to comply with the same FERC

License conditions and maintain the same Public Safety Plans as has Pacific Gas and Electric Company. Therefore, this is a *less-than-significant impact* system-wide, except for the Kings River Bundle, where a *significant impact* exists.

Impact Associated with Water Conveyance Facilities

The water conveyance facilities throughout the entire system do not receive the same level of oversight as the project dams, largely because they do not pose the same magnitude of potential for inundation, human harm or environmental damage. In addition, since the water conveyance facilities are so vast in length, the regulatory agency's labor resources are not adequate to provide greater oversight. However, the risk of failure for the water conveyance facilities can vary significantly from lower risk for closed conduit systems like tunnels and pipelines, to higher risk for open conduits like canal and flume sections. The change in risk is due largely to the environmental exposures, whereby open conduits can be exposed to debris restrictions or fall from trees, rocks and soil, and snow and ice accumulations, whereby closed conduits are generally not similarly exposed.

Open conduits, particularly flume structures, typically require a higher level of maintenance and operations monitoring as compared to closed conduits. Pacific Gas and Electric Company has developed standard inspection and maintenance procedures through its series of Maintenance Bulletins for assuring a proper level of operations oversight by its project personnel. With respect to maintenance of water conveyance facilities, the bulletins specifically include Bulletin Nos. 29, 35, 40, 43, 45, 48, 62, 63, 82, 85, 86, PG-G090, PG-G091 and PG-G092. A new owner would not necessarily develop its own similar procedures, and would have significant discretion in how it approaches operations oversight of the water conveyance facilities.

In addition to utilizing standard inspection and maintenance procedures, many of the FERC Licenses associated with the projects include conditions specifying a standard for maintenance by including one or more of the following paraphrased conditions:

- Requires the licensee to be responsible for the prevention of soil erosion on lands adjacent to project waterways
- Requires the licensee to maintain the projects so as to protect the integrity of project waters, lands and facilities

Failure of water conveyance facilities can be potentially hazardous to workers and the public, cause extensive damage to facilities, the environment, and third party land and developments, and cause extended periods of interruption in service potentially affecting water supply and power generation. Table 4.9-50 summarizes the number of water conveyance facility failures occurring over the past ten years beginning in January 1990, as well as identifies whether or not there exists FERC License conditions specifying a standard for maintenance.

Table 4.9-50 Water Conveyance Facility Failures Occurring over the Past 10 Years & FERC License Conditions Specifying Standards for Maintenance

Bundle/Project	Majority of Water Conveyance Facilities - Open vs. Closed Conduit	FERC Licence Condition for Prevention of Soil Erosion	FERC Licence Condition for Protecting Integrity of Project Facilities	No. of Water Conveyance Facility Failures over Past 10 Years
Bundle 1: Hat Creek 1 and 2 (FERC 2661)	Open	Yes	No	0
Bundle 2: Pit 1 (FERC 2687)	Closed	Yes	Yes	0
Bundle 2: Pit 3,4, and 5 (FERC 0233)	Closed	Yes	Yes	0
Bundle 2: McCloud-Pit (FERC 2106)	Closed	Yes	No	0
Bundle 3: Kilarc-Cow Creek (FERC 0606)	Open	Yes	Yes	0
Bundle 4: Battle Creek (FERC 1121)	Open	Yes	Yes	0
Bundle 5: Hamilton Branch (non-FERC)	Open	N/A	N/A	0
Bundle 6: Upper North Fork Feather River (FERC 2105)	Closed	Yes	No	0
Bundle 6: Rock Creek-Cresta (FERC 1962)	Closed	No	No	0
Bundle 6: Poe (FERC 2107)	Closed	No	No	0
Bundle 7: Bucks Creek (FERC 0619)	Closed	Yes	Yes	1
Bundle 8: DeSabla-Centerville (FERC 0803)	Open	Yes	Yes	4
Bundle 8: Lime Saddle (non-FERC)	Open	N/A	N/A	1
Bundle 8: Coal Canyon (non-FERC)	Open	N/A	N/A	0
Bundle 9: Narrows (FERC 1403)	Closed	Yes	Yes	0
Bundle 10: Potter Valley (FERC 77)	Closed	Yes	Yes	0
Bundle 11: Drum-Spaulding (FERC 2310)	Open	Yes	No	14
Bundle 12: Chili Bar (FERC 2155)	Closed	No	No	0
Bundle 13: Mokelumne River (FERC 0137)	Open	No	No	3
Bundle 14: Spring Gap-Stanislaus (FERC 2130)	Closed	No	No	2*
Bundle 14: Phoenix (FERC 1061)	Open	Yes	No	1
Bundle 15: Merced Falls (FERC 2467)	Closed	Yes	Yes	0
Bundle 16: Crane Valley (FERC 1354)	Open	No	No	2
Bundle 17: Kerchoff (FERC 0096)	Closed	Yes	Yes	0
Bundle 18: Kings River (FERC 0175 - Balch)	Closed	Yes	Yes	0
Bundle 18: Kings River (FERC	Closed	No	No	0

Table 4.9-50 Water Conveyance Facility Failures Occurring over the Past 10 Years & FERC License Conditions Specifying Standards for Maintenance

Bundle/Project	Majority of Water Conveyance Facilities - Open vs. Closed Conduit	FERC Licence Condition for Prevention of Soil Erosion	FERC Licence Condition for Protecting Integrity of Project Facilities	No. of Water Conveyance Facility Failures over Past 10 Years
1988 – Haas-Kings)				
Bundle 18: Kings River (FERC 2735 -Helms)	Closed	Yes	Yes	0
Bundle 19: Tule River (FERC 1333)	Closed	Yes	Yes	0
Bundle 20: Kern Canyon (FERC 0178)	Closed	Yes	Yes	0

Note: The two failures noted in Bundle 14 – Spring Gap/Stanislaus occurred in an "Open" Section of the Philadelphia Canal.
Source: PEA, Volume 8, Appendix A; PEA, Volume 10, Appendix D; Pacific Gas and Electric Company's Response to Aspen Environmental Group Data Request No. 37, Item No. 1, Part 2.

As can be concluded from the data provided above, the open conduit systems have a much greater risk of failure. The conditions of each FERC License vary as to whether it includes specific provisions for preventing soil erosion, and protecting the integrity of project facilities, waters and land. If a similar level of standard operating practices and regulatory compliance conditions is not maintained, the proposed project could result in a *significant impact*.

4.9.11.2 Impact 9-4: Mitigation Measures

Mitigation Measures Proposed as Part of the Project

No mitigation measures were identified as part of the project.

Mitigation Measures Identified in This Report

Mitigation Measure 9-4a: Prior to or concurrent with the transfer of title for Bundle 18, the new owner shall by binding written instrument agree to implement the Agreement on Sharing Operating Plans at Pine Flat Reservoir During Critical Flood Control Periods, executed on September 29, 1998 between the Army Corps of Engineers, Department of Water Resources, and Pacific Gas and Electric Company.

Mitigation Measure 9-4b: Prior to or concurrent with the transfer of title for each bundle, the new owner shall by binding written agreement commit to implement the measures specified in:

- Pacific Gas and Electric Company's Hydro Bulletins related to maintenance of water conveyance facilities. The bulletins specifically include Nos. 29, 35, 40, 43, 45, 48, 62, 63, 82, 85, 86, PG-G090, PG-G091 and PG-G092.

4.9.11.3 Impact 9-4: Level of Significance After Mitigation

Less than significant.

4.9.12 IMPACT 9-5: IMPACT, ANALYSIS, AND MITIGATION MEASURES

Impact 9-5: The project could increase risks to public safety from fire hazards should operating practices or land management change.

4.9.12.1 Evaluation of Impact 9-5: to Entire System

Risks from Changes in Operating Practices

The new owner will be required to comply with all applicable State regulations to maintain minimum clearances of vegetation from energized lines and equipment, while Pacific Gas and Electric Company will retain overall responsibility for maintenance of the transmission and distribution system. Although the greatest potential for fire hazards associated with hydropower operations is primarily due to operations associated with power transmission and distribution, rather than generation, Pacific Gas and Electric Company's transmission and distribution system is not part of the proposed ownership transfer. Pacific Gas and Electric Company will continue to own, operate and maintain the transmission and distribution system. Only certain distribution lines that provide control power for project facilities will be transferred. Under the FERC license, the new owner would be required to operate the control power lines in a safe manner.

During fire season, Pacific Gas and Electric Company manages its field operations on forest lands according to the Fire Index as specified by the USFS and CDF. The Fire Index is designed to compare the relative effect of weather on fire behavior such as spread, intensity and ignition. The Fire Index designations vary from low, medium, high, very high and extreme. Based on these designations, Pacific Gas and Electric Company alters its field activities during Very High and Extreme Fire Indexes such as by avoiding tree-falling, welding and blasting work, avoiding vehicle travel on uncleared roads, and prohibiting its employees to smoke unless they are inside of a vehicle. These procedures are specified in Pacific Gas and Electric Company's Standard Practice No. 245-2 titled Fire Precaution Procedures in Hazardous Fire Areas, and are part of a larger Pacific Gas and Electric Company fire prevention manual titled Fire and Risk Control Manual. If a new owner were to disregard implementing similar field operating practices as Pacific Gas and Electric Company's for fire prevention during Very High and Extreme Fire Indexes, this could lead to a higher frequency of forestland fires and an increased need for fire suppression services. Considering the thousands of acres of forest land that could be damaged, the structures and improvements that could be lost and the potential for loss of life from fire, the increase in risk to public safety from fire hazards should operating practices change is considered to be a *significant impact*.

Risks from Changes in Land Management

At one to three year intervals, Pacific Gas and Electric Company performs regular inspections of its forestlands, using Registered Professional Foresters to assess the status of the resource and to determine if any work is required. Results of the inspections may identify isolated or groups of damaged trees for removal, or larger scale timber harvesting for tree thinning and removal over acres of land. It is expected that a new owner would protect its land and timber assets over time with a similar inspection and management program. Fire prevention through voluntary fuel reduction programs, such as the development of co-op shaded fuel breaks and controlled burning, may actually be facilitated under new ownership where long-term commercial timber management and timber asset protection are the primary objectives of the landowner.

The new owner may also choose to accelerate timber harvesting for providing additional near-term income, which would most likely result overall in a reduced level of catastrophic fire potential and dependency on fire suppression services. Timber harvesting reduces fire potential by providing greater spacing between trees and eliminating heavy debris build-up. If the new owner chose to develop project lands with new structures, residences, or recreational facilities, this would likely be preceded by timber harvesting, but would result in some additional burden and dependency on local fire agencies. Fire suppression efforts are significantly complicated in forestland settings when structures, human life and personal property are at risk, and the emphasis moves to protecting and evacuating developments rather than applying the greatest fire suppression resources to the fire.

Public Resources Code 4291 addresses firebreaks, trimming of trees, chimney screens and variance or exemption by regulations of the state forester as applicable to structures in forestland settings. It applies to any person that owns, leases, controls, operates, or maintains any building or structure in, upon, or adjoining any mountainous area or forest-covered lands, brush-covered lands, or grass-covered lands, or any land which is covered with flammable material, and specifies a number of fire safety precautions as follows:

- Maintain around and adjacent to such building or structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side thereof or to the property line, whichever is nearer, all flammable vegetation or other combustible growth. This subdivision does not apply to single specimens of trees, ornamental shrubbery, or similar plants which are used as ground cover, if they do not form a means of rapidly transmitting fire from native growth to any building or structure.

- Maintain around and adjacent to any such building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth which is located 30 feet to 100 feet from such building or structure or to the property line, whichever is nearer, as may be required by the director if he finds that, because of extra hazardous conditions, a firebreak of only 30 feet around such building or structure is not sufficient to provide reasonable fire safety. Grass and other vegetation located more than 30 feet from such building or structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.

- Remove that portion of any tree which extends within 10 feet of the outlet of any chimney or stovepipe.

- Maintain any tree adjacent to or overhanging any building free of dead or dying wood.

- Maintain the roof of any structure free of leaves, needles, or other dead vegetative growth.
- Provide and maintain at all times a screen over the outlet of every chimney or stovepipe that is attached to any fireplace, stove, or other device that burns any solid or liquid fuel. The screen shall be constructed of nonflammable material with openings of not more than one-half inch in size.
- Except as provided in Section 18930 of the Health and Safety Code, the director may adopt regulations exempting structures with exteriors constructed entirely of nonflammable materials, or conditioned upon the contents and composition of same, he may vary the requirements respecting the removing of clearing away of flammable vegetation or other combustible growth with respect to the area surrounding said structures.

No such exemption or variance shall apply unless and until the occupant thereof, or if there be no occupant, then the owner thereof, files with the department, in such form as the director shall prescribe, a written consent to the inspection of the interior and contents of such structure to ascertain whether the provisions hereof and the regulations adopted hereunder are complied with at all time.

Although the law specified under Public Resources Code 4291 already exists and applies unless exempted as administered by California Division of Forestry, in practicality, it is not enforced thoroughly, likely because resources do not exist for enforcement. Developments that successfully implement the fire protection measures prescribed under Public Resources Code 4291, do so as a result of their own enforcement and/or adoption of CC&Rs (Kessler, 2000).

The project includes newly developed structures in forested lands that would occur throughout the Project Lands. The risk of hazards and possible need for additional fire suppression services that results from the new structures is a significant impact as a result of changes in land management practices.

4.9.12.2 Impact 9-5: Mitigation Measures

Mitigation Measures Proposed as Part of the Project

No mitigation measures were identified as part of the project.

Mitigation Measures Identified in This Report

Mitigation Measure 9-5a: Prior to or concurrent with the transfer of title for any bundle, the new owner shall by binding written instrument agree to adopt Pacific Gas and Electric Company's Fire and Risk Control Manual, including Standard Practice No. 245-2 titled Fire Precaution Procedures in Hazardous Fire Areas, as its own standard operating protocol until such time as it develops its own similarly detailed and equally effective Fire and Risk Control Manual and associated standard practices.

Mitigation Measure 9-5b: Such lands to be developed shall become burdened by conditions, covenants, and restrictions (CC&Rs) that require implementation of Public Resources Code 4291.

4.9.12.2 Impact 9-5: Level of Significance After Mitigation

Less than significant.

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