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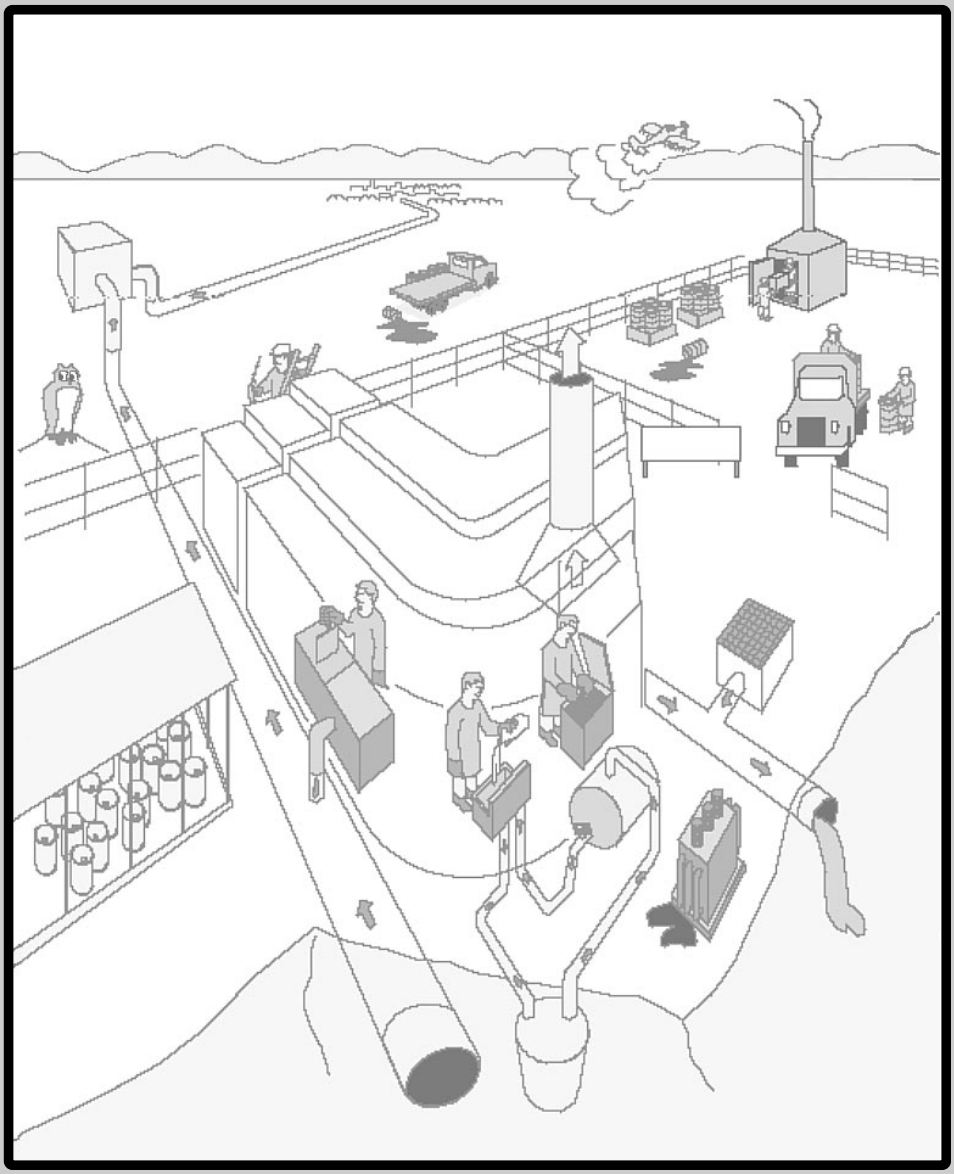
Lawrence Livermore National Laboratory
Environmental Protection Department

Environmental Compliance Manual



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Lawrence Livermore National Laboratory

Environmental Compliance Manual

November 1994

Robert W. Kuckuck Date 11/15/94

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Deputy Director for Operations

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PREFACE

The Lawrence Livermore National Laboratory (LLNL), as well as the Lawrence Livermore National Laboratory Experimental Test Site-Site 300 must comply with a variety of environmental laws, Department of Energy (DOE) orders, and policies designed to protect the environment and worker safety and health. This Environmental Protection Department (EPD) *Environmental Compliance Manual* is intended to assist you and LLNL in complying with environmental requirements. This manual is Volume III of the *Environmental, Safety, and Health Manual*, a three-volume set. Volume I is the "Road Map" of Environmental, Safety, and Health (ES&H) requirements; Volume II is the *Health & Safety Manual*, provided by the Hazards Control Department. The initial chapters of the *Health & Safety Manual* describe general policy and methods, the later chapters deal with specific hazards and their control, and supplements provide more detailed information than the chapters.

Guide to the Manual

This *Environmental Compliance Manual* summarizes the environmental regulatory programs and requirements affecting LLNL operations. Each section outlines how LLNL activities and operations are regulated and whom to contact for further information. This Manual is not intended to provide comprehensive guidance on each regulatory area; instead, it provides you with an overview of environmental requirements and enough information to determine whether:

- Environmental permits are required (e.g., an air quality permit);
- Environmental analyses must be performed (e.g., an environmental impact statement or report);
- Environmental plans must be prepared and implemented (e.g., an emergency response plan);
- A chemical release must be reported (e.g., a hazardous waste spill); and
- Records (and what kinds) must be kept.

Because some environmental activities or media (i.e., air, water, land) are regulated by more than one environmental program, the Manual is structured by functional topics, not environmental regulatory programs.

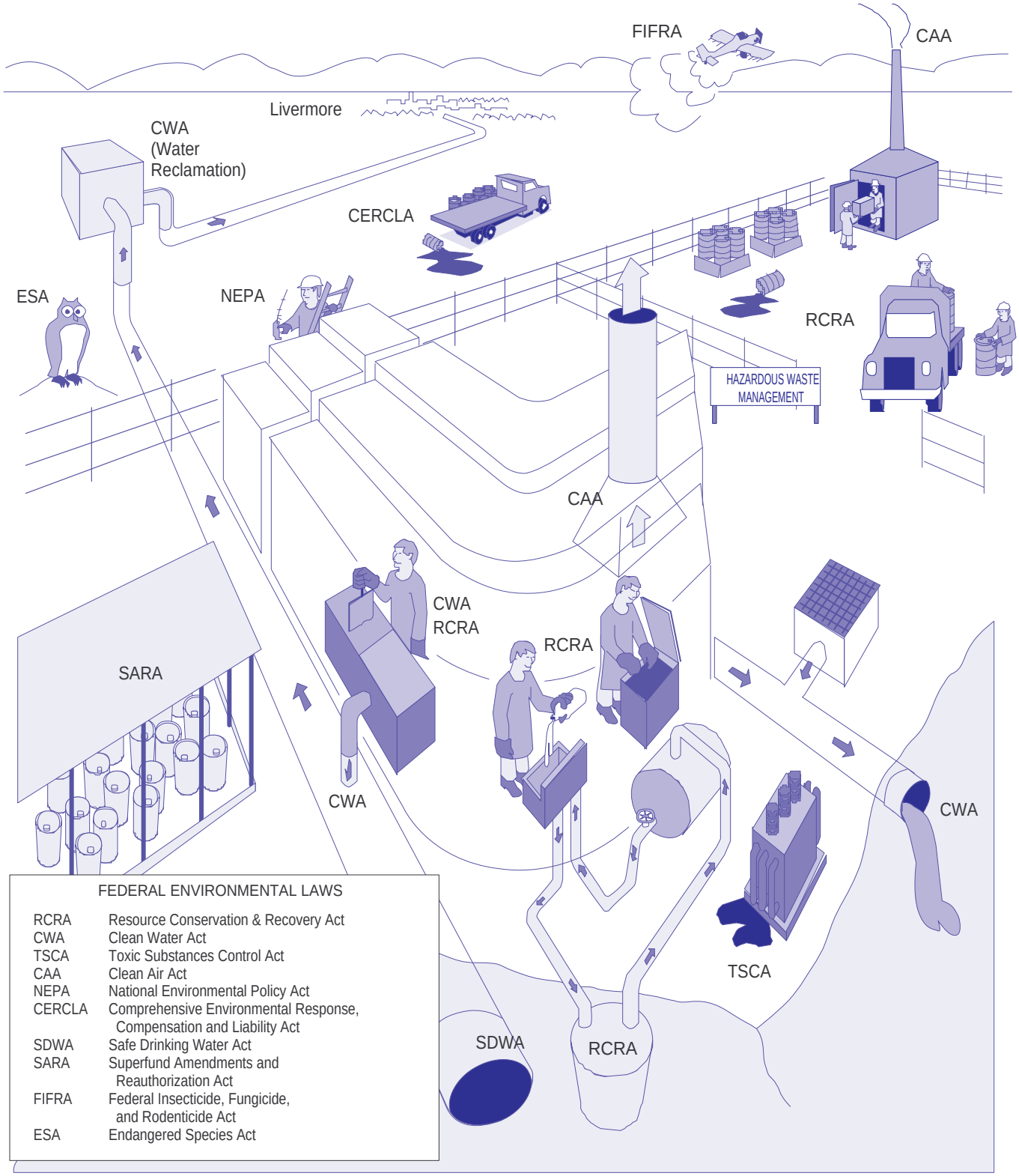
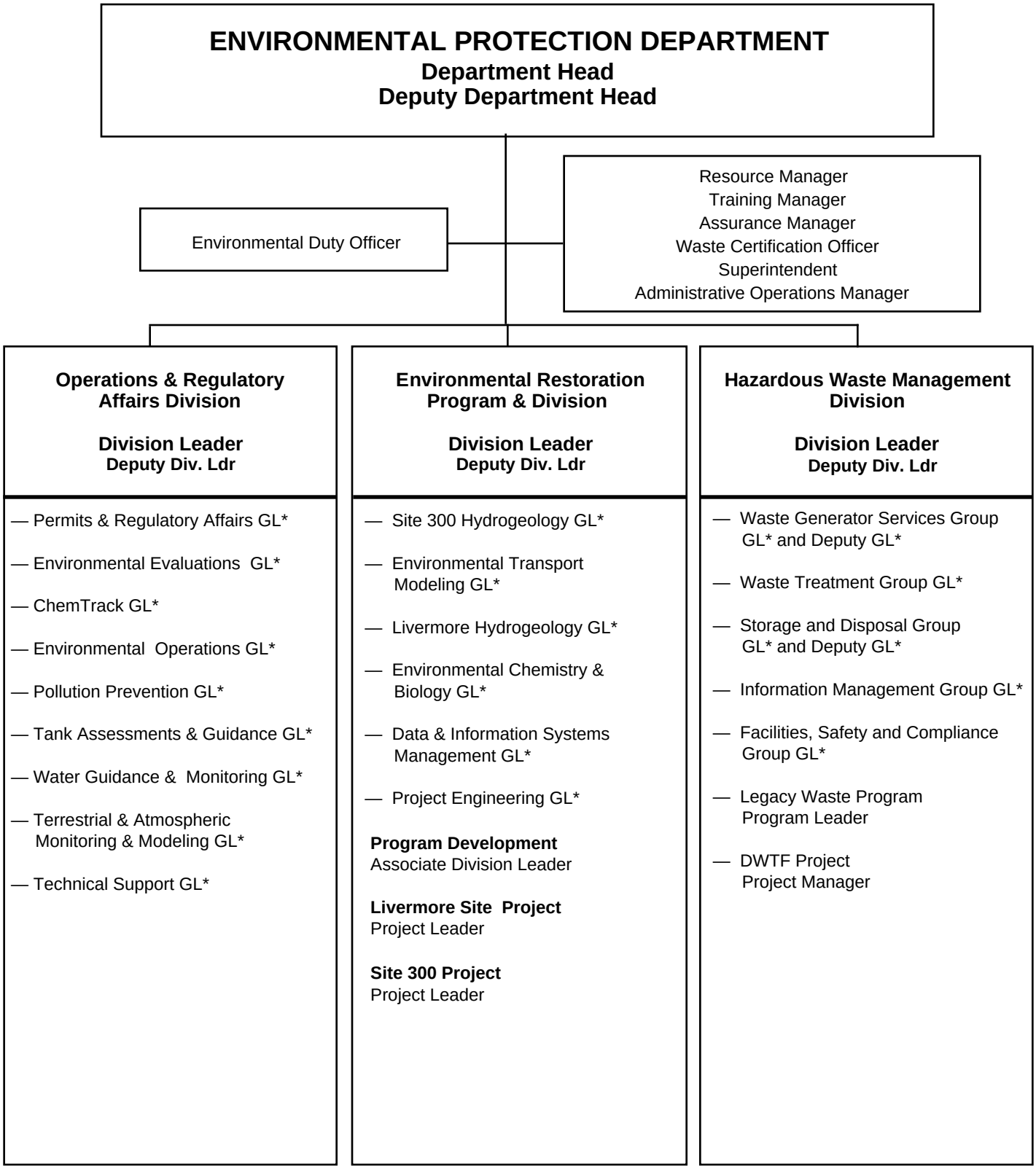


Figure P-1. Many laws regulate activities at LLNL

How to Use the Manual

This Manual is supplemented by the Guidance Documents, which include:

- *Guidelines for Discharges to the Sanitary Sewer System*;
- *Guidelines for Design and Operation of Retention Tank Systems*;
- *Guidelines for Soil and Debris Management*;
- *Guidelines for Permitting of Air Emission Sources;*
- *Guidelines for Polychlorinated Biphenyls*; and
- *Guidelines for Preparing Office and Shop Supplies for Disposal.*



•GL-Group Leader

Figure P-2. Organization chart of the Environmental Protection Department

1.0 Responsibilities at LLNL

1.0 RESPONSIBILITIES AT LLNL

1.1 Responsibilities of LLNL Personnel

The Environmental Protection Implementation Plan (EPIP) describes how LLNL complies with DOE Order 5400.1, General Environmental Protection Program. This order establishes environmental protection program requirements, authorities, and responsibilities to assure that DOE operations are in compliance with applicable federal, state, and local environmental protection laws and regulations, Executive orders, and internal DOE policies.

Environmental concerns are incorporated as part of LLNL's overall environment, safety, and health (ES&H) programs. The document *Environmental, Safety, and Health Management at LLNL* delineates the LLNL environmental management structure from the Director to the ES&H Working Group, and provides an overview of Laboratory implementation of ES&H requirements.

The Director of LLNL establishes Laboratory policy and holds the Associate Directors (ADs) accountable for implementing LLNL ES&H policies as an integral part of their management responsibilities. From the ADs, responsibility for implementing these policies continues down to the individual workers.

1.2 Whom to Call for More Information

The principal contacts for questions regarding environmental compliance are EPD personnel. Within EPD are a number of divisions; consult the following section to determine which division seems best able to handle your question.

1.3 Environmental Protection Department

EPD is responsible for providing assistance to line management to help ensure environmental compliance, conducting environmental restoration, and assisting the LLNL organizations in carrying out their tasks in an environmentally acceptable manner. EPD consists of three divisions.

1.3.1 Operations and Regulatory Affairs Division

The Operations and Regulatory Affairs Division (ORAD) provides effective Lab-wide oversight of environmental compliance. ORAD:

- Provides day-to-day guidance on regulatory requirements for environmental concerns such as the management of hazardous or radioactive materials/waste, tanks, and air emissions;

- Advises program personnel on waste minimization and pollution abatement methods;
- Assists program management to identify and alleviate potential environmental compliance issues in early project planning stages;
- Assists programs in conducting compliance audits;
- Provides a chemical tracking capability and develops the associated reports;
- Responds during emergencies to advise on environmental cleanup standards, sampling, and possible reporting to regulatory agencies;
- Prepares risk assessments, reports, and documents, such as initial study input under the California Environmental Quality Act (CEQA) and Environmental Assessments (EAs) required under the National Environmental Policy Act (NEPA);
- Monitors existing and pending environmental legislation that may impact LLNL activities;
- Obtains permits from regulatory agencies to ensure that LLNL operations are in compliance with environmental laws and regulations;
- Evaluates the effectiveness of environmental control measures;
- Assesses compliance with applicable emission standards;
- Estimates the impact of ongoing LLNL operations on the surrounding environment;
- Prepares reports for DOE, regulatory agencies, and the public, summarizing monitoring results; and
- Prepares reports, conducts surveys, and advises LLNL on natural, biological, and cultural resources.

1.3.2 Environmental Restoration Division

Throughout the world, past practices for handling and disposal of hazardous materials, and the residues of old leaks/spills, have resulted in environmental contamination that is unacceptable by today's standards. The Environmental Restoration Division (ERD) is responsible for ensuring effective remediation and cleanup of contamination resulting from past operations on LLNL property. ERD:

- Plans, directs, and conducts assessments;
- Performs environmental restoration;
- Investigates field sites;
- Manages corrections such as soil removal or groundwater/surface water treatment; and
- Closes inactive facilities in a manner designed to prevent future environmental contamination and the need for post-closure care.

1.3.3 Hazardous Waste Management Division

The Hazardous Waste Management (HWM) Division oversees collection, treatment, and disposal of regulated wastes. HWM:

- Develops and implements hazardous, radioactive, and mixed waste handling procedures, operations, and reporting systems;
- Provides hazardous and radioactive sample analysis;
- Analyzes waste to allow for its appropriate treatment and handling;
- Collects, packages, treats, and stores wastes before shipping to off-site recyclers, and treatment and disposal facilities;
- Tracks and documents the movement of hazardous, radioactive, or mixed waste from Waste Accumulation Areas (WAAs) located throughout all Lab areas to final disposal sites; and
- Responds to environmental emergencies and participates in spill cleanup.

1.4 Hazards Control Department

The Hazards Control Department is organized into four Environment, Safety and Health Teams that work directly with LLNL programs, five divisions that provide technical support and safety services, and an administrative core team. The ES&H Teams are covered in Section 1.5.

1.5 Environmental, Safety, and Health (ES&H) Teams

The Environmental, Safety, and Health (ES&H) Team approach provides effective points-of-contact:

- ES&H Teams are composed of specialists from the Environmental Protection and Hazards Control Department, Health Services and others as needed to support a specific program area;
- Currently, four ES&H Teams cover the Lab-wide setting;
- Also, four specialized EPD Environmental Support Teams focus on expanded support, specifically on environmental issues. The Environmental Operations Group (EOG) of the Operations and Regulatory Affairs Division, has an Analyst assigned to the ES&H Teams. The EOG Analyst can assist you in contacting the environmental specialist who can best help you; and
- Your supervisor and coworkers should inform you on how to contact your ES&H team members for guidance on environmental/safety requirements in your specific work area.

2.0 Introduction

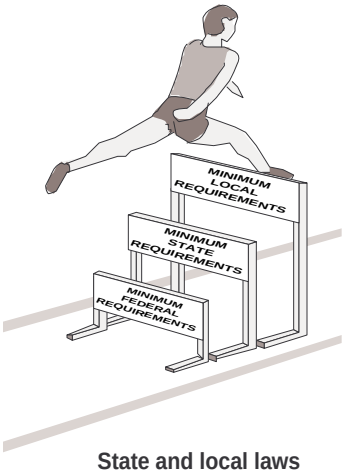
2.0 INTRODUCTION

2.1 The Environmental Legal Framework

Protection of environmental resources (i.e., air quality, water quality, land, and wildlife species) is governed by a complex set of standards and requirements administered by the federal government, the State of California, Alameda County, San Joaquin County, the City of Livermore, and special districts, such as the Bay Area Air Quality Management District and the San Joaquin Valley Unified Air Pollution Control District. Certain activities that affect the natural environment are prohibited (e.g., disposal of hazardous waste in an unpermitted waste management unit); others are allowed with conditions (e.g., air emissions may be released to the atmosphere as long as they have a permit); and yet others are encouraged (e.g., voluntary decommissioning of an air emission source in order to bank air emission credits). These standards, requirements, and incentives are specified in laws, agency guidance documents, DOE orders, and LLNL policy documents.

2.1.1 How Environmental Laws are Enacted

Environmental laws are composed of federal, state, and local statutes, regulations, and court opinions. Statutes are laws approved and passed by the elected officials at each level of government: federal statutes by the Congress and the President; state statutes by the California Legislature and the Governor; and city and county ordinances by local elected officials. For example, the Federal Clean Air Act is a statute. Most statutes are fairly broadly worded and are not specific as to how compliance is to be achieved. Often these laws overlap. For example, several statutory programs govern air quality in California. These and other laws that govern LLNL activities are shown on Tables 2-1 and 2-2.



State and local laws can be more stringent than federal laws

To provide much more detail and specifics on what steps must be taken to carry out the statute, a regulating agency issues regulations. In the case of federal statutes, the United States Environmental Protection Agency (EPA) implements the laws. At the state level, the California Environmental Protection Agency (Cal/EPA), through one of its departments, is the implementing agency. On occasion, statutes and regulations are interpreted by the courts, which may further refine how they are applied.

Generally, state and local laws regulating the same subject matter may be more, but not less, stringent than federal law. For example, the federal Resource Conservation and Recovery Act mandates regulations for hundreds of waste chemicals as hazardous waste. California's hazardous waste law (the Hazardous Waste Control Law) mandates regulations for additional chemicals as hazardous waste.

Table 2-1. Federal environmental laws

Environmental Statutory Program	Regulated Activity
Clean Air Act (CAA)	Air quality
Clean Water Act (CWA)	Water quality (navigable/surface waters) and wetlands, territorial waters
Resource Conservation and Recovery Act (RCRA) Subtitle C	Hazardous waste management
RCRA Subtitle D	Solid (nonhazardous) waste management
RCRA Subtitle I	Underground storage tanks
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Pesticide application and management
Toxic Substances Control Act (TSCA)	Polychlorinated biphenyls
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	Hazardous waste cleanup
Superfund Amendments Reauthorization Act (SARA)	Community right to know regarding hazardous materials
Safe Drinking Water Act (SDWA)	Drinking water quality
National Environmental Policy Act (NEPA)	Environmental planning and evaluation of environmental impacts
Asbestos Hazard Emergency Response Act	Asbestos in schools, public schools
National Historic Preservation Act (NHPA)	Cultural resource preservation and management
Endangered Species Act (ESA)	Threatened and endangered species
Pollution Prevention Act of 1990	Hazardous waste minimization

Table 2-2. California environmental laws

Environmental Statutory Program	Regulated Activity
California Clean Air Act of 1988	Air quality
Air Toxic Hotspots Information and Assessment Act of 1987	Air toxic emissions
Assembly Bill (AB) 1807	Toxic air contaminants
Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)	Exposure to carcinogenic and reproductive toxicants
California Safe Drinking Water Act	Drinking water quality
Porter-Cologne Water Quality Act	Water quality
California Hazardous Waste Control Act	Hazardous waste management
Hazardous Waste Reduction and Management Review Act of 1989 (SB 14)	Hazardous waste minimization
Hazardous Materials Release Response Plans and Inventory (AB 2185)	Hazardous materials disclosure
Risk Management and Prevention Program	Management of acutely hazardous materials
Underground Storage Tank Management Program	Underground storage tanks
Aboveground Petroleum Storage Act	Aboveground storage tanks
Solid Waste Assessment Tests	Solid waste disposal sites
California Environmental Quality Act (CEQA)	Environmental planning and evaluation of environmental impacts
California Endangered Species Act	Protection of rare and endangered native plants and animals
Medical Waste Management Act	Medical waste management
Hazardous Substance Account Act	Hazardous waste cleanup

2.1.2 Environmental Permits

One of the principal environmental legal requirements for LLNL operations is obtaining and complying with environmental permits. Many LLNL activities that directly or indirectly emit contaminants into the atmosphere, surface waters, groundwater, or land must have an environmental permit. As a general rule, construction projects need one or more environmental permits. Usually, these permits must be issued before construction begins. Permits are also required for storage and treatment of hazardous waste.

Discharges to the environment require permits, unless they have been declared exempt. For example, certain types and quantities of chemical discharges to the sewer require a permit from the City of Livermore Water Reclamation Plant. Emissions from an emergency electrical generator engine, however, are generally exempt from permit requirements. On the other hand, some air emissions do not require permits.

Permits are similar to driver's licenses in the sense that they grant a privilege to engage in a particular activity. Like a driver's license, environmental permits impose conditions and requirements. For example, only certain types, quantities, and concentrations of chemicals may be discharged to the sewer. The permit conditions also require that LLNL engage in specified monitoring and reporting of the influent discharge water and the effluent receiving waters at the point of discharge (e.g., a creek).

Permits may also be required for existing operations that undergo expansion or significant modification. Thus, LLNL activities and operations operating in accordance with a valid permit may be subject to additional or different permitting requirements if those activities and operations are changed. For example, the City of Livermore Water Reclamation Plant permit allows discharge of certain chemicals only at specified concentrations. If new or modified activities result in a discharge of chemicals not addressed in the permit, a permit modification may be required.

To obtain an environmental permit, a permit application must be submitted to the appropriate local, regional, state, or federal agency. A fee usually must accompany the permit application to cover the costs of processing the application. When planning construction projects or altering activities and operations, you will need to allot ample time to receive the necessary environmental permits. Before a permit can be issued, EPD staff needs time to prepare the permit application, and the environmental agency needs time to review the permit application. Lead time can vary from a few weeks to obtain a building permit, to two or three years for a permit to treat or store hazardous wastes.

2.1.3 Environmental Planning Processes

Environmental programs at all levels of government require that a variety of environmental planning documents be prepared. LLNL may be required to prepare planning documents (Table 2-3) or show consistency with planning requirements.

Other environmental plans are prepared by environmental agencies (Table 2-4). Typically, regulated facilities must demonstrate compliance with such plans.

Other environmental planning involves evaluating potential adverse environmental impacts before beginning a project. For example, DOE must complete a NEPA review of proposed LLNL projects to evaluate potential environmental impacts before making a decision to proceed with the project, or, in the case of large construction projects, before proceeding to final engineering design.

Table 2-3. Planning documents LLNL prepares

Planning Requirement	Program Description
Hazardous materials inventory and emergency response plan (Business Plan)	Businesses handling specified quantities of hazardous materials must prepare and submit an inventory of those chemicals and an emergency response plan.
Hazardous Waste RCRA and California Hazardous Waste Control Law Emergency Contingency Plans	Generators of hazardous waste and operators of treatment, storage, and disposal facilities must prepare a hazardous waste contingency plan. Such plans are designed to minimize the risk of hazardous waste releases and prepare for response to releases.
Spill Prevention Control and Countermeasure Plan (SPCC)	Owners and operators of aboveground storage tanks with a specified storage capacity for oil products must prepare an SPCC Plan. The SPCC Plan predicts oil discharge scenarios and describes measures designed to prevent and control such releases.

Table 2-4. Planning documents LLNL prepares for compliance

Environmental Agency Plans	Plan Requirements
Hazardous Waste Management Plan	Hazardous waste treatment, storage, and disposal operations must be consistent with County Hazardous Waste Management Plans.

2.1.4 Implications of Environmental Enforcement to LLNL Employees

Environmental agencies enforce requirements through imposition of administrative, civil, and criminal penalties and fines; imprisonment; and issuance of compliance orders. A compliance order may prohibit activities that could cause substantial and imminent danger to the environment and health (e.g., injunctions) or require compliance by a prescribed deadline (e.g., a cleanup and abatement order issued by the Regional Water Quality Control Board for discharge to a river).

Additionally, some environmental laws authorize environmental agencies to exclude businesses in violation of the law from federal contracts, grants, and loans (42 U.S.C. Section 7606(a)).

Noncompliance can result from:

- Operating without a permit where one is required;
- Violating a permit requirement;
- Not maintaining required operating records;
- Not reporting unauthorized releases;
- Not properly closing environmental management units (e.g., an underground storage tank);
- Violating a prohibitory standard set forth in environmental statutes and regulations;
- Failing to allow an inspector to enter the premises or to view a regulated activity;
- Not performing required monitoring, testing, or reporting of emissions and/or discharges;
- Falsifying statements and/or certifications, including knowing omission of material information;
- Removing, damaging, or adversely affecting cultural (historic, prehistoric, or architecturally significant) resources; or sensitive, threatened, or endangered species;
- Removing or damaging paleontological resources;
- Knowingly destroying, concealing or failing to file any required documents;
- Knowingly transporting hazardous waste to an unpermitted facility (e.g., “midnight dumping”); or
- Transporting hazardous waste without completing a manifest;
- Construction within a floodplain or damaging a wetland.

Depending on the environmental requirement in question, civil penalties range from a few thousand dollars per day to $25,000 per day per violation [42 USC 7413 (d)(3)].

Criminal penalties are usually imposed on individuals who knowingly violate the law (e.g., falsifying a report or failing to report a hazardous materials release). Criminal penalties can include fines of thousands of dollars per day up to $250,000 per day per violation, fifteen years imprisonment for individuals and $1 million per day for businesses [42 USC 7413 (c)(5)].

2.1.5 Environmental Agency Organization

The role of the environmental regulatory agency is to implement and enforce environmental statutes. Each agency is accountable to an elected official (the president, governor, or board of supervisors), who is ultimately accountable to the public. Agencies may have a direct influence or establish regulatory controls for LLNL activities or may need to be notified about operational activities at LLNL. Each federal, state, regional, and local agency responsible for administering environmental programs and regulations has a distinct and often diverse mandate. In many instances, agencies work with one another to protect public health and the environment. The responsibilities of each agency with an environmental mandate are described below.

Federal Agencies

U.S. Environmental Protection Agency (EPA)—The EPA is responsible for developing, administering, and enforcing national pollution control programs. The EPA generally regulates private industries and other government organizations in the management and control of air and water pollution, pesticides, radiation, hazardous and nonhazardous solid wastes, remediation and clean up of pollutants, toxic substances control, as well as many other environmental matters.

Regulation of hazardous waste management was recently delegated by the EPA to Cal/EPA's Department of Toxic Substances Control (DTSC). Federal air-quality programs are implemented by Cal/EPA's Air Resources Board (ARB) through EPA-approved state implementation plans (SIPs) created for each Air District.

U.S. Fish and Wildlife Service (USF WS)—The USF&WS administers the requirements of the Endangered Species Act.

U.S. Department of Energy (DOE)—The DOE regulates and administers national energy policies. In addition to coordinating energy and petroleum development and allocation, the DOE works with the Nuclear Regulatory Commission (NRC) in the licensing and management of nuclear power resources. The DOE is responsible for extensive research and development of existing and future national energy production alternatives; and for directing

research, development, testing, and production of nuclear weapons for national defense.

Nuclear Regulatory Commission (NRC)—The NRC reviews, licenses, and regulates the construction and operation of nuclear facilities and the possession and use of nuclear materials. This agency shares responsibility with the Department of Transportation (DOT) for shipping radioactive materials.

U.S. Department of Interior (DOI)—The DOI environmental responsibilities include the management and allocation of public lands, public energy resources, minerals, and the National Parks System. The DOI coordinates with federal and state agencies as well as private citizens in short- and long-term use of these and other public resources.

U.S. Department of Transportation (DOT)—The DOT is responsible for administering the development and construction of mass transit facilities, national transportation infrastructure programs, and a national aircraft noise control program. Additionally, in coordination with state and regional agencies, the DOT regulates the storage and transportation of hazardous substances as well as the prevention of pollution associated with transportation activities.

State Agencies

California Environmental Protection Agency (Cal/EPA)—California environmental programs are largely implemented and enforced by Cal/EPA. The Cal/EPA consists of six primary departments under the direction of the Secretary for Environmental Protection (see Figure 2-1).

Air Resources Board (ARB)—The ARB regulations, along with those of the local and regional air pollution control districts, implement the Federal Clean Air Act. The ARB has ultimate oversight of all air pollution control matters in California, with local and regional districts responsible for stationary sources and the ARB directly responsible for vehicular sources.

State Water Resources Control Board (SWRCB)—The SWRCB has primary authority to implement California water policy. This authority is shared with nine regional water quality control boards (RWQCBs). The SWRCB formulates and adopts water control policy that is implemented by the regional boards. The SWRCB approves water quality control plans administered by each RWQCB.

The Integrated Waste Management Board (IWMB)—State and local governments share responsibility for solid waste management under the California Integrated Waste Management Act of 1989. The IWMB has ultimate authority for managing nonhazardous solid waste. IWMB oversees the design and implementation of local integrated waste management programs administered by county governments (known as local enforcement agencies or LEAs). The IWMB is also responsible for issuing solid waste facilities permits for landfills and other waste management units.

Department of Toxic Substances Control (DTSC)—The DTSC (formerly part of the Department of Health Services [DHS]) is responsible for managing hazardous wastes under the California Hazardous Waste Control Law and the federal Resource Conservation and Recovery Act (RCRA). The DTSC oversees the generation, storage, treatment, and disposal of hazardous wastes. The DTSC has jurisdiction, along with EPA, to manage the site assessment and cleanup of hazardous waste contamination under the Comprehensive Environmental Response, Compensation and Liability Act (the Superfund program) and California's Hazardous Substances Account Act.

Department of Pesticide Regulation (DPR)—The DPR is responsible for managing the registration, handling, and application of pesticides. The DPR also manages worker health and safety, environmental monitoring, pest management enforcement, and information services.

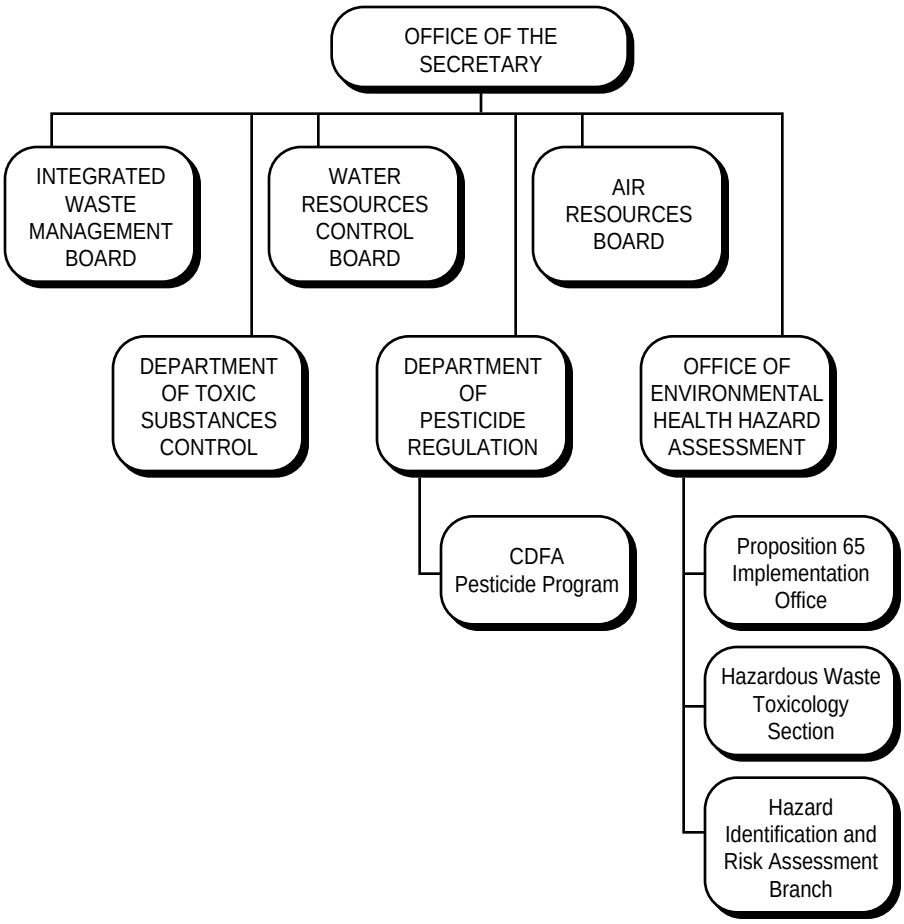


Figure 2-1. Cal/EPA organization

The Office of Environmental Health Hazard Assessment (OEHHA)—This office identifies, quantifies, and recommends health-based standards for chemical use. The OEHHA implements the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65); and provides technical and scientific support, consultation, and training regarding health risks of chemicals in the environment to regulators, local government agencies, and the public.

Department of Fish and Game (DFG)—The DFG regulates the protection, preservation, and enhancement of California wildlife.

Office of Emergency Services (OES)—The OES oversees the state Business Plan, Risk Management and Prevention Program, and Community Right-to-Know programs. The OES responds to disasters such as earthquakes, fires, and floods.

Regional Agencies

Bay Area Air Quality Management District (BAAQMD)—The BAAQMD (see Figure 2-2) was created to develop and administer air pollutant control programs for the San Francisco Bay Area. The BAAQMD is overseen by the ARB and specifically focuses on controlling air pollutants from stationary sources and implementing standards for the San Francisco Bay Area and surrounding vicinity. The general objective of these activities is to attain compliance with the Federal Clean Air Act (and amendments), the California Clean Air Act (CCAA), and other state regulations that control emissions of many common (or criteria) air pollutants and toxic air contaminants.

San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD)—Like the BAAQMD, the SJVUAPCD is responsible for implementing state and federal air-quality statutory requirements in the San Joaquin Valley. The

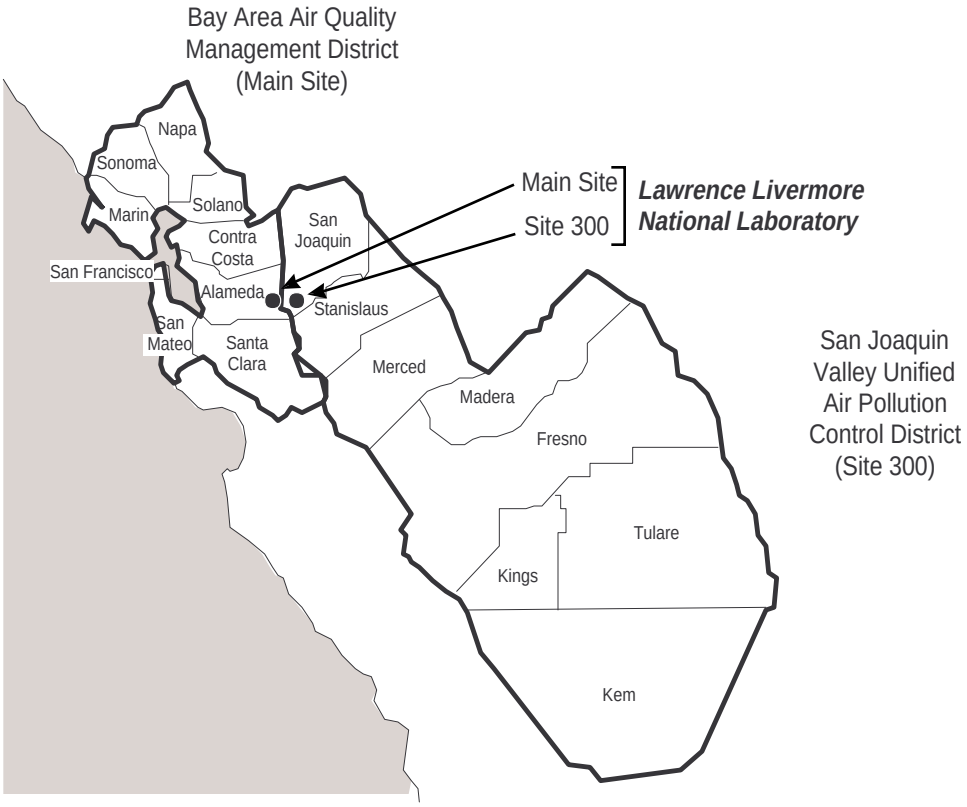


Figure 2-2. Air districts that govern LLNL activities

SJVUAPCD is principally responsible for developing, administering, and enforcing programs regulating stationary sources of air emissions. Site 300 is within the SJVUAPCD jurisdiction.

Regional Water Quality Control Board (RWQCB)—The Central Valley and San Francisco Bay RWQCBs regulate and administer the development, review, and implementation of state water quality standards in their respective areas of LLNL. These standards generally include pollutant discharges to the land and/or surface waters from general areas or specific point sources.

County Agencies

Alameda County Flood Control and Water Conservation District, Zone 7—This county district is responsible for administering and controlling local water resources. The district develops and manages flood control structures, and works to ensure the protection of area resources against flood damage.

Alameda County Health Care Services—The Alameda County Health Care Services Department implements state-wide and local regulations for the adequate provision and management of health care in the region.

Alameda County Department of Environmental Health—The Alameda County Department of Environmental Health is responsible for registering generators of medical wastes and for administering UST programs.

San Joaquin County Health Department—The San Joaquin County Health Department is responsible for developing, implementing, and enforcing the County health codes. This agency coordinates with public and private facilities and individuals to ensure the maintenance of safe operating and living conditions for the general public.

City/Municipal Agencies

City of Livermore Water Reclamation Plant—The city's Water Reclamation Plant is responsible for treating and managing the wastewater generated and collected by the municipal sewer system. This facility also ensures the implementation of wastewater pretreatment standards from industrial sources and manages the city's effluent discharge in accordance with applicable water quality standards set forth by the RWQCB.

2.1.6 LLNL and DOE Environmental Policies

In addition to laws and regulations that directly dictate environmental compliance requirements, both LLNL and the DOE publish internal policies, memoranda, and letters that relate to environmental compliance (Table 2-5). These procedures need to be followed with the same diligence as laws and regulations because they

are designed to meet both the intent and letter of these environmental laws and regulations.

An example of a policy memorandum was the February 1990, memorandum (SEN-15-90) from James D. Watkins, Secretary of Energy, to all elements of DOE. This memorandum required all Operations Office Managers to fully implement NEPA and to meet the DOE Order 5440.1D. This procedure served to provide a mechanism to better ensure that the Council on Environmental Quality (CEQ) regulation on NEPA was met. DOE has since published its own NEPA regulations (April, 1992) and an applicable DOE Order, 5440.1E.

In addition to the summary in Table 2-5, applicable policies are listed along with the laws and regulations in each subject area of this Manual. It is often best to review these policies first, since they provide a framework for understanding how LLNL and DOE will comply with the regulations. Only key policies are listed in this Manual. Contact the listed person for each subject area to obtain copies of other letters, policies, and memoranda that affect compliance in the area, as well as recent policies. Finally, you must remember policies generally have a shorter life span than laws and regulations, since they are generally tied to the management philosophies of key DOE and LLNL managers. For example, when federal government administration changes, policies written by past managers may no longer be in effect. Check each policy for current applicability prior to implementing it.

2.2 LLNL Environmental Education Courses

To provide more detail on environmental compliance laws and regulations to LLNL staff who must understand these requirements to function effectively in their jobs, LLNL has established a comprehensive environmental compliance training program, which is implemented by the Training Section of the Environmental Protection Department. The Training Section evaluates LLNL training needs, sets up and implements the courses, and provides quality control to ensure the courses are effective and constantly improved.

An abbreviated list of training courses is provided in Table 2-6. Following a review of the relevant section of this Manual, consider whether attendance at an applicable training course is necessary to meet your needs. If you feel you need additional training, contact the Training Section to request an appropriate class.

Table 2-5. DOE orders for environmental compliance

Regulatory Area	DOE Order	Description
General Environmental Program	DOE Order 5400.1	Establishes programs and authorities to assure facility compliance with applicable federal laws and regulations, executive orders, and departmental policies.
Environmental Compliance Issue Coordination	DOE Order 5400.2A	Requires that departmental elements and contractors coordinate activities involving significant environmental compliance issues. These are issues that involve Headquarters notification, concurrence, or approval and have the potential for being precedent-setting or controversial.
Occurrence Reporting and Processing of Operations Information	DOE Order 5000.3B	Establishes a system for categorizing, reporting, and processing environmentally related occurrences and departmental operations, excluding reports required by external agencies.
Labeling and warning requirements		
Safety Requirements for Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes	DOE Order 5480.3	Establishes requirements for packaging and transportation of hazardous materials, hazardous substances, and hazardous wastes. Incorporates federal requirements and establishes DOE requirements.
Environmental planning and permitting		
Real Property and Site Development Program	DOE Order 4300.1B	Calls for development of fish and wildlife management program in compliance with accepted scientific practices.
Site Development Planning	DOE Order 4320.1B	Requires each site to have a process for planning and developing the site's real property holdings in a Technical Site Information document and a Site Development Plan.
NEPA Compliance Program	DOE Order 5440.1E	Establishes internal DOE authorities and responsibilities to implement NEPA requirements.

Table 2-5. DOE orders for environmental compliance (continued)

Regulatory Area	DOE Order	Description
Hazardous waste handling requirements		
Hazardous and Radioactive Mixed Waste	DOE Order 5400.3	Establishes internal authorities and responsibilities necessary to implement RCRA requirements.
Safety Requirements for Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes	DOE Order 5480.3	Establishes requirements for packaging and transportation of hazardous materials, hazardous substances, and hazardous wastes. Incorporates federal requirements and establishes DOE requirements.
Hazardous waste cleanup		
CERCLA Requirements	DOE Order 5400.4	Establishes internal authorities and responsibilities to implement CERCLA.
Cultural resource requirements		
Protection of Archaeological Resources	DOE Order 5400.1	Establishes programs and authorities to assure facility compliance with applicable federal laws and regulations, Executive Orders, and Departmental policies.

Table 2-6. List of EPD courses

Course No.	Course Title	Description
EP0006	Hazardous Waste Generation and Certification	Ensures that generators of hazardous waste know how to properly identify, characterize, and manage hazardous waste. It provides an overview of the regulations which govern hazardous waste activities, as well as detailed procedures for performing specific hazardous waste activities.
EP0006-R	Hazardous Waste Generation and Certification Review	Annually required refresher for EP0006.
EP0021	TRU Waste Certification Program	Ensures that LLNL employees who generate TRU waste understand key components of the TRU Waste Certification Program and are able to perform their responsibilities within the program.
EP0053	WAA Personnel Training	Provides personnel managing and operating the LLNL's WAAs with the knowledge and skills necessary to perform their hazardous waste duties related to the WAAs. This course provides guidelines for performing WAA management activities, as well as an overview of the regulations which govern hazardous waste activities at WAAs.
EP0110	LLW Generation and Certification	Provides the LLW generators and HWM technicians with the key components of LLNL's LLW Certification Program. This course includes an overview of the statutory and regulatory requirements, as well as detailed procedures associated with performing LLW activities.
EP2001	Air Source Management	Helps facility and program Managers identify types of equipment/operations that may require an Air District Permit. It provides an overview of the laws and regulations that govern Air Source Management at LLNL, as well as the personnel to contact for assistance.
EP3001	Overview: National Environmental Policy Act (NEPA) Compliance	Presents a comprehensive overview of the implementation of the NEPA within DOE and at LLNL.

3.0 Emergency Response

3.0 EMERGENCY RESPONSE

Proper planning and preparation followed by appropriate and timely response to emergencies is the most effective way to minimize adverse impacts to public health and the environment. The requirements and procedures for emergency planning, preparedness, response, and reporting for operations at LLNL are presented in the following sections. The subsections are Emergency Planning (3.1) and Emergency Response (3.2). Additionally, see Chapter 10, Product Storage Hazardous Materials, 10.1 through 10.4.

3.1 Emergency Planning

The purpose of many environmental laws and regulations is to protect public health and the environment from damage caused by accidental discharges, spills, leaks, and other releases of hazardous substances. These laws delegate control over planning activities to state and local agencies. Their overall objective is to limit potential damage to the greatest extent possible through advanced planning and appropriate emergency response.

3.1.1 Regulatory Summary

There are many federal and state laws and regulations, and DOE orders that govern planning, preparedness (including training), and response to emergencies and environmental incidents. A brief overview of each law, regulation, and DOE order is presented in Table 3-1.

Table 3-1. Emergency planning regulatory summary

Clean Water Act (CWA)	This act requires on-shore installations with petroleum storage facilities exceeding certain thresholds for oil and/or hazardous substances to prepare and train personnel according to Spill Prevention Control and Countermeasure (SPCC) Plans. The CWA gave the State of California authority in 1987. The Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) has provisions similar to the California Porter-Cologne Water Quality Act.
State Clean Air Act	This act requires the state to adopt a plan that provides for attainment and maintenance of National Ambient Air Quality Standards.

Table 3-1. Emergency planning regulatory summary (continued)

Clean Air Act (CAA)	The CAA requires EPA to adopt emission standards for new vehicles, all aircraft, sources of hazardous air pollutants, and non-stationary sources that endanger public health and welfare. Under Title III of the CAA, covered facilities are required to implement chemical process safety management plans to prevent accidental releases of hazardous air pollutants.
California Aboveground Petroleum Storage Act	This act establishes the requirement for a program to inspect Aboveground Storage Tanks (ASTs) and requires petroleum storage facilities to file a Storage Statement, pay fees to the state, and write a spill prevention, control, and countermeasure plan and ensure compliance with reporting requirements.
California Porter-Cologne Water Quality Act	This act specifies permitting and monitoring requirements for discharge of wastewater to minimize contamination to the environment, and regulates the wastes released into both surfaces and groundwaters for the state.
Resource Conservation and Recovery Act (RCRA) and the State Hazardous Waste Control Law (HWCL)	RCRA and HWCL regulate the storage and management of hazardous wastes including operation and reporting requirements for underground storage tanks. RCRA and HWCL require preparation of hazardous waste contingency plans and provide for specific procedures to conduct site investigation and cleanup of hazardous waste releases.
Toxic Substances Control Act (TSCA)	This federal law specifically regulates the management of chemical substances and mixtures that present an unreasonable risk of injury to health and the environment, including PCBs, and contingency planning for potential release incidents.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	CERCLA enables federal agencies to provide a response to unpermitted releases of hazardous substances to the environment and procedures to remediate those releases. New requirements include Emergency Planning and the Community Right to Know Act.

Table 3-1. Emergency planning regulatory summary (continued)

Superfund Amendments and Reauthorization Act (SARA), Title III	Title III of SARA requires the preparation of annual comprehensive hazardous material storage inventories. This law also requires reporting on estimated annual toxic releases inventories (TRI) for use in emergency planning and public information.
SARA Title I, Section 126	This law includes minimum training requirements for personnel handling hazardous substances and responding to emergency releases. This program is implemented at LLNL beginning with initial personnel training.
Assembly Bill 2185 (Waters Bill)	This law requires local administering agencies to regulate the storage of hazardous materials by businesses through preparation and submittal of hazardous materials "Business Plans." The Waters Bill also requires local administering agencies to prepare Area Plans for emergency planning purposes and to identify and maintain resources for disasters and accidental releases.
Risk Management and Prevention Program (RMPP) California Health and Safety Code, Chapter 6.95, § 25531 et seq.	Requires certain facilities with threshold amounts of acutely hazardous materials (the California equivalent of the federal Extremely Hazardous Substances) to prepare an RMPP that addresses emergency planning and response.
DOE Order 5000.3B "Occurrence Reporting and Processing of Operations Information"	This order provides direction and procedures for DOE Order 5400.5 below, establishing a system for reporting operations information related to DOE-operated facilities and processing of that information to provide for appropriate corrective action.
DOE Order 5400.5 "Radiation Protection of the Public and the Environment"	This DOE order provides general and specific guidance and direction for adequate prevention of releases of radioactive substances. It was issued to protect the public and the environment from undue risk from radioactivity released from DOE facilities. The order requires that DOE facilities monitor routine and non-routine releases to assess dose exposure to the public.

Table 3-1. Emergency planning regulatory summary (continued)

DOE Order 5500.1B "Emergency Management System"	This order requires an Emergency Management System detailing emergency response activities for DOE installations.
DOE Order 5500.2A "Emergency Notification, Reporting, & Response"	This order requires an Emergency Notification, Reporting, and Response system establishing control and planning responsibilities and procedures for emergency response activities.
DOE Order 5500.3A "Emergency Planning & Preparedness for Operational Emergencies"	This order establishes policy and action requirements for on-site emergency planning activities.
DOE Order 5820.2A "Radioactive Waste Management"	This DOE order was established to provide policies and guidelines for DOE to manage radioactive and mixed wastes and contaminated facilities. It includes personnel and organization procedures for proper handling and management of radioactive wastes.

3.1.2 Applicability to LLNL Activities

LLNL is subject to the regulatory programs summarized in Table 3-1. A comprehensive hazardous material inventory was prepared in 1989 (this inventory has been updated, and an ongoing system is being implemented). LLNL has met the inventory requirements of SARA Title III and has prepared, updated, and submitted a Business Plan for both the Livermore Site and Site 300, and has submitted them to the San Joaquin and Alameda county agencies responsible for emergency response activities. This is used in planning for on-site releases. The CERCLA program is managed in accordance with regulations applicable to site remediation.

As the lead environmental support organization, the Environmental Protection Department (EPD) works with the Emergency Preparedness and Response Program (EP&RP), the LLNL Fire Department, and other LLNL and DOE organizations. EPD ensures proper planning, resource allocation, and inventory reporting under the existing regulations.

3.1.3 Process for Compliance

One of the more important aspects of the emergency planning process is the identification of specific facilities with any potential risks for unplanned releases and their consequent impacts to the public health or environment. This process typically includes the following:

- Implementing SARA III;
- Following DOE Order 5500.3A;
- Development of a comprehensive inventory of hazardous materials at a given facility or local area;
- Establishment of emergency response protocol, notification procedures, specific responsibilities, and training guidelines for all appropriate agencies and personnel;
- Inventory of the types and condition of process or storage equipment, tanks, containers, or transportation equipment;
- Assurance of ongoing evaluation and training of workers in proper hazardous material management and handling operations;
- Assessment of hazards associated with processes or operations pursuant to DOE Order 5500.3A;
- Identification of adequate equipment, personnel, and other resources available for timely, appropriate emergency response and protection of public health; and
- Creation of reasonable accident scenarios used in training exercises.

3.1.4 Information/Reporting Requirements

EPD and the LLNL Fire Department must coordinate inventory and planning efforts to prepare and submit appropriate reports and documentation for emergency planning. The ChemTrack Operations Group has prepared and submitted the Business Plan and will continue to prepare applicable reports in compliance with SARA Title III and other state and local requirements.

3.1.5 Training

Emergency Response Organizations, LLNL Fire Department, and other LLNL staff are responsible for emergency planning response, and coordination and are trained according to DOE and federal and state requirements. LLNL training requirements are described in the *LLNL Training Manual*.

3.1.6 Supporting References/Standards

40 Code of Federal Regulations, Parts 110, 112, 124, 141 through 147, 149, 264, and 265.

California Health and Safety Code, Chapter 6.95, Section 25500 et seq.

23 CCR, Sections 2651 and 2653.

19 CCR, Section 2620 et seq.

22 CCR, Sections 25504 and 25507.

Executive Order 12088, "Federal Compliance with Pollution Control Standards."

DOE Order 4500.1, "General Environmental Protection Program."

DOE Order 5000.3B, "Occurrence Reporting and Processing of Operating Information."

DOE Order 5400.5, "Radiation Protection of the Public and Environment."

DOE Order 5500.1B, "Emergency Management System."

DOE Order 5500.2A, "Emergency Notification, Reporting, and Response."

DOE Order 5500.3A, "Emergency Planning and Preparedness of Operational Emergencies."

DOE Order 5820.2A, "Radioactive Waste Management."

3.1.7 LLNL Contacts Specific to Emergency Planning

There are contacts available at LLNL to help with emergency planning. The ES&H Teams, which include personnel from a number of health, safety and environmental disciplines at LLNL, can identify the proper team members for assistance with specific emergency planning issues. EPD has an Emergency Management Coordinator (EMC) to coordinate emergency planning and assure EPD's readiness to respond to all environmental incidents.

3.2 Emergency Response

Appropriate and timely response actions during unplanned releases of radioactive and nonradioactive hazardous substances at LLNL are necessary to minimize potential impacts to public health and the environment. Ensuring effective responses to such releases is a key objective of environmental compliance regulatory programs implemented by federal and state government agencies.

3.2.1 Regulatory Summary

Incident and emergency response activities are mandated on all levels of government and by the DOE. LLNL has developed and implemented an existing Emergency Preparedness Plan which designates specific responsibilities for response and notification in the event of an emergency. See Table 3-2 for a summary of specific regulations.

3.2.2 Applicability to LLNL Activities

Activities at LLNL may pose a threat to human health or the environment due to the quantities of hazardous materials used and hazardous wastes generated during research and other operations. Emergency response actions must be instituted in accordance with regulatory requirements, DOE, and LLNL policy.

In the event of an incident or emergency, the following procedures should be followed relative to the level of the incident or emergency. Both small and large incidents must be reported. During normal working hours, the EOG Analyst for the area is notified. To report a spill during off hours, contact the EDO through the Fire Department dispatcher. For a large incident (Level 2, 3, or 4), the LLNL Fire Department will respond. At this time, the Incident Command System (ICS) will be established relative to the needs for response resources: the ES&H Team, EPD, Plant Engineering, etc. The Satellite Operations Center (SOC) may need to be activated, as well as the Emergency Management Center (EMC). Table 3-3 defines a small incident. Table 3-4 defines a large incident.

Table 3-2. Emergency response regulatory summary

CERCLA	Requires notification to the federal National Response Center (NRC) if hazardous substance releases to the environment in a 24-hour period exceed reportable quantities established in the regulations.
SARA, Title III	Requires notification to state and regional administering agencies whenever both extremely hazardous substances (EHS) and hazardous substances are released off-site that exceed reportable quantities.
NPDES	Identifies the conditions that must be reported to the EPA in accordance with the CWA.
RCRA	Requires, at minimum, that TSDFs provide a training program to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, equipment, and systems.
CAA	Requires reporting to the United States Environmental Protection Agency (EPA) in the event of excess pollutant emissions, changes in operations that increase permitted emissions, and excess toxic compound emissions.

Table 3-3. Small incident

A small incident (Level 1) is one that meets the following conditions: • The release of a material whose nature and potential hazards are known; • The release presents no actual or potential threat to human health or the environment;	• The release can be cleaned up by one or two people in less than one hour; and • The incident results in nothing more serious than a minor injury requiring simple first aid.

Table 3-4. Large incident

A large incident (Level 2) is one that meets the following conditions: Release of material with hazards unfamiliar to personnel; • Release of material that cannot be identified; • Release of material that cannot be cleaned up by two people in less than one hour;	• Release material migrates into a storm drain or sewer; • An incident that is regarded by personnel as unsafe to manage without the aid of the LLNL Fire Department; and/or • Fire, explosion, or earthquake.
For an emergency (Level 3 or 4 incident) which includes multiple fires, explosions, and/or a natural disaster, the LLNL Fire Department/Incident Commander (IC) is responsible for primary response and initiation of the Incident Command Systems.	

3.2.3 Process for Compliance

Trained personnel will respond to incidents to ensure that the impact to public health and the environment are minimum and notification requirements are met. EDOs are certified to meet notification requirements. Generators are required to be familiar with emergency procedures, equipment, and systems. Generator requirements are explained in the Hazardous Waste Generation and Certification course required for all generators of hazardous waste.

However, since emergency response equipment and systems are facility-specific, generators are required to:

- Be familiar with their own roles and responsibilities with respect to the emergency response systems in their area;
- Know how to report potential problems with the routine operations of these systems; and
- Contact their own ES&H Team staff for detailed instructions that are appropriate for their area when necessary.

Generators and trained program personnel can handle small incidents with some support from the ES&H Team if needed. The incident should be reported to the EOG Analyst during working hours, or EDO during off hours, following the Ten-Step Response Guidance Plan described in RCRA required training.

If a spill or emergency occurs meeting the large incident criteria (see Table 3-4), you should evacuate the area of the spill and immediately contact the LLNL Fire Department at 911 and provide the following information:

- Location, quantity, and substance released (if known);
- Extent to which spill has traveled;
- Number and extent of injuries;
- Your name, organization, and telephone number; and
- Other hazards and information requested by the dispatcher.

3.2.4 Information/Reporting Requirements

As part of the EP&RP, EPD is preparing an Emergency Preparedness Plan that identifies specific regulatory response and reporting requirements. The existing draft plan includes LLNL and EPD personnel responsibilities for emergency actions.

Within LLNL there are different requirements for reporting incidents and emergencies relative to the level of the incident or emergency. For a small incident, programs should report them to the EOG Analyst during work hours, or EDO for all off-hour incidents since EPD is responsible for providing proper agencies determinations and notifications following releases exceeding the reportable quantities identified by federal, state, and local ordinances and the standards set forth in applicable DOE orders. The LLNL Facility Manager (LLNL Director) is responsible for reporting and delegating to EPD, environmental and other reporting requirements.

3.2.5 Training

EPD assists programs by providing the necessary training requirements in accordance with environmental regulations and environmentally related DOE orders. This includes training to address and upgrade skills for environmental protection and hazardous substances handling practices. These courses address health, safety, and emergency response issues that are specific to the operations of each organization. In addition, the Hazards Control department provides training that addresses health and safety issues which in some cases is required before certain jobs or tasks can be performed.

3.2.6 Supporting References/Standards

29 Code of Federal Regulations, Part 1910, et seq.

40 Code of Federal Regulations, Parts 110, 112, 124, 141 through 147, 149, 260 et seq., 300, and 355.

Executive Order 12088, “Federal Compliance with Pollution Control Standards.”

DOE Order 5000.3B, “Occurrence Reporting.”

DOE Order 5400.1, “General Environmental Protection Program.”

DOE Order 5484.1, “Environmental Protection, Safety, and Health Requirements; Information Reporting Requirements.”

DOE Order 5500.1B, “Emergency Management System.”

DOE Order 5500.2A, “Emergency Notification, Reporting, and Response.”

DOE Order 5500.3A, “Emergency Planning and Preparedness of Operational Emergencies.”

Executive Order 12316, “Response to Environmental Damage.”

3.2.7 LLNL Emergency Response Personnel

If you have questions or concerns regarding hazardous substance releases to the environment, you should contact the following offices:

EOG Analyst—The EOG Environmental Analysts are members of the EPD’s ORAD and members of the ES&H Teams. These personnel are responsible for coordination of emergency response and reporting activities.

ES&H Teams—These teams include personnel from a number of ES&H disciplines and provide assistance during incident response. The Team Leader can identify the proper team member for assistance with emergency response activities.

Hazards Control Department—The Hazards Control Department coordinates some of the emergency planning, response, and reporting activities at LLNL.

LLNL Fire Department—The Fire Department should be contacted in case of emergency incidents and can provide information about the proper storage and handling of hazardous substances.

Hazardous Waste Management Division—Hazardous Waste Management Division personnel can assist in material and/or waste analyses if information about the released substances is not available.

Environmental Duty Officer (EDO)—EDOs are personnel from within EPD. These personnel are responsible for all off-hour coordination of emergency response and reporting activities. They provide input and support for compliance with environmental regulations. The EDO may be contacted through the Fire Department Dispatcher.

Emergency Management Coordinator (EMC)—The EPD EMC is responsible for ensuring EPD’s readiness to respond to all environmental-related incidents. The EMC can be contacted through the EDO if necessary.

4.0 Labeling and Warning Requirements

4.0 LABELING AND WARNING REQUIREMENTS

Proper labeling of materials used at LLNL serves to warn users of potential hazards and ensure that eventual disposal is carried out safely. Federal, state, and local laws govern the proper labeling of environmental hazards. These requirements are specific, detailed, and may be revised periodically.

4.1 Regulatory Summary

The Occupational Safety and Health Administration (OSHA) requires containers of hazardous substances to be labeled with the name and address of the manufacturer, the name of the substance, and the hazard warning. The *Health & Safety Manual* has information on these requirements.

The Department of Transportation (DOT), the United States Environmental Protection Agency (EPA), and the Department of Toxic Substances Control (DTSC) all have strict requirements regarding labeling of vehicles and containers for accumulation, storage, and transport of hazardous waste containers. LLNL has developed labels unique to LLNL that meet all these state and federal hazardous waste requirements. The regulations governing transport are very detailed, and requirements vary depending on the method of transport, the amount of hazardous waste to be shipped, and the type of hazardous waste to be transported.

For transport of hazardous materials, transport vehicles and packages must have appropriate DOT-required labels, markings, and placards. Placards, markings and labels must remain on the packaging and transport container/vehicle until the hazardous materials have been removed. All cabinets, including laboratory or office cabinets, that store hazardous materials must also be placarded.

PCBs must be labeled with the PCB classification and the approximate amount of PCB present.

Pesticides must be identified with specific information during all phases of use, including transport, active use, storage and disposal. Also, OSHA requires special storage facilities and warning signs if the pesticide is flammable.

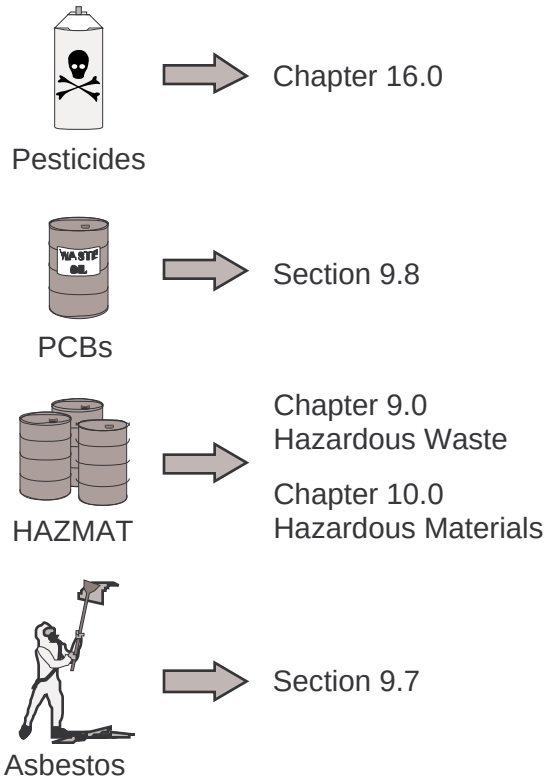


Figure 4-1. Labeling information

4.2 Applicability to LLNL Activities

Appropriate labeling is required when hazardous materials or waste are stored, handled, disposed of, or transported. If you store or ship chemicals of any kind, you should familiarize yourself with applicable regulations. If you plan any new construction, or plan to remodel your existing facility, contact your EOG Analyst for input on safe storage of hazardous substances in your new facility. Your EOG Analyst can also help you plan for possible asbestos removal. Figure 4-1 indicates which section of this Manual should be referred to for labeling information on different materials.

4.3 Responsibilities

As explained above, LLNL is required to use appropriate labeling for hazardous substances. You should familiarize yourself with the requirements applicable to your area of work. As a start, read the sections of this Manual that apply to your work. If you have any further questions, contact your EOG Analyst for help.

4.4 LLNL Contacts Specific to this Chapter

Contact your EOG Analyst for any questions on labeling requirements. Industrial Hygiene has requirements for storage of hazardous substances, contact your ES&H Team for information.

5.0 Environmental Planning and Permitting

5.0 ENVIRONMENTAL PLANNING AND PERMITTING

5.1 Environmental Evaluation Procedures

All proposed actions at LLNL that involve federal resources or may require a permit or decision by a California state/city/regional governmental agency, need to be evaluated to determine how environmental impact review requirements apply. In addition, new projects also must be analyzed to determine if permitting issues must be addressed. These two issues are discussed in this section.

5.1.1 Environmental Impact Assessment

Because LLNL facilities are federally owned and UC-operated, the environmental review requirements of both the DOE and the State of California are applicable during the project planning process. Federal environmental impact analysis requirements are set forth in the National Environmental Policy Act (NEPA); California requirements are governed by the California Environmental Quality Act (CEQA). Reviews to determine their environmental impacts are required for virtually all proposed LLNL projects or actions and for changes in existing activities or operations. The depth of review required varies with the project's environmental impact sensitivity. Some reviews require no documentation, while others may involve years of effort. NEPA or CEQA review requirements can range from preparing environmental checklists or records of review, to preparing a comprehensive environmental impact statement (EIS) (under the NEPA) or an environmental impact report (EIR) (under CEQA), both of which include detailed descriptions of projected environmental consequences of a particular project as well as mitigation measures to reduce its impacts. These documents are intended to ensure that environmental information is available to public officials (e.g., DOE or state agency decision makers), and to citizens, before decisions are made and actions are taken that could impact the quality of the human environment.

As part of an effort to evaluate the potential impact of operations of the laboratory, a joint EIS/EIR was prepared and finalized in August, 1992. This comprehensive document evaluated the environmental impacts of continuing operations of LLNL and Sandia National Laboratories, Livermore, including near-term (within 5 to 10 years) proposed projects. New projects and modifications to operations usually require preparation of additional environmental documentation. Mitigation measures (i.e., measures to avoid or minimize environmental impacts) identified in the EIS/EIR which may constrain LLNL activities must be implemented.

5.1.2 Regulatory Summary

National Environmental Policy Act (NEPA)

Under the original NEPA, all "major federal actions" or projects affecting the quality of the human environment must be reviewed to evaluate their environmental effects and to identify project alternatives. Subsequent to enactment of the NEPA, the Council on Environmental Quality (CEQ) prepared regulations requiring each federal Agency to prepare agency-specific procedures for implementing the NEPA. These procedures, within DOE, require different levels of environmental documentation depending on the potential severity of impacts as well as on other factors. This NEPA review process must be completed before final decisions are made by DOE officials to begin the project or action or before irretrievably committing substantial federal resources.

Under DOE's regulations, NEPA review requirements apply to all proposed actions, not only those that are considered "major" federal actions with potentially significant impacts. The process must begin as early as possible in the project planning cycle since the review must be completed by DOE before beginning Title II-level design (on certain construction projects), before committing substantial resources, or before actually starting the project activities on non-construction projects.

Environmental Review Process

The environmental review process begins when there is a federal proposed project or proposal having the potential to affect the environment, such as federally funded laboratory construction projects and laboratory experiments. Both overhead-funded and direct-funded projects performed on federal property by federal employees are subject to NEPA review. For example, because DOE is a federal agency, its actions—whether they involve a new research project, a modification of the current treatment process of hazardous wastes, or an environmental restoration project—are subject to the requirements of NEPA. Decisions as to whether the NEPA review process is adequate rest with DOE; DOE cannot delegate the authority to make NEPA determinations to contractor agencies such as UC/LLNL.

DOE NEPA review procedures also apply to proposed actions which involve DOE-funded staff, equipment, or operations at off-site (non-DOE) facilities or locations (e.g., Work-for-Others projects and Cooperative R&D Agreements [CRADAs]).

In some narrow instances relating to certain national security or other emergencies, decisions to begin the action prior to completion of the NEPA review process have been allowed by the CEQ. These cases are very rare and require prior certification by the Secretary of Energy and discussions with the CEQ.

For a number of DOE-defined (and publicly reviewed) classes of actions viewed as inherently benign on the environment, there exist "categorical exclusions" (CXs) from needing to prepare the more in-depth levels of NEPA documentation such as environmental assessments (EAs) or EISs. Proposed projects must meet a series of DOE eligibility criteria to qualify for such CXs. Analysts from the Environmental Evaluations Group (EEG) of EPD review the scope and potential impacts of proposed projects for their eligibility for these DOE CXs and prepare the application (request) for DOE approval of a CX.

If a proposed LLNL action or project does not meet the criteria for a CX, or if there may be a potential for significant environmental impact, LLNL will prepare an EA for DOE review. If DOE finds that the project's impacts will be insignificant or that the impacts can be mitigated so as to become insignificant, DOE will publish a "finding of no significance" (FONSI). However, if a FONSI cannot be determined, then DOE will direct preparation of an EIS. The EIS preparation and review process involves substantial public input and review and culminates in a "record of decision" (ROD) by the Secretary of Energy; also, if certain measures need to be implemented to help mitigate environmentally significant impacts of the project, a DOE "mitigation action plan" (MAP) will be prepared and implemented. DOE may also direct preparation of an EIS on certain types of proposed projects simply on the basis of their scope, type, or public controversy. Figure 5-1 illustrates a simplified form of the process of determining the appropriate needed level of NEPA review or documentation.

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) was enacted to achieve six objectives: to disclose to decision makers and the public the significant environmental effects of proposed activities, to identify ways to avoid or reduce environmental damage, to prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures, to disclose to the public reasons for agency approvals of a project with significant environmental effects, to foster interagency cooperation, and to enhance public participation. CEQA applies only to discretionary activities proposed or approved by California public agencies.

LLNL must meet CEQA requirements for certain proposed activities because the University of California is a California state agency. Implementing CEQA is also required when a state, regional, or local governmental agency is required to issue a permit for or render a decision on a LLNL project. In these latter cases, LLNL, as the applicant, generally is requested to prepare the needed documentation for agency review and approval. LLNL also prepares CEQA documentation for such UC-sponsored actions as the leasing of off-site facilities. Since the vast majority of LLNL projects are DOE funded, done only on federal property, and require no permit or other state agency decision, the need for formal CEQA documentation is very uncommon compared to the need for NEPA documentation.

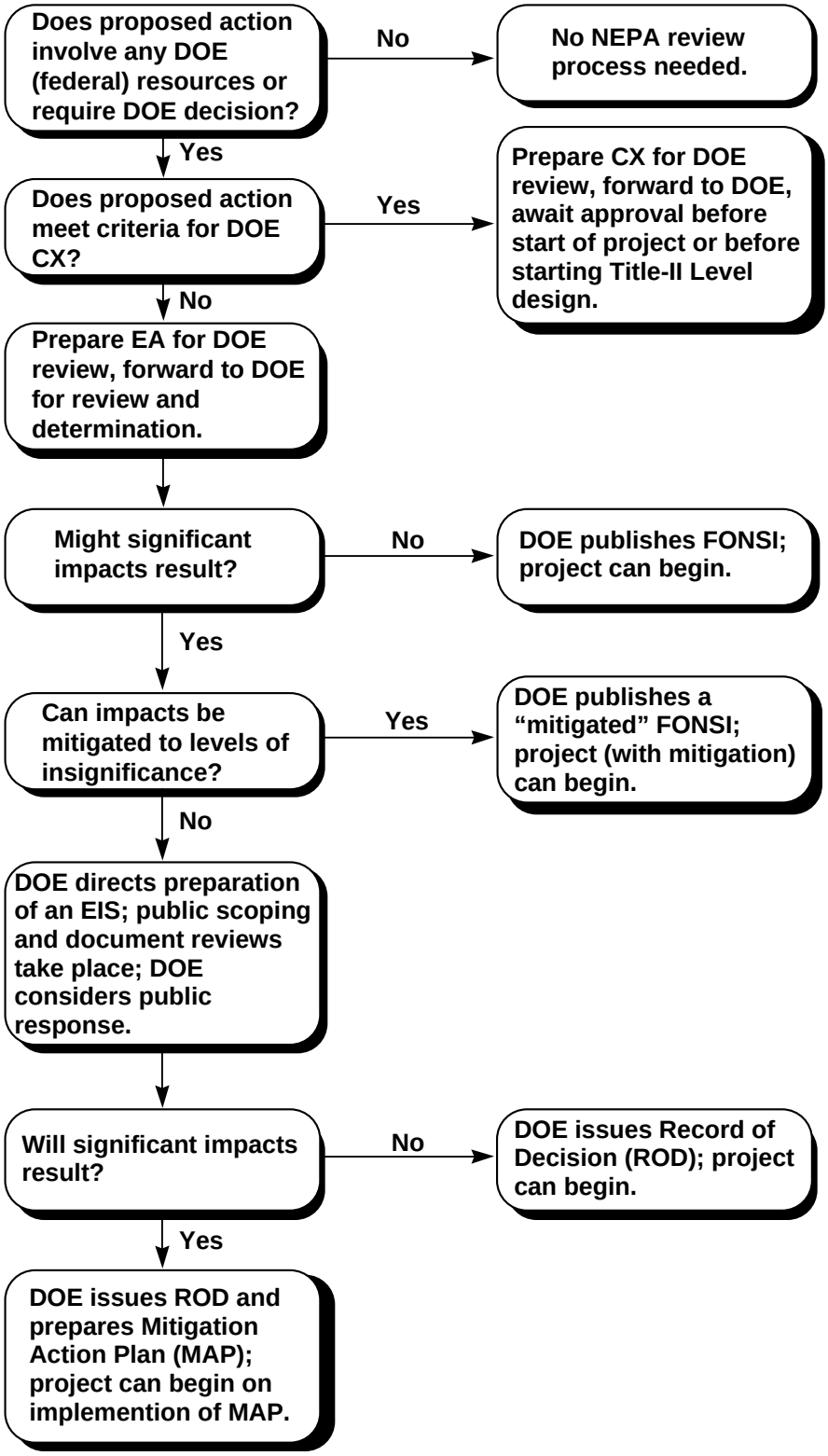


Figure 5-1. Simplified DOE NEPA screening and review process

CEQA provides for categorical exemptions from further environmental review and documentation for certain "ministerial" (nondiscretionary) and other minor agency actions. As with NEPA, if an action has the potential for significant impact or is not eligible for an exemption, an assessment, called an "initial study" (IS) is prepared and submitted to the appropriate state/local governmental agency for review and determination. The EEG staff prepares CEQA exemptions for LLNL projects and prepares ISs for submission to state decision-making agencies. Upon review, the lead state decision-making agency may issue a "negative declaration" (NEG DEC) if the project would not have significant impacts or would have impacts that could be mitigated (similar to a NEPA FONSI). The agency, however, may direct preparation of the more comprehensive environmental impact report (EIR), a document of scope similar to the EIS prepared under NEPA. Upon completion of EIR review, the lead agency issues a "notice of determination" (NOD) and requires implementation of a "mitigation monitoring and reporting program" (MMRP).

In August 1992, UC and the DOE published a jointly-prepared *Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore*. This EIS/EIR assessed the impacts of both continuing operations and near-term (5 to 10 years) improvements at LLNL and the impacts of renewing the DOE-UC contract for operation of LLNL by UC. Both a ROD (NEPA) and a NOD (CEQA), as well as a MAP (NEPA) and an MMRP (CEQA) were issued.

Aside from procedural differences regarding public notice and review procedures, the principal difference between the EIR and EIS processes involves CEQA's requirement that significant impacts be mitigated, that the project be redesigned to avoid significant impacts, or that the lead agency provide statements of overriding consideration on unavoidable significant environmental project effects.

5.1.3 Applicability to LLNL Activities

As noted above, the anticipated environmental effects associated with continuing laboratory activities and those stemming from near-term proposed projects and needed improvements were evaluated in the August 1992 site-wide EIS/EIR. If you are planning new research or testing projects, construction or infrastructure improvements projects, (including CRADAs and WFO projects), or if you are applying for environmental permits from local, state, and/or federal agencies, you should consult your EEG Analyst to determine whether these activities will require DOE or state agency environmental impact review under NEPA or CEQA. Your EEG Analyst can also help determine whether your proposed activity was adequately assessed in the 1992 EIS/EIR, whether a categorical exclusion (or CEQA exemption) is available, or whether the project may require an EA (or IS) or EIS/EIR-level assessment.

5.1.4 Process for Compliance

Because the DOE-NEPA and state agency CEQA processes can take several weeks/months (CXs) to several years (EIS/EIRs) to complete, you need to consult your EOG or EEG Analyst as soon as you identify a potential project or action. When defining the extent of the proposed activity, be sure to view the project in its totality. All connected elements of a proposed project must be fully analyzed in a single NEPA (or CEQA) environmental review document. NEPA and CEQA regulations do not permit a project to be split into two or more segments with separate environmental reviews because this may lead to underestimating the significance of direct and cumulative environmental impacts. Project segmentation can invalidate the piecemeal NEPA and CEQA reviews and cause substantial project delay.

Be sure to familiarize yourself with the 1992 site-wide EIS/EIR mitigation measures LLNL has committed to implement. You can contact your EEG analyst or refer to the August 1992 UC MMRP and October 1993 DOE MAP to identify what needs to be done and to obtain advice on complying with the required mitigation measures. EPD's NEPA Overview Course (EP3001) is also available to provide additional detail and information.

5.1.5 Supporting Reference/Standards

10 CFR PART 1021; 57 FR 15121

40 CFR 1500 et seq.

Bass, R.E. and Albert I. Herson. *Successful CEQA Compliance: A Step-by-Step Approach.* 1992.

California Public Resources Code, Section 21000 et seq.

Mandelker, D.R. *NEPA Law and Litigation,* 2nd ed. (Clark, Boardner, Callaghan, Deerfield, IL, 1992).

University of California CEQA Handbook: Procedures Handbook and Model Approach for Implementing the California Environmental Quality Act (CEQA), University of California, May, 1991.

University of California Mitigation Monitoring and Reporting Program for Continued Operation of Lawrence Livermore National Laboratory, August, 1992, University of California, SCH90030847.

5.1.6 LLNL Contacts Specific to this Chapter

Contact your Environmental Evaluations Group (EEG) Analyst for guidance on complying with NEPA and CEQA. Your supporting EOG Analyst can provide the name and telephone number of the EEG point of contact for your area.

6.0 Pollution Prevention

6.0 POLLUTION PREVENTION

It is the policy of the United States Environmental Protection Agency (EPA) to prevent or reduce pollution at the source, whenever feasible. To that end, since 1984, federal and state regulations have been developed to reduce the amount of hazardous waste and other pollutants released into the environment each year. These regulations institute pollution prevention programs that place specific evaluation and reporting requirements on hazardous waste generators, such as LLNL.

Three federal laws regulate discharges of hazardous wastes and substances into the environment: the Hazardous and Solid Waste Amendments of 1984 (HSWA), the Pollution Prevention Act of 1990 (PPA), and the Clean Water Act (CWA). The HSWA requires generators of hazardous waste, along with hazardous waste treatment, storage, and disposal facilities, to certify that they have waste minimization programs in place. Under the PPA, manufacturers, processors, or users of certain chemicals must report on the amount of wastes reduced as a result of waste minimization programs. In California, the Hazardous Waste Source Reduction and Management Review Act of 1989, or Senate Bill (SB) 14, requires documentation of existing and proposed waste minimization programs. In addition, DOE Order 5400.1 requires preparation of waste minimization plans.

6.1 Regulatory Summary

The HSWA requires hazardous waste generators to certify on their hazardous waste shipping documents that they have waste minimization programs in place and to report on the progress of their waste generation programs in their Biennial Reports to the EPA or state-delegated RCRA agency. In California, the California Department of Toxic Substances Control (DTSC) has been delegated the RCRA program. Owners and operators of permitted hazardous waste treatment, storage, and disposal facilities (such as LLNL) must also make the same waste minimization certification annually as part of their facility operating records.

PPA (42 USC Section 6602) also places minimization requirements on private and governmental facilities that emit toxic chemicals and generate hazardous wastes. Facilities that manufacture, process, or otherwise use certain chemicals must report annual chemical releases under Section 313 of the Superfund Amendment and Reauthorization Act (SARA), Emergency Planning and Community Right-to-Know Act (EPCRA). The SARA 313 “Form R” report used in this process details annual estimates of wastes reduced through source reduction, recycling, and treatment. The forms require reporting on four consecutive years of waste minimization activities by chemical to show success or failure in reducing chemical releases to the environment.

CWA requires the control of pollutant discharges from facilities that store or manage hazardous substances. The CWA generally requires that storage facilities for petroleum, hazardous substances, wastes, and other materials be constructed and maintained properly to prevent the pollution of stormwater and navigable waterways.

California's Hazardous Waste Source Reduction and Management Review Act of 1989, or SB 14, requires facilities that generate large amounts of hazardous waste to document their existing and proposed waste reduction measures. Under SB 14, facilities must report on the progress of waste minimization activities, changes in waste management activities, and evaluation of waste reduction alternatives every four years. Facilities must also develop plans for implementing future waste reduction measures.

The DTSC regulates management and reduction of hazardous wastes in California. Transportation waste manifests used in California include a waste minimization certification signed by responsible generating facility personnel. California Code of Regulations (CCR) Title 22, Section 66262.20 and its Appendix include the specific requirements for hazardous waste manifests. Similarly, DTSC regulates the preparation and submittal of Hazardous Waste Biennial Reports, which must report on the effectiveness of the hazardous waste generator's waste minimization programs.

Finally, DOE Order 5400.1 requires the preparation of two documents: the *Waste Minimization Program Plan,* and the *Pollution Prevention Awareness Program Plan* for waste minimization. Both of these plans must be reviewed annually and updated once every three years.

6.2 Applicability to LLNL Activities

LLNL is considered a hazardous wastes generator which must comply with regulations that require transportation manifests, Biennial Reports, and SB 14 evaluations. In the past, as a federal facility, LLNL has been exempt from EPCRA Form R and PPA reporting requirements; however, pursuant to DOE directives, all DOE facilities will submit a Form R on an annual basis to the EPA beginning on July 1, 1994. Because LLNL exceeds the SB 14 generation thresholds, it must also prepare applicable SB 14 reports and plans.

As a DOE facility, LLNL must prepare and submit waste minimization and pollution prevention documentation, as required by DOE Order 5400.1.

6.3 Responsibilities

EPCRA reporting requirements and the PPA require facilities to submit chemical-specific information on waste reduction activities, including an estimate of the amount of hazardous waste eliminated through source reduction

measures, on-site and off-site recycling, and treatment processes. This information must be summarized and submitted to the EPA annually, on or before July 1. Applicable regulations are included in the Code of Federal Regulations (CFR) Title 40, Part 372.

SB 14 regulations require that every four years facilities prepare both a baseline generation report and a plan for long-term waste reduction. The evaluations address waste streams that represent 5% or more of the total hazardous waste generated annually by a facility. A facility must generate more than 12,000 kilograms (kg) of hazardous waste, or 12 kg of extremely hazardous waste each year to be subject to SB 14. The progress report and plans must be kept at the facility and need not be submitted, unless requested.

6.4 Process for Compliance

The EPD, Operations and Regulatory Affairs—Waste Minimization Group at LLNL is responsible for identifying and reporting on waste reduction activities. The waste minimization certifications on manifests are signed by LLNL EPD staff.

Throughout the year, EPD staff collect data on hazardous waste generation and reduction activities, and maintain this information in a database. This information, as well as input from the EPD Hazardous Waste Steering Committee, is used to prepare and submit the Biennial Report, DOE Plans, and SB 14 reports. LLNL prepared its first SB 14 source reduction and management plan documents in 1991, updated this information in 1993, and will prepare applicable waste reduction documentation in 1995 and at least every four years thereafter.

You should always be thinking of ways to minimize the volume and hazard of your waste streams. Waste minimization can save money as well as make regulatory compliance easier. As shown in Figure 6-1, the two methods of waste minimization are source reduction and recycling. Potential waste minimization methods are listed in Figure 6-1 under these two categories.

The Chemical Exchange Warehouse (CHEW), promotes waste minimization and results in considerable savings by reducing the amount of new chemicals that need to be purchased as well as reducing costs of hazardous waste disposal. When programs shut down, employees retire, or inventories are reduced, many usable chemicals are sent to HWM for disposal. Unused chemicals represent a substantial portion of HWM waste. Before purchasing new chemicals from a commercial supplier or manufacturer, review the CHEW inventory database for excess chemicals free-of-charge. For more information about CHEW, talk to your EOG Analyst or your HWM Field Technician.

In an effort to reduce hazardous wastes at LLNL (and comply with applicable laws and save on disposal costs), each LLNL organization should work with EPD to identify and develop waste minimization alternatives. These measures can be

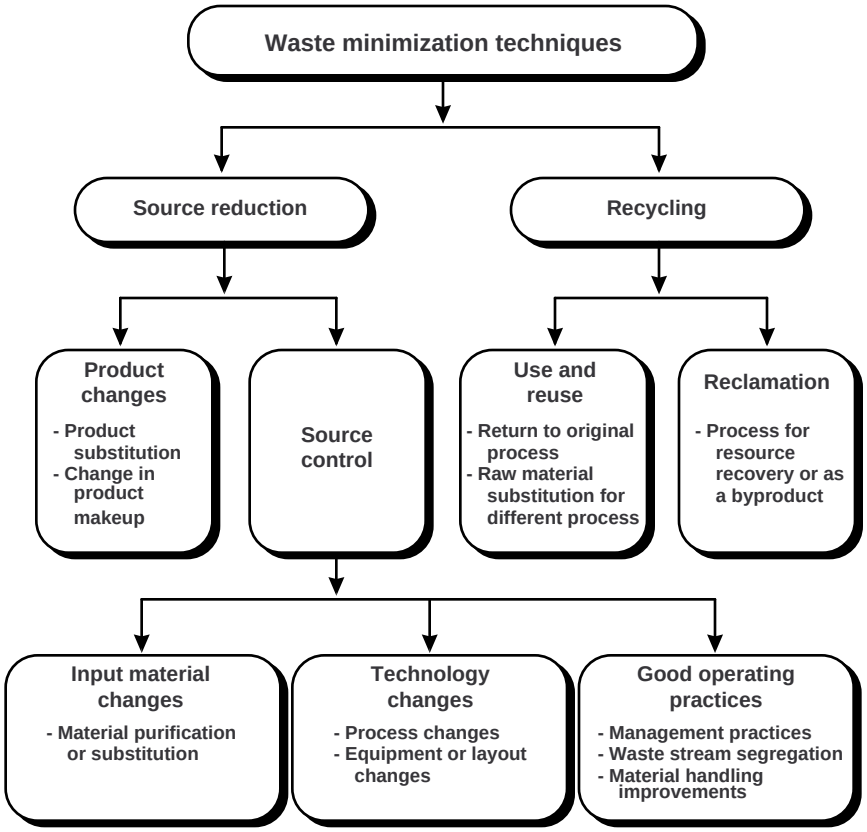


Figure 6-1. Waste minimization techniques

relatively simple. The EPD Waste Minimization Group encourages LLNL staff to submit all waste minimization recommendations both for possible adoption and to ensure that credit for existing waste reduction measures is recorded.

6.5 Supporting References/Standards

California Code of Regulations (CCR), Title 22, Chapter 12, Article 2, Section 66262.20.

California Health and Safety Code (HSC), Sections 25244.14 through 25244.23.

Code of Federal Regulations, Title 40, Part 372.

Department of Toxic Substances Control (DTSC), *Guidelines for Preparation of Hazardous Waste Management Evaluation and Plans, and Hazardous Waste Management Reports*.

EPA Toxic Chemical Release Inventory Reporting Form R and Instructions, Revised 1992 Version.

6.6 LLNL Contacts Specific to this Chapter

It is important to discuss any increases, decreases, or other substantial changes in hazardous waste generation and management at your operation with EPD staff. The principle point of contact responsible for pollution prevention within EPD is the Waste Minimization Representative. Your supporting EOG Analyst can provide the name and telephone number of the waste minimization representatives for your area. Additionally, each Organization's representative on the Hazardous Waste Minimization Steering Committee can be contacted for additional information.

7.0 Wastewater Discharge and Treatment

7.0 WASTEWATER DISCHARGE AND TREATMENT

Water at LLNL is primarily used for sanitary systems, landscape irrigation, process waters, and cooling water. Other uses include drinking, washing, boilers, and a swimming pool.

The San Francisco Water Department, via the Hetch Hetchy Aqueduct system and the Alameda County Flood and Water Conservation District, Zone 7, supplies water to the LLNL main site. On-site drinking water wells currently supply water to Site 300. In the near future, Site 300 may switch to the Hetch Hetchy Aqueduct system as a primary water source, and the on-site wells will remain as a backup water supply. Water for other uses in the vicinity of both Site 300 and the LLNL main site includes residential, commercial, and agricultural. Water in the Livermore Valley is supplied primarily by the Alameda County Flood and Water Conservation District, Zone 7. Near Site 300, water users typically have their own water supply wells.

Disposal of industrial, commercial, and domestic wastewater by LLNL has the potential to degrade the quality of waters of the state resources. Several federal, state, and local regulatory programs govern treatment and discharge of the wastewater generated at LLNL to public wastewater treatment plants, groundwater, surface streams, and arroyos.

Chapter 7.0 is divided into four sections to address management and maintenance of water quality. Section 7.1 describes the requirements and practices governing storm water discharges, point discharges to surface waters, and discharges to waste management units or engineered-to-ground systems having the potential to affect groundwater. Section 7.2 describes the requirements and practices governing wastewater discharged to the Livermore Water Reclamation Plant (LWRP) that ensure LLNL meets receiving water standards. Section 7.3 presents the drinking water monitoring and treatment standards that must be followed at LLNL. Finally, Section 7.4 describes other state and federal programs that impact water quality.

7.1 Wastewater Discharge Requirements

7.1.1 Regulatory Requirements

The State of California via the State Water Resources Control Board (SWRCB) protects the quality of groundwater and surface water (e.g., rivers, streams, lakes, and ponds) resources. The SWRCB sets water quality objectives through Regional Water Quality Control Boards to ensure water resources can support designated recreational, domestic, commercial, industrial, and other beneficial uses.

The specific water quality objectives for water bodies impacted by activities at the LLNL main site and Site 300 are regionally implemented by the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the Central Valley RWQCB, respectively. Each board individually designates water quality objectives for different bodies of water within its boundaries. These standards are implemented by requiring individual dischargers to operate pursuant to waste discharge requirements (WDRs). WDRs restrict the types and volumes of pollutants that may be discharged.

WDRs also implement the federal National Pollutant Discharge Elimination System (NPDES) permit program. The SWRCB has authority from the United States Environmental Protection Agency (EPA) to implement the NPDES program. The main difference between these two programs is that WDRs additionally regulate discharges of waste and wastewater to land, while NPDES permits are limited to discharges to “waters of the United States” (which include lakes, streams, rivers, and intermittent streams).

LLNL, like other facilities that discharge or have the potential to discharge contaminants that could affect the quality of the groundwater or surface waters, must operate in accordance with WDRs. WDRs are issued for direct discharges (e.g., via pipe or other discrete conveyance) to surface waters, discharge to waste management units having the potential to contaminate groundwaters, and storm water runoff with the potential of mixing with pollutants before reaching surface or groundwaters. Figure 7-1 illustrates types of discharges to water and land. Indirect wastewater discharge entering the LWRP via sanitary sewer lines is regulated by a different permit issued by the LWRP.

The different types of wastewater discharge and their regulatory requirements are described below.

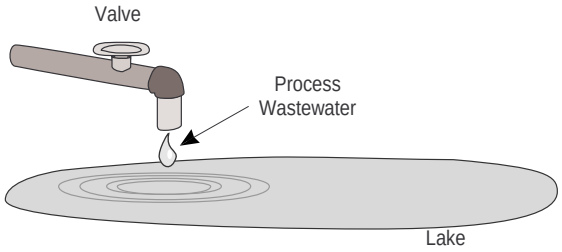
Wastewater Discharge to Municipal Sanitary Sewer System

Sanitary sewer discharges at LLNL are regulated under a site-wide Wastewater Discharge/Chemical Storage Permit from the local control authority. LLNL must annually submit a comprehensive permit application to the LWRP for discharge permit renewal. Not all discharges are direct to the sewer; some process waste streams are first contained and treated prior to discharge. Specific sanitary sewer discharge conditions and standards are discussed in Section 7.2.

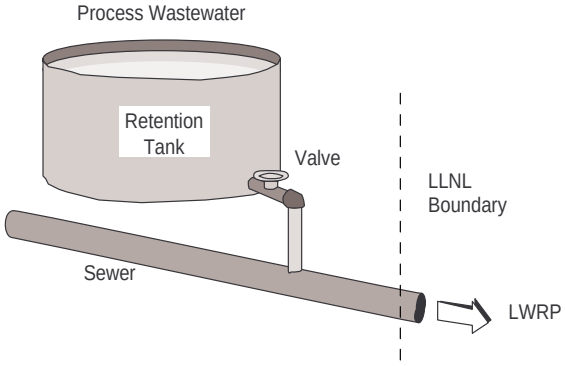
Wastewater Discharge to Surface Waters

All discharges of waste to surface waters require WDR/NPDES permits. WDR/NPDES permit requirements for discharges directly to surface waters impose different types of conditions depending on the type of discharging facility and the waste characteristics. Discharge limits can be set based on the known technological treatment methods within a specified industry, and/or based on water quality objectives for the specific pollutants discharged. Surface

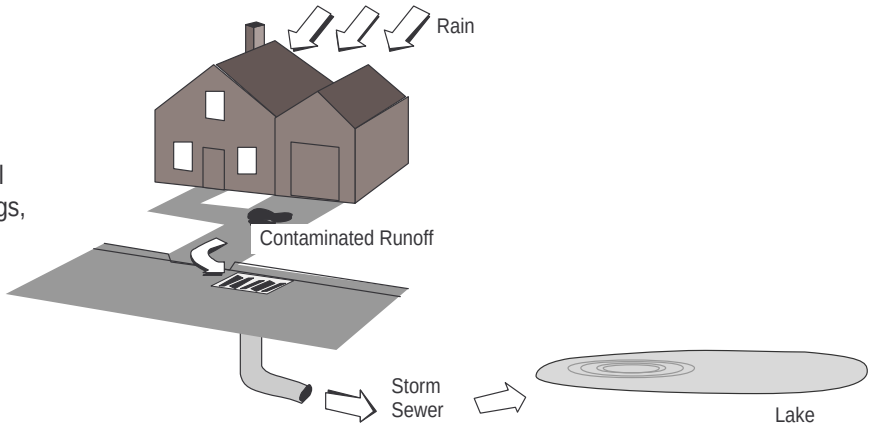
Direct discharge
to surface water
(lake, river, stream, etc.).



Indirect discharge
to sanitary sewer system
(Livermore Water
Reclamation Plant [LWRP]).



Stormwater discharge.
Waste oil or other chemical
contamination from buildings,
roads, or other surfaces
contact rainwater and flow
into storm sewer.



Discharge to land.
Either engineered discharge
or rupture or leak of storage
vessel (which can cause
contamination of groundwater
and surface water).

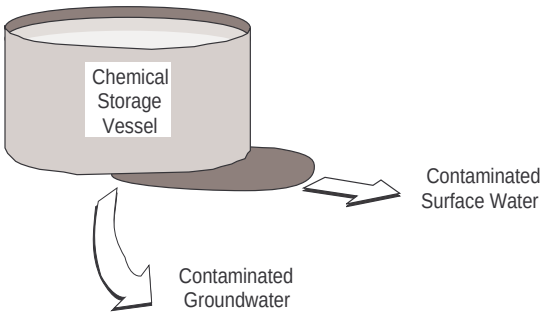


Figure 7-1. Discharge to water and land

water WDRs (NPDES permits) are valid for five years; permit applications for renewal must be submitted and deemed complete by the Regional Board 180 days prior to the expiration date.

Storm Water

Storm water discharges associated with industrial and construction activity are regulated under two statewide general WDR/NPDES permits unless regulated under individual permits for individual facility dischargers. Storm water dischargers seeking coverage under these permits must notify the SWRCB that it intends to operate under the statewide permit. These WDRs are designed to limit the sources of pollutants in storm water runoff associated with these activities (such as oil, sediments, and pesticide residue) that flow into storm drains and ultimately into rivers, lakes, streams and bays. Both WDRs require implementation of best management practices (BMPs), including good housekeeping, source reduction, and, if necessary, treatment of storm water discharges. In addition, non-permitted discharges to storm sewers of wastes and wastewaters are prohibited.

Industrial facilities subject to storm water permitting must develop and implement a storm water pollution prevention plan (SWPPP), conduct a monitoring program, inspect their facilities annually, and annually certify compliance with both the provisions of the SWPPP and the permit as part of an annual monitoring report submitted to the Regional Boards. Construction sites must also develop SWPPPs, implement an inspection program to ensure BMPs are in place and function properly, and meet annual certification of compliance with the SWPPP and the permit.

Waste Management Units/Engineered to Ground Systems

WDR permits must be obtained for any discharge of waste to waste management units, such as surface impoundments, landfills, and waste piles that potentially may affect groundwater. Other waste discharges to the ground subject to regulation include waste discharging to systems engineered to ground, including percolation pits, irrigation (using treated groundwater), and injection. Land disposal WDRs do not have a predetermined expiration date, but they must be renewed upon request of the RWQCB.

7.1.2 Applicability to LLNL Activities

LLNL activities result in waste and wastewater discharges falling into all four of the above categories. LLNL discharges are identified below by WDR permit, type of discharge, and location:

Table 7-1. Surface water WDRs

Permit	Regulated Discharges	Main Site or Site 300
Central Valley Regional Water Quality Control Board (RWQCB) Order No. 94-131, NPDES No. CA0081396	Discharge of cooling tower wastewater to surface waters and storm water discharges related to industrial activities.	Site 300
Central Valley RWQCB Order No. 91-052, NPDES No. CA0082651	Discharge to Corral Hollow Creek of treated groundwater from a groundwater treatment system.	Site 300
San Francisco Bay RWQCB Order No. 91-091, NPDES No. CA0029289	Discharge to an infiltration trench, injection wells, storm sewer, Arroyo Las Positas, and Arroyo Seco of treated groundwater generated from groundwater remediation project as part of CERCLA.	Main Site

Table 7-2. Storm water WDRs

Permit	Regulated Discharges	Main Site or Site 300
San Francisco Bay RWQCB Order No. 95-174, NPDES No. CA0030023	Discharges of storm water runoff associated with industrial activities and specific low threat non-storm water discharges.	Main Site
California General Construction Activity Storm Water Permit, Order No. 92-08-DWQ, NPDES No. CA CAS000002	Discharges of storm water runoff associated with construction activities covered on a project by project basis.	Main Site and Site 300

Table 7-3. Waste management units/engineered to ground systems

Permit	Regulated Discharges	Main Site or Site 300
Central Valley Regional Water Quality Control Board (RWQCB) Order No. 85-188	Discharge of HE rinse water and photolab rinse water to Class II surface impoundment; discharge of domestic waste to individual building septic systems; and discharge of domestic waste to a sewage oxidation pond that overflows to an evaporation-percolation pond.	Site 300
San Francisco Bay RWQCB Order No. 88-075	Discharge of extracted and treated groundwater to a percolation pond and use as irrigation as part of a pilot study extraction test for a groundwater (primarily organic compounds composed of solvents) cleanup effort.	Main Site
Central Valley RWQCB Order No. 93-100	Establishes groundwater monitoring program to detect discharges from closed Landfill Pits 1 and 7. The landfills accepted firing tables gravel (consisting of wood, plastic, metal, and gravel that could have been contaminated with organics, heavy metals, and radioactive compounds). Landfill Pits 1 and 7 were closed with the waste in place in 1992 (RCRA closure).	Site 300

Specific Permits, WDRs, etc., are subject to periodic amendment. Please consult the water/wastewater analyst for the most current permit conditions and status.

7.1.3 Process for Compliance

If you are aware of or plan to discharge waste or wastewater to new discharge points, please contact your EOG Analyst or the Water Guidance and Monitoring Group; to determine whether this activity is currently regulated under

an existing WDR permit or whether a new permit must be obtained. Similarly, if you are discharging wastewater in accordance with one of the permits above, you need to notify your EOG Analyst or the Water Guidance and Monitoring Group in the event there is a “material change” in the character, location, or volume of discharge. Finally, any dredge and fill operations, or other activities that may impact floodplains or wetlands, (see Chapter 15.0, Floodplains and Wetlands) must be made in accordance with a WDR permit as well as other permits.

Construction projects resulting in a disturbance of five acres or more of land must submit notices of intent to comply with the state storm water permit for construction activities and develop Construction SWPPPs. Smaller construction projects at LLNL are subject to the Industrial SWPPP required implementation of BMPs. Make sure that your EOG Analyst is informed of any and all construction projects and plans.

Because permit applications often take several months to prepare in addition to the 180-day minimum lead time required by the RWQCB, you should notify your EOG Analyst or Water Guidance and Monitoring Group as soon as you identify the possible need for a permit (new, modified, or renewed), so a permit application can be submitted in a timely manner. The steps in the permitting process are presented in Figure 7-2. Construction storm water permits can be obtained in a much shorter time frame; however, the notice of intent must be filed and the SWPPP developed and approved for implementation before construction begins, so planning lead time is still necessary so construction schedules are not delayed.

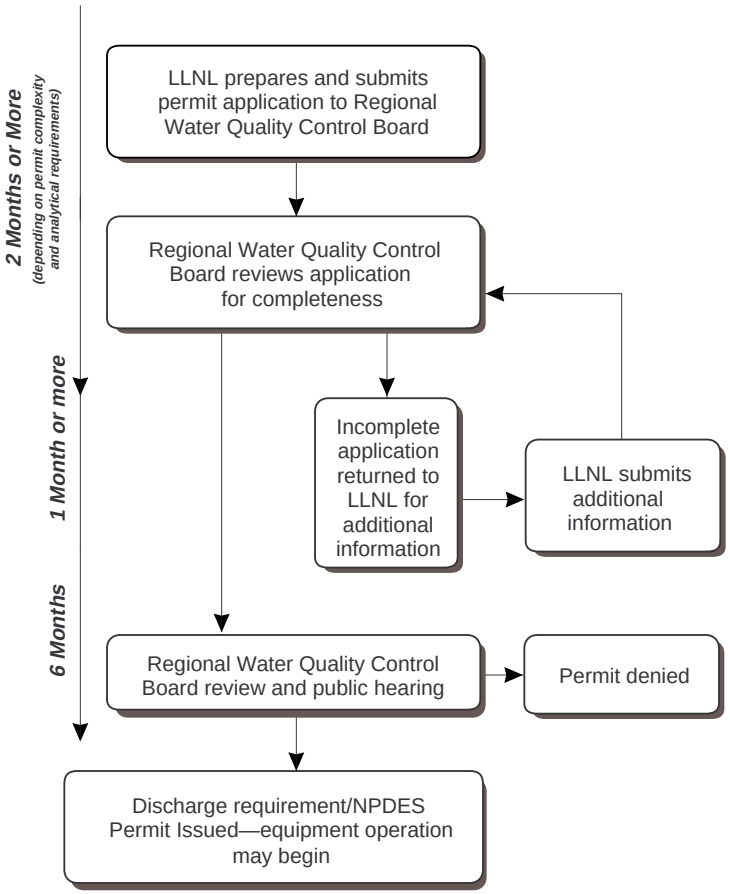


Figure 7-2. Wastewater discharge permitting process

7.1.4 Information/Reporting Requirements

Specific effluent limitations, operating conditions, prohibitions, monitoring, and reporting requirements listed in the individual WDR permit must be followed. The RWQCB usually requires routine reporting of compliance activities including monitoring results and status of any treatment systems. EPD can assist in the preparation of routine reports. Make sure that you know who is writing and submitting permit-required reports.

LLNL, as the permit holder, has an obligation to immediately report to the appropriate agency noncompliance with effluent standards, permit conditions, or other performance standards. There are significant penalties for failure to follow these reporting obligations. These reports are handled through EPD.

Permits usually include provisions for reporting illicit discharges; and spills ;of oils and hazardous materials. In the event of a spill, contact your EOG Analyst who then will work with the ES&H team and program to resolve the problem. After the release, the EOG Analyst must submit a written report detailing the reasons for noncompliance. (See Chapter 3.0, Emergency Response.)

7.1.5 Supporting References/Standards

Federal Water Pollution Control Act, 33 United States Code Section 1251 et seq.

40 Code of Federal Regulations Parts 15, 25, 100-149, 400-471.

California Porter-Cologne Water Quality Control Act, Section 13000 et seq.

California General Construction Activities Storm Water Permit (WDR 91-13-DWQ).

California General Industrial Activities Storm Water Permit (WDR 92-08-DWQ).

23 California Code of Regulations 2200 et seq.

DOE Orders 4700.1, Chapter V; 5480.4, 1B, 1C; and 6430.1A.

Central Valley Regional Water Quality Control Board Order No. 94-131.

Central Valley Regional Water Quality Control Board Order No. 85-188.

Central Valley Regional Water Quality Control Board Order No. 91-052.

Central Valley Regional Water Quality Control Board Order No. 93-100.

San Francisco Bay RWQCB Order No. 88-075.

San Francisco Bay RWQCB Order No. 91-091.

7.1.6 LLNL Contacts Specific to this Section

If you have a question on whether WDR/NPDES permits are needed or whether the permit conditions are being followed, contact your EOG Analyst or the Water Guidance and Monitoring Group (WGMG) Analyst in the Operations and Regulatory Affairs Division. Your EOG and WGMG Analyst will work with you to assess and evaluate regulatory issues.

7.2 Sanitary Sewer Discharge

Federal, state, and local laws govern discharges to and from Publicly Owned Treatment Works (POTWs), such as the LWRP. The Federal Water Pollution Control Act, as amended by the Clean Water Act (CWA) in 1977, establishes nondomestic wastewater pollution control criteria. The California Porter-Cologne Water Quality Control Act further regulates discharges to navigable waters, and local ordinances regulate discharges to the sanitary sewer.

LLNL is the largest contributor to the LWRP. LLNL discharge comprises about 8% of the total volume received by LWRP. In 1994, sanitary effluent from the LLNL site totaled 105 million gallons.

7.2.1 Regulatory Requirements

Discharges to the sanitary sewer are regulated depending on the waste stream point of origin. Each has its own self-monitoring program required by the LWRP. Local limits and general pretreatment standards refer to domestic sanitary effluent and process waste streams. Categorical standards refer to those LLNL wastewater generating processes identified and defined under 40 CFR 403.6. Groundwater discharge standards refer primarily to Environmental Restoration Division (ERD) activities that generate groundwater eventually discharged to the sanitary sewer. Groundwater standards may be implemented under the General site-wide Discharge Permit, or in separate, specific groundwater discharge Permits from the LWRP. As of 1994, LLNL holds two groundwater discharge Permits issued by the LWRP, one implementing standards for groundwater discharges from the Building 403 Gas-pad clean-up operation. The second implements standards for ERD site-wide groundwater treatability studies.

Pretreatment regulations (Title 40, Code of Federal Regulations, Part 403.12[e]), of the EPA require that LLNL develop and maintain a program to ensure compliance for point-source discharges of wastewater. Under delegated authority to enforce those regulations, the City of Livermore's Water Reclamation Plant (LWRP) requires (under Section 2.B. of the Wastewater Discharge Permit) that LLNL monitor identified categorical processes and submit process descriptions and monitoring results via semi-annual wastewater reports, due July and January of each year.

Both DOE and the State of California regulate discharges of radionuclides to the sanitary sewer. DOE Order 5400.5, CCR Title 10, and 40 CFR Part 20 implement standards with which LLNL must comply. Because it is DOE policy that LLNL will comply with all applicable local, state, and federal requirements, there is an annual 1-curie limit (excluding hydrogen 3 and carbon 14) on the total radioactivity that can be discharged to the sanitary sewer each year.

As set forth in the Wastewater Discharge Permit from the LWRP, several general discharge prohibitions and limitations apply to the LLNL waste stream.

General prohibitions apply to the following:

- Explosive or pyrophoric solids, gases, or liquids;
- Solids or viscous substances;
- Toxic pollutants;
- Substances that would cause the LWRP to be in noncompliance with sludge use or disposal criteria;
- Odoriferous, colored, or noxious wastewaters;
- Heated waters; and
- Pollutants which may cause interference to the LWRP.

Limitations apply to the following:

- pH less than 5 or greater than 10;
- Fat, oil, or grease;
- Metals (As, Cd, Cu, Cr, Pb, Hg, Ni, Ag, Zn);
- Total toxic organics (TTO);
- Chlorides; and
- Cyanide (CN).

Generators of wastewater that contains constituents that are either prohibited or limited must comply with discharge standards established and governed by the City of Livermore Public Services Ordinance (Chapter 13.32). This ordinance provides standards for wastewater collection and treatment systems. The LWRP is responsible for enforcement and control of the ordinance standards. Failure to meet the permissible pollutant levels will incur enforcement action by the LWRP. Repeated or sustained excesses of the Wastewater Discharge Permit can jeopardize continued use of LWRP's sanitary sewer system by LLNL facilities.

7.2.2 Applicability to LLNL Operations

LLNL directs an internal pretreatment program designed to meet all applicable wastewater standards and, when possible, to minimize discharge volume to the LWRP. Sanitary effluent from LLNL is discharged to the LWRP, which treats sewage and wastewater from the greater Livermore area. LLNL maintains both a compliance and surveillance monitoring capability which samples effluent daily, weekly, monthly, and quarterly for a variety of parameters for which standards apply or which may affect operations at LWRP.

7.2.3 Process for Compliance

Wastewater generated at LLNL is sampled and monitored continuously to ensure effluents do not exceed levels that may interfere with LWRP's ability to treat the effluent to permissible levels or otherwise impact the environment. The

combined LLNL effluent is continuously monitored for pH, selected metals, and radioactivity. If contaminant warning levels are reached, action is initiated by an electronic alarm that is sounded at both the LLNL Fire Department and at LWRP. Wastewater not acceptable for discharge to the sanitary sewer is diverted and held until further characterization and/or treatment in a diversion facility. This diversion facility is automatically activated when the monitoring system detects an unacceptable discharge.

Upstream from the Monitoring Station and the Diversion Facility, additional sampling and monitoring occur prior to release of wastewaters to the sanitary sewer.

To further ensure compliance with discharge standards, LLNL operates a system of retention facilities to prevent elevated ("slug") discharges to the sanitary sewer system. Before process wastewater is released to the LLNL collection system, potentially contaminated wastewater is collected in retention tanks or otherwise collected at the facility where it is generated. After the contents of the tanks or containers are sampled and characterized, the volume is discharged to the sanitary sewer only if laboratory results show that pollutant levels are within allowable discharge limits. Authorization for discharge is granted by a Retention System Disposition Record (RSDR). This form is initiated by the person(s) responsible for wastewater discharge control within the Water Guidance and Monitoring Group of EPD. If effluents exceed permissible pollutant levels, they are treated or shipped to an off-site treatment or disposal facility through LLNL's Hazardous Waste Management facility.

In conjunction with the sewer monitoring system, LLNL has implemented a system of satellite monitoring stations designed to trace the origin of spills.

7.2.4 Information/Reporting Requirements

The LWRP requires that LLNL notify them within 24 hours of discovering any discharge violations. If you become aware of a spill or detect unusually high releases of process wastewater effluents, contact your EOG or WGMG Analyst. Your area Analyst can confirm whether any LWRP requirements are exceeded and initiate the appropriate notification procedures.

7.2.5 Supporting References/Standards

Federal Water Pollution Control Act, 33 United States Code Section 1251 et seq.

1993–1994 LLNL Wastewater Discharge/Chemical Storage Permit No. 1250 (93–94).

City of Livermore Public Services Ordinance (Chapter 13.32).

1994–1995 LLNL Ground Water Discharge Permit No. 1505G-(93-94).

1994–1995 LLNL Ground Water Discharge Permit No. 1510G-(93-94).

40 Code of Federal Regulations Parts 400–471.

20 Code of Federal Regulations.

23 California Code of Regulations.

10 California Code of Regulations.

DOE Orders.

7.2.6 LLNL Contacts Specific to this Section

For information concerning local, state, or federal discharge limitations, discharge guidance or approval, contact your area EOG Analyst or the Water Guidance and Monitoring Group (WGMG) Analyst. Your EOG and WGMG Analyst will work with you to assess and evaluate wastewater discharge and regulatory issues.

7.3 Safe Drinking Water

Federal and state laws protect drinking water from the impact of man-made and natural activities which create chemical and biological contamination. Regulations require LLNL and LLNL's water supplier, to adhere to performance, design, and water quality standards.

7.3.1 Regulatory Summary

Public drinking water supplies are regulated by the Safe Drinking Water Act of 1974 (SDWA), which establishes minimum requirements and standards. These requirements and standards are enforced in part by the EPA and in part by the California State Department of Health Services (DHS), which has been delegated authority to implement portions of the SDWA. The California Safe Drinking Water Act, which in some respects is more stringent than its federal counterpart, created additional requirements and standards. DHS is responsible for implementing and enforcing these drinking water standards.

The EPA and DHS require permits, create minimum control and system design guidelines, and implement primary and secondary drinking water standards. The standards include maximum contaminant levels (MCLs) for materials that may be present in drinking water supplies and for treatment levels. The SDWA also sets minimum guidelines for sampling, analysis, and reporting on the quality of drinking water supplies.

7.3.2 Applicability to LLNL Activities

LLNL uses water for drinking, cooking, and other processes. At the main site, state water quality standards apply to LLNL's supply and distribution system since LLNL receives water from a supplier who is responsible for compliance with the SDWA regulations.

Main Site

LLNL's primary drinking water comes from the San Francisco Water District (SFWD) treatment, and Hetch Hetchy Aqueduct system. When it arrives at LLNL, the water enters the on-site storage system. From there it is distributed throughout the facility. Backup water service comes from the Zone 7 treatment and distribution system.

SFWD is responsible for delivering potable water meeting all the requirements of the state's Health and Safety Code to LLNL.

Although not required to do so, since LLNL main site is not a public water system, LLNL has an internal drinking water sampling program at the main site. The program conducts periodic analyses of on-site drinking water. This activity provides LLNL with the capability of assessing its water supply, in the distribution system.

Site 300

LLNL Site 300 draws drinking water from on-site groundwater well and is subject to the SDWA regulations. The system includes a primary drinking water supply well and a backup well, several holding tanks, and a distribution network. LLNL disinfects well water with chlorine and monitors the quality of this water at the well and throughout the distribution system. In addition, Hazards Control reviews the data to assure drinking water standards are met and Site 300 Plant Engineering submits the required reports to DHS.

At the time of the writing of this document, future plans are that the Hetch Hetchy Aqueduct system will begin supplying water to Site 300 which will be subsequently treated prior to distribution throughout the site. LLNL will maintain the on-site drinking water wells as a backup supply and will continue to be responsible for the Site 300 Drinking Water Permit requirements.

7.3.3 Process for Compliance

LLNL's main site water supplier is responsible for providing potable water to LLNL as required by drinking water standards. The supplier prepares and submits source water sampling reports to DHS. An information copy of the report is sent to LLNL for review and record keeping. Site 300, LLNL is the water supplier and is responsible for preparing and submitting water supply

sampling reports to DHS. Copies are maintained on site. The frequency of required drinking water sampling depends on factors like contaminant types (e.g., bacteria, organic materials, inorganic materials, radioactive isotopes), the number of user connections, and the results of past analyses. Figure 7-3 describes the process that ensures compliance with safe drinking water standards.

Plant Engineering conducts distribution system-wide sampling of drinking water. It includes regular domestic water sampling and analysis for total coliform bacteria and lead, copper, and trihalomethanes. If an MCL is exceeded in any sample, corrective actions are taken.

If you identify an activity which could potentially contaminate or reduce the quality of the drinking water, contact your EOG Environmental Analyst, or the Hazards Control Department (see also Section 7.3.6).

7.3.4 Information/Reporting Requirements

SFWD prepares and submits appropriate source water sample and analysis reports to DHS according to a schedule established by the regulations. If SFWD finds that any MCLs are exceeded, they must notify LLNL, DHS, and, as needed, the public. They must also maintain appropriate historic records of drinking water results. LLNL maintains the records for the on-site distribution sampling.

Site 300 prepares and submits appropriate source water and distribution water sample and analyses reports to DHS according to the requirements of the Drinking Water Permit. Any detection of an excess of MCLs must be reported to DHS and, as needed, the public as required by 22 CFR. Site 300 also maintains all required records.

7.3.5 Supporting References/Standards

40 Code of Federal Regulations, Parts 124, 141 through 147, and 149.

Executive Order 12088, “Federal Compliance with Pollution Control Standards.”

Title 22, California Code of Regulations (CCR), Sections 64211 through 64481.

California Health and Safety Code (HSC), Sections 4010 et seq.

DOE Order 4500.1, General Environmental Protection Program.

Lawrence Livermore National Laboratory Environmental Report for 1991.

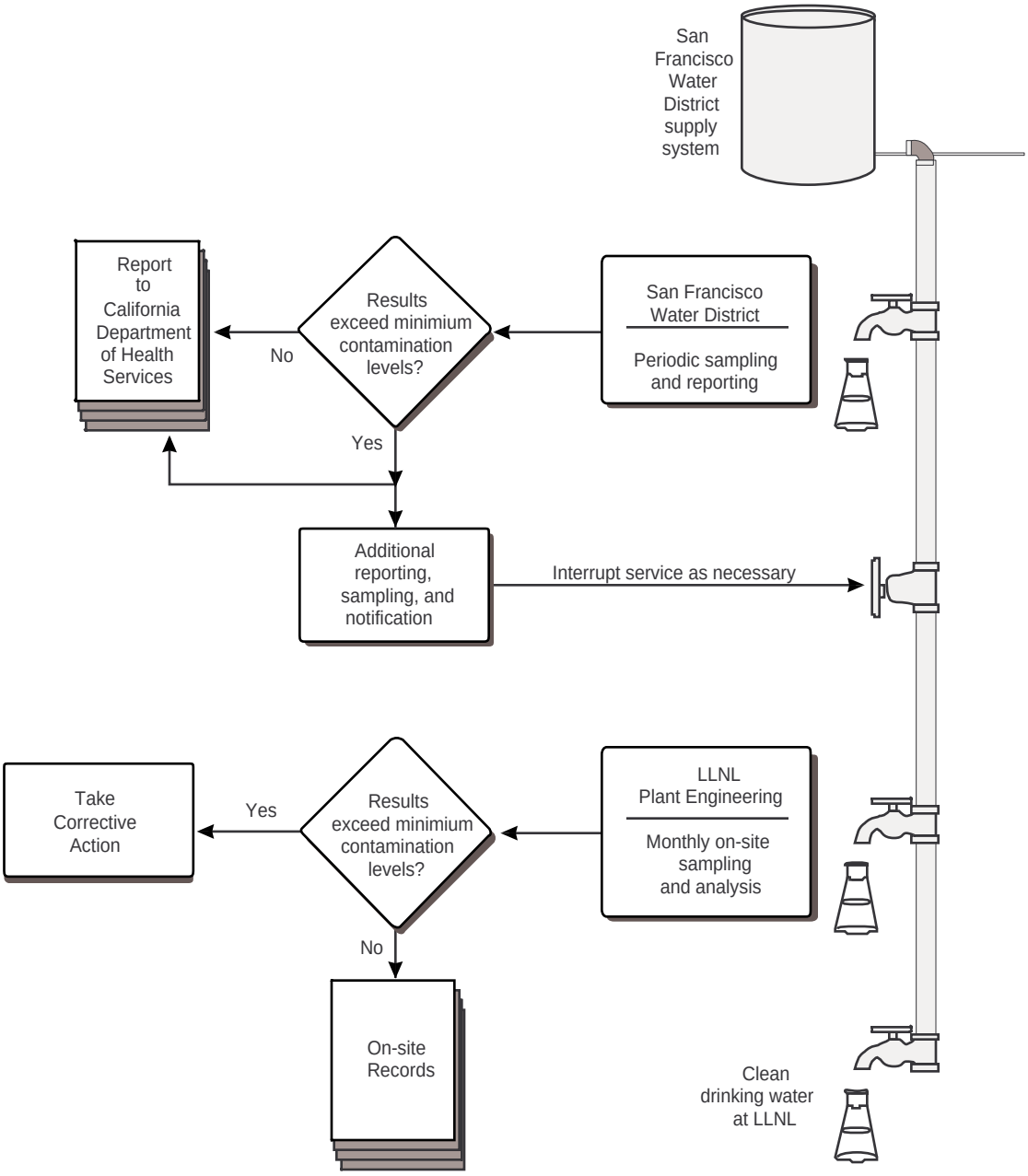


Figure 7-3. Safe drinking water compliance process

Drinking Water Permit.

LLNL Site 200 and 300 Water Quality Site Monitoring Plans.

7.3.6 LLNL Contacts Specific to this Section

Questions or concerns about compliance with drinking water standards or LLNL's water quality should be presented to: the Hazards Control Department, or the area EOG or WGMG Analyst.

For Site 200: Plant Engineering Mechanical Utilities organization.

For Site 300: Plant Engineering Site 300 Division.

7.4 Water Quality Programs

Other regulatory programs that protect water quality include Streambed Alteration Agreements (Fish and Game Code 1600-1607), Army Corp. of Engineer Permits (CWA Section 404), Water Quality Certifications (CWA Section 401), and evaluation of construction generated soil for re-use based on beneficial uses of groundwater (Porter-Cologne Act). For specific requirements on these Programs and their effect on your Project, please contact your WGMG Analyst. Discharges of water may also create or contribute to the existence of wetlands; and some maintenance and construction projects could impact wetlands or floodplains. Please see Chapter 15 for more information on requirements for protecting floodplains and wetlands, or contact the EEG Analyst for your area.

8.0 Solid Waste Handling Requirements

8.0 SOLID WASTE HANDLING REQUIREMENTS

In recent years, solid nonhazardous waste has become the focus of concerns regarding potential and real impacts to human health, the environment, and economic resources. As a result, federal and state guidelines and regulations have been developed to ensure the proper handling, minimization, and disposal of solid waste.

Regulatory programs for managing and disposing of solid waste were developed with three primary goals in mind:

- Resource conservation;
- Recycling of waste materials; and
- Environmentally sound waste management practices.

Due to the size and nature of its operations, LLNL generates large volumes of waste and nonhazardous solid waste. “Nonhazardous solid waste” means solid or liquid wastes, including garbage, trash, refuse, paper rubbish, industrial, demolition and construction wastes, food, sludge, or any other nonhazardous discarded material.

8.1 Regulatory Summary

Executive Order 12780, replaced by 12873, requires that all federal facilities develop and implement active recycling and solid waste reduction programs. Federal regulations implementing the Resource Conservation and Recovery Act (RCRA) Subtitle D, which governs the management of solid wastes, require that federal facilities implement recycling programs for office paper and newspaper. Additionally, RCRA Subtitle F sets guidelines for federal facilities to purchase recycled materials and for source-separating of recyclable materials.

In California, the Integrated Waste Management Act of 1989 (Assembly Bill [AB] 939) requires cities and counties throughout the state to develop plans for reducing the amount of solid waste entering landfills each year. Using 1990 as a baseline year, this act established landfill diversion goals of 25% by the year 1995, and 50% by 2000. It additionally requires cities and counties to submit plans (called Source Reduction and Recycling Elements [SRRE]) to the state outlining how these diversion goals will be met.

8.2 Applicability to LLNL Activities

As a federal facility, LLNL is subject to the waste minimization requirements established by Executive Order 12873, RCRA Subtitles D and F, and state and local ordinances as well as University of California Contract performance measures for operations at LLNL. The current performance measures require a 10% reduction in waste (hazardous and nonhazardous).

Although the requirements of AB 939 do not yet target specific waste generators under the control of local agencies, the County of Alameda has requested cooperation from LLNL in reaching that agency's waste reduction goals for the years 1995 and 2000. In a proactive effort to comply with applicable laws, LLNL has agreed to assist Alameda County and recover wastes for reuse, recycling, and economic value. In doing so, LLNL has implemented and continues to refine a successful waste minimization program that recovers approximately 30 to 40 percent of the waste disposed at the laboratory compared to 1990 levels.

8.3 Process for Compliance

Solid waste minimization is the effort to reduce the amount of solid waste generated, treated, and/or disposed. The main objectives of most waste minimization programs are to conserve energy and resources and to reduce the amount of waste sent to a landfill for disposal.

Wastes can be minimized through a number of methods (see Figure 8-1). These methods may include: source reduction, reuse, recycling, volume reduction, and treatment. "Source reduction" is the technique of modifying everyday activities so that less waste is generated. For example, an office may use electronic mail (or e-mail) instead of paper or telefaxed memoranda, thereby eliminating waste paper *before* it is generated. Another example is to purchase more durable materials that, although more expensive, will last longer and reduce the frequency of disposal and overall costs.

"Reuse" is just that—using materials again in the same process or a similar process. This technique reduces the demand for new products, saving both purchasing and disposal and landfill space. Examples include the reuse of cardboard boxes in packing, or using reusable utensils and serving plates instead of paper and plastic dinnerware in a cafeteria, using both sides of writing paper, etc.

In California, "recycling" is defined as "the process by which salvaged materials become reusable products." Typically, this process includes physically changing the waste material before it can be reused. Waste paper, newspapers, cardboard, scrap metals, beverage containers, tires, and wood, are all recyclable materials. Each of these wastes is easily recycled for its value as a reusable resource.

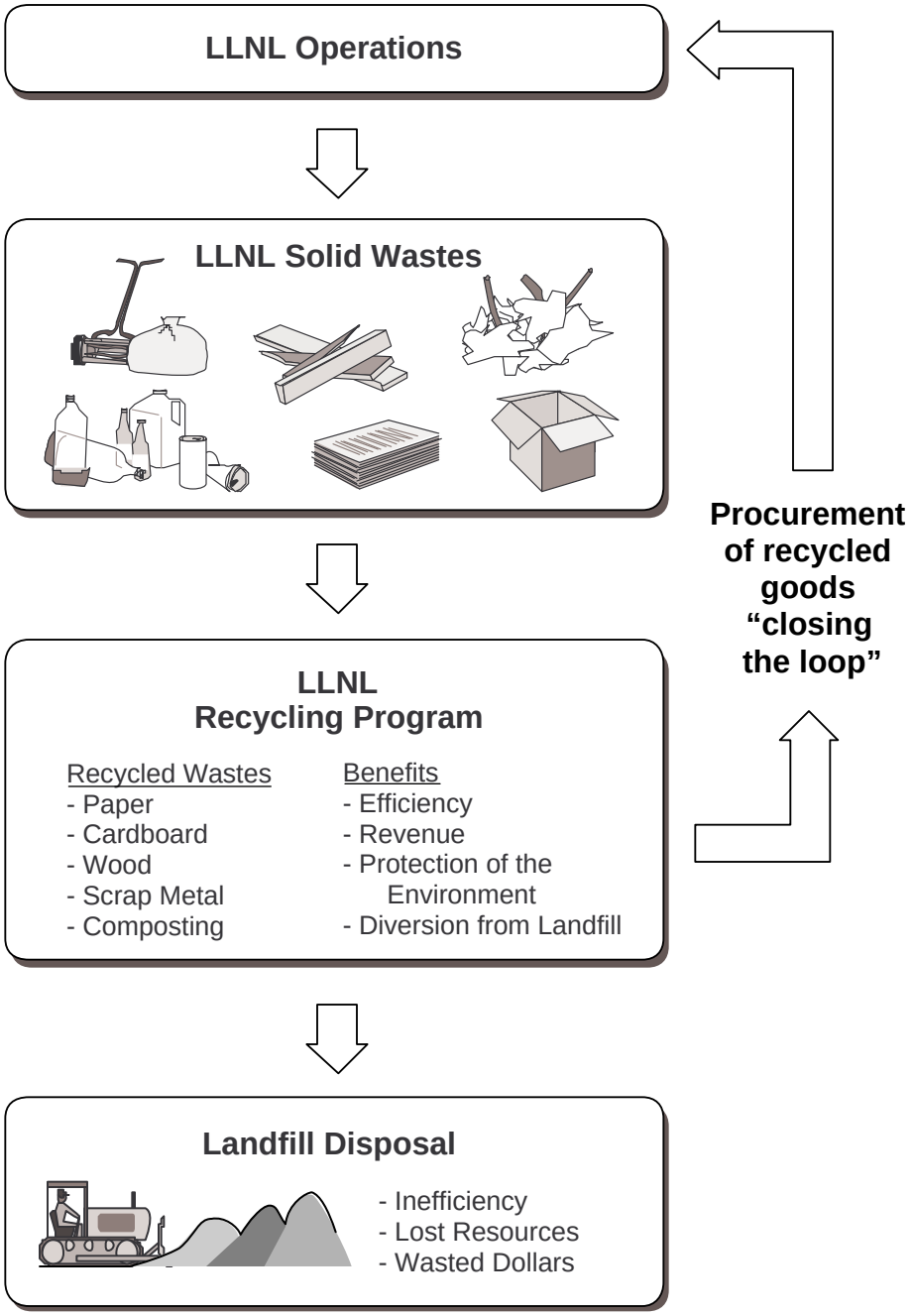


Figure 8-1. Solid waste minimization pays off

Compliance with solid waste minimization regulations generally consists of developing and implementing a viable recycling and waste reduction program. Currently there are mandated reporting requirements associated with federal or state regulations and University of California Contract performance measures. DOE requires periodic reporting on the status of DOE facility solid waste minimization and management programs.

The Environmental Protection Division, Operations and Regulatory Affairs, Waste Minimization Group is responsible for developing, implementing, and reporting on site-wide waste reduction programs at LLNL. A few important elements of a successful recycling program include: identifying available resources for collection, segregation and storage; educating laboratory personnel and the public; establishing laboratory-wide involvement; and identifying markets for recyclable goods. In general, waste reduction increases the overall efficiency and effectiveness of LLNL's operations. You can help LLNL minimize solid wastes generated by participating in the following existing or proposed programs:

- Recycling and recovery of scrap metals and other materials. LLNL Business Services, Donation, Utilization, and Sales (DUS), accepts, stores, and sells ferrous and nonferrous metals, tires, precious metals, and reassigned equipment. DUS also operates several reuse initiatives, such as moving box and pallet reuse.
- Waste office paper collection and recycling. This very successful effort uses the combined efforts of LLNL staff in more than 100 buildings, the on-site janitorial service, and a recycling contractor to accumulate and collect this high-volume waste stream.
- Cardboard collection and recycling at high-volume generation points. Waste cardboard is collected from a number of generator locations and packaged by DUS for eventual sale to an off-site recycler. LLNL will expand this program to include full-site collection in early 1995.
- An active Affirmative Procurement Program to purchase raw materials and products (i.e., office paper, reconditioned toner cartridges, paper towels) that are made with post-consumer, or recycled, content. In April 1993, LLNL won the DOE Solid Waste Recycling Award for its efforts in this area and recycling in general.
- Education and awareness programs for LLNL personnel. This active program solicits participation in recycling activities through newsletters, publications, presentations, and other publicity programs.
- Cafeteria polystyrene recycling program. This proposed waste reduction program is being evaluated and would include the segregation, collection, and recycling of polystyrene food containers at all food services facilities at LLNL.
- Compost program for landscaping wastes. LLNL has set aside an open area for accumulation and composting of organic materials (i.e., grass

clippings, weeds, tree trimmings, and other "green wastes"). The compost is then utilized as an on-site soil amendment versus buying compost.

It is also LLNL's responsibility to remove hazardous wastes (for example, oils, paints, solvents, aerosols, pesticides) from the wastes subject to landfill disposal. This can be done through proper education and training of personnel and by periodic inspections and/or segregation at collection containers.

8.4 Supporting References/Standards

Title 14, California Code of Regulations (CCR), Chapter 3, Section 17311 et seq.

40 CFR, Code of Federal Regulations (CFR), Parts 240 through 246, "Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste."

40 CFR, Code of Federal Regulations (CFR), Parts 255 and 256.

Federal Recycling Guide, EPA, Region IX and Government Services Administration, 1993.

8.5 LLNL Contacts Specific to this Chapter

Issues, concerns, and recommendations that you may have regarding nonhazardous waste generation, recycling, and disposal should be forwarded to the Environmental Protection Division, Waste Minimization Group at the *EARTH HOTLINE*: 42-EARTH (or 423-2784) the EOG Analyst assigned to your area, or your organization's representative on the Hazardous Waste Minimization Steering Committee. If you have questions or materials that might be used to benefit the waste reduction efforts of LLNL or other agencies, the DUS Operation should be contacted.

9.0 Waste Management Requirements

9.0 WASTE MANAGEMENT REQUIREMENTS

Scientific and industrial activities at LLNL generate wastes, some of which are hazardous and can cause detrimental effects to both human health and the environment if not properly managed. To aid facilities such as LLNL in handling these wastes safely, both the state and federal governments have developed regulations to control the management of hazardous waste from "cradle to grave," i.e., from the point of generation, through various storage and treatment steps, to ultimate disposal.

The two key laws, and the regulations that implement them, are: the federal Resource Conservation and Recovery Act (RCRA) and the California Hazardous Waste Control Law (HWCL). In August 1992, California received authority from the United States Environmental Protection Agency (EPA) to implement the state hazardous waste program in lieu of the federal (RCRA) hazardous waste management program. Therefore, LLNL hazardous waste generators need only concern themselves with the California hazardous waste management program (Title 22, California Code of Regulations [CCR]), which now incorporates the federal RCRA regulations. The state Department of Toxic Substances Control (DTSC) enforces these regulations. The EPA, however, can still be involved in oversight activities. Figure 9-1 indicates how the statutes, regulations, and agencies interact.

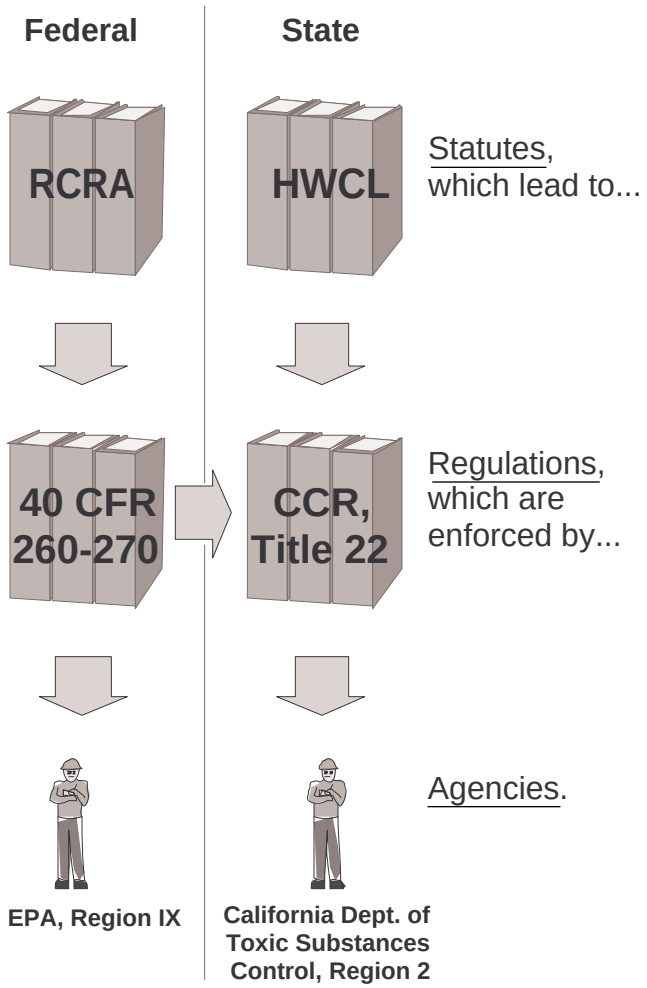


Figure 9-1. Hazardous waste regulations

Sections 9.1, 9.2, 9.3, 9.4, and 9.5 discuss the respective hazardous waste management processes of generation (9.1), temporary storage in waste accumulation areas (WAAs) (9.2), treatment (9.3), disposal (9.4), and transportation (9.5). Special types of waste that are regulated under other laws are discussed in Section 9.6 (mixed waste), 9.7 (asbestos), 9.8 (PCBs), and 9.9 (medical waste).

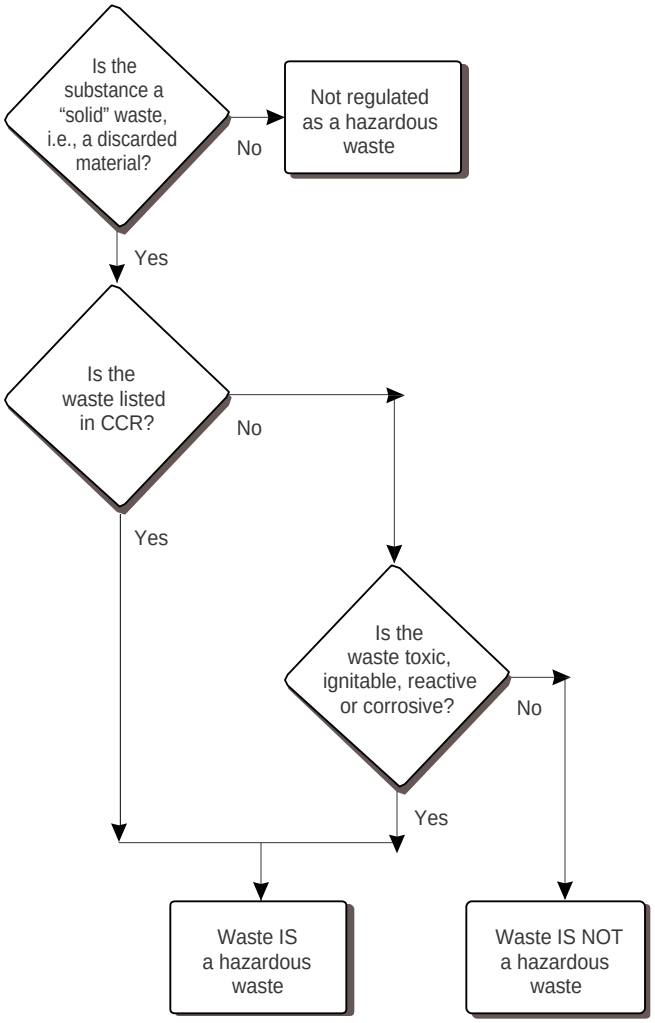


Figure 9-2. Is the material a hazardous waste?

9.1 Generator Requirements

9.1.1 Regulatory Summary

California regulations mainly address the following:

- Determining whether or not a waste is hazardous;
- Hazardous waste generator standards;
- Transporter standards;
- Standards for treatment, storage, and disposal of hazardous waste; and
- Permitting requirements for facilities that treat, store, or dispose of hazardous wastes.

What is a Hazardous Waste?

Figure 9-2 indicates the basic procedure to follow to determine if a material is a hazardous waste. Once a substance has been "discarded," the waste is deemed hazardous if it is either a *listed* waste or a *characteristic* waste. A listed waste is a specific chemical or type of waste appearing on a list in Title 22, CCR. A characteristic waste is one that is toxic, ignitable, reactive, and/or corrosive, as determined by specific criteria in Title 22, CCR.

While the flowchart makes the process appear simple, there are many exemptions and conditions that can make determining whether a waste is hazardous or not a very difficult task. Additionally, many wastes have land disposal restrictions and treatment standards required for their disposal. Furthermore, HWM is not permitted to accept some of these waste streams for storage. Therefore, it is always advisable to consult with your EOG Analyst and/or HWM Field Support Technician to accurately characterize your waste streams. Hazardous materials or products that are not discarded are regulated differently. These requirements are addressed in Chapter 10.

9.1.2 Applicability to LLNL Activities

Waste generated at LLNL generally falls into one of the following categories:

- Nonhazardous waste;
- Nonhazardous, nonsewerable wastewater;
- Hazardous waste:
  - RCRA hazardous waste
  - California-only or non-RCRA hazardous waste
    (Note: California-only hazardous waste refers to waste not hazardous under the federal RCRA program, but hazardous under state law);
- Radioactive waste:
  - Low-level radioactive waste
  - Transuranic waste
  - Low-level or transuranic waste with California-only hazardous waste constituents;
- Mixed waste;
- Medical wastes; and
- Sewerable wastes.

This section discusses the requirements for managing hazardous, mixed wastes, and medical wastes. Mixed wastes have both radioactive and RCRA hazardous waste components.

Listed below are some of the more common waste streams that make up the approximately 300,000 gallons and 500,000 pounds of solid hazardous waste generated annually at the main site. (Site 300 activities generate approximately 40,000 gallons and 40,000 pounds of hazardous waste annually.)

- Acid solutions (including some highly acidic solutions such as nitric acid);
- Aerosol cans;
- Aqueous waste contaminated with small quantities of metals and/or solvents;
- Batteries (e.g., lead/acid batteries);
- Beryllium wastes;
- Caustics (e.g., sodium hydroxide);
- Heavy metals (e.g., lead, cadmium);
- High explosives;

- Hydrogen peroxide;
- Paint thinners;
- Polychlorinated biphenyls (PCBs) in oil;
- Photographic wastes;
- Reactive metals (e.g., sodium);
- Solvents (e.g., xylene, acetone); and
- Waste oils (motor oil and hydraulic fluid).

The proper management of these hazardous wastes at LLNL is very important not only because it is required by law (cradle-to-grave), but also for your own personal safety and protection of the environment. To meet the requirements, LLNL has devised a specific hazardous waste management system, depicted in Figure 9-3, to promote the safe management of these wastes. This flowchart indicates the flow of wastes from generation, to the waste (WAA) accumulation area, to on-site storage and/or treatment, and finally to off-site disposal.

9.1.3 Responsibilities

Generators of hazardous waste are responsible for proper hazardous waste management in their program area and must follow the key procedures summarized below. These procedures are specified for each of the basic steps in the waste handling process in the satellite accumulation areas and waste accumulation areas.

The Hazardous Waste Management (HWM) Division Field Technician will inspect containers in which hazardous waste is placed for proper labeling and review the Waste Disposal Requisition prior to transport to the WAA.

If you discover abandoned containers of unknown waste, do not touch them. Call your EOG Analyst immediately or 911.

9.1.4 Process for Compliance

Waste Minimization

The first priority is to always minimize the amount of waste generated. Two approaches to waste minimization are source reduction—the technique of substituting non- or less-hazardous material, optimizing processes, and using good operation practices—and recycling. Your program's Waste Minimization Coordinator can help you identify waste minimization approaches for the wastes you generate. Refer to Chapter 6.0 for more detail on waste minimization.

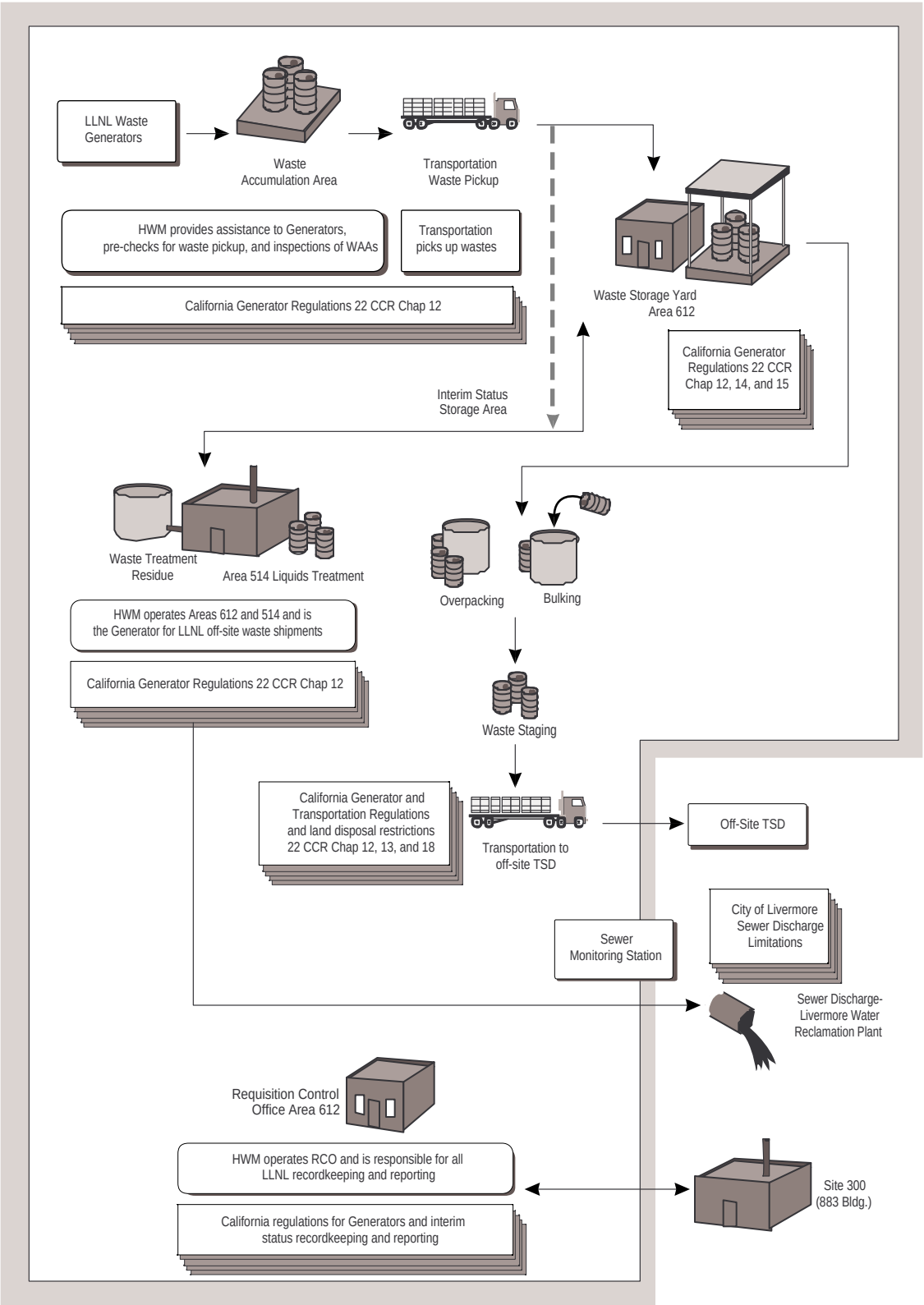


Figure 9-3. Hazardous waste management at LLNL

Waste Identification

Waste identification requires knowledge of both the process that generates the hazardous waste and the location where it was generated. Wastes must be characterized and accepted by HWM before on-site transport to HWM facilities. The HWM Field Technician or EOG Analyst can assist you with waste characterization. Containers that no longer hold hazardous waste and meet certain specific requirements regarding minimum residues may be managed as nonhazardous waste, but your EOG Analyst should be contacted.

Container Selection

HWM maintains a list of approved waste containers. Selecting the correct container for a given type of hazardous waste depends on the waste type, volume, physical state, and potential reactivity of the waste with the container. Wastes that are incompatible (i.e., wastes that could adversely react with each other) or that are to be handled in different ways, must be segregated. Containers must be in good condition and must remain closed, except when adding or removing waste.

Containers used to store hazardous waste can be managed in a satellite accumulation area (i.e., a work station) until either 55 gallons of total hazardous waste or 1 quart of extremely or acutely hazardous waste is accumulated, or when a 9-month time limit has been reached.

Labeling

Each hazardous waste container must be clearly labeled. The label must be filled out when waste is first put into the container. LLNL has developed a set of waste labels for all waste types (radioactive, mixed, nonhazardous, and hazardous) to help meet all labeling requirements; contact HWM if you need labels. Refer to Chapter 4.0 of this manual for more information on labeling.

Transport of Waste to Waste Accumulation Area (WAA)

After the waste has been put into containers, the procedure for transferring wastes to the WAA is dependent on whether the program owning the WAA has executed a “full service” agreement with HWM. For a full service area, the HWM Field Technician completes the Hazardous Waste Requisition and label and transfers the container to the WAA. At other areas, the generator completes the Hazardous Waste Requisition and label, transfers the waste to the WAA, and notifies HWM. The HWM Field Technician inspects the container, reviews the Hazardous Waste Requisition and label, and then signs and submits the Hazardous Waste Requisition to HWM. In addition, prior to transport, the container must be sealed, free of external contamination, and have complete labeling and requisition forms. You can use an HWM Special Service Request for any wastes of particular concern.

Spill Response

In the event of a spill, your first priority is to maintain your own safety and that of your co-workers. Use your personal protective, safety and spill response equipment and follow the appropriate emergency response procedures.

Call 911 if anyone is injured or contaminated, or if there is any danger of fire or explosion.

See Section 3.2 for more information on spill response.

See Chapter 3.0 for information on preventing, responding to, and reporting spills.

9.1.5 Training

Any person who generates hazardous waste is initially required to take the training course EP0006, *Hazardous Waste Generation and Certification,* and thereafter, to annually complete the training course EP0006-R, *Hazardous Waste Generation and Certification Review.*

9.1.6 Supporting References/Standards

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

40 CFR 260–271.

EPA, *Test Methods for Evaluation of Solid Waste*. SW-846. 3rd Edition. 1986.

Lawrence Livermore National Laboratory. *Guidelines for Discharges to the Sanitary-Sewer System.* Environmental Protection Department. 1989.

Lawrence Livermore National Laboratory. *Guidelines for Design and Operation of Retention Tank Systems.* Draft. Environmental Protection Department. 1993.

RCRA. Public Law 94-580, as amended. 1976.

9.1.7 LLNL Contacts Specific to this Section

The EOG Analysts coordinate day-to-day support of hazardous waste activities and can help you with waste management issues, including characterization, regulatory interpretation, handling, and spill response. The HWM field technicians can help you with packaging, labeling, sampling, disposal requisition, and transport issues.

9.2 Waste Accumulation Area and Storage Requirements

After wastes have been generated, they are transferred to waste accumulation areas (WAAs) for temporary storage (90 days) prior to transfer to HWM facilities for storage up to one year. Waste can be stored within a WAA for *only* 90 days or less.

Site 300 also has WAAs for storing hazardous waste. Following storage at Site 300 WAAs, wastes can be transferred to storage at HWMs, Building 883 at Site 300, or to the HWM main site facilities.

9.2.1 Responsibilities

Each WAA has a coordinator responsible for the operations at the WAA. Their responsibilities include review of WAA inspection records, ensuring compliance with all WAA management requirements, and review of documentation. WAA operators work under the WAA coordinators and are responsible for the day-to-day operations and compliance activities at each WAA.

9.2.2 Process for Compliance

Key WAA storage requirements are summarized below, for specific compliance categories:

Accumulation Time

Waste in the WAAs can be stored up to 90 days, and up to one year at the HWM storage facilities. On rare occasions DTSC can approve longer storage periods in the HWM storage facilities. If for some reason you anticipate being unable to comply with the 90 day requirement for storage in a WAA, contact your HWM Field Support Technician as soon as possible.

Labeling

The accumulation start date must be noted on each container. The correct LLNL label must be completed in full, with the words “Hazardous Waste” (as applicable) clearly legible, written with permanent, non-fading ink and visible during inspection.

Container Management

Wastes must be compatible with the container, and the container must remain closed except when adding or removing wastes. Containers holding ignitable or reactive wastes must be kept 50 feet from the LLNL property line, and incompatible wastes must be on separate pallets and spatially separated.

Additionally, incompatible wastes must be on separate containment pans. Containers of hazardous or mixed waste must be arranged so that labels are easy to view.

Required Equipment

Key types of equipment required to adequately manage storage areas include: communications or alarm systems, a device such as a telephone or hand-held radio for summoning emergency assistance, fire extinguishers, spill control equipment, and decontamination materials. A safety shower and eyewash system are required if liquids are stored.

Contingency Plan and Emergency Procedures

A written contingency plan for WAAs outlines the responsibilities and procedures to be followed in the event of an emergency.

Required Aisle Space

Adequate aisle space between containers must be maintained to allow free movement of personnel and equipment during normal operations, spill cleanups, and emergency response activities. At least 2-1/2 feet of aisle space is required.

Secondary Containment

Though not strictly required, EPD recommends that containers used to store hazardous liquids (except portable tanks) have secondary containment, which can be achieved through use of containment pallets or pans. Tanks storing liquids must have secondary containment with a leak detection system so that spills can be expeditiously removed and properly handled. Required secondary containment systems for tanks must be able to contain 100% of the capacity of the largest tank plus rainwater (if outside) from a 25-year, 24-hour rainfall.

Operating Records

A written operating record must be maintained which includes a description of the type of waste, waste quantity, dates of storage, container type, date of waste transfer, and waste location within the facility.

Inspections

Inspections must be conducted at least weekly. Areas used for container storage or transfer are to be inspected for leaking containers and for deterioration of containers and any contamination caused by corrosion or other factors.

Any deficiencies must be corrected and the correction documented. Weekly inspections must be recorded in an inspection log, and records must be kept for three years.

WAA communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment and materials are to be tested and maintained to assure proper operation.

Consult with your ES&H Team for requirements and frequencies.

9.2.3 Training

Waste accumulation area operators must attend Waste Accumulation Area Operations Training, EP-0053.

9.2.4 Supporting References/Standards

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

40 CFR 240–271.

EPA, *Test Methods for Evaluation of Solid Waste*. SW-846. 3rd Edition. 1986.

RCRA. Public Law 94-580, as amended. 1976.

9.2.5 LLNL Contacts Specific to this Section

The EOG Analysts support HWM activities and can help you with waste management issues including characterization, regulatory interpretation, handling, and spill response. The HWM Field Technicians can help you with packaging, labeling, sampling, disposal requisition, and transport issues.

9.3 Hazardous Waste Treatment Compliance

The regulations define a second area of hazardous waste management, called a Treatment, Storage, or Disposal Facility (TSDF), that is regulated more stringently than a generator storage unit (discussed in Section 9.1). After wastes are generated and temporarily stored in generator WAAs at LLNL, they are either treated on-site at the HWM/TSDF or shipped off-site for treatment and/or disposal.

9.3.1 Responsibilities

Treatment facilities at LLNL require specialized operators that are responsible for facilities operation. These personnel work under the direction of the HWM Division.

9.3.2 Process for Compliance

Waste treatment at LLNL takes place at the TSDF. Treatment is defined as any action which changes the volume, toxicity, or hazardous characteristics of the hazardous waste. At LLNL, the main types of treatment are treatment of bulk liquids in tanks at the Area 514 Facility and the open burning/open detonation (OB/OD) of high explosive wastes at Site 300.

TSDFs are regulated by the DTSC through the hazardous waste facility permitting process. DTSC regulations in Title 22, CCR specify TSDF requirements. The DTSC initially brought LLNL's TSDFs into the permitting process through the requirement that all TSDF owners submit a Part A application, which is a brief form specifying basic information on the type of wastes, waste volumes, and treatment method employed. After approval of the Part A application, DTSC granted "interim status" to TSDFs, which allowed them to operate with an Interim Status Document as long as regulations were followed. Eventually, TSDFs were required to submit a formal permit application in order to receive a hazardous waste facility permit from the DTSC which would replace the Interim Status Document. This application is referred to as a Part B Permit Application, or Operation Plan. The Part B Permit is a much more detailed version of the Part A, specifying numerous details about facility operation. LLNL has submitted Part B Applications for both the main site and Site 300 facilities, and is in the process of obtaining these permits.

9.3.3 Training

The Status Document application specifies training requirements for each LLNL staff member involved in operating treatment facilities until the RCRA Part B Permit Application is approved. The training must specifically cover the LLNL treatment units being operated, as well as general RCRA treatment requirements.

9.3.4 Supporting References/Standards

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

40 CFR 260–271.

EPA, *Test Methods for Evaluation of Solid Waste*. SW-846. 3rd Edition. 1986.

Lawrence Livermore National Laboratory. *Guidelines for Discharges to the Sanitary-Sewer System.* Environmental Protection Department. 1989.

Lawrence Livermore National Laboratory. *Guidelines for Design and Operation of Retention Tank Systems*. Draft. Environmental Protection Department. 1993.

RCRA. Public Law 94-580, as amended. 1976.

9.3.5 LLNL Contacts Specific to this Section

Your EOG Analyst can help you with waste management issues.

9.4 Hazardous Waste Disposal Requirements

After wastes are stored or treated, the wastes (or treated residuals), must go off-site to other treatment and disposal sites. Disposal sites include:

- Landfills;
- Surface impoundments; or
- Waste piles.

Since disposal facilities fall under the definition of TSDFs, owners of these facilities must file an Operation Plan and follow interim status or permit standards. The regulations specify additional standards for disposal facilities, e.g., liner requirements for landfills, groundwater monitoring requirements, and land treatment standards.

Additional detail is not provided here on disposal standards since LLNL does not have any on-site disposal facilities and instead transports waste for off-site disposal. Wastes sent off-site are manifested at LLNL and transported to sites throughout the United States for disposal.

Land Disposal Restrictions

One key concept related to the disposal of hazardous waste is the concept of land disposal restrictions (LDRs). LDRs specify waste-specific treatment standards that must be met before waste can be placed into a land disposal facility. The LDR regulations are complex because each type of waste has a specific treatment standard, i.e., a certain treatment technology or concentration level, that must be achieved before burial is allowed and because each waste type has a schedule listing the date that the specific LDR takes effect. The DTSC specifies LDR requirements in their hazardous waste management regulations. An LDR form must be attached to each manifest for waste leaving the LLNL site which specifies the treatment standards for each load of waste.

9.4.1 Supporting References/Standards

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

40 CFR 240–271.

EPA, *Test Methods for Evaluation of Solid Waste*. SW-846. 3rd Edition. 1986.

RCRA. Public Law 94-580, as amended. 1976.

9.4.2 LLNL Contacts Specific to this Section

Your EOG Analyst can help you with waste management issues.

9.5 Hazardous Waste Transportation

Before a shipment of hazardous waste can leave the LLNL site, it must be properly packaged and labeled, and it must be accompanied by the appropriate shipping documents. Transportation of hazardous wastes off the LLNL site and on public roads may only be conducted by a California registered hazardous waste hauler and must be in compliance with Department of Transportation (DOT) regulations.

9.5.1 Regulatory Summary

Transporting hazardous waste on public roads is regulated under federal and state hazardous waste and transit laws. Transporters of hazardous wastes must abide by the RCRA and California Hazardous Waste Control Laws, which specify regulations for:

- Waste packaging;
- Manifesting;
- Labeling;
- Registration;
- Reporting;
- Recordkeeping; and
- Spill response requirements.

The federal regulations are in 40 CFR 261, 262, 263, and 268. The state regulations are in Title 22, CCR, Division 4.5. The DOT regulations are in 49 CFR Parts 170–178.

The requirements for transporting hazardous waste on public roads are in the Hazardous Materials Transportation Act and the California Vehicle Code at 49 Arp. O.S.C. 1801–1819; Hazardous Materials Regulations are in 49 CFR Parts 170–178. Federal Highway Administration regulations are 49 CFR 383–399.

The state issues a unique identification number for each site, such as LLNL, that transports, treats, stores, and/or disposes of hazardous wastes. LLNL is also required to complete and maintain records and reports for hazardous waste shipments. These records and reports include manifests, manifest exception reports, biennial reports, annual reports for permitted facilities, and waste analysis results. Figure 9-4 indicates the system required by DTSC for manifest transmittals, to document to all parties that the wastes have been handled properly.

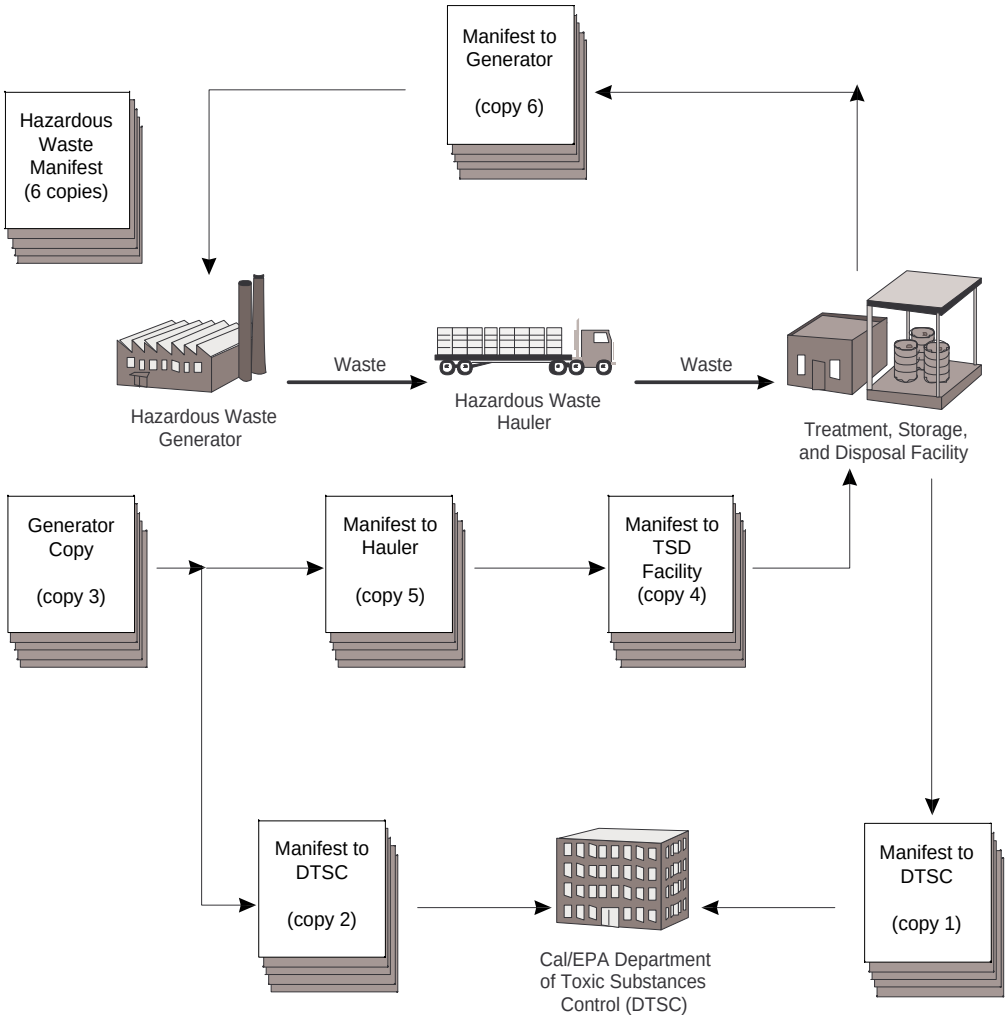


Figure 9-4. California's hazardous waste manifest system

9.5.2 Applicability to LLNL Activities

Because hazardous materials are used throughout LLNL, various types of hazardous wastes are generated at LLNL. These wastes are usually transported off-site for storage, treatment, or disposal. It is LLNL's responsibility to prepare each shipment that leaves the site to comply with all applicable hazardous waste transportation requirements. Figure 9-5 summarizes the basic steps at LLNL to prepare wastes for transportation. Full compliance with these requirements is necessary only for off-site shipments, but DOE's policy states that some requirements should be applied to on-site transfers. LLNL has also developed its own requirements for on-site transfers of wastes from points of generation and WAAs to the HWM facilities.

9.5.3 Responsibilities

The generator is responsible for properly packaging and labeling hazardous waste. (See Section 9.1 for a more detailed discussion of hazardous waste generator requirements.) The HWM Field Technician can assist with packaging, labeling, completing and submitting the appropriate requisition forms. The Field Technician can also help you transfer your waste to a WAA, and help you with waste sampling and spill response information. Only generators who have completed the waste sampling class can take samples.

When a shipment is ready to leave the LLNL site, the HWM Shipping Coordinator arranges all off-site waste transport activities, including compliance with appropriate DOT packaging, labeling, and marking requirements. The Traffic Office is responsible for final inspection of the load (packaging, labeling, and paperwork) before the transporter leaves the LLNL site.

9.5.4 Process for Compliance

As the generator, you should have the waste in the appropriate containers as recommended in EP0006, with the correct LLNL labels; the wastes must also be accompanied with a completed Hazardous Waste Requisition Form (LL 5344-B). You, as the generator, do not have to be concerned with completion of DOT labels, which are completed by HWM. HWM reviews the waste container to verify that it meets DOT requirements, and HWM often repackages waste to meet DOT container requirements before shipping waste off-site.

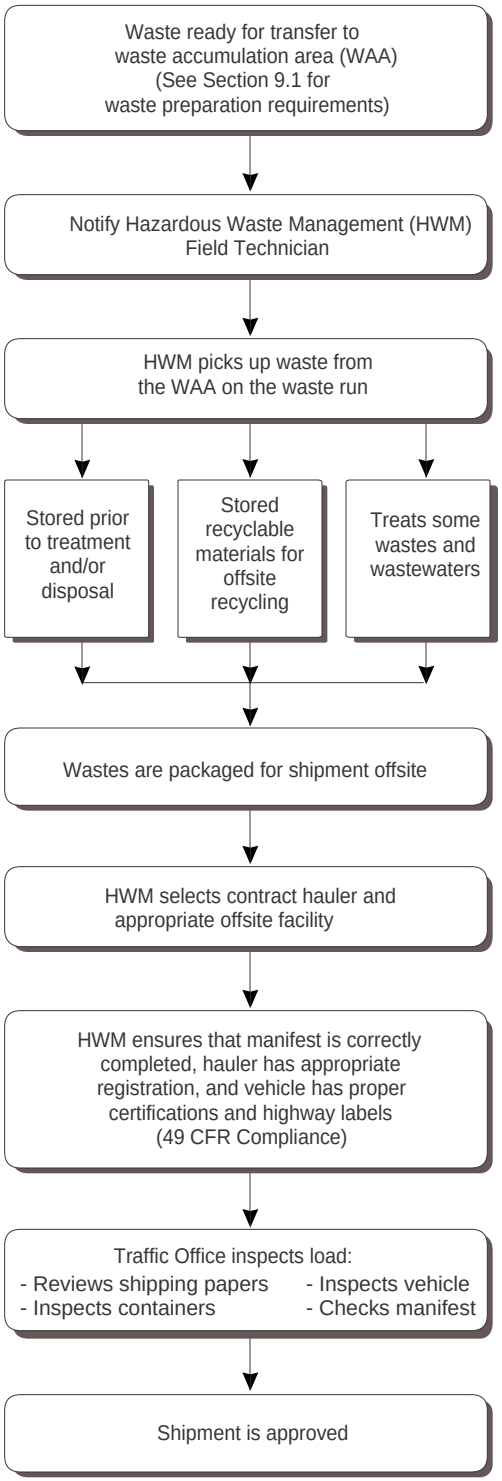


Figure 9-5. Hazardous waste transportation at LLNL

Once the waste is at the WAA, the HWM Field Technician inspects the containers and paperwork and transports it to HWM for storage prior to off-site shipment.

The HWM Shipping Coordinator prepares the manifest and other tracking documents, notifies the treatment, storage, or disposal facility (TSDF) of the shipment, and determines if the transporter is registered and uses certified vehicles.

9.5.5 Information/Reporting Requirements

HWM obtains the state's unique identification number for shipments of hazardous waste. The HWM maintains the records and reports completed for hazardous waste transported off-site.

9.5.6 Training

Any person who generates hazardous waste is initially required to take the training course EP0006, *Hazardous Waste Generation and Certification,* and thereafter, to annually complete the training course EP0006-R, *Hazardous Waste Generation and Certification Review.*

9.5.7 Supporting References/Standards

Resource Conservation and Recovery Act, PL, 42 U.S.C. 6923.

Hazardous Materials Transportation Act, PL 93-633, 49 U.S.C. 1801.

40 CFR Parts 260–272.

49 CFR Parts 170–173.

California Hazardous Waste Control Law, HSC 25000 et seq.

Title 22, CCR, Division 4.5.

LLNL Training Course, EP0006, Hazardous Waste Generation and Certification.

LLNL Form LL 5344-B, Hazardous Waste Disposal Requisition Form.

9.5.8 LLNL Contacts Specific to this Section

HWM Division is responsible for hazardous waste transportation issues. You can contact your EOG Analyst or the HWM Field Technician assigned to your program.

9.6 Mixed Waste Requirements

Mixed waste has both radioactive and federal RCRA hazadrous waste components. Wastes may become mixed in three ways:

- Generation of mixed wastes during a specific activity;
- RCRA hazardous waste being exposed to sources of radioactivity; and
- Mixing RCRA hazardous and radioactive wastes.

A hazardous waste must be managed as mixed waste if the level of radioactivity exceeds the activity limits as determined by the analytical laboratory. Proper management of these wastes is very important since the wastes exhibit two types of hazards—radioactivity and at least one of the RCRA characteristics which makes waste hazardous (toxicity, ignitability, reactivity, and corrosivity).

9.6.1 Regulatory Summary

Since mixed waste contains both federal RCRA hazardous and radioactive components, management of mixed waste must meet the requirements of RCRA and the Atomic Energy Act. DOE Order 5820.2A, 9/6/88, Radioactive Waste Management, establishes policies, guidelines, and minimum requirements by which DOE manages its radioactive and mixed waste. The categories of low-level waste (LLW), high-level waste, and transuranic (TRU) radioactive waste are each addressed individually. The DOE policy for TRU waste is to move from long-term storage at a limited number of sites to final disposal at a Waste Isolation Pilot Plant. The policy for LLW specifies requirements for waste reduction, waste characterization, treatment, storage, environmental monitoring, and recordkeeping.

9.6.2 Applicability to LLNL Activities

LLNL generates a wide variety of mixed waste which includes HEPA filters, laboratory wastes, contaminated clothing, contaminated equipment, machine shop wastes, liquids, depleted uranium-238, radioactive tracers, and waste materials exposed to neutron beams. Mixed waste at LLNL must comply with all RCRA hazardous waste management requirements specified in this chapter, due to the hazardous waste component, as well as Atomic Energy Act regulations.

The main issue on mixed waste affecting LLNL is the limited availability of treatment or disposal facilities for mixed wastes. LLNL currently stores all untreatable mixed waste indefinitely on-site. This lack of disposal facilities makes it critical that all possible efforts are made to minimize mixed waste generation.

9.6.3 Responsibilities

Since mixed wastes are also hazardous wastes, all LLNL staff indicated as responsible for hazardous waste have the same responsibilities for mixed waste. In addition, the EPD Waste Certification Program staff can help with mixed waste issues. Your program's Waste Minimization Coordinator can help with identifying processes and procedures to minimize mixed waste.

9.6.4 Process for Compliance

LLNL has developed a waste certification process for hazardous waste, low-level waste, and TRU waste to verify that wastes are properly characterized (whether radioactivity has been added to the hazardous waste). When a waste disposal requisition form is completed for hazardous waste, the certification statement is signed by the generator confirming that the waste has not been exposed to radioactivity. A specific label exists for mixed wastes that must be completed and affixed to all containers with mixed wastes. Process knowledge and sampling for radioactivity are the two methods that can be used to verify whether wastes are indeed mixed.

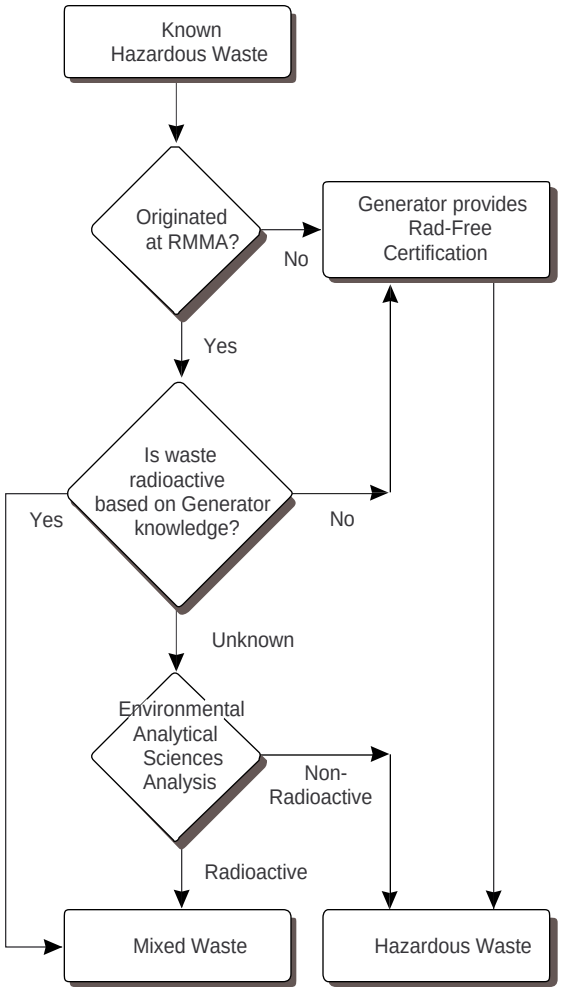


Figure 9-6. Hazardous waste certification process

LLNL has designated Radioactive Materials Management Areas (RMMAs) as locations where radioactive contamination of a waste could occur. Hazardous waste generated in these areas must be evaluated for potential radioactive contamination. These RMMAs are posted with signs. Figure 9-6 summarizes the hazardous waste certification process and indicates how a waste can be classified as mixed.

9.6.5 Information/Reporting Requirements

Refer to the hazardous waste management section of this document since reporting of mixed waste must follow hazardous waste management procedures.

9.6.6 Training

Refer to the hazardous waste management section of this document since training for mixed waste must follow hazardous waste management procedures.

9.6.7 Supporting References/Standards

AEA. 42 U.S.C. §§ 2011-2292, amended 1982. 1954.

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

40 CFR 240–271.

DOE Order 5400.3. Hazardous and Radioactive Mixed Waste Program. 1990.

DOE Order 5820.2A. Radioactive Waste Management. 1988.

EPA, *Test Methods for Evaluation of Solid Waste*. SW-846. 3rd Edition. 1986.

LLNL Hazardous Waste Management. "TRU Container Inspection and Control." Procedure No. 202. Rev. 2 (3/1/90). 1993.

LLNL Hazardous Waste Management. "TRU Container Procurement Control." Procedure No. 201. Rev. 2 (2/5/90). 1993.

LLNL Hazardous Waste Management. "TRU Nonconformance Reports and Corrections." Procedure No. 205. Rev. 2 (2/26/90). 1993.

LLNL Hazardous Waste Management. "TRU Shipping Procedure." Procedure No. 204. Rev. 2 (2/5/90). 1993.

LLNL Hazardous Waste Management. "TRU Waste Shipment Preparation." Procedure No. 203. Rev. 2 (7/27/89). 1993.

LLNL Hazardous Waste Management. "Compaction of Dry, Low-Level Radioactive Waste." Procedure No. 555. Rev. 1 (3/26/91). 1993.

LLNL Hazardous Waste Management. "Radioactive LSA Shipments to NTS." Procedure No. 528. Rev. 1 (6/13/90). 1993.

LLNL Hazardous Waste Management. "LSA Shipment Preparation." Procedure No. 533. Rev. 1 (5/4/90). 1993.

LLNL Hazardous Waste Management. "LSA Solidification (Small Quantity)." Procedure No. 503. Rev. 1 (5/2/90). 1993.

Low-Level Radioactive Waste Policy Amendments Act. Public Law 99-240. Section 3(b)(1)(D). 1985.

RCRA. Public Law 94-580, as amended. 1976.

Title 10 CFR, Part 61. "Licensing Requirements for Land Disposal of Radioactive Waste." 1982.

WIPP/WAC, Rev. 4. "Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant." 9/81, as updated. 1992.

9.6.8 LLNL Contacts Specific to this Section

If you have any questions about mixed waste, contact your EOG Analyst or the HWM Field Technician assigned to your program.

9.7 Asbestos Requirements

Asbestos is a friable material which was widely used in past years as a construction material in roofing, floor and ceiling tiles, insulation, and fire walls. Over the past two decades, evidence regarding the negative health effects of exposure to asbestos has mounted. Asbestos dust particles are known to be highly toxic, and inhalation of asbestos has been linked to cancers of the lung and gastrointestinal tract. Of particular concern is asbestos-containing material (ACM) which has been, or can be, broken into a powdered form. Such material, called friable ACM, can be inhaled and become lodged in people's lungs where it may cause cancers of the lining of the lung and periotoneal cavity.

9.7.1 Regulatory Requirements

An extensive set of programs regulate asbestos both on a federal and state of California level. Regulations govern the use of asbestos, the notification of people working in buildings which contain asbestos, actions which must be taken during renovation and demolition of buildings containing asbestos, and the training of workers who deal with asbestos. Although asbestos is not considered a hazardous waste under federal law, it is classified as a special waste, and in California, some asbestos-containing wastes are considered hazardous wastes under the California Hazardous Waste Control Law. Because of its special classification, the transport and disposal of asbestos-containing wastes are closely controlled. In addition to the areas of concern mentioned above, in the hopes of protecting children, particular emphasis in the law has been placed on detecting and managing asbestos present in schools.

Asbestos is mentioned in the federal Clean Water Act, the Clean Air Act, the Occupational Safety and Health Act, and Superfund, but the most significant federal regulations regarding asbestos were issued under the Toxic Substances Control Act. In addition, California's Health and Safety Code addresses asbestos notification, and the California Division of Occupational Safety and Health (Cal/OSHA) is responsible for requiring certification and training of asbestos workers. The local Air Districts have forbidden the use of potentially friable asbestos in insulating materials and the spraying of asbestos during construction or repairs.

9.7.2 Responsibilities

Figure 9-7 indicates responsible parties and actions which must take place to satisfy asbestos regulations during the planning of a renovation or demolition at

LLNL. A renovation is defined as any operation which involves removing or stripping of Regulated ACM (RACM). (RACM consists of friable asbestos and forms of asbestos which may become friable due to handling.) Before any demolition or renovation can commence, the Air District requires a thorough survey for the presence of RACM. Any RACM found must be removed, and an on-site representative who has been trained in compliance with asbestos rules must be present during any asbestos removal. All demolitions (even those of buildings without known asbestos) must be reported to the Air District at least 10 days before work begins if the project will remove RACM in quantities that exceed the amount specified in the Bay Area Air Quality Management District (BAAQMD) regulations. This reporting is handled through the Permits and Regulatory Affairs Group (PRAG). Special handling procedures including wetting and other approved methods must also be used to minimize the air emissions of asbestos.

Demolition and renovation wastes which contain asbestos become classified as Asbestos-Containing Waste Material and must be handled and disposed of in a special manner. The wastes must be wetted, placed in sealed containers, and eventually disposed of or processed into nonfriable form. The regulations require that friable asbestos waste be packaged in two layers of 6-milliliter plastic. As they travel to a processing or disposal facility, the wastes must be tracked on a waste manifest. In California, wastes with more than one percent asbestos and in a friable state are classified as hazardous wastes and must be managed as such. HWM is responsible for certification and completion of all documentation for the shipment of RACM off-site.

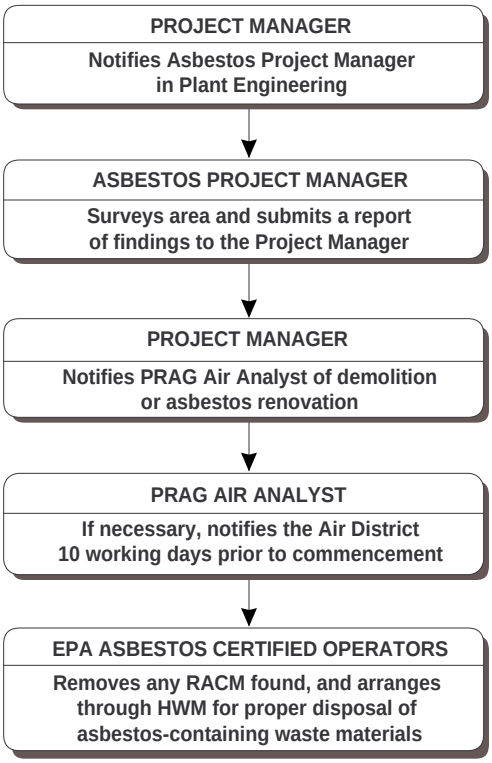


Figure 9-7. Flow chart for renovation and demolition project

9.7.3 Process for Compliance

If you suspect the presence of asbestos, notify your EOG Analyst immediately so that notification requirements can be satisfied in a timely manner. Also, inform your EOG Analyst of any planned demolition or renovation as early as possible so that the BAAQMD and San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) can be notified and the proper asbestos surveys and control activities can occur.

9.7.4 Supporting References/Standards

California Health and Safety Code 25915 through 25919.7.

29 CFR 1910.1001, 1926.58.

40 CFR Part 61, Subparts M and G.

40 CFR Part 763, Subpart E.

BAAQMD Regulation 11, Rule 2.

9.7.5 LLNL Contacts Specific to this Section

Your main contact at LLNL for help with asbestos waste issues is your EOG Analyst. Contact your ES&H Team for health and safety issues regarding asbestos.

9.8 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are regulated by the EPA under the Toxic Substance Control Act (TSCA), which regulates all aspects of PCB use. For PCBs that become waste, including PCB spills, the state of California has enacted additional regulatory requirements. PCBs are not regulated under RCRA as federal hazardous wastes, except as being materials which must meet land disposal restrictions.

LLNL has prepared comprehensive guidance, identification, handling, and management of PCBs. Please refer to the document, *Guidelines for Polychlorinated Biphenyls,* for detailed information.

9.8.1 Regulatory Summary

There are three classifications of PCB-containing materials, based on the concentration of PCBs present. (See Table 9-1.) Mixtures of PCB-containing materials are subject to all requirements of the highest PCB concentration classification within the mixture. Dilution to a lesser classification is prohibited.

Table 9-1. Classifications of PCB-containing materials

PCB Classification	Definition
PCB	Contains ≥500 ppm
PCB-contaminated	Contains ≥5 and <500 ppm (TSCA-regulated 50–500 ppm, California regulated [waste only] 5–50 ppm)
Non-PCB	<5 ppm

TSCA and California regulations also regulate the storage and disposal of PCB waste. These regulations differ on PCB classification for waste as indicated above.

A PCB spill must be reported immediately. In the event of a spill, the area must be controlled to protect personnel from exposure, and the spill must be cleaned up within 48 hours. Special precautions must be undertaken during PCB cleanup.

9.8.2 Applicability to LLNL Activities

PCB regulations apply to LLNL activities, especially when using or servicing the following equipment:

- Transformers;
- Large high- and low-voltage capacitors;
- Electric motors using PCB coolant;
- Hydraulic systems;
- Microscopy mounting media and immersion oil;
- Heat-transfer systems;
- Fluorescent light ballasts (If not leaking, these are handled as California hazardous waste only);
- Electromagnets;
- Switches;
- Voltage regulators;
- Compressors; and
- Vacuum pumps.

PCBs may be used in other scientific experiments or analysis. Under these uses, which may require special documentation from EPA, PCBs can only be purchased in hermetically sealed containers of less than 5 milliliters. If your laboratory uses PCBs, you must provide adequate spill containment and label all PCB materials. The regulations also specify the type of containers that can be used to package PCB waste.

9.8.3 Responsibilities

As the generator, you need to make sure that PCB equipment has the appropriate labels placed on PCB items. Labeling requirements are based on the type of equipment in use and the concentration of PCBs. The recommended frequency of inspections depends on the type of equipment in use. Inspection logs must be maintained for all equipment containing PCBs.

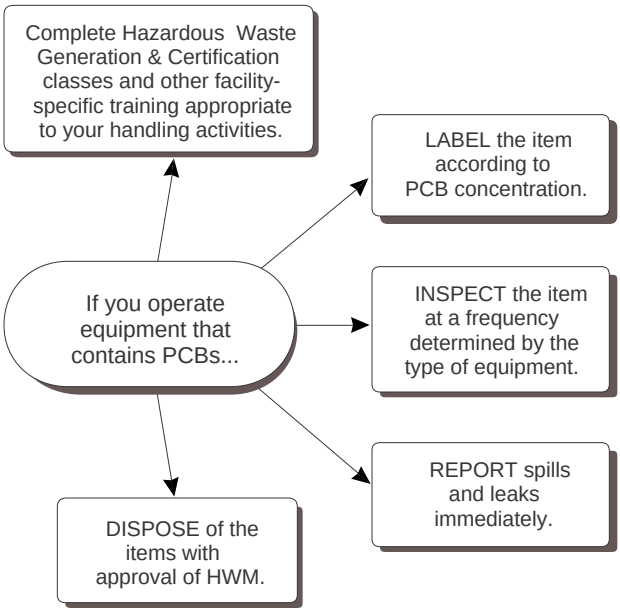


Figure 9-8. PCB-related responsibilities at LLNL

If you spot a PCB leak, report the leak to your ES&H Health and Safety Team Leader immediately. Leaks can also be reported by calling the Dispatch Center at 911. Be prepared to give the Dispatch Center your name and badge number, the location of the leak, the amount spilled, and the fact that the spilled material contains PCBs. If you find a larger spill, report it immediately to 911, your ES&H Team, and your EOG Analyst.

If you need to dispose of PCB and PCB-contaminated items, contact your HWM Field Technician or EOG Analyst who will coordinate the labeling, packaging, and storage of these items through HWM.

In the unlikely case that PCBs are inadvertently generated and in concentrations greater than 2 ppm, you must contact your EOG Analyst and submit a report to the EPA within 90 days.

Figure 9-8 summarizes PCB-related responsibilities at LLNL.

9.8.4 Process for Compliance

There are several aspects of PCB compliance at LLNL that you should be particularly aware of: labeling, proper containers, inspecting PCB equipment, spill reporting, and initial response. Specific containers must be used to package PCB waste. These containers must meet DOE and/or DOT specifications.

- Your EOG Analyst can assist you in determining the concentration of PCBs in each item by arranging for a sample of the fluid to be taken and analyzed by a certified laboratory. If the item is a sealed capacitor, contact the manufacturer stamped on the unit to determine if it contains PCBs.
- Choose and obtain the appropriate PCB label(s) as follows:

  1) For equipment items containing PCBs:

Concentration of PCBs	Label Type
Nondetectable PCBs (parts per million)	"Non-PCB"
Some PCBs but less than 5 ppm	"Non-PCB—Contains less than 5 ppm"
5 to less than 500 ppm	"PCB Contaminated"
500 ppm or greater	"Caution Contains PCBs"

2) For other PCB containers (such as drums, cans, tanks, etc.), that have been in contact with, or presently contain, PCBs in concentrations exceeding 50 ppm, use the appropriate "Caution Contains PCBs" label. If the PCB concentration is below 50 ppm, use one of the other labels as specified above.

- Labels should be placed on the exterior of items containing PCBs so that the labels can be read easily by anyone inspecting or servicing the item. In addition, the access points (doors, lids, posts, etc.) to transformer and capacitor storage containers, rooms, vaults, etc., should be clearly marked with the label appropriate for the item containing the highest concentration of PCBs in that storage area.

For more information regarding the proper labeling of items containing PCBs, contact your area EOG Analyst.

9.8.5 Information/Reporting Requirements

To transport, treat, store, or dispose of PCB waste, LLNL must have an identification number, issued by the state, which is unique to the LLNL site. The Environmental Protection Department (EPD) at LLNL is responsible for obtaining this number. HWM has also filed the required notification of PCB waste activity with the EPA.

HWM is also responsible for maintaining the records and reports completed for PCB handling activities. These include:

- Annual records of PCB disposal;
- Annual document log;
- PCB manufacturing reports;
- PCB waste manifest exception reports; and
- PCB spill cleanup records.

The PCB equipment owner is responsible for documenting inspections.

If PCBs are generated in concentrations greater than 2 ppm, you must contact your EOG Analyst and submit a report to the EPA within 90 days.

9.8.6 Training

If you are generating hazardous waste, including PCBs, you are initially required to take the training course EP0006, *Hazardous Waste Generation and Certification*, and thereafter, to annually complete the training course EP0006-R, *Hazardous Waste Generation and Certification Review*.

9.8.7 Supporting References/Standards

40 CFR Part 761.

40 CFR Parts 170–173.

California Hazardous Waste Control Law, HSC 25000 et seq.

Hazardous Materials Transportation Act, PL 93-633, 49 U.S.C. 1801.

LLNL Draft Document, *Guidelines for Polychlorinated Biphenyls (PCBs).* 1994.

Title 22, CCR, Division 4.5.

Toxic Substances Control Act, PL 94-469, 15 U.S.C. 260.

U.S. DOE Environmental Guidance, Management of Polychlorinated Biphenyls, EH-231,U.S. DOE, Office of Environmental Guidance, RCRA/CERCLA Division, November 1993.

9.8.8 LLNL Contacts Specific to this Section

At LLNL, the Permits and Regulatory Affairs Group (PRAG) of EPD's Operations and Regulatory Affairs Division is responsible for the PCB compliance program. For specific questions on day-to-day management of PCBs, your main contact is the EOG Analyst.

9.9 Medical Waste Management Requirements

Medical wastes are a separate category of wastes and are not regulated as hazardous wastes under either state or federal regulation. Medical wastes consist of two categories, biohazardous waste and sharps wastes, whose definitions are summarized below:

Biohazardous Waste—Includes laboratory waste, human or animal specimen cultures, infectious agents, discarded vaccines, microbiologic specimens, surgery specimens, animal parts, and contaminated blood.

Sharps Waste—Any device having acute rigid corners or edges capable of cutting or piercing, including:

- Hypodermic needles, syringes, blades, and needles with attached tubing; or
- Broken glass items, such as blood vials and pipettes contaminated with other medical waste.

Medical wastes, which are generated by LLNL both at the main site and Site 300, are a concern due to their ability to transfer infectious diseases to those handling them. These wastes are generated by LLNL's biomedical research and health operations.

9.9.1 Regulatory Summary

Medical wastes are regulated under the California Health and Safety Code, Division 20, Chapter 6.1, also known as the Medical Waste Management Act. The regulations specify requirements related to the storage, treatment, registration, permitting, transportation and enforcement of medical waste handling. Separate requirements exist for both large quantity generators (>200 lb/month) and small quantity generators (<200 lb/month). While the California Department of Health Services (DHS) administers the Chapter 6.1 requirements, the Alameda County Environmental Health Services (ACEHS) is the medical waste regulating agency for LLNL and the San Joaquin County public health services for Site 300.

9.9.2 Applicability to LLNL Activities

LLNL generates approximately 2,600 lb/yr of medical waste, with an additional 12 lb/yr generated at Site 300. Buildings 345, 361, 364, 365, and 663 at the main site and Building 877B at Site 300 are the sources of these wastes. Most of these wastes are treated by autoclaving in Buildings 361 and 365 to sterilize the waste prior to disposal as sanitary waste. Sharps are sent to a commercial incinerator.

In July 1991, LLNL submitted an application for a medical waste permit to ACEHS which contained information concerning the management and treatment of medical wastes. Two permits were issued in August 1991:

1) Large quantity generator permit renewed annually; and
2) On-site treatment permit, renewed every 5 years. Site 300 Medical, a small quantity generator is not required to obtain a permit.

9.9.3 Process for Compliance

Key medical waste management requirements, as specified in the Medical Waste Management Act law, are as follows:

Storage Requirements

- Store separately from other waste;
- Store in red biohazard bags which are placed in rigid containers with appropriate labeling sign;
- Can store for 7 days if above 0˚C and 90 days if below 0˚C;
- Must be stored in a secure storage area with appropriate warning signs;

- Compaction not allowed until after treatment; and
- Registration as a medical waste generator and inspection are required.

Treatment Requirements

- Treatment is required prior to landfilling;
- Sharp wastes must be treated by:
  - Incineration, or
  - Sterilization,

  and then destroyed or public access to treated waste prevented (e.g., solidification);
- Allowed treatment methods are incineration, steam sterilization, sewering under specified circumstances, or approved alternative method; and
- Treatment facility must be permitted.

Hauler Requirements

- Must be transported by registered hazardous waste hauler or other local agency approved hauler;
- Medical waste must be hauled separately from other waste types;
- Can be transported only to a permitted treatment facility, a transfer station, or a consolidation facility;
- Personnel handling waste must wear protective clothing; and
- Tracking document must be used to track waste.

Enforcement

County can issue violations for noncompliance. The first offense is a $2,000 fine and/or one year in jail. Subsequent violations can incur up to a $25,000 fine and/or one to three years in jail.

9.9.4 Supporting References/Standards

California Health and Safety Code, Division 20, Chapter 6.1.

22 California Code of Regulations (CCR), §§ 66261 et seq.

9.9.5 LLNL Contacts Specific to this Section

The EOG Analyst supports HWM activities and can help you with waste management issues, including characterization, regulatory interpretation, handling and spill response. The HWM Field Technicians can help you with packaging, labeling, sampling, disposal requisition, and transport issues.

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10.0 Product Storage/ Hazardous Materials

10.0 PRODUCT STORAGE/HAZARDOUS MATERIALS

10.1 Inventory Requirements

The management of hazardous substances (i.e., regulated hazardous materials and hazardous waste) presents potential risks to workers, the environment, and public health. In order to plan for, and respond to, an emergency involving the release of hazardous substances, inventories must be prepared and maintained. Additionally, these inventories must be provided to local administering agencies.

10.1.1 Regulatory Summary

Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), provides for emergency planning procedures and requires covered facilities that manufacture, use, or store hazardous chemicals to report the presence of these chemicals in the workplace. The purpose of the regulatory reporting requirements is to provide information to local communities regarding the quantity and hazards of chemicals stored on-site to better plan for an emergency. EPCRA has four major sections that address emergency planning, emergency notification, community right-to-know reporting, and toxic chemical release inventory reporting.

SARA Sections 301–303 address emergency planning by requiring states to establish an emergency response commission and appoint local emergency planning committees. These committees are responsible for preparing comprehensive emergency response plans. In addition, covered facilities must designate an emergency response coordinator and notify the state commission if extremely hazardous substances are present at the facility in excess of established quantities. Section 304 addresses emergency notification by requiring facilities that produce, use, or store hazardous chemicals to notify the community emergency coordinator if a hazardous substance release exceeds reportable quantities. Section 311 addresses the community right-to-know reporting by requiring facilities to submit Materials Safety Data Sheets (MSDSs) or a list of all chemicals to each of the following: 1) the local emergency planning committee, 2) the state emergency response commission, and 3) the fire department with jurisdiction over the facility. Section 313 addresses toxic chemical release inventory reporting by mandating facilities to prepare an annual Toxic Release Inventory (TRI) report for TRI-listed chemicals in excess of reporting thresholds. TRI reporting provides the EPA with valuable information for targeting specific industries for pollution prevention initiatives and increased regulatory oversight. TRI reporting also provides an incentive for covered facilities and industries to minimize toxic chemical releases because EPA makes the information in these reports available to the public.

10.1.2 Applicability to LLNL Activities

LLNL has historically been required to comply with all SARA Title III provisions except for Section 313. In August 1993, President Clinton signed an Executive Order requiring all federal agencies to comply with Title III requirements, including Section 313 if the federal facility has ten or more employees and meets established reporting thresholds. To accomplish this, EPD, with the assistance of the LLNL programs, will complete an EPA Form R report for all chemical releases that exceed established thresholds.

In California, the Waters Bill and its amendments require a business to submit a business plan to the local administering agency. As with SARA Title III, the purpose of the business plan is to enable state, local, and LLNL authorities to adequately plan for, and respond to, chemical emergencies.

10.1.3 Responsibilities

The ChemTrack Operations Group has the responsibility for maintaining ChemTrack, an institution-wide database and tracking system for chemicals (see Figure 10-1). ChemTrack will determine which TRI-listed chemicals are used on-site and compare these amounts against reporting thresholds and their threshold determinations. Additionally, they are responsible, with assistance from other LLNL organizations, for preparing and completing the TRI reports, beginning in July 1995.

The ChemTrack Operations Group is also responsible for providing the local administering agency with LLNL's business plan.

10.1.4 Process for Compliance

The ChemTrack Operations Group submits MSDSs/chemical lists to the appropriate agency as required by SARA Title III, Section 311. Additionally, the ChemTrack Operations Group prepares and provides the TRI reports to meet compliance requirements of SARA Title III, Section 313 to DOE. They will obtain and compile the appropriate data from LLNL facilities and the appropriate group within EPD.

The ChemTrack Operations Group also prepares the business plan which contains the following information: 1) an inventory of all chemicals and their MSDSs, 2) an inventory of all hazardous waste stored on-site, 3) the emergency response plans and procedures, and 4) the training plans for all employees in safety procedures in the event of a release or threatened release of a hazardous substance. They compile and prepare the annual business plan for both the Livermore site and Site 300, and submit them to Alameda and San Joaquin county agencies responsible for emergency response activities.

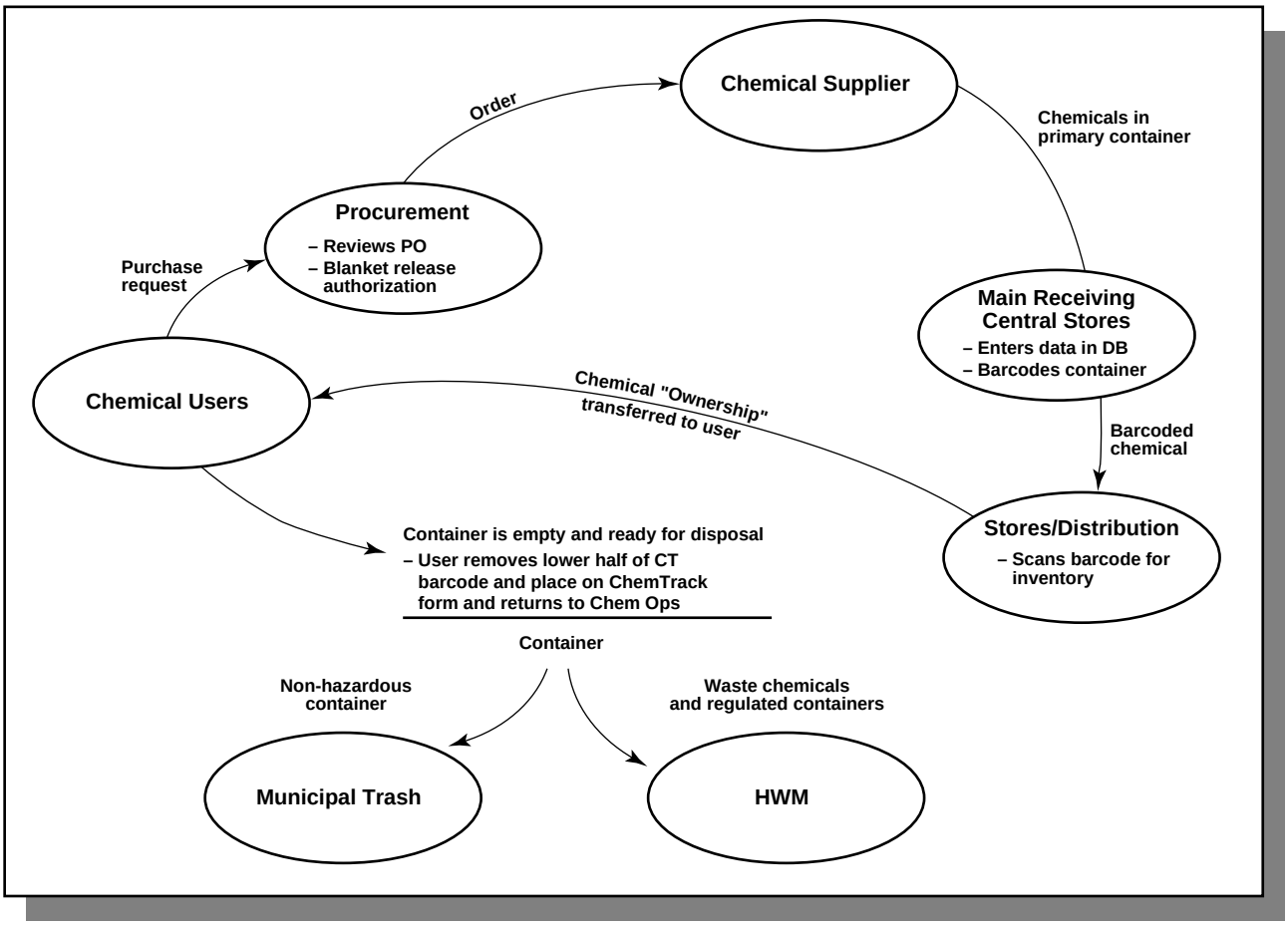


Figure 10-1. ChemTrack process model

10.1.5 Information/Reporting Requirements

TRI reports are submitted annually to DOE. The first report for calendar year 1994 is due July 1, 1995.

A business plan is submitted annually to both Alameda and San Joaquin county agencies responsible for enforcing business plan provisions.

10.1.6 Supporting References/Standards

The Waters Bill, California Health and Safety code, Section 25500 et seq.

California Code of Regulations, Title 19, Section 2620 et seq.

42 United States Code, Section 11001, et seq.

40 Code of Federal Regulations, Parts 300, 355, 370, and 372.

Toxic chemical Release Inventory Reporting Form R and Instruction, EPA-Office of Pollution Prevention and Toxics, 1993.

LLNL Alameda County 1994 Hazardous Material Business Plan.

10.1.7 LLNL Contacts Specific to this Section

Contact the ChemTrack Operations Group regarding chemical inventory data.

10.2 Petroleum Underground and Aboveground Storage Tanks

In California, nearly 20,000 unauthorized releases from underground storage tanks (USTs) have been reported. Approximately 90% of these USTs contain petroleum products. Figure 10-2 indicates a design and leak detection system for a typical Petroleum UST. Aboveground storage tanks (ASTs) have also leaked or spilled because of age, defects in design, human error, or equipment failure. These leaks have contaminated soil and groundwater, which require expensive and time-consuming cleanup. To prevent such leaks from occurring, federal and state governments have passed increasingly strict design construction, operation, and monitoring requirements.

This section addresses the requirements for storage tanks containing petroleum products such as gasoline, diesel fuel, heavy fuel oils, lubricating oils, waste oils, and substances containing at least 5% petroleum. Tanks containing other hazardous wastes must meet the storage requirements for those wastes (see Chapter 9.0).

10.2.1 Regulatory Requirements

Federal regulation of tanks began as part of the Clean Water Act with Spill Prevention, Control and Countermeasures (SPCC) regulations. California enacted similar but more stringent regulations, which specifically address construction, operation, and release detection actions for USTs. These state regulations, which apply to LLNL USTs, are administered by the Alameda County Department of Environmental Health, Hazardous Materials Division for USTs at the Livermore Site. USTs at Site 300 are regulated by San Joaquin County Public Health Services, Environmental Health Division. Aboveground tanks, that are regulated by California's Aboveground Petroleum Storage Act, are regulated by the Regional Water Quality Control Board, San Francisco Bay Region and Central Valley Region for the Livermore Site and Site 300, respectively.

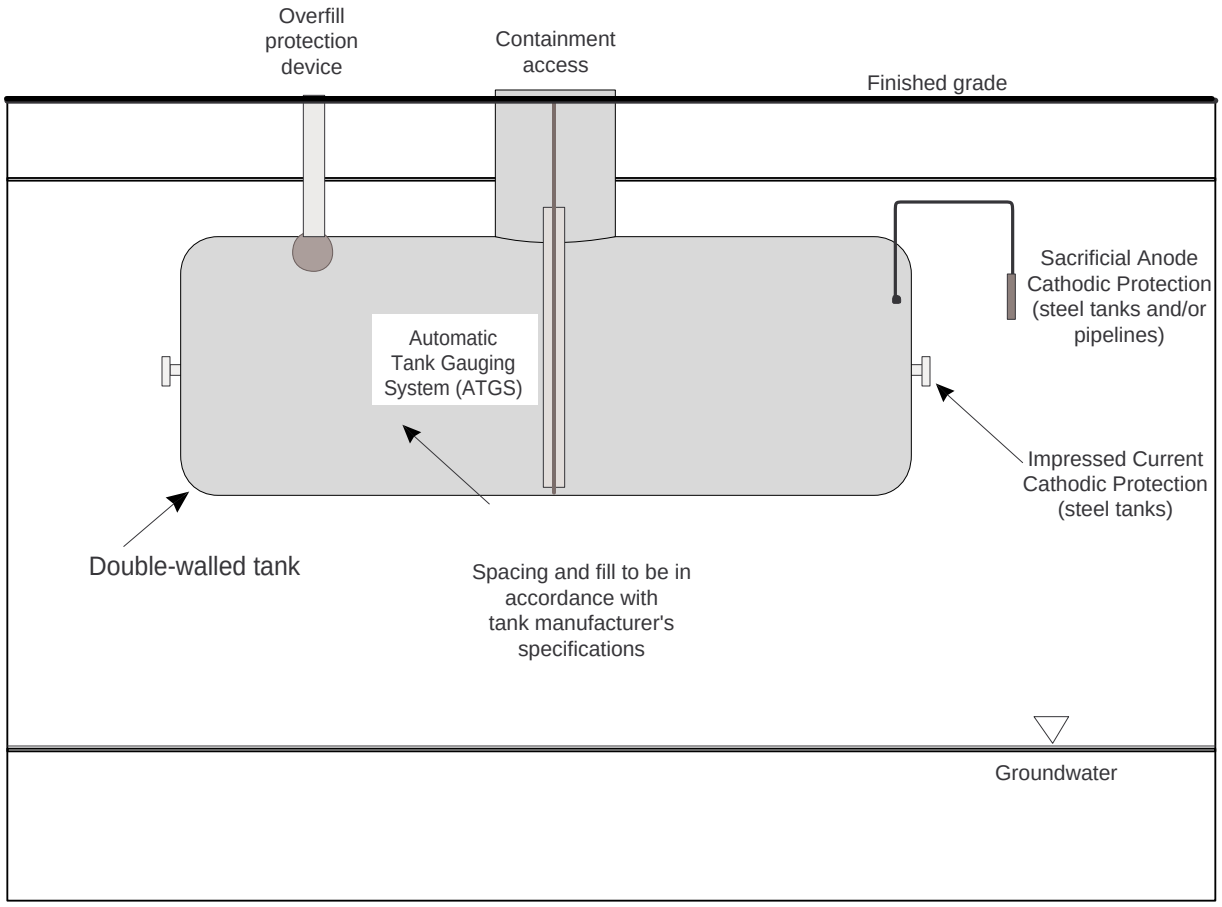


Figure 10-2. Generalized UST design and leak detection methods

USTs must be inspected on a daily basis, and records of these inspections must be current and maintained. In addition, ASTs require filing a storage statement with the State Water Resources Control Board. SPCC compliance is administered by the Regional Water Quality Control Board.

UST Requirements

Federal and state regulations define standards for constructing and monitoring USTs and UST piping. These include release prevention equipment such as double-wall containment and leak detection monitoring. In most cases, underground tanks cannot be visually inspected for leaks, so other forms of leak prevention and detection must be used.

Regulations require that a monitoring program detect any unauthorized release from USTs (CCR 23, Article 4, Section 2641). The monitoring program must be approved by the Alameda County Department of Health for USTs at the Livermore Site and by San Joaquin County Public Health Services, Environmental Health Division for those at Site 300. Written records and procedures that describe methods for determining unauthorized releases are

required. These are included in the LLNL UST Management Plan. USTs are permitted with the county.

AST Requirements

ASTs are often chosen as an alternative to USTs. Regulations concerning spill prevention and secondary containment apply to these tanks as well. AST requirements include secondary containment as well as visual inspections for leaks and inventory control. They may also require the AST to be included in the facility's SPCC Plan.

For petroleum ASTs with a capacity greater than 660 gallons or a facility with ASTs where the cumulative storage capacity is greater than 1,320 gallons, a storage statement must be filed with the State Water Resources Control Board every two years. Appropriate containment for ASTs that have a volume of less than 660 gallons should be provided if they pose a significant risk.

10.2.2 Applicability to LLNL Operations

LLNL operates over 200 ASTs and USTs containing petroleum products, wastewater and other substances. Tanks containing petroleum products must be managed in compliance with all county, state, and federal UST and AST regulations. Tanks containing waste, including hazardous waste other than petroleum products, must meet storage requirements for those substances (see Chapter 9.0). Written records and procedures that describe methods for determining unauthorized releases from USTs are included in the LLNL UST Management Plan. The LLNL SPCC Plan addresses spill prevention controls for all storage tanks.

10.2.3 Responsibilities

Operators of single-wall USTs must perform tank tightness testing annually. In addition, petroleum USTs larger than 2,000 gallons must be tested monthly. USTs and piping are tested annually. Double-wall USTs do not require this annual test, because monitoring the interstitial space provides this function. Testing is contracted and scheduled through the Environmental Protection Department, Tank Assessments and Guidance Group (TAGG).

Operators of both USTs and ASTs should coordinate with TAGG any changes in the tank's process, products stored, leak detection system, or alarm system, or whenever major repairs are made.

Finally, you must follow spill containment and response procedures if you suspect a leak in an AST. These procedures are described in the LLNL SPCC and Spill Contingency Plans.

10.2.4 Process for Compliance

Double-walled USTs are monitored for leakage in two ways. The interstitial spaces between the double-walls of the tank and the piping are monitored, and an automatic tank gauging system can determine whether the product level fluctuations are such as to indicate a possible leak.

If you suspect a release, follow the spill containment and response procedures detailed in the LLNL Spill Contingency Plan and in the UST Management Plan. Most often, this entails removing the UST from service for a minimum of 48 hours and taking stick readings at the beginning and end of this period to see if there is any level change.

Aboveground Tanks

You should be familiar with the LLNL SPCC Plan, particularly with those sections specific to your facility. The LLNL SPCC Plan requires the inclusion of all ASTs above 660 gallons or areas with ASTs where the cumulative storage capacity is greater than 1,320 gallons. Generally, the SPCC plan defines requirements for daily inspections of ASTs, secondary containment, security, and spill prevention procedures.

In areas where secondary containment may accumulate rainwater, the drain valve must be a locking type and not be left opened. An oil-sheen test per 40 CFR 110.3 shall be performed on the rainwater. If no sheen is present, the liquid can be discharged, unless it is located in an RMMA. In this case, it may need to be tested for radioactivity before it is discharged. If sheen is present, contact the EOG. The operator must ensure that rainwater is all drained. The operator need not be present to visually observe the drainage discharge. The secondary containment drain valve must be left closed and locked at all other times. If a discharge might affect groundwater, the bottom of the AST must have a foundation design that provides for early detection of a release, or have a system installed to detect a release before there is an impact on the groundwater. If the AST bottom can be viewed directly, this monitoring can be performed by visual inspections.

For both ASTs and USTs, LLNL has voluntarily decided to meet the hazardous waste tank requirements for wastewater tanks. The *Guidelines for Design and Operation of Retention Tank Systems* document provides guidance for all wastewater tanks, most of which generally applies to USTs and ASTs.

10.2.5 Information/Reporting Requirements

Operators must maintain records of all daily inspections for both USTs and ASTs. The records documenting compliance with each of these operating requirements must be current and maintained. The LLNL UST Management Plan, distributed in June 1993, provides the details for UST inventory records. TAGG maintains records of annual tightness tests.

You must report any change in AST use or status to TAGG.

Spill reporting and response are addressed in the SPCC and Spill Contingency Plans for LLNL.

10.2.6 Training Requirements

Your Environmental Coordinator must ensure that all storage tank operators complete a program of classroom instruction and/or on-the-job training in personal safety and regulatory compliance. This training should review known spill events or failures, operation of equipment and components, and precautionary measures as required by AST/SPCC regulations (40 CFR 112.7(e)(10)), and be documented, by date and topic. Personnel must receive this training within six months of assignment and before working alone in a tank operation or maintenance position. Topics must include:

- Daily monitoring and inspection procedures (training on monitoring should cover all the monitoring program requirements of CCR 23, Article 3, Section 2632(e), i.e., frequency of monitoring, methods and equipment used, location, responsible persons, reporting format, preventative maintenance schedule, and description of training for both the tank system and monitoring equipment);
- Proper stick reading and inventory control procedures;
- Hazard communication;
- Spill response;
- Tank filling and fuel transfer procedures;
- Health and safety; and
- Spill contingency plans.

Information and presentation materials on these topics are available from EPD.

10.2.7 Supporting References/Standards

40 CFR, Part 112.

40 CFR, Part 280.

CCR, Title 23, Division 3, Chapter 16, Underground Storage Tank Regulations.

California Aboveground Petroleum Storage Act.

LLNL Underground Storage Tank (UST) Management Plan.

LLNL Spill Prevention, Control, and Countermeasures (SPCC) Plan.

LLNL Spill Contingency Plan.

Guidelines for Design and Operation of Retention Tank Systems.

10.2.8 LLNL Contacts Specific to this Section

If you have any questions regarding storage of petroleum products in USTs or ASTs, your supporting EOG Analyst can provide the name and telephone number of the TAGG Analyst for your area.

10.3 Hazardous Materials Transportation

Due to the dangers associated with hazardous materials transportation, shippers and transporters are subject to specific, stringent shipping requirements.

10.3.1 Regulatory Summary

Materials with hazardous properties are generally grouped into one of the following categories:

- Toxic chemicals;
- Flammable substances;
- Reactive substances; and
- Corrosive materials.

To ensure that these materials are transported safely on public roads, the Hazardous Materials Transportation Act (HMTA) was passed. The Act, which is administered by the U.S. Department of Transportation (DOT), regulates the shipping, marking, labeling, placarding, and recordkeeping requirements for hazardous materials listed in Title 49 of the Code of Federal Regulations (CFR) 172.101. California further imposes vehicle safety requirements and restricts routing and scheduling of hazardous materials transport.

Current DOT regulations cover the following activities:

- Manufacturing, packaging, and transporting containers;
- Labeling, marking, or placarding containers and vehicles;
- Handling hazardous materials (this includes packing and unpacking, loading and unloading, and procedures during transport);
- Training of transport personnel;
- Registering the transportation of highly hazardous materials;

- Restricting and designating hazardous materials transport routes (this is controlled by state and local agencies which must follow federal standards);
- Reporting spills (this is implemented in conjunction with the EPA and the Federal Emergency Management Agency (FEMA); and
- Demonstrating financial responsibility.

DOT determines what materials are considered hazardous and assigns them to a class and division of material that present similar risks. Each class and division of hazardous material triggers particular packaging, labeling, handling, and registration rules. Transporters of highly hazardous materials (including radioactive and explosive materials) must also register with DOT and with the California Highway Patrol (CHP) under certain conditions (see 10.3.5, Information/Reporting Requirements).

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (also known as "Superfund") also designates hazardous substances that are regulated in transport under the HMTA. When a CERCLA hazardous substance is transported, special rules apply if any single container holds a quantity that equals or exceeds the listed "reportable quantity" (RQ) for that substance. The RQ is the quantity of the substance that, if spilled, requires that spill to be reported under CERCLA. RQs range from 1 pound to 5,000 pounds.

10.3.2 Applicability to LLNL Activities

The requirements of the HMTA are applicable to all off-site (i.e., public roadways) shipments of regulated hazardous materials received, shipped to, and transferred within LLNL properties. LLNL receives hazardous materials from outside vendors and distributes them to most activities. Shipping containers must be properly packaged and labeled, and the vehicles used to transport the materials must have the appropriate markings and placards.

Hazardous materials are sometimes shipped to and from LLNL by commercial companies, who must also comply with DOT regulations. LLNL's on-site transfer of hazardous materials is subject to DOE Orders.

10.3.3 Responsibilities

If you have hazardous materials that you plan to have shipped off-site, every container must meet regulatory standards and must be marked with the proper shipping name and identification number. For example, if the material poses an inhalation hazard, the package must be marked for that hazard. Hazard markings must be visible and unobscured by other markings.

Hazardous materials must enter LLNL through the Receiving Group of the Supply and Distribution Department.

The Materials Distribution Division and the Materials Management Division move explosives on, and between, the LLNL Main Site and Site 300.

The Traffic Management Section of the Supply and Distribution Department reviews and approves all shipments of materials before shipment and ensures that the carrier is properly certified to transport hazardous or radioactive materials.

The Hazardous Waste Management Division is responsible for the preparation of off-site shipments of hazardous materials which are also hazardous waste.

10.3.4 Process for Compliance

Controlled and hazardous materials must be transported by one of the Divisions mentioned in this section.

On-Site Receipt and Distribution

LLNL classifies certain materials—such as explosives, radioactive materials, special nuclear materials, classified substances and parts, and precious metals—as "controlled." Some controlled materials are designated "hazardous."

Controlled materials are delivered directly to Materials Management Control points. Materials Management then delivers controlled materials to the users, but only if there is an approved safety and security procedure for that material.

The Supply and Distribution Department and Materials Management Division ensure that materials are properly packaged, labeled, marked, and documented for both on-site transfer and off-site shipment. If you need help, the *LLNL On-site Packaging and Transportation Safety Manual* contains all major on-site transportation procedures and requirements.

Vehicles transferring hazardous and radioactive materials on-site are marked with warning signs and equipped with fire extinguishers and radiation detectors. Users may transport small quantities of hazardous materials by hand or in qualified vehicles to facilities for use. In these cases, all LLNL requirements for hazardous materials transportation and spill response procedures must be followed.

Off-Site Shipment

A Traffic Management Section representative inspects the load to ensure that packaging meets DOE and DOT standards and that the carrier has the appropriate certifications and registrations to transport the materials on public roads. Vehicles, placards, and shipping papers are also checked to ensure DOE and DOT compliance.

All explosives shipments must be packaged in DOT-approved containers with appropriate DOT labels.

10.3.5 Information/Reporting Requirements

Under the federal program, transporters of certain highly hazardous materials must register with DOT. These highly hazardous materials are:

- Radioactive materials, more than 25 kg of Class A or Class B explosives, or more than one liter per package of materials that DOT designates as extremely toxic by inhalation;
- Hazardous materials in any package, container, or tank having a capacity of 3,500 gallons or more, or more than 468 cubic feet; and
- Hazardous materials, for which placarding is required, in any shipment of 5,000 pounds or more.

Annual registrations must be submitted to DOT by these transporters.

In California, any transporter of explosives of more than 500 pounds of hazardous materials must obtain a hazardous materials license from the California Highway Patrol. In addition, transporters of flammable and combustible liquids must comply with additional registration, inspection, and certification requirements. Annual registration is required.

10.3.6 Training

Federal transportation regulations require training for personnel who load, unload, handle, store, and transport hazardous materials. Training in emergency preparedness for response to accidents involving hazardous materials is also required.

10.3.7 Supporting References/Standards

Hazardous Materials Transportation Act (HMTA), P.L. 93-633, 49 U.S.C. 1801.

49 CFR 171-178.

California Vehicle Code.

CCR, Title 13.

LLNL On-site Packaging and Transportation Safety Manual, 1991.

U.S. DOE, *Transportation of Hazardous Wastes and Substances Reference Manual*, 1988.

U.S. DOE, *Transportation of Hazardous Wastes and Substances Training Manual*, 1988.

10.3.8 LLNL Contacts Specific to this Section

The principal point of contact for hazardous materials shipments is the Traffic Management Section Shipping Coordinator.

10.4 Hazardous Materials Storage

LLNL routinely handles many chemicals and substances that may be considered hazardous if not handled, stored, or used appropriately. Chemicals that have hazardous properties include toxic chemicals, flammable or combustible substances, reactive substances, and corrosive materials. Compressed gases may also be considered hazardous materials.

The discussion in this section is limited to the generic requirements and best management practices (BMPs) that should be followed to avoid spills or releases of hazardous materials to the environment that may be caused by improper storage or handling practices. The handling requirements for oil, pesticides, asbestos, hazardous waste, and radioactive materials are addressed in other chapters of this manual.

10.4.1 Regulatory Summary

Hazardous materials are regulated primarily under occupational safety and health, fire prevention, and water protection laws. The following address the proper storage and handling of hazardous materials as well as spill contingency and response requirements:

- **Occupational Safety and Health Administration** (OSHA) Safety and Health Standards are specified in 29 CFR 1910, and regulate the storage and handling of flammable and combustible liquids. Specifically, OSHA requires under 29 CFR 1910.1200 that Material Safety Data Sheets (MSDSs) be maintained for chemicals handled at a facility.
- The **National Fire Protection Association** (NFPA) has published fire protection guidance in the form of the National Fire Code (NFC). The NFC provides code sections (in pamphlet format) specific to a hazardous material or to an operation which requires special fire protection considerations. The Code is NOT a federal or state law, but is guidance developed by fire safety experts and can be used at the local level to establish local fire ordinances.
- The federal **Clean Water Act** (CWA) establishes planning, response, and reporting requirements for petroleum and hazardous substances that are released to the nation's "navigable waters."
- The **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA) requires a 24-hour notification to the federal

National Response Center if a regulated hazardous substance has been released to the environment in excess of its reportable quantity.

The *Health & Safety Manual* has information about hazardous material storage.

10.4.2 Applicability to LLNL Activities

LLNL routinely uses and stores hazardous materials, the practice of which is regulated under federal and state laws. Any program that handles hazardous materials must do so in a manner that is protective of human health and the environment. Hazardous materials should always be handled to avoid spills or releases to the environment.

10.4.3 Responsibilities

If you handle and/or store hazardous materials, you are responsible for ensuring that these materials are managed properly. This includes storing the hazardous materials in the appropriate areas (flammable resistant cabinets, storage areas which meet fire code, maintenance of minimum aisle space, etc.), training employees on the hazards of chemical handling (on-the-job or classroom training on hazard communication), handling the chemicals in a safe manner (dispensing procedures and chemical compatibilities), and maintaining written information on the substance (Material Safety Data Sheets). You are also responsible for reporting any spills of hazardous materials to the Dispatcher at 911. (See Section 3.2 of this manual for complete information on reporting spills.)

In the event of a spill, you must implement the appropriate initial response procedures. Depending on the size of the spill, the LLNL Fire Department may need to be contacted to clean up the spill. The LLNL Fire Department is responsible for initial response, containment, and stabilization of any environmental release at LLNL.

EPD's Emergency Management Team (EMT) is responsible for assisting in response activities for any on-site or off-site environmental incidents resulting from LLNL operations.

Hazardous Waste Management and Labor Shop personnel also provide assistance in cleaning up hazardous materials by providing staff, containers, cleaning and neutralizing agents, and various light- and heavy-duty equipment.

10.4.4 Process for Compliance

First, when you receive a hazardous material, it should be accompanied by a MSDS. The MSDS will provide information on the hazardous material, including its chemical composition, safe handling requirements, and storage conditions. The MSDS must be maintained so that it is readily accessible to employees who may come in contact with the material. (A file drawer or binder is a good place to keep MSDSs.)

If you store hazardous materials, check the MSDSs to see how they should be stored. Typically, flammable and combustible materials should be stored in metal cabinets that meet the appropriate fire code for the specific type of flammable/combustible material. Check with the ES&H Team for guidance on storage requirements of these materials. Make sure that materials are stored at the proper temperature. Figures 10-3 and 10-4 indicate typical storage methods. Figure 10-5 indicates a typical warning sign for flammable materials.

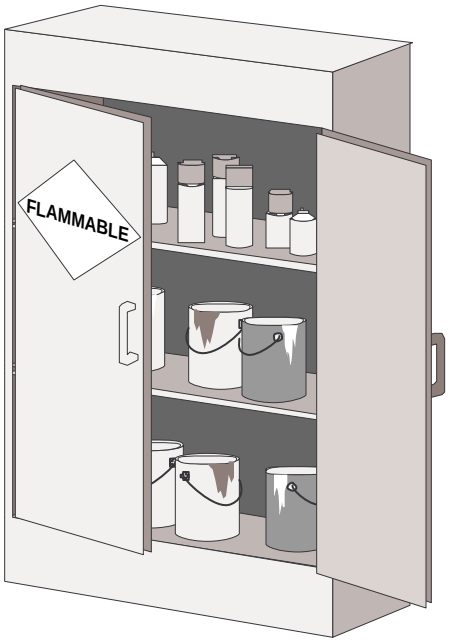


Figure 10-3. Typical storage method for flammable materials

Corrosive materials and flammables should not be stored adjacent to each other. These two incompatible materials must be stored in segregated areas, with adequate containment to prevent any spills from mixing. You should also have the appropriate fire suppression equipment on hand. Check with the ES&H Team to determine whether you need a sprinkler system and/or fire extinguishers. If you do have fire extinguishers, establish an annual inspection schedule with the fire department.

Make sure that hazardous materials storage areas are properly labeled according to the chemical hazard (i.e., inhalation hazard, flammable, corrosive, reactive).

These signs should be visible from 25 feet and should also be in languages other than English if persons who do not understand English come in contact with the area.

Again, if you see a spill, report it according to the general procedures outlined in this section, or see Section 3.2 for complete procedures on spill reporting.

10.4.5 Information/Reporting Requirements

If you come upon a spill or other emergency incident involving hazardous materials, call 911. Also notify the EOG Analyst assigned to your program.

10.4.6 Training

Call your ES&H Team for assistance in determining training requirements.

10.4.7 Supporting References/Standards

29 CFR Part 1910, Subpart H—Hazardous Materials.

National Fire Protection Code, Flammable and Combustible Liquids Code NFPA 30.

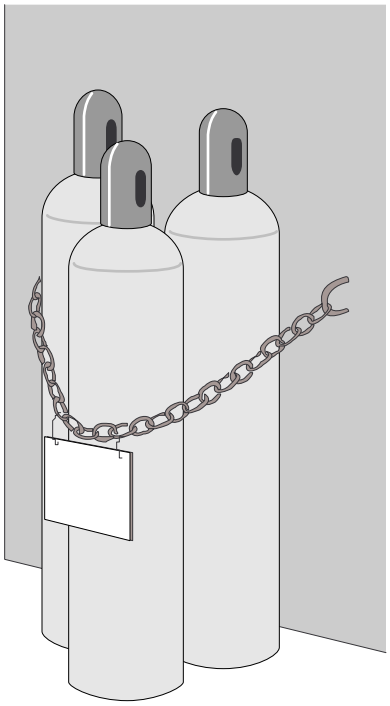


Figure 10-4. Typical storage method for compressed gasses

Figure 10-5. Typical warning sign for flammable materials

NFPA Pamphlets 325A, 325M, 49, 491F, and 740M (Guidance only).

Executive Order 12088, Federal Compliance with Pollution Standards.

Uniform Fire Code and Uniform Fire Code Standards (Reference only).

10.4.8 LLNL Contacts Specific to this Section

Contact the ES&H Team for specific information on how to handle hazardous materials safely.

11.0 Site Cleanup Requirements

11.0 SITE CLEANUP REQUIREMENTS

Do you disturb soils on LLNL's Main Site or Site 300? Are you involved in any project that generates waste soil or debris from excavation? Such soil and debris must be managed properly under many federal and state laws and regulations, especially when hazardous contamination is present. If you answered yes to either question, you should read this section, especially Sections 11.4 and 11.5, to understand what your responsibilities are and how to involve your ES&H Team Environmental Analyst.

The cleanup of soil and groundwater contamination caused by prior activities is regulated by federal and state "Superfund" laws: the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the California Hazardous Substance Account Act.

CERCLA specifies site identification, investigation, and cleanup procedures. The "National Priority List" (NPL) or "Superfund List" is a prioritized list of the more contaminated sites. The United States Environmental Protection Agency (EPA) oversees remediation of sites under CERCLA; the California EPA, Department of Toxic Substances Control (DTSC) oversees remediation of sites under the state program. The San Francisco Regional Water Quality Control Board (RWQCB) also has broad authority to issue cleanup and abatement orders to remedy contamination which may adversely affect the quality of groundwater and surface waters (rivers, lakes, streams, and wetlands). Thus, contaminated land or water not subject to the federal or state Superfund program may still be subject to a cleanup process administered by the RWQCB.

The EPA, the DOE, the DTSC and the RWQCB entered into a Federal Facility Agreement under CERCLA. This agreement integrates DOE's CERCLA response obligations and RCRA corrective action obligations which relate to releases of hazardous substances, hazardous wastes, pollutants, or contaminants under a single procedural framework.

The Department of Energy (DOE) is the lead agency for LLNL's response to requests for cleanup actions. At LLNL, the Environmental Restoration Division (ERD) of the Environmental Protection Department (EPD) is responsible for carrying out LLNL's CERCLA program.

If, in the process of constructing or undertaking your project, you uncover contamination from past activities, you must coordinate with the ERD's site cleanup staff to ensure the contamination is handled properly. See "Applicability to LLNL Activities," below. Your Environmental Safety and Health (ES&H) Team Environmental Analyst can help you in this process. Similarly, contaminated soil and debris unearthed during construction must be handled properly; see "Process for Compliance—Soil and Debris Management," on the following page.

11.1 Regulatory Summary

Both the federal and state Superfund programs require specific steps to properly evaluate the size and extent of contamination, its mobility and toxicity, and to implement cleanup solutions. After a contamination problem is recognized, either federal or state regulators or both will set requirements for documentation and schedule of cleanup.

11.1.1 Remedial Response Process

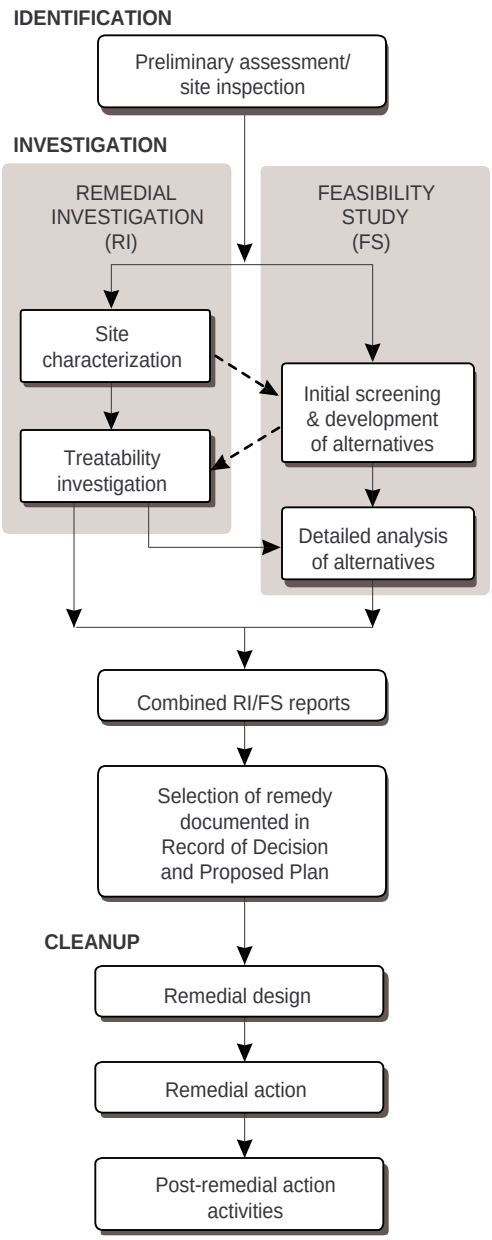


Figure 11-1. Remedial response process

The process for identifying, investigating, and remediating a hazardous waste site is shown in Figure 11-1. The preliminary assessment and site inspection (PA/SI) determine whether the site may be a candidate for expeditious cleanup or whether a more detailed and comprehensive assessment must occur. A remedial action begins with a two-phase "remedial investigation/ feasibility study."

The remedial investigation, which includes collection and analyzing samples, characterizes the nature and extent of the contamination. Also a health risk assessment is included to evaluate the potential risks to public health and the environment from the contamination. The feasibility study then evaluates methods for remediating the problem. Both the remedial investigation and feasibility study must be thoroughly documented.

The remedy is selected in the "Proposed Plan" (PP) and "Record of Decision" (ROD), which also provide the rationale for selection. Following a public comment period, an appropriate cleanup level and method of cleanup are selected by and approved by the EPA for CERCLA sites and by the DTSC for state actions. Design documents are then prepared, and the remedial action is implemented.

11.1.2 Liability

Groundwater and soil contamination may result in economic losses, health impacts, and impairment of the environment. CERCLA imposes strict liability for parties deemed responsible for hazardous waste contamination. Thus, LLNL could be required to bear the entire cleanup costs for a contaminated site regardless of LLNL's contribution to the contamination, or reimburse the EPA for its costs of cleanup.

11.2 Applicability to LLNL Activities

In 1987, the LLNL main site was placed on the NPL; Site 300 was placed on the NPL in 1990. A Record of Decision (ROD) was issued for the main site in 1992. A separate cleanup program is underway at Site 300. You should be aware of the progress of these cleanup activities so your actions do not impede the cleanup program objectives.

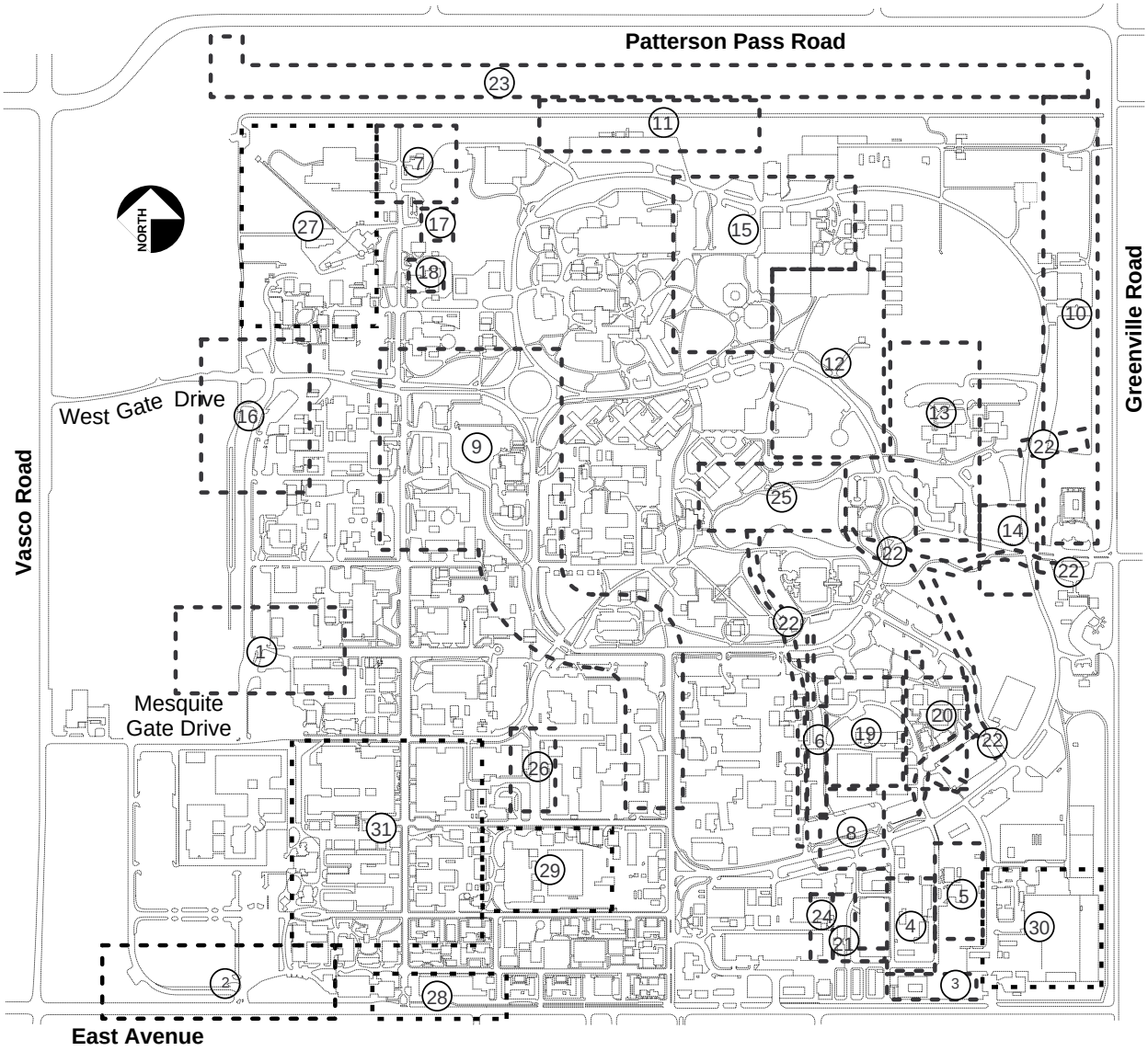
11.2.1 Main LLNL Site Cleanup Activities

Groundwater and soils at LLNL were contaminated by use, storage, and disposal of hazardous materials, starting in 1942 when the U.S. Navy began operations at what is now the main site. Key contaminants in both media include volatile organic compounds (VOCs), fuels, chromium, lead, and tritium. Figures 11-2 and 11-3 indicate source investigation areas and suspected areas where these contaminants are located. Contaminated groundwater is currently about 1.6 miles from the City of Livermore drinking water supply wells.

EPA, DTSC, and RWQCB have been the key regulatory agencies overseeing the cleanup activities. A Federal Facilities Agreement (FFA), adopted in November 1988, specified the cleanup scope and schedule. In July 1992, a ROD was issued, which specified the following cleanup actions:

- Pumping water from 18 initial locations to contain and remediate the plume of contaminants in the groundwater;
- Constructing ten on-site treatment facilities to treat the extracted groundwater using ultraviolet (UV)/oxidation, air stripping, ion exchanges, and granular activated carbon.
- Removing contaminant vapors in the soil by vacuum-induced venting and treatment by catalytic oxidation and activated carbon.

A January 6, 1993, document entitled *Remedial Action Implementation Plan* provides more detail on the remediation program. We have also issued five Remedial Design Reports for the various treatment units.



LEGEND

OLD AREAS

1. Building 141 Area
2. Arroyo Seco Area
3. Building 518 Area
4. Building 514 Area
5. Building 612 Area
6. Eastern Landing-Material Storage Area
7. Building 297/298 Area
8. Old Salvage Yard Area

NEW AREAS

9. Chromium Study Area
10. Northeast Boundary Area
11. Northern Boundary Area
12. Helipad Area
13. Building 571 Area
14. East Gate Drive Area
15. Building 490 Area
16. MW-501 Area
17. Building 293 Area
18. Building 292 Area
19. Building 549 Area
20. East Taxi Strip/ Trailer 5475 Area
21. Building 511 Area
22. Unlined Drainage Ditches
23. Arroyo Las Positas Area
24. Building 419 Area
25. Drainage Retention Basin Area
26. Building 331 Area
27. Building 191 Area
28. Building 212 Area
29. Building 321 Area
30. Salvage Yard
31. TFG Area

Scale: Feet

0 250 500 1000

Figure 11-2. Source investigation areas—Main Site

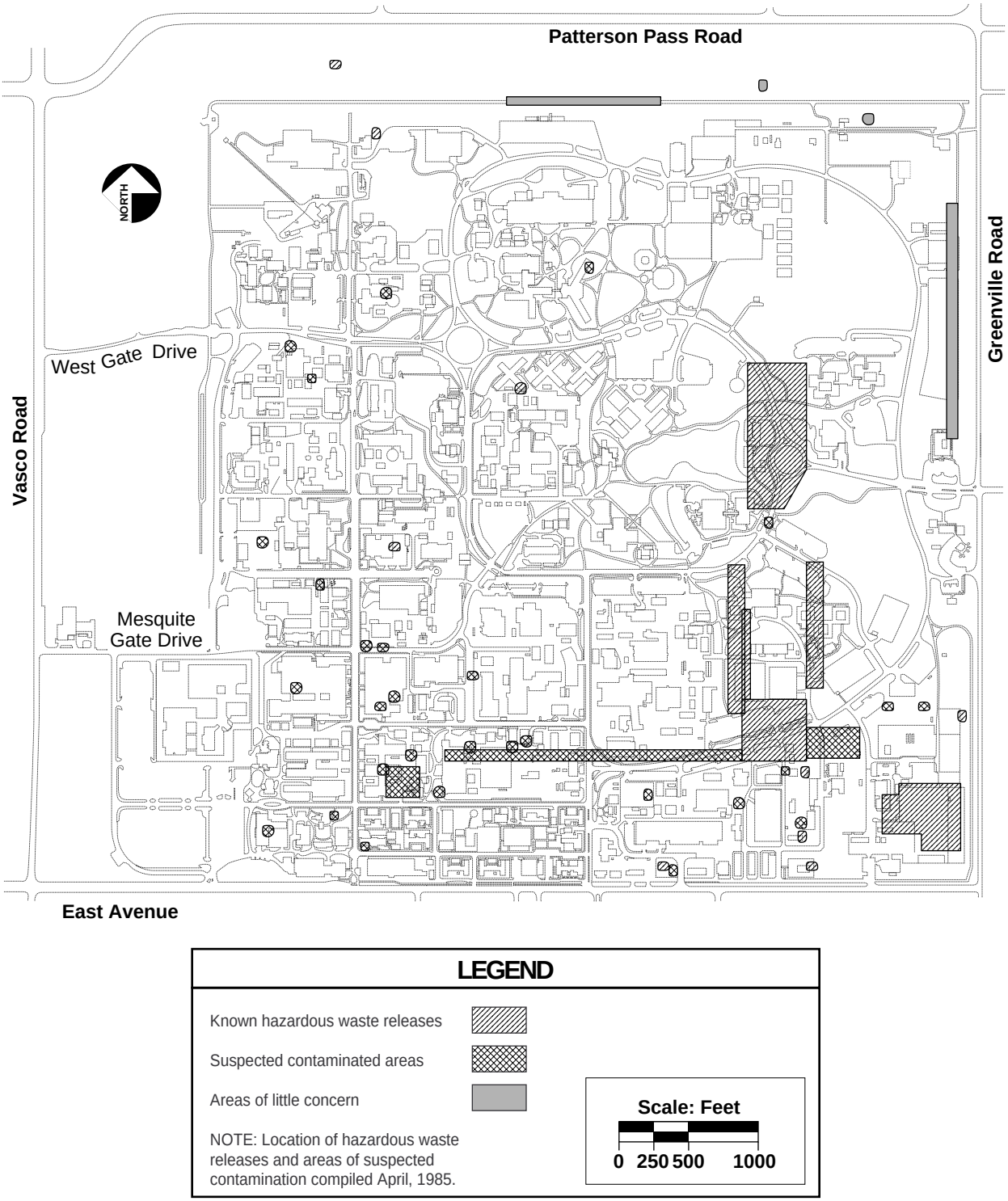


Figure 11-3. Suspected contaminated areas—Main Site

11.2.2 Site 300 Cleanup Activities

Past activities at Site 300, including the formulation, manufacturing, and testing of high explosives and the discharge of liquid waste materials to unlined evaporation ponds, have contaminated the soil and groundwater (see Figure 11-4). The principal soil contaminants include VOCs, fuels, metals, radionuclides, and high explosive compounds. The key groundwater contaminants are chlorinated solvents and tritium.

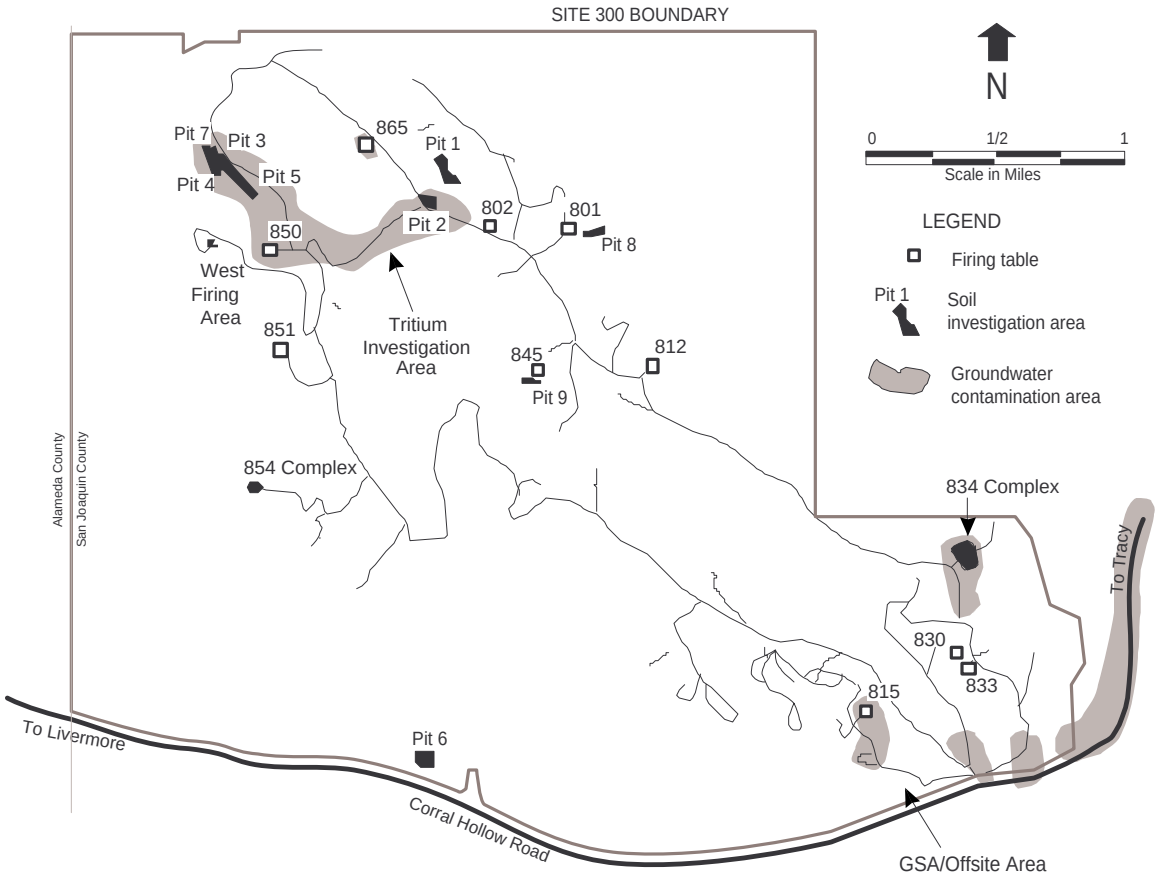


Figure 11-4. Areas of groundwater contamination and soil investigation—Site 300

An FFA for Site 300 was signed in June, 1992. A site-Wide Remedial Investigation Report and two feasibility studies have been completed. An additional feasibility study is in progress and a Record of Decision for the entire site is expected in 1998.

11.3 Responsibilities

While the CERCLA programs at the main site and Site 300 are well under way, newly-uncovered sites can still be included in the program. Therefore, it is essential that all staff at LLNL who are involved in projects that disturb the soil

or deal with large amounts of contaminated materials or wastes be aware of how to coordinate with the CERCLA program.

In the event contamination is discovered that may be subject to the CERCLA program, project managers must coordinate with CERCLA staff at ERD both prior to and during construction of projects (see Figure 11-5). Notify the ES&H Team Environmental Analyst as soon as possible when a construction project is planned, and at least 120 days prior to construction. You will need to provide enough information—project description, maps, depths of excavation—for the ES&H Team Environmental Analyst to devise a sampling plan to uncover any possible contamination. The ES&H Team Environmental Analyst will also prepare a preconstruction site evaluation by comparing the project location with the "Suspected Contaminated Areas Map" and the "Source Investigation Maps."

These maps are updated by ERD and indicate the location of known contamination. For Site 300, refer to the *LLNL Site 300 Environmental Investigation Quarterly Report* for similar information.

Once the project is properly referred to the ES&H Team Environmental Analyst, the Analyst will coordinate with ERD to determine whether cleanup of the site, if it is contaminated, should be handled either inside or outside the CERCLA program.

11.4 Process for Compliance—Soils and Debris Management

Most contaminated soil and debris uncovered during excavation can be managed outside of the LLNL CERCLA program. Figures 11-6 and 11-7 indicate the procedures to follow prior to and during excavation to ensure that any contaminated soil is properly managed. LLNL policy for Soil and Debris Removal is written in the guidance document, *Guidelines for Soil & Debris Management.*

If you are involved with a type of project (e.g., construction, demolition) that generates soil and debris, notify the ES&H Analyst as soon as possible, so that potentially contaminated soils and debris can be dealt with before construction. At least 120 days advance warning is needed for long-term projects, and as soon as practical for shorter-term projects. The ES&H Team Environmental Analyst will request information about the project (e.g., drawings, history of the area, planned depth of excavation) and devise any needed sampling plans. The sampling gathers enough information to properly classify the soils and debris into one of the five classes of waste types shown in Figure 11-7.

After evaluating the results, the ES&H Team Environmental Analyst will recommend the proper method of handling any contaminated soils.

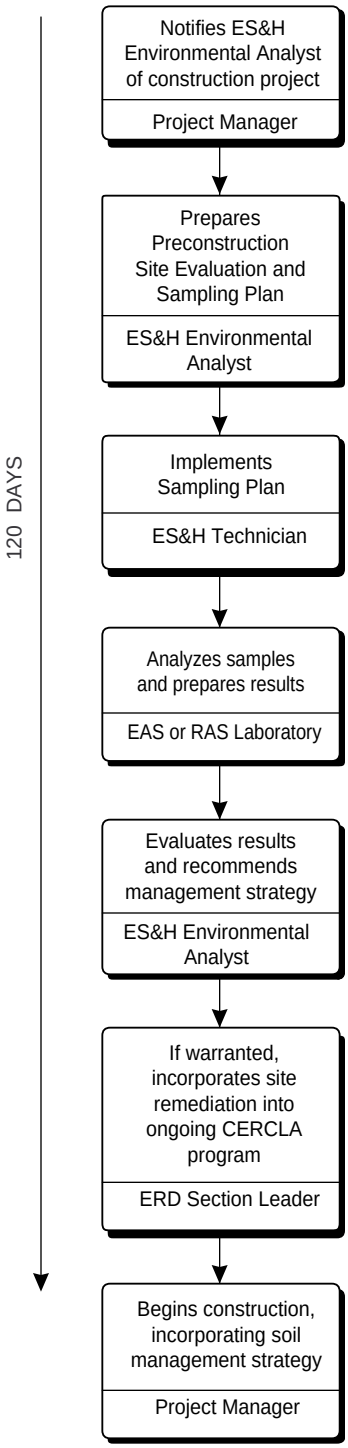


Figure 11-5. Soil/debris management planning prior to construction projects

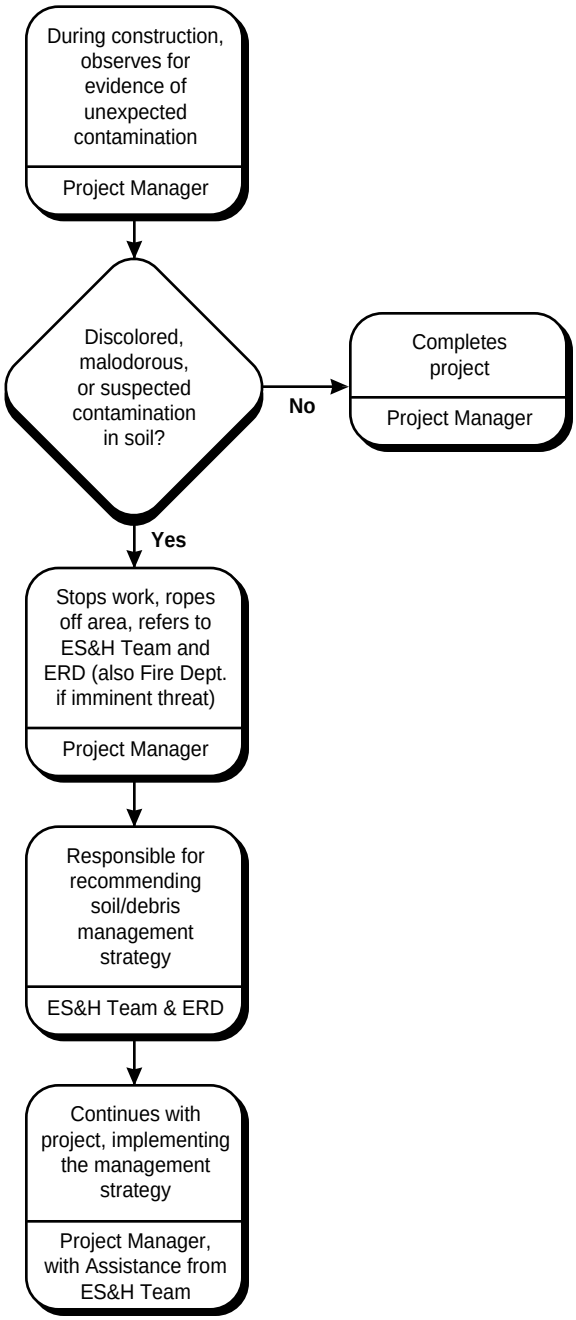


Figure 11-6. Discovery of contaminated soil/debris during construction or demolition project

The preferred method of handling uncontaminated soils is to use them for landscaping or fill onsite. The ES&H Team and Plant Engineering's Space and Site Planning must approve such handling. At Site 300, soils cannot be spread in undisturbed areas without approval by the ES&H Team Environmental Analyst because of the endangered species program.

11.5 Supporting References/Standards

40 CFR 300-355 (Various regulations for PL 99-499).

The Carpenter-Presley-Tanner Act (California Health and Safety Code Section 25300-25395).

The CERCLA Program, DOE 548014.

CERCLA Compliance with Other Laws Manual, EPA, 1988.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (Public Law 99-499).

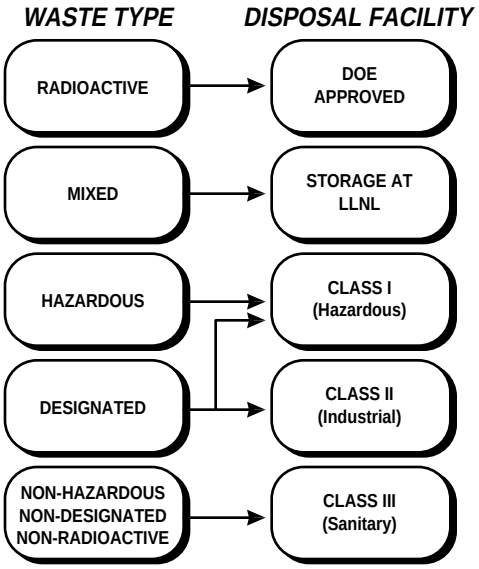


Figure 11-7. LLNL policy for disposition of soil and debris

Cooke, Susan M. *The Law of Hazardous Waste: Management, Cleanup, Liability and Litigation*. Matthew Bender and Company, Inc.: New York and Oakland, CA. 1987.

DOE Order 5000.3A, *Occurrence Reporting and Processing of Operations Information*, U.S. Department of Energy, Washington, DC. 1990.

Environmental Protection Department, Environmental Restoration Division, *Remedial Action Implementation Plan for the LLNL Livermore Site, Livermore, California*, UCRL-AR-110532, Lawrence Livermore National Laboratory, Livermore, CA 94551. 1993.

Environmental Protection Department, Environmental Restoration Division, *Record of Decision for the Lawrence Livermore National Laboratory Livermore Site*, UCRL-AR-109105, Lawrence Livermore National Laboratory, Livermore, CA 94551. 1992.

Environmental Protection Department, Operations and Regulatory Affairs Division, *Guidelines for Soil and Debris Management*, Draft, UCRL-AR-105087, Lawrence Livermore National Laboratory, Livermore, CA 94551. 1992.

Environmental Protection Department and Plant Engineering, *Suspected Contaminated Areas Map*, PLC 85-099-153E, Lawrence Livermore National Laboratory, Livermore, CA. 1986.

Executive Order 12316 Response to Environmental Damage.

Executive Order 12580.

"Federal Facility Agreement Under CERCLA Section 120" between the United States Environmental Protection Agency, the United States Department of Energy, the California Department of Health Services, and the California Regional Water Quality Control Board.

WATS Procedure 204, *Soil Sampling Procedure*, Lawrence Livermore National Laboratory, Livermore, CA. 1992.

11.6 LLNL Contacts Specific to this Chapter

The main contacts at LLNL for help on CERCLA issues are ERD for questions on the status of LLNL's CERCLA program.

Your supporting EOG Analyst can provide the name and telephone number of an ERD contact for your questions.

Environmental Restoration Division (ERD) Staff—The ERD investigates and remediates contamination at LLNL. They also maintain a database of all analytical results. They should be contacted for any questions on LLNL's CERCLA program.

Environmental Safety and Health (ES&H) Teams—These teams are composed of specialists from health, safety, and environmental disciplines for each programmatic area at LLNL. These teams provide support to all programs on ES&H issues. The team leader can identify the proper team member for assistance.

Hazardous Waste Management (HWM) Division—Contact for assistance with handling of LLNL-generated hazardous, designated, radioactive, or mixed waste.

12.0 Air Quality Compliance

12.0 AIR QUALITY COMPLIANCE

Air pollution's impact on public health, the environment, and the economy is substantial and has resulted in regulation through federal, state, and local government agencies. Laws and regulations governing air quality can be divided into two groups: those that deal with pollutants generated mostly by combustion ("criteria pollutants"), and those that deal with compounds known as toxic air contaminants (a California term for air toxics—also called hazardous air pollutants [HAPs] under federal law). Toxic air contaminants have the potential to cause increased likelihood for cancer or reproductive toxicity as well as acute or chronic health effects. In California, sources of air pollution are largely regulated through a permit system and the application of prohibitory rules. This permit system is designed to permit each piece or group of equipment or process that may emit air pollutants on an individual basis. Permits may be required for 1) new equipment or operations that may cause air pollution; and 2) modifications to equipment, throughputs, processes or materials.

The air permitting process is driven, in part, by the federal Clean Air Act (CAA). The purpose of the CAA is to protect the public health of the most sensitive portion of the population, such as children, frail elderly, and those with allergies, asthma, or emphysema. To accomplish this, regulation of air pollution involves federal, state, and local agencies. On the federal level, the EPA is responsible for promulgating nationwide standards and oversight of air quality planning and regulatory implementation conducted by the state and local air districts. The State of California Air Resources Board (ARB) is responsible for adopting state ambient air quality standards, and regulating vehicular sources of air pollution on the state level. At the local level, the air districts are responsible for stationary sources region-wide planning and permitting. Most often the agencies pursuing enforcement actions against facilities not in compliance will be the local air districts.

The EPA establishes National Ambient Air Quality Standards (NAAQS). California delegates responsibility for attaining the NAAQS to Air Pollution Control Districts (APCDs)/Air Quality Management Districts (AQMDs). LLNL is regulated by two air districts. They are 1) Bay Area Air Quality Management District (BAAQMD) for the Livermore site; and 2) San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) for Site 300. Additionally, the State of California has also established its own California Ambient Air Quality Standards (CAAQS), and a California Clean Air Act (CCAA). Both the CAAQS and the CCAA are more restrictive than federal requirements.

Radionuclides are air pollution sources that are not currently regulated by permit or at the local level. Standards for radionuclide emissions to air are promulgated and enforced directly by the EPA, and are based on resultant doses rather than emissions or concentrations. This special class—radioactive air pollutants—is especially important at LLNL; see section 12.3.1 below. Plans are underway for the EPA to delegate this program to state or local agencies.

12.1 Criteria Pollutants

The criteria pollutants are regulated by the federal CAA based upon an area's classification. The classification for each pollutant in a given area indicates whether or not the area meets the NAAQS. If the area meets the health-based standards it is an "attainment area." If the area exceeds the standards, it is a "nonattainment area." There is also the category of "unclassified," which is an area that does not have enough monitoring data to determine its classification. These areas are treated as attainment for purposes of regulation.

An area's designation as attainment or nonattainment will determine what permitting regulations are applicable to any new or modified sources. If an area is nonattainment the amount of regulation is also dependent upon a further sub-category that indicates the severity of nonattainment. The sub-category will determine the amount of regulation (rules, regulations, and requirements) that will be applied in the area in the attempt to meet the NAAQS.

During the spring of 1995, the BAAQMD applied to the federal EPA to be reclassified from to attainment for ozone and carbon monoxide. The EPA made the determination that there was sufficient data to make the reclassification and did so. During the summer of 1995, the development of meteorological conditions proved to be ideal for the formation of ozone in the BAAQMD. The federal NAAQS for ozone appears to have been violated during this period. The EPA has yet to complete the review of the data and make any conclusion with regard to again changing the classification back to nonattainment.

The SJVUAPCD is classified as nonattainment for ozone. In fact, the air in the SJVUAPCD is growing worse faster than any other area in the nation. As a result, the amount of air pollution regulation is expected to grow within the SJVUAPCD. The valley also experiences violations of the state standards for ozone, and PM-10.

12.1.1 Pollutant Categories

Several pollutants released to the atmosphere are of a major concern to the environment, including the six "criteria pollutants," sulfur oxides, nitrogen oxides, volatile organic compounds, PM-10 (particulate matter of respirable size), carbon monoxide, and lead. The level of these "criteria pollutants" is used as an indicator of ambient air quality and the basis for the attainment or nonattainment classification.

Volatile organic compounds are of particular concern to the air districts and are divided into two categories: Precursor Organic Compounds (POCs) and Non-Precursor Organic Compounds (NPOCs). The POCs are so named because they are chemical precursors that react with nitrogen oxides at ground level in the presence of sunlight to form photochemical "smog" of which ozone is a primary constituent. For this reason, air districts are particularly interested in reducing POCs and NO_X. The NPOCs include solvents such as methylene chloride,

1,1,1-trichloroethane, and the family of chemicals referred to as Freons. Freons are subject to regulation because they are believed to deplete ozone in the stratosphere. The list of compounds classified as non-precursors is not the same in the BAAQMD and the SJVUAPCD.

The local air districts in California are required to regulate emissions to reduce ambient levels of these pollutants and to ensure that both the CAAQS and the NAAQS are not violated. Most California air districts are not in compliance with the California ozone standard. The California Clean Air Act requires air districts to reduce their emission by 5% per year retroactive to the base year, 1987 in order to attain the CAAQS. Each air district is required to submit a Clean Air Plan to the ARB that will identify new measures to be implemented to achieve the mandated reductions in the district's emission inventory. To help accomplish this reduction in emissions, local districts require facilities to obtain air permits for equipment/operations that emit criteria air pollutants and comply with prohibitory rules.

One requirement of the CCAA is known as "No Net Increase." This provision of the law prevents any air district from issuing any air permit that represents a growth in emissions above the level established on January 1, 1988. To comply with this provision, local districts require that offsetting emissions from existing sources be obtained as part of the districts permitting program. LLNL has adopted an Air Emission Offsets Management Plan, which guides Laboratory efforts in providing offsets (see Air Emission Offsets Management Plan at the end of this section).

At the current time LLNL has found that it is eligible to obtain offset credits from the districts' Small Facility Bank. This allows LLNL to borrow offsets as long as our growth stays below district specified limits. Should LLNL exceed the limits, all offset borrowed from the bank would have to be repaid and the Air Emissions Offsets Management Plan would be in full effect again.

12.1.2 Process for Compliance

To acquire an air permit from the local district, program personnel should contact their Air Quality Specialist and provide answers to the following questions:

1. What chemicals are being used? Include the composition of paints, coatings, and adhesives, as well as Material Safety Data Sheets (MSDS).
2. What quantities of chemicals are being used?
3. What is the type of operation or equipment (painting, solvent cleaner, boiler, fume hood, etc.)?
4. What are the release points (stack information height, diameter, flow rate, and location)?

5. What is the maximum frequency of emissions? (For example, is it a one-time puff, continuous, 4 hours/day, 2-5 days/month, etc.)
6. Is there abatement equipment (HEPA scrubber baghouse, etc.)?
7. What is the efficiency of the abatement equipment?
8. Describe the equipment. Include a manufacturer's catalog description or an engineer's drawing, etc.
9. Describe the project. (What does it do? Does it produce any waste? Include a flow diagram of the process?)
10. When will the equipment be installed?

A Permit to Operate can take up to a year to obtain, but may take much less time. The reason for this is that there are three stages for processing an air permit. The first stage is the completion of the application. The second stage is the Authority to Construct, which is issued by the local district. This Authority to Construct should be obtained before construction or modification begins on the equipment that will emit the pollutants. The program should not purchase or fabricated new equipment that may emit air pollutants until LLNL has received an Authority to Construct. The last stage is the Permit to Operate, which specifies final operating conditions. Permits may be rescinded at any time for a violation of regulations or permit conditions. Some sources may be exempt from permitting requirements. The Air Permit Specialist can assist in determining if a source is exempt.

12.1.3 Responsibilities

EPD provides air quality assistance to the Programs through the Operations and Regulatory Affairs Division (ORAD). Additionally, EPD is responsible for paying permit fees assessed by the air district. The following are general responsibilities of LLNL's internal organizations.

Environmental Analysts are members of the Environmental Operations Group (EOG) of ORAD and the EPD Environmental Support Teams. EOG Analysts assist the programs and the Air Quality Specialists to locate and identify potential sources of air emission. They check permitted equipment to ensure that program personnel understand the regulation and permit conditions associated with the equipment. EOG Analysts are familiar with the more common air emission sources within various programs.

The Air Quality Specialists are members of the Permits and Regulatory Affairs Group (PRAG) of ORAD, and typically members of the EPD Environmental Support Teams. Air Quality Specialists evaluates the unit for an air permit, obtains permits for program equipment/operations, performs air compliance assessments, provides offsets to comply with the LLNL Air Emission Offset Management Plan, maintains copies of permit records issued by BAAQMD and SJVUAPCD, and renews permits if there are no changes in the equipment/operations. They coordinate any related agency contact or inspections

of permitted equipment with the programs and respond to enforcement action, such as a Notice of Violation (NOV) or Notice to Comply.

The programs identify potential sources of air emissions with assistance from EPD. The programs implement emission-control strategies to comply with air quality regulations and maintain usage records. When a potential air emission source is identified, the program consults with the assigned Air Quality Specialist to determine whether a permit is required.

12.1.4 Applicability to LLNL Activities

Currently, LLNL has several hundred Permits to Operate. LLNL activities that emit air pollutants may require permits and need to comply with air permit operating conditions and prohibitory rules. Some emission sources may be subject to rules prohibiting certain activities regardless if a permit is required. Failure to comply with these requirements includes issuance of a NOV, which may include penalties, fines, and adverse publicity or even a citation with probation or jail time following a court appearance. In a case of continuing violations, an air district could shut down a permit unit.

12.2 Air Toxics

With the exception of radionuclides, discussed in the following section, toxic air pollutants must be evaluated under local air quality district regulations. In California, the process of permitting toxic air contaminants is different from the federal system. The California system requires that a risk screening be conducted first. From the risk screening, the degree of control required for the permit is determined. The federal system uses risk screening at the end of the process. It requires that a specific control efficiency be attained and then requires the health risk be determined within 8 years for the entire category of similar source. The federal system is also limited to large sources while the California system is applied to extremely small sources.

The BAAQMD regulates several hundred compounds as toxic air contaminants. Each compound has a threshold value, which determines if a Health Risk Screening needs to be conducted as part of a permit application. If the calculated risk is high, a source must complete a full Health Risk Assessment and mitigate the emissions. In the SJVUAPCD, the first threshold in a permit review is a *de minimus* level. The compounds reviewed by the SJVUAPCD include the 189 HAPs compounds plus those compounds identified under the California AB 1807 process.

In the federal system, National Emission Standards for Hazardous Air Pollutants (NESHAPs) are being implemented through local district regulations, with the exception of the radio nuclide NESHAP. The HAPs discussed above become NESHAPs as the new emission standards are developed. There are plans for 173 NESHAPs to be added to the dozen or so that have been in place for the past

15 years. These new NESHAPs will address categories of sources rather than specific compounds.

12.2.1 Process for Compliance

The information needed by the local air district to conduct a Health Risk Screening is the same as required for the criteria pollutants and identified in Section 12.1.2 except the quantity or concentration must be included for each Toxic Air Contaminant.

If your operations require that you use new Toxic Air Contaminants or have any changes in the quantities used, the equipment, or the processes, check with your PRAG Air Quality Specialist to determine if there are any air permitting requirements necessary.

12.3 Radioactive Air Pollutants

12.3.1 Standards for Release of Radiation

Radioactive substances used at LLNL include tritium, uranium, transuranics, mixed fission products, and biomedical tracers. LLNL is required by EPA and DOE to perform assessments of the radiological doses to the public resulting from LLNL operations, and to annually report these assessments. We must demonstrate compliance with the radiation protection standards promulgated by these federal agencies.

The principal standards for airborne emissions are those defined in the National Emission Standards for Hazardous Air Pollutants (NESHAPs, 40 CFR 61, Subpart H), under section 112 of the CAA. The standard for emissions of radionuclides to the ambient air from DOE facilities is that such emissions shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent (EDE) of 10 mrem/y or greater. In addition, continuous monitoring of radionuclide effluent must be made at all release points having the potential to discharge radionuclides into the air in quantities sufficient to cause an EDE in excess of 1% of the standard, i.e., in excess of 0.1 mrem/y. In this determination, the estimated radionuclide release rates shall be based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal. An application to construct a new or modify an existing facility does not need to be filed with the EPA so long as the off-site EDE from any emission point from the new or modified facility is less than 1% of the 10 mrem/y standard, taking credit for emission abatement devices.

Demonstrations of compliance with the radiation protection standards must use methods for measurements and calculations approved by the EPA; in particular, the sampling, monitoring, abatement, etc., methods and the calculational models

for dispersion and dosimetric assessments must be among those prescribed and sanctioned by the EPA.

12.3.2 Responsibilities

To assure that the foregoing NESHAP regulatory obligations on use of radioactive materials are met, two questions need to be answered prior to initiating a new project or significantly modifying an existing one: (1) Is continuous monitoring of radionuclide air effluent from a particular exhaust point required? (2) Is it necessary to obtain EPA approval for start up of the project. The Terrestrial and Atmospheric Monitoring and Modeling (TAMM) Group in ORAD in EPD provides guidance and calculations to help the project participants answer these questions, and (if needed) provides regulatory representation.

The requirements to report on activities having the potential to produce releases of radiation to the environment are satisfied by two annual reports—both the responsibility of ORAD. Detailed information on radionuclide sources, facilities, control programs, monitoring and modeling activities, impact assessments, and other aspects of operations at LLNL involving radionuclides is provided in the LLNL NESHAP Annual Report (e.g., Surano, et al., 1995) and in the Laboratory's Site Annual Environmental Report (e.g., Harrach, et al., 1995).

12.3.3 Process for Compliance

To demonstrate compliance, answers to the following questions are needed:

1. What is the building number and room number in which the operation/experiment takes place?
2. What radionuclides are being used?
3. What is the quantity of each radionuclide being used (expressed in curies)?
4. What is the physical state (solid, liquid, powder, gas) of each radionuclide being used? (Give fraction of time in different states, if applicable.)
5. What is the type of area where the operation takes place (fume hood, glove box, open air, etc.)?
6. What are the characteristics of the release points (stack height relative to ground, stack diameter, stack flow rate, and exhaust identification number)?
7. Are there emission control (abatement) devices? (HEPA filter(s), Venturi scrubbers, Douglas bags, activated carbon filters, etc.)
8. What is the efficiency of the abatement equipment? (For example, 99.7% for one-stage HEPA.)

9. What is the maximum frequency of emissions? (For example, is it a one-time puff, continuous, 4 hours/day, 2-5 days/month, etc.)
10. Describe the project or experiment. (What does it do? Does it produce any activation products? Does it produce any waste? Does it involve heating,, melting, or vaporization of radioactive substances?)
11. When will the equipment be installed? When do you expect operations would be ready to commence?

12.3.4 Applicability to LLNL Activities

Currently, LLNL has approximately 400 Radioactive Materials Management Areas (RMMAs) and about 300 release or emission points. LLNL activities that may emit radioactive pollutants require annual evaluation, and new or modified operations may require permits and need to comply with federal and state air permit operating conditions. Some emission sources may be subject to rules requiring that continuous effluent monitoring systems be put in place. Failure to comply with these requirements includes issuance of a NOV, which may include penalties, fines, and adverse publicity. In a case of extreme and continuing violations, the EPA or an air district could shut down a process and possibly a facility.

12.4 Supporting References/Standards

42 United States Code 7401 et seq.

Code of Federal Regulations, 40 CFR Parts 50, 51, 60, and 61.

California Health and Safety Code, Section 39000 et seq.

California Code of Regulations, 17 CCR 60000 et seq.

Bay Area Air Quality Management District Regulations, Regulation XI.

San Joaquin Valley Unified Air Pollution Control District Regulations.

Bay Area Air Quality Management District Quality Handbook.

Surano, K.A., A.H. Biermann, R.J. Harrach, F.J. Gouveia, R.L. Berger, B.C. Fields, P.J. Tate, and G.M. Gallegos (1995), *LLNL NESHAPs 1994 Annual Report*, Lawrence Livermore National Laboratory, Livermore, CA (UCRL-ID-113867-95).

Harrach, R.J., G.M. Gallegos, R.A. Failor, E. Christofferson, P.J. Tate, E.R. Brandstetter, J.M. Larson, J.R. Mc Intyre, B.C. Fields, R.A. Brown, L.M. Garcia, and A.R. Grayson (1995), *Environmental Report 1994*, Lawrence Livermore National Laboratory, Livermore, CA (UCRL-50027-94).

12.5 LLNL Contacts Specific to this Chapter

Contact a PRAG Air Specialist for guidance on air permits regarding criteria pollutants and toxic air contaminants, and contact a TAMM Group radio nuclide NESHAP analyst regarding release to air of radioactive pollutants.

Your supporting EOG Analyst can provide the name and telephone number of the PRAG Air Specialist or TAMM Group analyst or your Pollution Prevention Specialist for your area.

The PRAG Air Specialist supports your program for the following:

- Obtain, renew, and close out local district permits;
- Clarify the conditions of a permit;
- Aid in the design of record keeping logs;
- Clarify application rules/regulations relative to your equipment/ operation;

The TAMM Group analyst supports project participants for the following:

- Assess potential radionuclide emissions.
- Evaluate obligations (if any) to report to the EPA and receive permission to proceed.
- Provide regulatory interaction, if needed.

12.6 LLNL Air Emission Offsets Management Plan

(See following six pages.)

University of California

Lawrence Livermore National Laboratory

LLNL
Air Emissions Offsets Management Plan

April 1995

Approved by:

Robert W. Kuckuck 4-13-95

Robert W. Kuckuck **Date**
Deputy Director for Operations

AIR EMISSION OFFSET MANAGEMENT PLAN

I. Introduction

The *Air Emission Offsets Management Plan* (Plan) establishes responsibilities for Lawrence Livermore National Laboratory's (LLNL's) management of air emissions and emission credits necessary to meet offset requirements of the regional air districts.

The offset requirements are driven by the California Clean Air Act (CCAA) restrictions on new air emissions in air districts that do not attain ambient air quality standards (non-attainment districts). The Bay Area Air Quality Management District (BAAQMD) regulates the Main Site and the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) regulates Site 300. Both are non-attainment districts which have adopted "no net increase" regulations in order to comply with CCAA requirements. The pollutants addressed by the offset regulations are Precursor Organic Compounds (POCs), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), and Particulate Matter (PM10). In the following discussion, the general terms "pollutants" and "emissions" refer to these four pollutant categories.

The CCAA "no net increase" requirements prohibit non-attainment districts from issuing permits for significant new emission sources of air pollutants, unless they are "offset" by reductions of air pollutants from other sources. Offset reductions may be obtained by reducing on-site facility emission sources or sources at other facilities. The POCs and NO_X are the two pollutants most likely to require offsets for future LLNL projects. These two pollutants are of greatest concern to the districts, as they are precursors to the formation of ozone, the principal non-attainment pollutant in both districts.

The air districts have established a banking system to account for additions and deletions of air pollutants. If a facility voluntarily reduces air pollutants, it can bank emissions for immediate or subsequent use, or they can be sold to other facilities. Thus, a commodities market has been established in air emissions "offsets." LLNL has previously banked some emission credits and is holding them as an institutional resource until they are used for new air emission sources.

The only sources that can bank emission reductions are permitted sources. The relatively small inventory of LLNL permitted emissions provides only limited potential for future banking. Many of the POC and NO_X emissions are for general facility maintenance equipment, for which there is an ongoing need. There are numerous requirements and conditions placed upon the banking of emissions. It is the policy of LLNL to aggressively pursue the banking of emissions, as long as there is a reasonable possibility they will be approved by the Districts. Even if the banking request is denied, the application will serve as a record of a source eliminated and could be taken into consideration at a later date. LLNL's waste minimization programs, including the application of solvent substitution, will tend to create bankable emissions.

BAAQMD adopted its first "no net increase" rule in July 1991. In response to the new rule and to a DOE request, LLNL developed an *Air Emission Offsets Management Plan*, dated April 1993. After implementing the rule, BAAQMD found the rule cumbersome and not easily understood by many smaller facilities. In response, BAAQMD revised the rule in June 1994. The revised rule established three categories of facilities:

- Small (less than 15 TPY)
- Mid-size (15 to 50 TPY)
- Large (greater than 50 TPY).

"TPY" refers to the pollutant-specific, annual, facility-wide emissions, expressed in Tons Per Year. Small facilities are exempt from providing offsets. Mid-size facilities must provide offsets, but can borrow them at no cost from the District if the facilities meet Best Available Retrofit Control Technology (BARCT). Large facilities must provide offsets at a ratio of 1.15:1.0 (the extra 15% is to make up for the small sources that do not provide offsets), so that district emissions will be reduced over time.

LLNL is currently a mid-size facility and is eligible to receive credits from the District. The District has determined that LLNL has good emission controls on its POC and NO_X sources and has advised that LLNL is in compliance with BARCT. The conditions associated with obtaining credits from the District are continued compliance with BARCT and immediate repayment of all borrowed credits if LLNL emissions should rise above the 50-TPY threshold. Repayment of borrowed credits must be in the form of credits obtained from another facility; it cannot be in cash. Future market values of offset credits are unknown, but current values are on the order of $10,000 per TPY.

The 50-TPY threshold is also significant with regard to the federal Title V and BAAQMD Synthetic Minor Operating Permit (SMOP) program. If LLNL remains below the 50-TPY threshold and the other relevant thresholds regarding hazardous air pollutants (HAPs) , it can avoid obtaining a "SMOP." LLNL is currently well below the HAPs thresholds of 7-TPY for a single HAP or 15-TPY for a combination of HAPs. Assuming LLNL remains below these thresholds, the cost of recordkeeping and reporting associated with the SMOP permit can be avoided.

With regard to Site 300, SJVUAPCD has also revised its new source permitting rule. In SJVUAPCD, facilities with POC or NO_X emissions below 10-TPY are exempt from providing offsets. Even though the SJVUAPCD threshold is much lower than the BAAQMD threshold, Site 300 is currently well below both the POC and NO_X thresholds and should remain so in the foreseeable future. Site 300 is also well below the HAPs thresholds.

II. Elements of the Plan

To meet the letter and spirit of offset requirements, LLNL has created the following tenets on which this Plan is based:

A. Emission Minimization – Minimizing emissions can reduce and sometimes eliminate the need for permits and offsets. In some cases, a project can be modified so that a permit is not required; and, therefore, several months of time required for the permitting process can also be avoided. A greater incentive is that minimization of emissions results in the improvement of air quality in the region and, in many cases, lowers operating costs for the Programs.

B. BACT – Best Available Control Technology (BACT) is required by air districts in certain instances, and LLNL must be prepared to install BACT on new sources. In BAAQMD, BACT is generally required for new sources of POC or NO_X above 10 lbs per highest day of emissions. BACT efficiencies and technologies are described in air district reference documents for common air emission sources and are modified periodically as new technologies are put into practice. In other cases, especially for less common air emission sources, the BACT requirements must be determined by the air district on a case-by-case basis. Exceptions to the published BACT requirements may be requested based on site specific issues related to cost effectiveness.

C. BARCT – Best Available Retrofit Control Technology (BARCT) is similar to BACT except that it applies to emission controls applied retroactively to existing emission sources.

LLNL must continue to apply BARCT to all POC and NO_X emission sources as required by District rules, and, at times, apply future BARCT requirements adopted in the District's Clean Air Plan.

D. ALARA – When BACT or BARCT is not required by the District, project proponents will be guided by the ALARA (As Low As Reasonably Achievable) principle for each new source. Some air emissions are readily reduced to near zero levels, while others are prohibitively expensive to reduce. All factors must be weighed in determining the right level of reductions, including safety and health impacts, hazardous waste generation, and costs.

E. Institutional Management – LLNL must manage emission credits and offsets institutionally. The air districts could not address offset issues with multiple clients within LLNL. They, like all other regulatory agencies, view LLNL as a single entity. BAAQMD emissions will be maintained below the 50-TPY pollutant specific threshold, and SJVUAPCD emissions will be maintained below the 10-TPY pollutant specific threshold. Emission sources may be prioritized in the future, so that some emission sources are curtailed to allow replacement by new sources in order to maintain overall emissions below the thresholds.

III. Responsibilities

Deputy Director for Operations

The Deputy Director for Operations (DDO) is appointed by the Laboratory Director, confirmed by the Regents of the University of California, and is a member of the Laboratory's executive management team. The DDO assists the Director by managing Laboratory-wide business, administrative, and operational activities, including ES&H.

Other significant functions include serving as an interface between the Senior Management Council and the ES&H Working Group and referring to the Director those ES&H management issues that require the Director's decision or approval. The DDO provides final signatory approval of the *Air Emission Offsets Management Plan* and any modifications. The DDO provides signatory approval of applications for new air emission sources of POC or NO_X when LLNL's actual air emissions exceed 90% of the 50-TPY emission threshold.

Senior Management Council

The Senior Management Council advises the Laboratory Director on Laboratory policies and oversees the effectiveness of activities and programs to implement these policies. The Senior Management Council is chaired by the Laboratory Director and is composed of the Deputy Director for Operations, the Deputy Director for Science and Technology, the Laboratory Executive Officer, the Associate Directors, and LLNL Counsel. With respect to ES&H matters, the Senior Management Council periodically reviews policies and recommends changes to the Director, assures the implementation of these policies, and reviews the effectiveness of their implementation.

ES&H Working Group

The ES&H Working Group supports the DDO and Senior Management Council in carrying out its charter. Its membership is composed of the Associate Directors' Assurance Managers; the heads of the Hazards Control, Environmental Protection, and Health Services Departments; the Quality Assurance Office; and environmental counsel. The Working Group is chaired by one of its members and reports to the DDO. Under the Plan, the Working Group's responsibilities are to:

- Maintain oversight and monitor activities undertaken pursuant to the Plan.

- Assure that line management implements the Plan approved by the Senior Management Council.

- Consult with the Environmental Protection Department (EPD) on applications for new air emission sources of POC or NO_X when LLNL's actual air emissions exceed 90% of the 50-TPY emission threshold and recommend to the DDO regarding approval of the new sources.

Environmental Protection Department

With regard to air emission regulations, the responsibilities of the Environmental Protection Department are to:

- Advise Programs of regulations regarding new and existing sources, including BACT and BARCT requirements, and help Programs identify resources with regard to alternative methods and materials which may minimize emissions.

- Maintain records of emission credits borrowed from the District, so that beneficiaries of the credits can be identified in the event that the credits must be repaid in the future.

- Provide Programs with information on the costs of emission control strategies and other factors relevant to the prioritization of air emission sources.

- Track LLNL air emission inventories and advise the Working Group of concerns regarding emission trends or new emission sources.

- The Pollution Prevention Group (PPG) in EPD will work with Plant Engineering to identify opportunities for reduction of NO_X emissions from internal combustion engines, boilers, and other combustion sources. PPG will assist Programs to find substitutes for "ozone-depleting substances" which do not contribute to LLNL's emissions of POCs.

- EPD will periodically report to the ES&H Working Group on the status of POC and NO_X emissions. EPD will report to the Working Group when LLNL's actual air emissions of POC or NO_X exceed 90% of the 50-TPY emission threshold. EPD will consult with the Working Group on applications for new air emission sources when actual air emissions exceed 90% of the threshold. EPD will forward such applications to the DDO for approval with the Working Group recommendations.

Programs

Under the Plan, the responsibilities of each LLNL Program are to:

- Minimize air pollutant emissions when practicable. To the extent that new emissions can be reduced, the requirement for "offsets" at both sites can be avoided.

- Accurately estimate air emissions and operating schedules for proposed projects and work closely with EPD in developing air emission permit applications and assessing offset requirements.

- Consider installing emission control systems that exceed District requirements. In some cases the emission reductions can be banked. Programs will be guided by the ALARA principle in determining emission control levels. The ALARA determination will take into consideration such factors as cost/benefit analysis, safety and environmental impacts, established national priorities, and public relations issues.

- Maintain and retain records pertaining to non-permitted sources because the air districts may decide to allow banking of such sources at a later date.

IV. Summary

The goal of LLNL's Air Emission Offsets Management Plan is to manage air emission sources and offset credits, in the manner described above, in order to maintain POC and NO_X emissions below the 50-TPY level for the Main Site and below 10-TPY for Site 300. The system will also be guided by an ALARA principal and will be managed on the basis of cost effectiveness and maximum benefit to LLNL. This approach will meet or exceed the intent of the CCAA, will provide for timely permitting of new projects, and will avoid the necessity for additional permitting associated with the federal Title V program. As "no net increase" provisions of either BAAQMD and SJVUAPCD change, this Plan will change accordingly, as guided by the ES&H Working Group and the Senior Management Council.

13.0 Cultural Resources

13.0 CULTURAL RESOURCES

Cultural resources are protected under several state and federal laws. These laws were enacted to ensure consideration of historic values and to protect significant resources from destruction or theft. The major federal laws include: the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), and the American Indian Religious Freedom Act of 1978 (AIRFA). State-level cultural resource protection is regulated through the provisions of Appendix K of the California Environmental Quality Act (CEQA).

If you are planning a project that will involve construction or ground disturbance, notifying the LLNL archaeologist within the Operations & Regulatory Affairs Division (ORAD) early in the planning stage will ensure that project activities will not be delayed by the cultural resource protection compliance process.

During the compliance process, every effort is made to locate surface cultural resource deposits. However, it is possible that subsurface deposits may be unearthed during construction activities. Mitigation Measures 4.1.1 and 4.2.1 of the 1992 EIS/EIR require that these deposits be reported to the LLNL ORAD archaeologist immediately. Work in the area of the find should be halted until the archaeologist assesses the discovery. Artifacts are protected under the ARPA, and may not be collected or defaced.

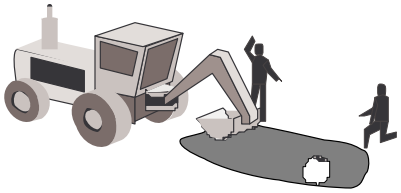
13.1 Regulatory Summary

The National Historic Preservation Act (NHPA), as amended through 1992, contains two primary sections that apply to federally operated and funded installations such as LLNL: Sections 110 and 106.

Section 110 sets forth the broad affirmative responsibilities for balancing agency missions with cultural values. Its purpose is to ensure that historic preservation is fully integrated into federal agency programs.

Section 106 requires federal agencies to take into account the effects their projects may have on “historic properties” (cultural resources), and they must allow a reasonable time period for the Advisory Council on Historic Preservation (the Council) to comment. The Section 106 regulations (36 CFR 800) outline a five-step review process that is conducted on a project-by-project basis. The five steps are the following:

- Identify and evaluate historic properties;
- Assess project effects;



- Consult on mitigation measures;
- Obtain Council comment; and
- Proceed with project.

During most project reviews, the State Historic Preservation Officer (SHPO) represents the Council.

The California Environmental Quality Act (CEQA), Appendix K outlines a project-by-project historic property review process for State agencies similar to the Federal Section 106 process, described above.

13.2 Applicability to LLNL Activities

Each project that involves construction or ground-disturbing activities (including drilling) must be evaluated to ensure that it will not affect significant historic or prehistoric resources. At Site 300, 29 sites (seven prehistoric, 21 historic, and one with elements of each) have been discovered to date. At the main site, the World War II-era buildings themselves may be eligible for the National Register of Historic Places; however, this determination has not yet been made.

13.3 Responsibilities

It is the responsibility of each project coordinator to notify the ORAD archaeologist, who will initiate a cultural resources investigation of the project site and notify the DOE and SHPO at the appropriate time.

13.4 Process for Compliance

Notify the LLNL ORAD archaeologist early in the project planning stage. The archaeologist will check to see whether the project site has been surveyed and, if not, will survey the site, as appropriate. He or she will also prepare the necessary NHPA documentation and notify the DOE and SHPO.

If no sites are discovered during the survey, the SHPO is notified and the project will be notified that it may proceed (pending other environmental and regulatory approval). If sites are discovered, what happens next depends on the significance of the site and whether or not the site will be affected by the project. Figure 13-1 shows the process for complying with cultural resource laws at LLNL. If a significant site is discovered, appropriate mitigation measures will be developed in consultation with DOE, SHPO and other interested parties.

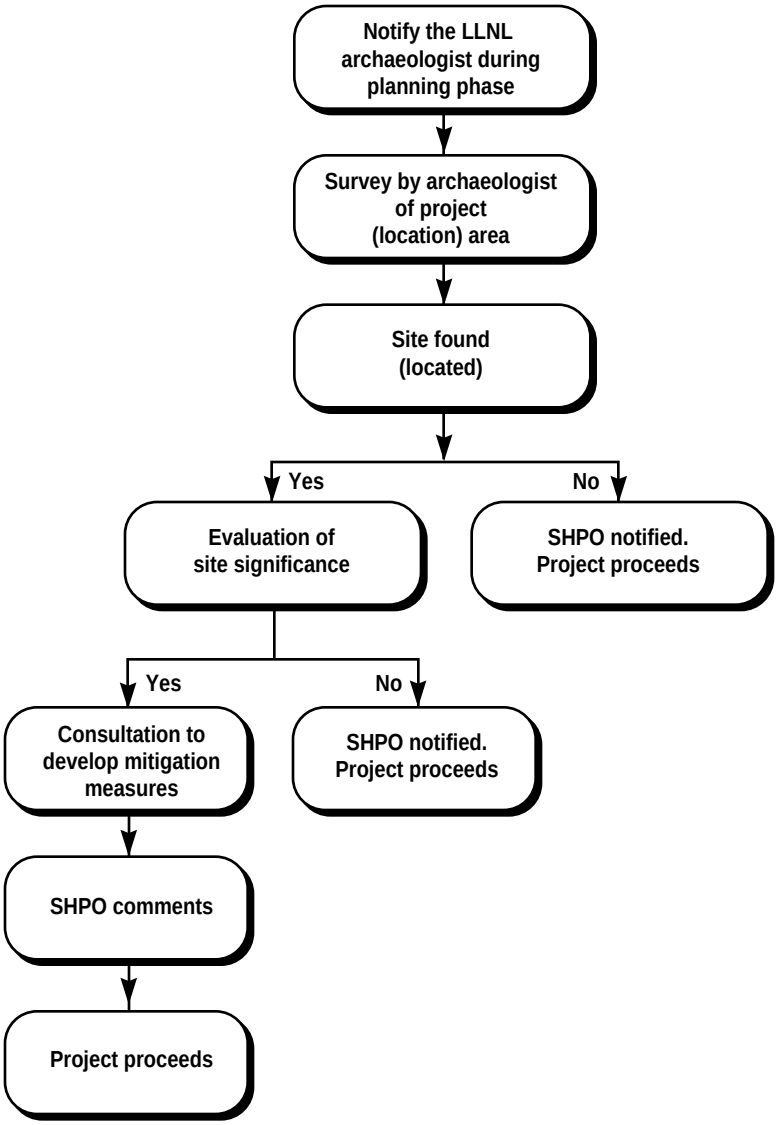


Figure 13-1. Cultural resource compliance process

If, during construction or other activities on your project, you discover artifacts, antiquities, or (most especially) human remains, stop work immediately and notify the LLNL ORAD archaeologist. The archaeologist will investigate the site. Major discoveries may necessitate more comprehensive investigation, and perhaps relocation of the project. Under no circumstances may you or contractors remove or disturb any artifacts or remains. Such removal is subject to substantial civil and/or criminal penalties.

13.5 Supporting References/Standards

Antiquities Act. 16 U.S.C. 431–433; 43 CFR 3 (Public Law 59-209) Civil and Criminal Penalties.

Regulations:

43 CFR Part 3

Historic Sites, Buildings, and Antiquities Act, as amended. 16 U.S.C. 461–467 (Public Law 74-292).

Federal Aid to Highways Act (1956 & 1958).

Reservoir Salvage Act of 1960.

NHPA, as amended. 16 U.S.C. 470 et seq.; (Public Law 89-665) Civil Penalties.

National Historic Preservation Act Amendments of 1980, Public Law 96-515.

National Historic Preservation Act Amendments of 1992, Public Law 102-575.

Regulations:

36 CFR Part 60

36 CFR Part 63

36 CFR Part 64

36 CFR Part 66

36 CFR Part 68

36 CFR Part 79

36 CFR Part 800

NEPA of 1969. 42 U.S.C. 4321-4361; 40 CFR 1500-1508, 10 CFR 1021; Executive Order 11514, as amended by Executive Order 11991; (Public Law 91-190). DOE NEPA Regulation/Rule: 57FR15122, April, 1992.

Executive Order 11593 (1971), Protection and Enhancement of the Cultural Environment.

Archaeological and Historic Data Preservation Act (AHDPA) of 1974. 16 U.S.C. 469-469c; (Public Law 86-532).

American Indian Religious Freedom Act (1978), 42 U.S.C. 1996, Public Law 95-341.

Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa-470mm, Public Law 96-96 Civil and Criminal Penalties.

Regulations:

43 CFR Part 7

Native American Graves Protection and Repatriation Act (1990) (25 U.S.C. 3001), Public Law 101-601.

State Preservation Laws

Native American Historical, Cultural, and Sacred Sites Act (1976, amended 1982 and 1987) Public Resources Code Chapter 1.75, Sections 5097.9-5097.99 Criminal Penalty.

Health and Safety Code Section 7050.5 (added 1982).

CEQA Appendix K (1983).

Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore, August 1992; DOE/EIS 0157, UC EIR SCH #90030847 (1992 EIS/EIR), and its January 21, 1993 DOE Record of Decision (58FR6268).

13.6 LLNL Contacts Specific to this Chapter

If you have any questions or need assistance, contact the LLNL archaeologist in ORAD.

14.0 Endangered Species

14.0 ENDANGERED SPECIES

The Federal Endangered Species Act of 1973 was passed by the U.S. Government to conserve the ecosystems of federally listed threatened or endangered species and to require interagency consultation on federally sponsored or approved activities that may harm listed endangered or threatened species or their habitat, ultimately with the objective of bringing populations of listed species to healthy levels. The California Endangered Species Act, passed in 1984, has the same objective for native California species on the state Endangered or Threatened Species Lists. The U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG), respectively, implement the federal and state Endangered Species Acts. Each agency has published a list of endangered, threatened, or candidate species that are protected under the respective Acts. In general, LLNL activities with effects extending outside of buildings, and construction or other ground-disturbing activities (especially in previously undeveloped locations), could have an impact on protected species.

Nonlisted species may also receive special consideration under the above laws and under agreements established between the University of California, the Department of Energy, and federal or state species trustees (see the Mitigation and Monitoring Reporting Program for Continued Operation of Lawrence Livermore National Laboratory, August, 1992). For example, actions by LLNL potentially affecting species that are formally being considered for listing on either state or federal lists ("proposed or candidate species") are given a greater degree of attention during the consultation process by the state and federal implementing agencies. The presence of California-sensitive species at LLNL's Site 300, such as the American badger and the burrowing owl, results in specific mitigation measures that must be implemented by LLNL prior to ground-disturbing activities. These mitigation measures are part of the basis for certification of the Environmental Impact Report portion of the *Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore, August, 1992.*

14.1 Regulatory Summary

Under the federal and California ESAs, federal and state agencies must consult with the USFWS and the CDFG, respectively, to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or habitat. If initial consultation indicates that no sensitive species occur in the vicinity, no further action is required. Agencies may use the procedure called "informal consultation" with USFWS when they believe that listed species would not be affected by a proposed project occurring in their habitat.

A Biological Assessment (BA) is required if federally listed species or critical habitat may be present in the area affected by any major construction activity. The BA is usually prepared in conjunction with NEPA documentation (especially an Environmental Impact Statement or "EIS") (see Chapter 5.0 of this manual for a discussion of EIS/EIR). The BA evaluates the potential effects of the project on any listed species and any designated critical habitat that may be present in the project area. It also includes measures designed to mitigate potential impacts. The USFWS uses the BA to determine if further consultation is necessary.

Formal consultation concludes with USFWS's issuance of a "biological opinion." If it is determined that the proposed action is not likely to adversely affect listed species or critical habitat (and the USFWS concurs), then consultation can be terminated. An opinion of "no jeopardy" indicates that the proposed project is not likely to jeopardize the continued existence of, or adversely modify critical habitat, of a species. Mitigation measures may be required to minimize adverse effects and an authorization to "take" listed species may be included in the biological opinion. A "jeopardy" opinion indicates that the project, including proposed mitigation, is likely to jeopardize the continued existence of a species. After the USFWS issues the biological opinion, the project proponent decides whether and how to proceed with the proposed project. If a "jeopardy" opinion is issued and the federal agency decides it must nevertheless conduct the project in a manner that jeopardizes the species, an exemption is sought. However, such exemptions are rarely given; when given, they are usually only for projects with strong national importance.

Similarly (as required by CEQA), consultations between LLNL/University of California and the CDFG must occur and written findings of the CDFG must be obtained when preparing a CEQA EIR. If a project may affect species listed under both California and federal laws, the CDFG generally defers to the federal process and provides input to the Federal Biological Opinion.

14.2 Applicability to LLNL Activities

A detailed BA was prepared in 1992 as part of the August 1992 *Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore* (DOE/EIS-0157, UC/EIR SCH90030847) which included proposals for several planned construction projects at LLNL. The USFWS concurred with LLNL's determination that continued operation of LLNL and near-term proposed projects (within 5 to 10 years) would not affect any federal or state threatened, endangered, or other sensitive species, given the implementation of the proposed mitigation measures. The CDFG concluded that the BA did "a good job" of assessing impacts, and it recommended evaluation or mitigation for activities involving ground squirrel control and wetland destruction at Site 300.

The evaluation process for sensitive species is presented in Figure 14-1. As a result of surveys conducted for the BA and observations made by the LLNL wildlife biologist, a total of 20 special status (endangered, threatened, proposed, candidate, State species of special concern, and State protected species) have been observed at Site 300, and 10 have been observed at the main site. One 160-acre area at Site 300 has been formally designated as critical habitat for the federally endangered large-flowered fiddleneck (*Amsinckia grandiflora*).

Potential habitats for two additional sensitive species (valley elderberry longhorn beetle, and San Joaquin kit fox) were also observed at Site 300. The locations of sensitive habitats at Site 300 appear in Figure 14-2.

Twenty-three mitigation measures were proposed, including designations of restricted areas around elderberry bushes (to protect the habitat of the federally listed valley elderberry longhorn beetle); requirements for the performance of pre-construction surveys for the San Joaquin kit fox, burrowing owl, and American badger to avoid potential harm; and other Site 300 operation policies designed to prevent or minimize impacts on sensitive species at Site 300. For a more thorough discussion of LLNL sensitive species habitats and locations, consult the EIS/EIR (1992), Appendix F.

14.3 Process for Compliance

In most cases, the existing information on the locations of sensitive species at LLNL and Site 300 will facilitate quick determinations of potential impacts and application of possible mitigation measures. If it is necessary to prepare a BA for the project in conjunction with preparation of an EA or EIS, the length of the consultation process can be highly variable and dependent on the complexity of the issues.

Project managers should submit a Project Information Form to the ORAD Environmental Evaluations Group (EEG) during the initial planning stages of any

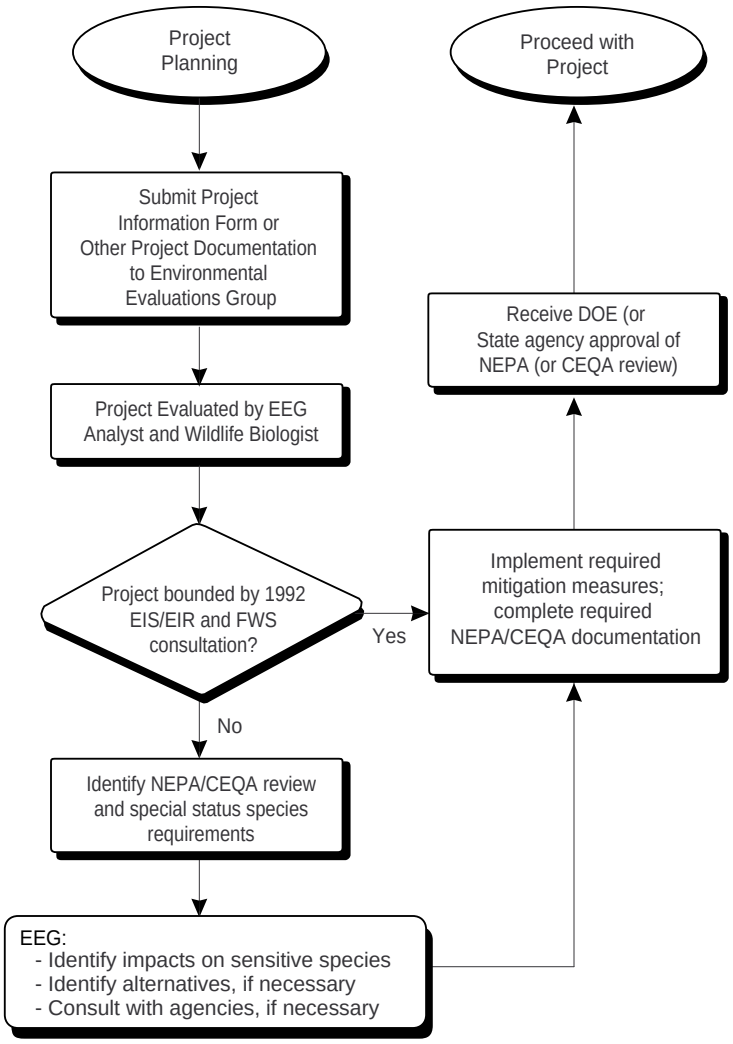


Figure 14-1. Sensitive species evaluation process

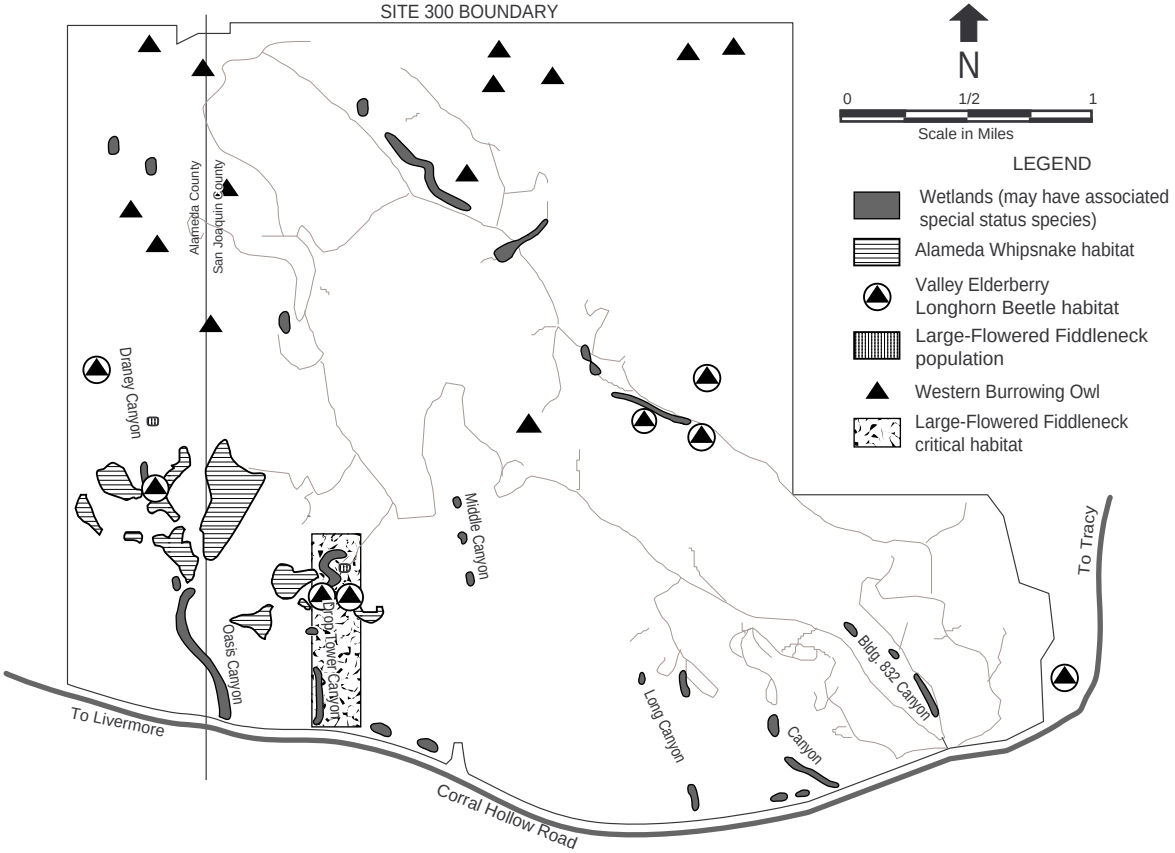


Figure 14-2. Locations of sensitive habitats at LLNL Site 300

project (Figure 14-1). This form gives the EEG staff the information it needs to begin consultation with the program proponent and to start an evaluation of the potential impacts on sensitive species. The EEG NEPA and CEQA staff can assist in project development and planning to avoid costly schedule delays, or project modifications; and can help develop mitigations to reduce impacts to listed or sensitive species.

14.4 Supporting References/Standards

The Endangered Species Act of 1973 and amendments. 16 U.S.C. 1531 et seq., PL 93-205, PL 95-632, PL 96-159, PL 97-304.

50 CFR 17.11-12. Listing of endangered fish and wildlife species.

50 CFR 402. Procedures for Interagency Cooperation under the Endangered Species Act.

California Endangered Species Act. California Fish and Game Code, Sections 2050 et seq.

Environmental Services Division Administrative Report 86-1. Guidelines for Consulting with the California Department of Fish and Game. 1986.

14.5 LLNL Contacts Specific to this Chapter

The LLNL point of contact for compliance with the endangered species acts is the EEG of the Environmental Protection Department. Your supporting EOG Analyst can provide the name and telephone number of the EEG point of contact.

15.0 Floodplains and Wetlands

15.0 FLOODPLAINS AND WETLANDS

A floodplain is defined as the valley floor adjacent to the incised channel, which may be inundated during high water (Linsley, Kohler, and Paulhus, 1982). Based on Executive Order 11988, Floodplain Management (May 24, 1987), federal agencies must evaluate action taken in a floodplain. The Floodplain and Wetlands Assessment is prepared pursuant to the DOE "Compliance with Floodplain/Wetlands Environmental Review Requirements" (10 CFR, part 1022, 1979). There must be a floodplain assessment (a document sent to the public) for any action inside a floodplain. Normally, the floodplain assessment is done within the NEPA EA or EIS.

Wetlands generally include swamps, marshes, bogs, and similar areas. Commonly pictured as coastal marshes or swamps, wetlands have the broader regulatory definition of "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR § 328.3(b))." In addition to their aesthetic beauty, wetlands are valued for their ability to purify water, recharge groundwater, and prevent flooding and erosion. Wetlands also provide nesting, spawning, rearing, and resting sites for many aquatic and land species, including numerous endangered species (see Chapter 14.0 for further discussion of endangered species).

In years past, wetlands were regarded as wastelands, and many were drained or filled in the course of development. In fact, California has lost over 90% of its original wetland acreage to human activities. In order to preserve the remaining wetlands, Federal Acts and Executive Orders (and implementing regulations restricting development of wetlands and requiring minimization of impacts to wetlands) have been established, and the DOE has adopted a policy of minimizing "the destruction, loss, or degradation of wetlands." It is important to consider these laws, Executive Orders, and regulations when planning projects which may impact wetlands.

15.1 Regulatory Summary

The most wide-reaching wetlands program is administered by the U.S. Army Corps of Engineers which regulates discharges of dredged or fill material to, and placement of structures in wetlands. This program, described in more detail on the following page, requires parties wishing to develop wetlands to obtain a permit. Before granting a permit, the Corps may require measures to be taken to mitigate the impact to wetlands. Special policies (e.g., requiring floodplain/ wetland assessments) also apply which further limit the extent to which federal projects may destroy or degrade wetlands.

The U.S. Army Corps of Engineers derives the regulatory authority to administer their wetlands protection program from Section 404 of the Clean Water Act. The program is overseen by the EPA and other agencies such as the Fish and Wildlife Service and California State Water Resources Control Board may make comments which affect the permitting decision. It is important to note that Section 404 wetlands permitting is time-consuming, typically taking 6–8 months (and sometimes longer) to complete.

Certain types of projects do not require individual Section 404 permits. Projects such as maintaining drainage ditches, maintaining currently serviceable structures, and very small projects involving less than 0.1 acres of wetlands typically are eligible for general permits (sometimes called "nationwide permits") which bypass the individual permit application process. However, it is prudent (and sometimes required) to notify the Corps before commencement of the project and receive official confirmation that an individual Section 404 permit is not required. Even if a project qualifies for a general permit, it still will be required to obtain water quality certification from the Regional Water Quality Control Board before proceeding. Also, other state and local programs which may affect wetlands such as the stream bed alteration agreement program administered by the Department of Fish and Game may impose additional requirements on a project.

In addition, all DOE actions must comply with the DOE policy regarding wetlands as stated in 10 CFR, Part 1022—Compliance with Floodplain/Wetlands Environmental Review Requirements. The DOE wetlands policy was put in place to comply with Executive Orders 11990 and 11988 which require federal agencies to consider adverse effects on wetlands and floodplains during decision-making. For certain proposed actions that will affect floodplains/wetlands, the DOE must prepare a Floodplain/Wetland Assessment that includes an evaluation of the effect of the proposed action on these resources and an evaluation of less-harmful alternatives to the action. Typically, DOE's wetlands policy is satisfied by incorporating the Floodplain/Wetlands Assessment into documents prepared in compliance with the National Environmental Policy Act (discussed in Chapter 5.0).

15.2 Applicability to LLNL Activities

The DOE wetlands/floodplains regulations described above are pertinent during the planning of projects that impact the wetlands which exist on the LLNL Livermore site and Site 300. Small areas (0.36 acres in total) of wetlands supporting salt grass and cattails are present on the northern perimeter of the LLNL Livermore site along Arroyo Las Positas, and additional small wetlands have developed along some drainage channels throughout the site. Also, there are more extensive areas of wetlands on the relatively undeveloped Site 300 (see Figure 14-1). The Site 300 wetlands cover a total of 6.76 acres and can be found in the bottoms of canyons, in areas affected by building runoff, and in three vernal pools. The requirements applied to the wetlands in Site 300 may be

especially stringent since the wetlands can provide habitat for the tiger salamander and red-legged frog (federal candidate and federally proposed endangered species, respectively). Based on sampling conducted in 1995, federally-listed fairy-shrimp species which occur in seasonal wetlands are not present in Site 300 vernal pools. (For further discussion of endangered species, see Chapter 14.0.) The 100-yr floodplain at the LLNL Livermore site is limited to the Arroyo Las Positas and Arroyo Seco channels, plus a small area near the East Gate at Greenville Road. At Site 300, the nearest 100-yr floodplain is within Corral Hollow Creek, south of the site.

15.3 Process for Compliance

The most important part of complying with these regulations is to be aware of the wetlands which exist on LLNL lands, both on the LLNL Livermore Site and on Site 300 and to recognize that floodplains exist at the LLNL Livermore Site and adjacent to Site 300. If you believe that a project you are planning may affect wetlands, notify your EEG or EOG Analyst. Projects affecting areas larger than 0.1 acres of these wetlands may require a permit from the Corps, and even smaller projects should be brought to the attention of an EEG and EOG Analyst. As with many permitting programs, early notification is crucial since the permitting process can be time consuming.

15.4 Supporting References/Standards

Carter, J., Executive Order 11990, Protection of Wetlands, 1977.

California Council of Civil Engineers and Land Surveyors, *Summary of Legal and Regulatory Requirements Affecting Section 404 Permits*, Including Wetlands, 1991.

California Environmental Law, Part F. Wetlands Regulation in California, 1993.

Clean Water Act, Section 404, 33 U.S.C. § 1344.

33 CFR § 328.3(b).

44 Federal Register No.46, Title 10, Chapter X, Part 1022, Compliance with Floodplain/Wetlands Environmental Review Requirements, 1979.

Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines, 1990.

U.S. Department of Energy and University of California, *Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore, 1992.*

15.5 LLNL Contacts Specific to this Chapter

Your main contact at LLNL for help with wetlands issues is your EEG Analyst, a member of the Environmental Evaluations Group in ORAD. You may also reach your EEG Analyst by contacting your supporting EOG Analyst, also a member of ORAD.

16.0 Pesticide Management

16.0 PESTICIDE MANAGEMENT

A pesticide is defined as any substance or mixture of substances which is intended to prevent, destroy, repel, or mitigate any pest, or which is intended for use as a plant regulator, defoliant, or disinfectant. The chemicals in pesticides are specifically designed to be toxic to living things. Because of their toxicity, pesticides are regulated to protect the public health and to ensure that pesticide workers are properly trained in application techniques, labeling, handling, and storage requirements. Figure 16-1 indicates the two main methods of pesticide application at LLNL.

16.1 Regulatory Summary

Pesticide control is regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which is administered by the EPA in cooperation with state and local agencies. In general, EPA uses FIFRA authority to collect information necessary to register and control the "active" ingredients in pesticides, while state and local agencies control the registration and actual use of the pesticides themselves.

In California, state pesticide laws incorporate FIFRA's federal standards and definitions, and provide additional detailed controls over pesticides and pesticide applicators. California has assigned primary regulatory responsibility for pesticides to the California Environmental Protection Agency (Cal/EPA) Department of Pesticide Regulations. The state's pesticide laws are administered by the state Department of Food and Agriculture and its county Agricultural Commissioners.

The level of regulation depends on the classification of the pesticide. Pesticides are classified into three categories by their use: general, restricted, and mixed use. General use pesticides have been found to have no unreasonable adverse effects on the environment when they are used as directed. Restricted use pesticides may have unreasonable adverse effects. And mixed use pesticides may be classified either as general use under certain applications or as restricted under other uses.

Regulations also require that pesticide applicators fulfill specific certification requirements, including specialized training, licensing, and financial responsibility (commercial applicators).

16.2 Applicability to LLNL Activities

FIFRA regulates pest control activities at LLNL. The regulated activities include pesticide use, storage, handling, disposal, and transportation.

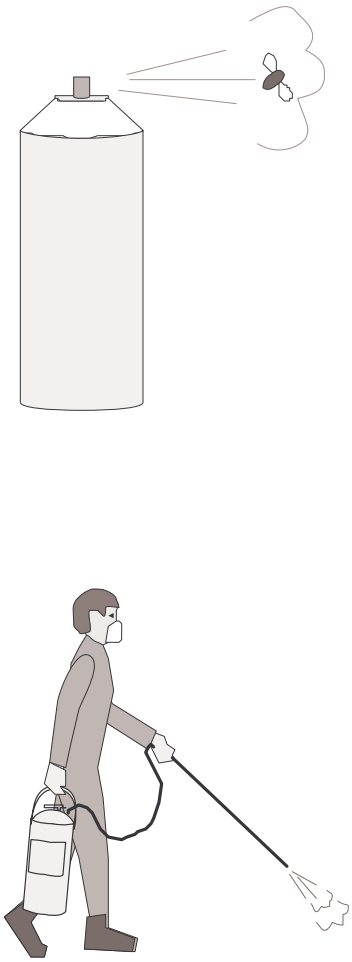


Figure 16-1. Methods of pesticide application

16.3 Responsibilities

Plant Engineering is responsible for dealing with all pest problems, but if you have pests like ants and roaches, they will help you select an appropriate pesticide (a general use aerosol spray or bait traps). Be sure to clear their use with Plant Engineering prior to using them.

If you have bigger pest problems, like rodent infestations, or if you need large-scale exterminations, Plant Engineering is responsible for carrying out the controls. Plant Engineering also employs gardeners who are certified pest control applicators.

Under no circumstances should you purchase or use a pesticide which has not been approved by Plant Engineering.

16.4 Process for Compliance

Store general use pesticides in their original containers, sealed, with their labels intact and readable. Place on sturdy shelves, away from food preparation areas. Do not use pesticides in areas where food may become contaminated through incidental exposure (e.g., spraying the coffee room counter with ant spray).

Don't dispose of your excess pesticides without consulting Plant Engineering on proper disposal procedures. Some pesticides can be wrapped and disposed in the trash, while others must be disposed as hazardous waste through Hazardous Waste Management.

Report any spill of bulk pesticides to the Dispatcher at 911. Be prepared to give them the name of the pesticide, the quantity spilled, and the location of the spill.

16.5 Information/Reporting Requirements

All pesticide containers must be labeled during all uses, including transportation, storage, use, and empty-container disposal. If you place a pesticide in a container other than the one it came in, be sure it is labeled with the following information:

Trade name

Manufacturer name

EPA registration number

EPA establishment number

Amount and weight of contents

Ingredient list of inert and active ingredients (totaling 100%)

Front panel warning statement

Child warning

Indication of necessary medical treatment

Physical and chemical hazards

Directions for use

Pesticide storage areas which contain pesticides labeled WARNING or DANGER must have signs that meet the following criteria:

Visible from any direction of approach

Readable from a distance of 25 feet

Worded as follows:

DANGER

POISON STORAGE AREA

ALL UNAUTHORIZED PERSONS KEEP OUT

KEEP DOOR LOCKED WHEN NOT IN USE

This label must be repeated in the appropriate foreign language if people who do not understand English are likely to come to the storage area.

16.6 Training

If you apply certain pesticides, you must be trained in all aspects of pesticide use. Plant Engineering is responsible for ensuring that its gardeners are certified pesticide applicators. Certification includes initial training and continuing education.

16.7 Supporting References/Standards

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), PL-92-516, 7 USC 136.

40 CFR Parts 152-180.

Food and Agriculture Code section 11401 et seq.

California Code of Regulations, Title 3, Division 6.

16.8 LLNL Contacts Specific to this Chapter

Plant Engineering should be contacted for all pest and pesticide matters. They can provide help in selecting an appropriate pesticide, managing a rodent infestation, or conducting large-scale exterminations. Any pest problems that cannot be handled with general use pesticides should be addressed by a Plant Engineering gardener.

17.0 Environmental Sampling Protocols and Requirements

17.0 ENVIRONMENTAL SAMPLING PROTOCOLS & REQUIREMENTS

Environmental sampling and analyses are performed in many instances and on many media, but always with one purpose: to ascertain whether the sample or the environmental media contains contaminants, and if so, in what concentrations. Such data may be used for a variety of purposes, e.g., to determine whether a waste material may be landfilled or must be treated, whether groundwater has been contaminated by the uncontrolled release of a contaminant, or whether a treatment process is operating effectively. And as with any sampling and analytical procedure, strict sampling and analytical protocols and guidelines must be followed to ensure usable data are produced. EPA's *Test Methods for Evaluating Solid Waste* (commonly referred to as SW-846 and summarized in Figure 17-1) thoroughly describes sampling protocols used for environmental sampling.

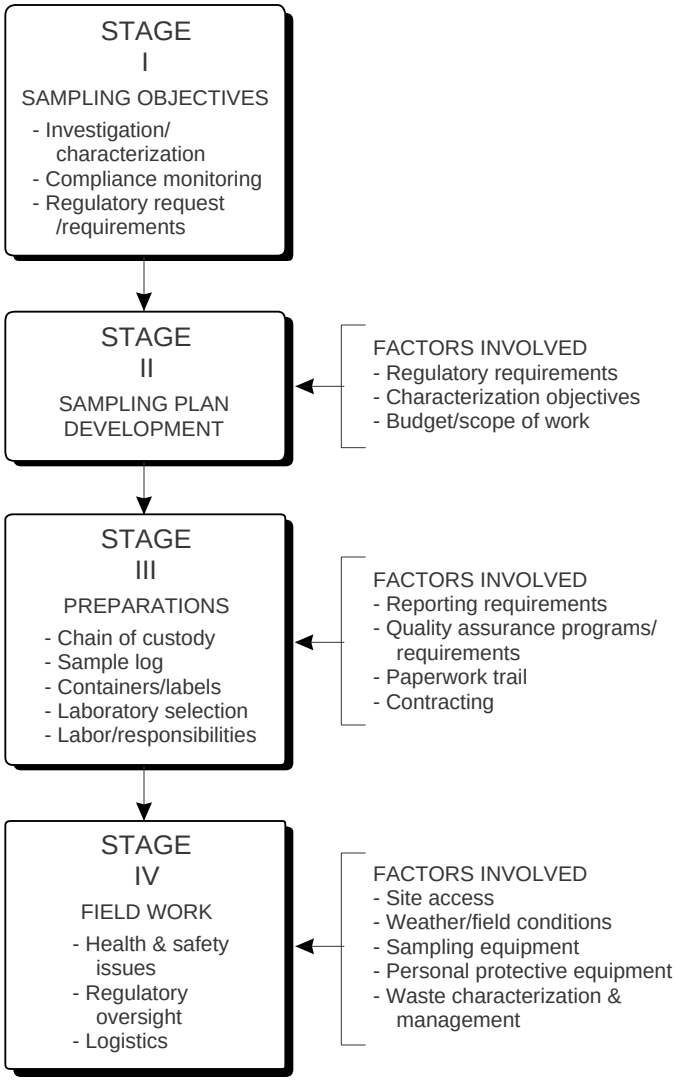


Figure 17-1. Sampling flow chart

17.1 Regulatory Summary

The majority of environmental laws and regulations identified in this compliance manual specify sampling protocols to be followed to ensure that environmental standards are met. It is essential that any sampling program being carried out at LLNL in response to regulatory requirements be conducted in accordance with these regulations.

17.2 Applicability to LLNL Operations

LLNL conducts environmental sampling for a number of reasons, e.g., under the CERCLA remedial response program to determine the nature and extent of groundwater and soil contamination; under Clean Air Act and Bay Area Air Quality Management District (BAAQMD) requirements to determine what compounds are being emitted to the atmosphere, and whether they pose health risks to persons downwind; and to determine whether particular wastes can be "delisted" and therefore need not be disposed of as hazardous wastes. Sometimes these sampling events are project-specific; sometimes they apply to LLNL operations as a whole.

17.3 Responsibilities

The HWM Technician responsible for the particular program in which sampling is required will also be responsible for arranging for sampling. The technician will arrange for sampling by the Field Sampling Technician.

17.4 Process for Compliance

The purpose and rationale behind each sampling event need to be considered carefully. There should be a specific need for each constituent sampled for, and detection limits should be adequate to detect levels low enough to be meaningful. Proper quality assurance and quality control (QA/QC) measures should be employed to ensure that the data gathered are meaningful. These measures include:

- Sample integrity; that is, making sure samples are representative of the material being tested;
- Adequate chain-of-custody procedures;
- Adequate sample handling methods, e.g., making sure samples are analyzed before hold times are exceeded;
- Use of laboratories that are certified for the analyses being performed;
- Use of extra QA/QC samples (e.g., duplicates, spiked samples, and blanks) to ensure quality data;
- Proper analytical data analysis procedures, using statistical methods, to ensure accurate conclusions; and
- Use of properly cleaned equipment and containers to minimize cross-contamination.

The time required to prepare for a sampling effort can be extensive and must be considered in the planning process. You cannot just go to the field and collect a sample. The selection of correct analytical techniques, coordinating with laboratories, obtaining sampling equipment, getting access to the site, obtaining digging permits, and planning for health and safety concerns can take considerable time and effort.

Because environmental sampling protocols vary by media (e.g., groundwater, soil, air, etc.) sampling protocols are discussed on the following pages.

Groundwater Sampling

Four major techniques are used to sample groundwater: conventional groundwater monitoring or extraction wells; HydroPunch (a probe driven into the groundwater from a drill rig); temporary soil borings; and excavation. All of these are invasive, so the potential for introducing contaminants during sampling (cross-contamination) is high.

Groundwater monitoring is a three-dimensional issue. The water can flow vertically, horizontally, and laterally. As a matrix, groundwater properties include flow, gradient, hydrostatic pressure, and mineral content. Long-term groundwater monitoring is best conducted with a well-designed network of wells located within the zone(s) of interest.

Figure 17-2 shows the basic steps for groundwater sampling. Sampling containers vary by analysis, and the samples must often be preserved; however, groundwater sampling methods can be customized to meet project-specific criteria. For example, because leaking tanks are such a prevalent issue, EPA Method 8015 gas or diesel or Total Petroleum Hydrocarbons (TPH), has been modified to detect specific compounds associated with underground fuel tank releases. Several other analytical methods have been developed for specific issues.

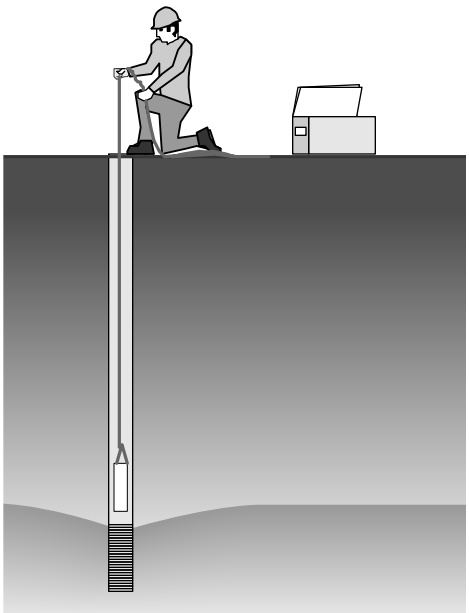


Figure 17-2.
Groundwater sampling

Soil Sampling

Soil sampling provides information about contamination of the subsurface. Methods for sampling soil are relatively straightforward. Minimizing the loss of volatiles is crucial when samples are collected for volatile analyses. The samples are chilled immediately after collection and sealed in airtight containers. Nonvolatile samples (e.g., metals) are collected in a variety of containers.

Figure 17-3 shows common methods used for soil sampling. The techniques available for soil sampling include surface soil sampling, hand-augering to depths of up to 15 feet, sampling during excavation or other earth-moving operations, and mechanized soil boring to depths of several hundred feet or more. Again, depending on the investigation's objectives, soil sampling can provide reliable information; however, conditions in the soil can change rapidly because of many factors, including oxidation of chemicals, biodegradation, and transport of chemicals in the subsurface.

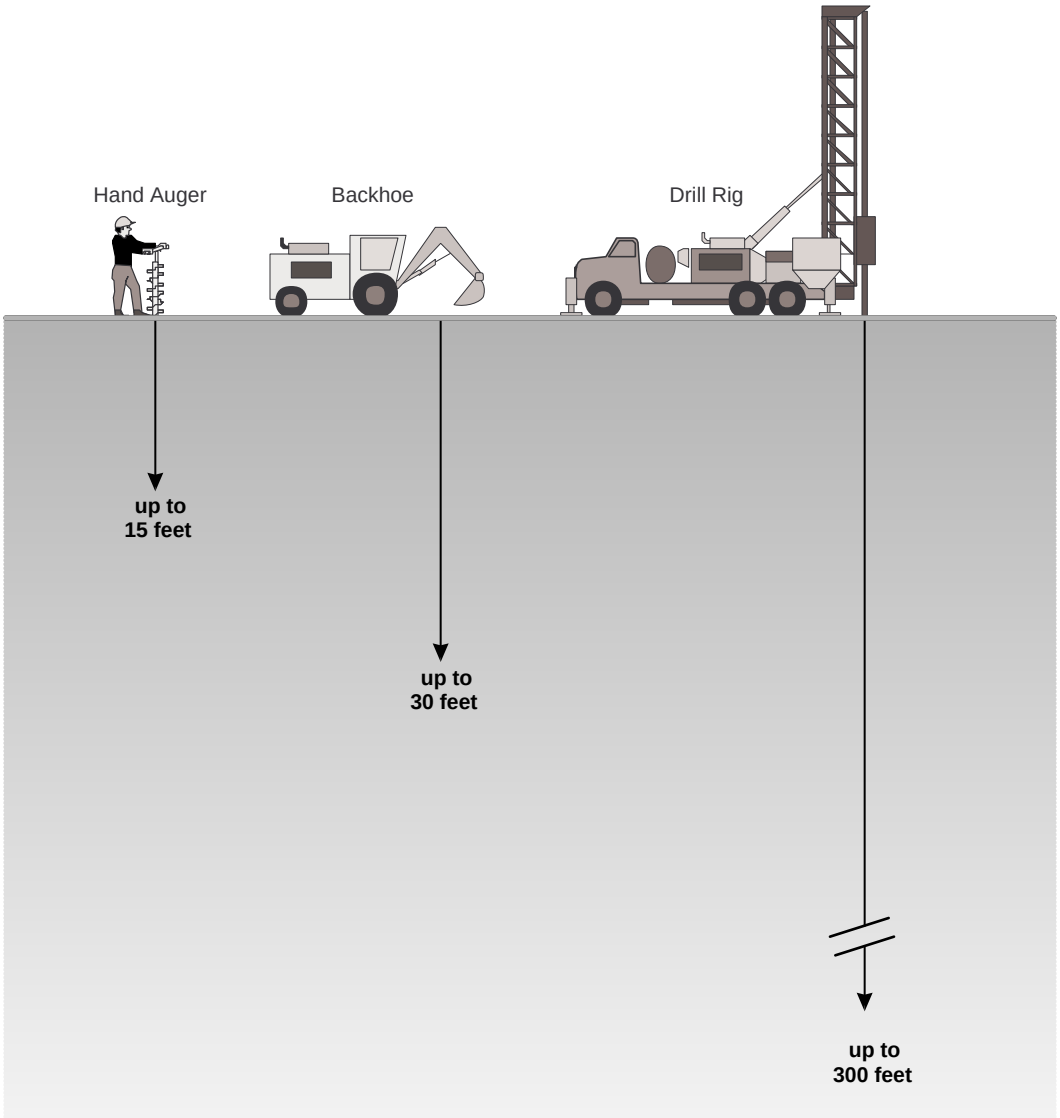
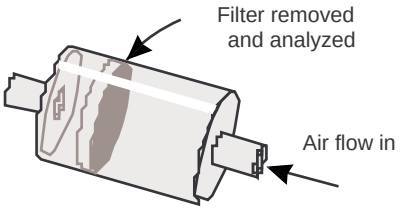


Figure 17-3. Soil sampling methods

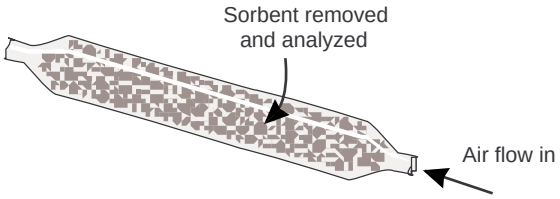
Air Sampling

Methods for acceptable sampling of the air are defined by both the EPA and the National Institute of Occupational Safety and Health (NIOSH). Air is the most difficult medium to sample because it is subject to environmental influences such as weather, so careful planning is essential. Sampling for health and safety involves personal samplers and/or sampling to determine if conditions are immediately dangerous to life and health. Checking the Lower Explosive Limit (LEL) and oxygen content of the air (21% ± is normal) are examples of sampling for health and safety. “Stack sampling” is the term used to describe indoor or outdoor sampling of gaseous point sources. Figure 17-4 shows several different types of sampling methods and/or containers.

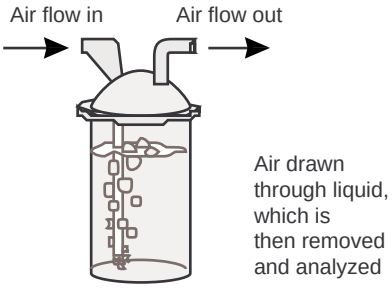
FILTERS for sampling dust, fumes, and chemical aerosols.



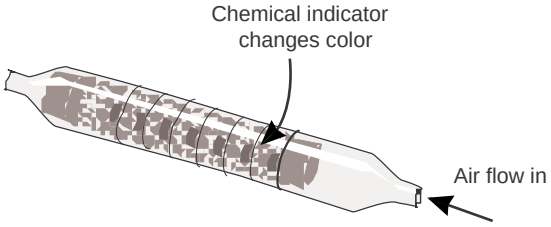
SORBENT TUBES for sampling chemical aerosols.



LIQUID SOLUTIONS (impinger) for sampling chemicals.



CHEMICAL INDICATORS (long-duration tubes) for sampling chemical aerosols.



CONTAINERS for taking samples of gases to be analyzed.

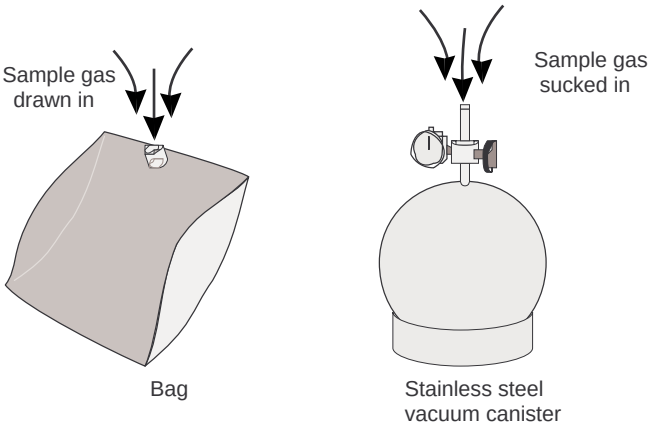


Figure 17-4. Air sampling methods

17.5 Supporting References/Standards

United States Environmental Protection Agency. *Test Methods for Evaluating Solid Waste (SW-846)*, Volume II: Field Manual for Physical and Chemical Methods. 1986.

National Institute for Occupational Safety and Health. *NIOSH Manual of Analytical Methods*, Second and Third Editions. 1984.

Water Environmental Federation. *Standard Methods for the Examination of Water and Wastewater*, 18th Edition. 1992.

SKC West, Inc. *SKC Comprehensive Catalog and Air Sampling Guide*. Winter Edition, 1993.

17.6 LLNL Contacts Specific to this Chapter

The HWM Technician responsible for the particular program in which sampling is required will also be responsible for arranging for sampling. The technician will arrange for sampling by the EAS Technician.

Glossary

Glossary

AAA: American Antiquities Act.

AAQS: Ambient Air Quality Standards. Air Standards established by EPA to protect human health and the environment.

AB2588: Air Toxics "Hot Spots" Information and Assessment Act of 1987. A California law that requires submittal of data on toxic air emissions to the local air pollution control districts.

Accumulation Start Date: That point in time when hazardous waste is first placed into a container. This accumulation start date begins the 90-day accumulation period for hazardous wastes stored without special permits from environmental regulatory agencies.

ACEHS: Alameda County Environmental Health Services.

ACM: Asbestos Containing Material.

Administrative Order: An official, legally enforceable order issued by EPA or the RWQCB to force a facility owner or operator to address potential threats to human health or the environment resulting from activities at the facility. Administrative orders can be used to force a facility to comply with specific regulations, to take corrective action, and to perform monitoring, testing, and analysis.

ADM: Action Description Memorandum. The ADM is used in the DOE NEPA process to facilitate determination of the appropriate level of NEPA documentation for a proposed action.

AEA: Atomic Energy Act. Established requirements for managing radioactive materials and waste.

AEC: Atomic Energy Commission.

AHDPA: Archaeological and Historical Data Preservation Act.

Air Contaminant or Air Pollutant: Any material which, when emitted, causes or tends to cause the degradation of air quality. Such material includes, but is not limited to, smoke, charred paper, dust, soot, grime, carbon, fumes, gases, odors, particulate matter, acids, or any combination thereof.

Air Pollution: Any air emissions in excess of air quality standards.

Air Pollution Control Devices: Mechanisms or equipment that "clean" air emissions from a process. These devices remove pollutants (particulate matter, acid gases) that would otherwise be released to the atmosphere.

Air Quality Management District: Local or regional agency, responsible for controlling pollutants discharged into the atmosphere from stationary and area sources.

Air Toxics: Toxic air contaminants that have the potential to affect human health.

AIRFA: American Indian Religious Freedom Act of 1978.

Alameda County Health Care Services (ACHCS): Local agency responsible for regulating hazardous waste generators, underground tanks, and implementation of Business Plans at the Livermore Site.

Ambient Air: Any portion of the atmosphere not confined by four walls and a roof; outside air.

Ambient Air Quality Standard: The prescribed level of a pollutant in the outside air that cannot be exceeded during a specific time in a specified geographical area. Established by both federal and state governments.

APCD: Air Pollution Control District. Local agency that regulates stationary air emission sources. Site 300 is regulated by the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD).

ARB: State of California Air Resources Board. State agency responsible for developing control strategies to protect ambient air quality. This agency also regulates mobile sources and consumer products.

ARPA: Archaeological Resources Protection Act.

AST: Aboveground Storage Tank.

ATGS: Automatic Tank Gauging System. An ATGS remotely monitors the volume and temperature of petroleum in a tank.

Atmosphere: The air that surrounds the earth, excluding the general volume of gases contained within a building or structure.

BA: Biological Assessment.

BAAQMD: Bay Area Air Quality Management District. The local agency responsible for regulating stationary air emission sources (including LLNL Livermore Site) in the San Francisco Bay Area. BAAQMD is a regional district, including all seven Bay Area counties (Alameda, Contra Costa,

Marin, Napa, San Francisco, San Mateo, and Santa Clara) and the southern halves of Solano and Sonoma counties.

BACT: Best Available Control Technology.

Baghouse: An air pollution control device that filters particulate emissions.

BAT: Best Available Treatment (economically achievable).

BDAT: Best Demonstrated Available Technology. As identified by EPA, the most effective commercially available means of treating specific types of hazardous wastes. The BDAT for a particular waste may change in the future as new advances in treatment technologies are made.

BMP: Best Management Practice.

BOD: Biochemical (biological) Oxygen Demand. A measure of the amount of oxygen consumed in biological processes that break down organic matter in water; a measure of the organic pollutant load. It is used as an indicator of water quality.

Business Plans: Facilities that use hazardous materials must provide local and state emergency planning organizations with information about how much and where these materials are used on-site. The Livermore site plan is due annually.

CAA: Clean Air Act. Federal law that required the EPA to set air quality standards and to assist state and local governments to develop and execute air pollution prevention and control programs.

CAAQS: California Ambient Air Quality Standards. These standards are more restrictive than the NAAQS.

Cal/EPA: California Environmental Protection Agency.

Cal/OSHA: California Division of Occupational Safety and Health.

CAPCOA: California Air Pollution Control Officers Association.

CARB: California Air Resources Board (see ARB).

Categorical Process (Industry): A specific process or industry that EPA has designated as subject to specific discharge standards.

CCAA: California Clean Air Act.

CCR: California Code of Regulations. This Code contains all the state regulations, including environmental requirements. Formerly called the California Administrative Code.

CCR T22: California Code of Regulations, Title 22, 1978, 1985.

CDFG: California Department of Fish and Game. State agency within Cal/EPA responsible for protection of endangered species.

CEPRC: Chemical Emergency Planning and Response Commission. A California state agency created in 1987 to comply with federal and state requirements.

CEQA: California Environmental Quality Act.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980. Also known as Superfund, this law authorizes the federal government to respond directly to releases of hazardous substances that may endanger health or the environment. The U.S. Environmental Protection Agency is responsible for managing Superfund. The major step in the Superfund process is the Remedial Investigation/Feasibility Study (RI/FS).

CFC: Chlorofluorocarbon, or Freon. Chemical substance associated with the depletion of earth's ozone layer.

CFR: Code of Federal Regulations. A series of documents that contain all regulations developed and finalized by federal government agencies. RCRA regulations are contained in Volume 40 of the Code of Federal Regulations.

Chain of Custody: Method for documenting the history and possession of a sample from the time of its collection through its analysis and data reporting to its final disposition.

Characteristic Waste: A waste that is toxic, ignitable, reactive, and/or corrosive, as determined by specific criteria in Title 22.

CHP: California Highway Patrol.

CO_2: Carbon Dioxide.

COD: Chemical Oxygen Demand. A gross analytical test for the presence of organics in water.

Controlled Materials: Term used at LLNL for specific materials that are closely controlled, including beryllium and its compounds; explosives and explosive wastes; radioactive materials (except check sources and some sealed sources); items contaminated with controlled materials; classified substances, wastes containing controlled materials; precious metals; source and special nuclear materials; mock HE; stable nuclides; special reactor materials; drugs and chemical carcinogens.

Criteria Pollutants: The class of pollutants generated mostly by combustion. These include carbon monoxide, nitrogen oxides, sulfur dioxides, lead, particulate matter of respirable size (PM_{10}), nonmethane hydrocarbons, and ozone.

CWA: Clean Water Act. Federal Water Pollution Control Act Amendments of 1972, with 1977 amendments, the objective of which is to maintain the integrity of the nation's waters. This Act also promotes the protection of navigable waters and their beneficial uses.

dB: Decibel, a measurement of sound level.

dB(A): Decibel, with specific frequency weighting to more closely reflect the attenuation of the ear canal.

dEIR or DEIR: Draft Environmental Impact Report.

DEIS: Draft Environmental Impact Statement.

Delisting: A process whereby a type of waste that is listed as hazardous by EPA can be excluded from hazardous waste regulation. If the generator can demonstrate that a particular waste does not pose risks to human health and the environment, the waste can be delisted.

DHS: Department of Health Services. California state agency responsible for health-related regulations, including the establishment of drinking water standards. Formerly responsible for hazardous waste management, prior to the creation of Cal/EPA.

DOD: U.S. Department of Defense.

DOE: U.S. Department of Energy. DOE owns the Lawrence Livermore National Laboratory and has an agreement with the University of California whereby the University administers the day-to-day operations of the lab.

DOI: U.S. Department of the Interior.

DOT: U.S. Department of Transportation. Federal agency that sets regulations for transportation of hazardous materials and waste over public roads.

DPR: Department of Pesticide Regulation. The agency within Cal/EPA that is responsible for managing registration, handling, and application of pesticides.

Draft Permit: A preliminary permit drafted and published by regulatory agencies. The draft permit is subject to public review and comment before the agency takes final action on a permit application.

DTSC: California Department of Toxic Substances Control. State department within Cal/EPA that regulates hazardous waste management and remedial actions. Formerly part of California Department of Health Services (DHS).

DWTF: Decontamination and Waste Treatment Facility.

EA: Environmental Assessment. A report that identifies potential significant environmental impacts from any federally approved or funded project that may change the physical environment. If an EA shows significant impact, an EIR is required.

EEG: Environmental Evaluations Group.

EHS: Extremely Hazardous Substances. This list of chemicals and their respective threshold planning quantities was prepared by the EPA and may be found in 40 CFR, Part 355, Appendix A—*Federal Register*, April 22, 1987, as modified by the August 27, 1993 *Federal Register*.

EIR: Environmental Impact Report. A detailed report on the significant environmental impacts from any project that is carried out, approved, or funded by a local or state (California) public agency that may change the physical environment.

EIS: Environmental Impact Statement. A detailed report on the significant environmental impacts that a pending structure or development will have on the environment. An EIS must be prepared by a government agency when a "major" federal action that will have "significant" environmental impacts is planned.

EMC: Emergency Management Center.

EMT: EPD's Emergency Management Team. This group is responsible for assisting in response activities for any on-site or off-site environmental incidents resulting from LLNL operations.

Environment: The aggregate of all the external conditions and influences affecting the life, development, and ultimately the survival of an organism.

Environmental Restoration Program: A DOE program to clean up environmental contamination caused by past waste practices at DOE facilities.

EOG: ORAD's Environmental Operations Group. This group updates hazardous substance inventories, SPCC Plans, Business Plans, Emergency Response and Notification Procedures, and ensures appropriate coordination with the DOE, OES, local fire department, and other applicable agencies.

EP&RP: Emergency Preparedness and Response Program.

EPA: United States Environmental Protection Agency. Federal Agency responsible for enforcing environmental laws. Although some of this responsibility may be delegated out to local regulatory agencies, EPA retains oversight authority to ensure protection of human health and the environment. EPA administers the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA), or Superfund, as it is commonly known, and works with state and local agencies to provide technical oversight for cleanup activities at federal facilities regulated by the Superfund program.

EPCRA: Emergency Planning and Community Right-to-Know Act. Section 313 of SARA.

EPD: Environmental Protection Department (LLNL).

ERO: Emergency Response Organization.

ES&H: LLNL Environmental Safety and Health. ES&H teams provide assistance to each organization in identifying and implementing training requirements.

ESA: Endangered Species Act of 1973. The large flowered fiddleneck (*Amsinckia grandiflora*), which grows at Site 300, is protected under this law.

F&D: Findings and Determinations Memorandum. Prepared by Space and Site Planning.

Feasibility Study: A study made on the basis of remedial investigation to determine the feasibility of correcting the release, or threat of release, of hazardous substances, pollutants, or contaminants.

Federal Facility: A facility that is owned or operated by the federal government. With the passage of SARA, Federal facilities became subject to the same requirements that other responsible parties must adhere to once they are placed on the Superfund National Priorities List.

Federal Register: A document published daily by the federal government containing notification of government agency actions. The *Federal Register* contains notification of EPA and DOE actions, including notification of EPA and DOE decisions concerning permit applications.

FEIS: Final Environmental Impact Statement.

FEMA: Federal Emergency Management Agency.

FFA: Federal Facilities Agreement. A document that specifies required actions at a federal facility as agreed by various agencies (EPA, DTSC, RWQCB, and DOE).

FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act. Federal law that regulates pesticide usage and disposal.

Fluorocarbon: An organic compound that contains fluorine. Some of these compounds may affect health, but do not produce smog.

FONSI: Finding of No Significant Impact. A conclusion that may be reached after the preparation of an environmental assessment under NEPA.

Friable: A rock or mineral that crumbles naturally or is easily broken, pulverized, or reduced to powder, such as a soft or poorly cemented sandstone.

FWPCA: Federal Water Pollution Control Act. This federal law is also referred to as the Clean Water Act (CWA).

g: gram.

Generator: The specific employee within a program or department who generates or produces hazardous wastes as a by-product of operations.

HAP: Hazardous Air Pollutants. Air toxics.

Hazardous Waste Label: A label that gives: (1) the name and building of the person generating the waste; (2) phone number; (3) accumulation start date; (4) hazardous properties of the waste; and (5) composition and physical state of the waste. In accordance with current environmental regulations, this label must be affixed to all containers receiving hazardous wastes.

Hazardous Waste Management: The collection, source separation, storage, transportation, processing, treatment, recovery, and disposal of hazardous waste.

Hazardous Wastes: Wastes exhibiting any of the following characteristics: ignitability, corrosivity, reactivity, or EP-toxicity (yielding toxic constituents in a leaching test). In addition, EPA has listed as hazardous other wastes that do not necessarily exhibit these characteristics. Although the legal definition of hazardous waste is complex, the term more generally refers to any waste that EPA believes could pose a threat to human health and the environment if managed improperly. RCRA regulations set strict controls on the management of hazardous wastes.

HEPA: High-Efficiency Particulate Air (filters).

HMTA: Hazardous Materials Transportation Act, 1974.

HSC: California Health and Safety Code.

HSWA: Hazardous and Solid Waste Amendments of 1984 to RCRA. These amendments to RCRA greatly expanded the scope of hazardous waste regulation. In HSWA, Congress directed EPA to take measures to further reduce the risks to human health and the environment caused by hazardous wastes.

HWCL: Hazardous Waste Control Law. The California law that promotes protection of the environment through proper waste handling.

HWM: Hazardous Waste Management Division of the Environmental Protection Department (LLNL).

IC: EMT Incident Commander. Establishes an EMC for coordination of emergency response activities and determines if deployment of the EMT is required.

Interim Status: A legal classification that applies to hazardous waste incinerators or other hazardous waste management facilities that were under construction or in operation by November 19, 1980, and can meet other interim status requirements. Interim status facilities may operate without a permit until EPA has made a final decision on the permit application.

IWMB: Integrated Waste Management Board.

kg: kilogram.

LDR: Land Disposal Restriction.

LEA: Local Enforcement Agency.

LEDO: Lab Emergency Duty Officer.

Liner: A continuous layer of natural or man-made materials lining the bottom and/or sides of a surface impoundment, landfill, or landfill cell that restricts the downward or lateral escape of hazardous waste, hazardous waste constituents, or leachate.

Listed Waste: A specific chemical or type of waste appearing on a list in Title 22.

LLNL: Lawrence Livermore National Laboratory.

LSA: Low Specific Activity.

LWRP: Livermore Water Reclamation Plant. The city of Livermore's municipal wastewater treatment plant, which accepts discharges from the LLNL Livermore site.

MACT: Maximum Available Control Technology.

MCL: Maximum Contaminant Levels in Drinking Water.

MSDS: Material Safety Data Sheet. Contains descriptive information on hazardous chemicals under OSHA's Hazard Communication Standard (HCS).

NAAQS: National Ambient Air Quality Standards. (See AAQS).

NAGPRA: Native American Graves Protection and Repatriation Act.

NCA: Noise Control Act of 1972. Established that federal agencies must comply with federal, state, and local environmental noise control requirements to the same extent as private entities.

NEPA: National Environmental Policy Act. A federal statute that imposed the first requirements on federal agencies to consider the environmental effects that may result from agency actions. One provision of NEPA requires the preparation of an Environmental Impact Statement by federal agencies when "major" actions are taken.

NESHAP: National Emissions Standards for Hazardous Air Pollutants. Found in the Clean Air Act. Standards are set for such pollutants as beryllium and radionuclides.

NFC: National Fire Code. Fire protection guidance published by the NFPA.

NFPA: National Fire Protection Association. Organization that sets standards to prevent fire hazards.

NHPA: National Historical Preservation Act.

NIOSH: National Institute for Occupational Safety and Health. Agency that researches and recommends appropriate occupational standards for OSHA.

Non-Precursor Organic Compound (NPOC): An organic compound that does not react or contribute to the formation of ozone. The following are considered non-precursor organic compounds by the BAAQMD: methylene chloride, 1,1,1-trichloroethane, 1,1,2-trichlorofluoroethane (CFC-113), trichlorofluoromethane (CFC-11), dichlorodifluoro-methane (CFC-115), 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124), pentafluoroethane (HFC-125), 1,1,2,2-tetrafluoroethane (HFC-134), 1,1,1-trifluoro-ethane (HFC-143a), 1,1-difluoroethane (HFC-152a), trifluoromethane (CFC-23), and perfluorocarbons which fall into the following classes:

- Cyclic, branched or linear, completely fluorinated alkanes;
- Cyclic, branched or linear, completely fluorinated ethers with no unsaturations;

- Cyclic, branched or linear, completely fluorinated tertiary amines with no unsaturations; and
- Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

Nonhazardous Solid Waste: Solid or liquid wastes, including garbage, trash, refuse, paper rubbish, industrial, demolition and construction wastes, food, sludge, or any other nonhazardous discarded material.

Notice of Authority to Construct: A preconstruction permit issued by an air district.

Notice of Violation (NOV): A notice to an owner of apparent or potential violations of air district or hazardous waste regulations observed during an inspection and corrective actions to be taken. (Also referred to as a Warning Letter in terms of federal and state RCRA regulations.)

NOV: See "Notice of Violation (NOV)."

NO_X: Nitrogen Oxides. Product of combustion and a major contributor to acid deposition and the formation of ground level ozone. A criteria pollutant.

NPDES: National Pollutant Discharge Elimination System. This federal regulation, under the Clean Water Act, requires permits for discharges into surface waterways. LLNL holds NPDES permits at Livermore for groundwater discharges to the arroyos and for cooling-tower discharges at Site 300.

NPL: National Priorities List. EPA's list of the top-priority hazardous waste sites in the country that are subject to the Superfund program.

NRC: National Response Center. The federal department which receives notification, as required by CERCLA, if hazardous substance releases to the environment in a 24-hour period exceed reportable quantities established in the regulations.

NRC: Nuclear Regulatory Commission.

NTS: Nevada Test Site (DOE).

O&M: Operation and Maintenance.

OB/OD: Open burning/open detonation of highly explosive wastes.

OEHHA: Office of Environmental Health Hazard Assessment. The agency within Cal/EPA that identifies, quantifies, and recommends health-based standards for chemical use.

OERO: On-site Emergency Response Organization.

OES: Office of Emergency Services. The agency within Cal/EPA that manages and oversees the state hazardous material emergency planning and community right-to-know programs.

ORAD: EPD's Operations and Regulatory Affairs Division. This division is responsible for compliance with emergency planning and reporting requirements.

OSHA: Occupational Safety and Health Administration. Sets and enforces workplace standards. DOE has an equivalent program and so is not subject to OSHA enforcement.

Ozone (O_3): A criteria pollutant in ambient air. In the stratosphere, it is an essential covering of protection to the earth from ultraviolet radiation.

PA/SI: Preliminary assessment and site inspection. Used to determine whether a hazardous waste site may be a candidate for expeditious cleanup or whether a more detailed and comprehensive assessment must occur.

Part B Permit: The second, narrative section submitted by generators in the RCRA permitting process. Covers in detail the procedures followed at a facility to protect human health and the environment.

Particulate Matter: Particles of solid or liquid matter less than 10 microns in diameter, such as soot, dust, aerosols, fumes, and mists. A criteria pollutant.

PCBs: Polychlorinated Biphenyls. PCBs are highly regulated compounds. Incineration and handling of PCBs is regulated under TSCA, rather than RCRA. Incinerators that burn PCBs must achieve DREs of 99.9999.

Performance Standards: Specific regulatory requirements established by EPA limiting the concentrations of designated organic compounds, particulate matter, and hydrogen chloride in emissions from incinerators. Permit applicants must show that the incinerator can meet the performance standards under specific operating conditions specified in the RCRA permit. EPA also established performance standards for concentrations of metals and organics in wastewater.

Permit to Operate: An operational permit issued yearly by BAAQMD and every five years by SJVUAPCD.

POC: Precursor Organic Compounds. Volatile organic compounds that react in the troposphere with nitrogen oxides in the presence of sunlight to form photochemical "smog," of which ozone is a primary constituent. Any compound of carbon that reacts or contributes to the formation of ozone.

Point Source: Any confined and discrete conveyance (i.e., pipe, ditch, well).

Porter-Cologne Act: State of California Act that established two-tier administrative organization to enforce its water-quality legislation: Regional Water Quality Control Boards, and the State Water Resources Control Board.

POTW: Publicly Owned Treatment Works. General term used for sewage treatment plants. The Livermore Water Reclamation Plant is the POTW that accepts sewage from LLNL.

PP: Proposed Plan.

PPA: Pollution Prevention Act of 1990.

ppm: Parts per million.

PRAG: Permits and Regulatory Affairs; a group in ORAD.

Pretreatment: Any process used to reduce a pollutant load before it enters the sewer system.

Public Comment Period: A specified amount of time allowed for members of the public to express their views and concerns regarding an action by EPA. The public comment period begins after EPA publishes a draft permit or a Notice of Intent to Deny.

Public Notice: Notification by an agency informing the public of agency actions, e.g., the issuance of a draft permit. For draft permits, EPA must follow procedures to ensure proper public notice, including publication of the notice in newspapers and broadcast of the notice over radio stations.

QA: Quality Assurance.

QC: Quality Control.

RACM: Regulated Asbestos Containing Material. RACM consists of friable asbestos and forms of asbestos which may become friable due to handling.

RCRA: Resource Conservation and Recovery Act of 1976. RCRA is an amendment to the first federal solid waste legislation, the Solid Waste Disposal Act of 1965. In RCRA, Congress established initial directives and guidelines for EPA to regulate hazardous wastes.

Recycling: The process by which salvaged materials become reusable products.

Remedial Investigation (RI): An investigation conducted to fully assess the nature and extent of the release, or threat of release, of hazardous substances, pollutants, or contaminants and to gather necessary data to support the corresponding feasibility study.

Requisition Form: A form issued by the Hazardous Waste Management Division (HWM) of the Environmental Protection Department. The form is filled out by the generator of hazardous waste prior to transport of the waste by HWM for treatment and/or off-site disposal.

Response to Comments: A document that addresses all significant public comments received by EPA during the public comment period on a proposed permit or action. The document includes a summary of each comment, as well as EPA's response to each comment.

Reuse: Using materials again in the same or a similar process.

RI/FS: Remedial Investigation/Feasibility Study.

Risk Assessment: The use of established methods to measure the risks posed by an activity such as hazardous waste treatment. Risk assessments evaluate (1) the relationship between exposure to toxic substances and the subsequent occurrence of health effects, and (2) the potential for that exposure.

RMMA: Radioactive Materials Management Area. An LLNL location where radioactive contamination of a waste could occur.

ROD: Record of Decision.

RQ: Reportable Quantity.

RSDR: Retention System Disposition Record.

RWQCB: Regional Water Quality Control Board. A regional agency that maintains water quality standards for areas within its jurisdiction and enforces state water quality laws. The Livermore site is regulated by the San Francisco Bay Region; Site 300 is regulated by the Central Valley Region.

SARA: Superfund Amendments and Reauthorization Act of 1986. Modifications to CERCLA enacted on October 17, 1986. Title III of this act is also known as the Emergency Planning and Community Right-to-Know Act of 1986.

SB: California State Senate Bill.

SDWA: Safe Drinking Water Act. Federal law that established a program to protect the quality of drinking water.

SFWD: San Francisco Water District. LLNL's water supplier.

SHPO: State Historic Preservation Officer.

SIP: State Implementation Plan.

SIR: Statistical Inventory Reconciliation. A method of statistically analyzing 30 to 45 days of manual stick readings of tank levels for leaks.

Site Development Plan: Land use planning objectives that are consistent with the strategic vision for the LLNL mission. This plan is administered through the Space and Site Planning Division.

SJVUAPCD: The San Joaquin Valley Unified Air Pollution Control District. This agency is principally responsible for developing, administering, and enforcing programs regulating stationary sources of air emissions. The SJVUAPCD governs LLNL's Site 300.

Source Reduction: The technique of modifying everyday activities so that less waste is generated.

SO_X: Sulfur Oxides.

SPCC: Spill Prevention Control and Countermeasure. Facilities that could accidentally discharge oil to navigable waters are required to develop this plan on how they will respond in the event of a spill.

SRRE: Source Reduction and Recycling Elements.

Sulfur Dioxide (SO_2): A product of natural gas and diesel fuel combustion. A criteria pollutant.

Superfund: The common name used for the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). CERCLA is a federal statute that gives the federal government the ability to respond to hazardous waste releases that pose a potential threat to human health and the environment. California has also established a "State Superfund" under provisions of the California Hazardous Waste Control Act.

Surface Impoundment: A facility or part of a facility that is a natural topographic depression, artificial excavation, or diked area formed primarily of earthen materials, although it may be lined with man-made materials. The impoundment is designed to hold an accumulation of liquid wastes, or wastes containing free liquids, and is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

SWPPP: Stormwater Pollution Prevention Plan. Designed to provide effluent limitations which require dischargers to control and eliminate the sources of pollutants in stormwater.

SWRCB: State Water Resources Control Board. A state agency under Cal/EPA that develops and adopts statewide water quality plans and policies; issues permits pertaining to property rights to use water; and acts as an appellate agency for actions of the Regional Water Quality Control Boards.

TAGG: Tank Assessment and Guidance Group of the EPD.

TDS: Total Dissolved Solids. The portion of solid material in a wastestream that is dissolved and passed through a filter.

Title 22: Title 22 of the California Code of Regulations. These California regulations are implemented by the DTSC and regulate the management of hazardous waste.

TRI: Toxic Release Inventory.

TRU: Transuranic (containing transuranium nuclides).

TSCA: Toxic Substances Control Act. The federal statute under which the storage, use, treatment, and disposal of PCBs are regulated.

TSD: Treatment, Storage, and Disposal. A term used to describe hazardous waste management options.

TSDF: Treatment, Storage, and Disposal Facility. A facility that manages hazardous waste under provisions of a permit.

TSS: Total Suspended Solids.

UCRL: University of California Radiation Laboratory, Livermore. The name of LLNL in 1952.

USFWS: United States Fish and Wildlife Service.

UST: Underground Storage Tank. A stationary device designed to contain an accumulation of hazardous materials or waste. A tank is constructed primarily of nonearthen materials, but the entire surface area of the tank is totally below the surface of, and covered by, the ground.

UV: Ultraviolet.

VOC: Volatile Organic Compound. Liquid or solid organic compounds that have a tendency to spontaneously pass into the vapor state.

WAA: Waste Accumulation Area. A temporary (less than 90 days) storage area for hazardous waste.

WAC: Waste Acceptance Criteria.

Wastewater Treatment System: A collection of treatment processes and facilities designed and built to reduce the amount of suspended solids, bacteria, oxygen-demanding materials, and chemical constituents in wastewater.

Waters Bill: AB 2185. This bill and its amendments require businesses and public agencies to disclose information pertaining to chemical inventories and emergency response plans. LLNL is subject to state standards included in the Waters Bill.

WDR: Waste Discharge Requirements. Permit mechanisms that impose operating restrictions on the types and volumes of pollutants discharged in wastewater.

WIPP: Waste Isolation Pilot Plant.

Zone 7: Common name for the Alameda County Flood Control and Water Conservation district. Zone 7 is the water management agency for the Livermore-Amador Valley with responsibility for water treatment and distribution. Zone 7 also is responsible for management of agricultural and surface water and the groundwater basin.

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