

3. Environmental Program Information



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Introduction

LLNL is committed to environmental compliance and accountability. During the course of each year, the Environmental Protection Department (EPD) monitors the environment surrounding the Livermore site and Site 300 through a sampling and analysis program. In 1994, over 17,000 samples were taken, and more than 236,000 analytes were analyzed. This effort, which is conducted in accordance with DOE Orders 5400.1, 5400.5, 5484.1, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), has four purposes: (1) to assess the effectiveness of pollution control programs, (2) to assess compliance with applicable environmental laws and regulations, (3) to evaluate the impact of operations on the environment, and (4) to support CERCLA investigations and cleanup. Data are gathered from air, sewage, ground water, surface water, soil, vegetation, foodstuff, and environmental radiation samples. The type of samples collected at a specific location depends on the site and the potential pollutants to be monitored. Details on the monitoring activities can be found for each environmental medium in the specific chapters of this report. In addition, a special study of tritium in rain and storm water runoff is documented in Chapter 6, Surveillance Water Monitoring. Summary information on monitoring activities can be found in Chapter 12, Radiological Dose Assessment, and Chapter 13, Compliance Self-Monitoring.

Although its monitoring activities are quite comprehensive, EPD's main mission is to work with LLNL programs to ensure that operations are conducted in a manner that limits environmental impacts and are in compliance with regulatory guidelines. The specific activities required by environmental statutes were described in the preceding chapter. This chapter describes the divisions comprising EPD and the activities they carry out as mandated by DOE, environmental regulations, and/or LLNL management.

Environmental Protection Department

As the Laboratory's environmental support organization, EPD prepares and maintains LLNL environmental plans and guidelines, informs management about pending changes in environmental regulations pertinent to LLNL, represents LLNL in day-to-day interactions with regulatory agencies, assesses the effectiveness of pollution control programs, and monitors the environment to determine the impact of LLNL operations. EPD also helps LLNL programs to

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manage and minimize hazardous, radioactive, and mixed wastes; determines the concentrations of environmental contaminants remaining from past activities; cleans up environmental contamination to acceptable standards; and responds to emergencies in order to minimize and assess any impact on the environment and the public.

Training is an important component of EPD's work. EPD provides LLNL employees with training on environmentally related topics and improves their ability to comply with environmental regulations. Training tasks address both specialized training for environmental professionals in EPD and training in a variety of environmental topics for employees at all levels throughout LLNL.

The four operating divisions in EPD, described below, include: Operations and Regulatory Affairs Division (ORAD), Hazardous Waste Management Division (HWM), Environmental Restoration Division (ERD), and Environmental Monitoring and Analysis Division (EMAD). EPD has also established Environmental Support Teams, composed of various environmental discipline specialists from the four divisions, which work with LLNL staff to identify and address compliance issues.

Operations and Regulatory Affairs Division

The six groups that comprise ORAD specialize in environmental compliance and provide laboratory programs with information to make more informed environmental decisions. Each group makes a specific contribution toward the compliance and environmental goals of the University of California and DOE.

ORAD drafts the environmental permits for federal, state, and local agencies; tracks chemical inventories; prepares National Environmental Policy Act (NEPA) documents and conducts related field studies; provides guidance to programs on environmental issues; operates the pollution prevention and recycling programs; teaches numerous environmental training courses; and operates the underground storage tank assessment program.

LLNL programs are supported by four Environmental Support Teams. Each team includes representatives from each environmental specialty and each group within ORAD. These teams evaluate existing operations and provide guidance on environmental regulations and DOE orders for existing and proposed projects. Each environmental support team assists programs in planning, implementing, and operating projects and their environmental requirements. When permits are obtained from regulatory agencies, Environmental Support Teams aid the program in evaluating the permit conditions and implementing recordkeeping requirements. ORAD also provides the liaison between LLNL and regulatory agencies conducting inspections.

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ORAD responds to environmental emergencies such as spills and assigns a specially trained Environmental Duty Officer (EDO). Training includes simulated accidents to provide the staff with the experience of working together to resolve environmental issues within the regulatory structure. EDOs are on duty 24 hours a day and coordinate with LLNL's Hazards Control Team and other first responders or environmental specialists.

Hazardous Waste Management Division

All hazardous, radioactive, and mixed wastes generated at all LLNL facilities are managed by HWM in accordance with state and federal regulations. HWM processes, stores, packages, solidifies, treats, and prepares waste for shipment and disposal, recycling, or discharge to the sanitary sewer.

As part of its waste management activities, HWM tracks and documents the movement of hazardous, mixed, and radioactive wastes from waste accumulation areas (WAAs) located near the waste generator to final disposition; develops and implements approved standard operating procedures; decontaminates LLNL equipment; ensures that containers for shipment of waste meet the specifications of the U.S. Department of Transportation (DOT) and other regulatory agencies; responds to emergencies; and participates in the cleanup of potential hazardous and radioactive spills at LLNL facilities. HWM prepares numerous reports, including the annual and biennial hazardous waste reports required by the state and federal environmental protection agencies. HWM also prepares waste acceptance criteria documents, safety analysis reports, and various waste guidance and management plans.

In 1994, HWM completed and implemented a new waste data management system and a system to automate control of existing tank treatment units; completed the HWM Safety Analysis Report and submitted it to DOE for approval; resumed shipments of low-level waste (LLW) to the Nevada Test Site (NTS); developed new waste treatment methodologies; implemented computer-based DOT training for the HWM Division; and activated laboratory operations within Building 612 for waste verification.

Environmental Restoration Division

ERD was established to evaluate and remediate contaminated soil and ground water resulting from past hazardous materials handling and disposal, and from leaks and spills that have occurred at the Livermore site and Site 300, both prior to and during LLNL operations. At both the Livermore site and Site 300, ERD investigates field sites to characterize the existence, extent, and impact of contamination. ERD evaluates and develops various remediation technologies, makes recommendations, and implements actions for site restoration. ERD is responsible for managing remedial activities, such as soil removal and ground

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water extraction, and for assisting in closing inactive facilities in a manner designed to prevent environmental contamination.

In dealing with CERCLA compliance issues, ERD plans, directs, and conducts assessments to determine both the impact of such releases on the environment and the restoration activities needed to reduce contaminant concentrations to protect human health and the environment. ERD is responsible for interacting with the community. Several public meetings are held each year as required in the ERD CERCLA Community Relations Plans. To comply with CERCLA ground water remedial actions at the Livermore site, ERD has designed and constructed five ground water treatment facilities and associated pipeline networks and wells. At Site 300, ERD has designed and implemented two soil vapor/ground water extraction and treatment systems and one ground water extraction and treatment system. ERD has also capped two inactive mixed-waste landfills. ERD is actively designing, testing, and applying innovative remediation and assessment technologies to contaminant problems at the Livermore site and Site 300.

Environmental Monitoring and Analysis Division

The effluent monitoring, surveillance monitoring, and modeling functions of EMAD cover a number of environmental media and include sampling and analysis, risk assessment, impact modeling and analysis, and reporting. EMAD is responsible for monitoring the environmental effects, both radiological and nonradiological, of effluent streams of air, sewage, storm water runoff, and wastewater. The monitoring is performed by sampling point-source discharges in accordance with federal regulations. EMAD works with other LLNL programs to prepare storm water pollution prevention plans, eliminate illicit wastewater discharges, and provide regulatory guidance and permitting assistance on storm water/wastewater issues. The surveillance, effluent, and compliance monitoring program includes direct radiation monitoring; radiological and nonradiological monitoring of air, soil, water, ground water, vegetation, and foodstuff; as well as meteorological monitoring.

The EMAD analytical laboratory supports LLNL waste generators and HWM in performing chemical and radiological analysis to identify, characterize, and certify waste for proper disposal. Risk assessment and impact modeling and analysis are part of this work.

EMAD is responsible for producing this annual Environmental Report and for radionuclide effluent reporting and compliance demonstration under the National Emission Standards for Hazardous Air Pollutants (NESHAPs) of the Clean Air Act. EMAD is responsible for producing the quarterly ground water report and annual ground water report for the Central Valley Regional Water Quality Control Board (RWQCB); the semiannual wastewater report; and a

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number of other documents, including those dealing with wastewater management for regulatory compliance, permit applications, monitoring reports, and compliance plans.

During 1994, the four operating divisions in EPD included ORAD, HWM, ERD, and EMAD. In early 1995, EPD reorganized, moving the functions of EMAD into ORAD and the Chemistry and Materials Science Directorate.

Self-Monitoring Programs

At both the Livermore site and Site 300, a number of self-monitoring programs are required by the permits and regulations governing projects and activities. The National Pollution Discharge Elimination System (NPDES) permits require self-monitoring of storm water discharges associated with industrial activity (covered under the California General Industrial Activity Storm Water Permit) and of construction projects that are 2 hectares and greater (covered under the General Construction Activity Storm Water Permit).

Self-monitoring of pretreated, nondomestic, industrial-source wastewater is required at both sites by the Livermore Water Reclamation Plant, under the authority of the San Francisco Bay RWQCB, for wastewater that will be discharged from LLNL into the City of Livermore sewer system. The standards for pretreated water are defined in 40 CFR 403.

Self-monitoring is required at the Livermore site by the San Francisco Bay RWQCB for discharge of treated ground water to a percolation pond, to the surface drainage system, or for on site reuse. Similarly, self-monitoring programs at Site 300 are required by permits issued by the Central Valley RWQCB for discharges of cooling tower blow down water to surface waters, for discharges of treated ground water from the eastern General Services Area (GSA) treatment facility, and for monitoring of landfills at the site. In addition, self-monitoring programs are dictated by substantive requirements (under CERCLA) issued by the Central Valley RWQCB for discharges of treated ground water from the central GSA treatment facility and the Building 834 treatment facility.

Waste Minimization and Pollution Prevention Awareness Plan

The combined *Waste Minimization and Pollution Prevention Awareness Plan* (Celeste 1994) was prepared in accordance with DOE Order 5400.1. It was originally issued on May 31, 1991, updated on May 31, 1992, and revised in April 1994. Since then several significant changes in regulatory requirements have affected Laboratory operations. Some changes include: California passed a law requiring reporting of recycled non-RCRA wastes; the California Hazardous Waste Management and Source Reduction Review Act led LLNL to identify its

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largest hazardous waste streams, select waste minimization options for them, and make a commitment to implement them; the Pollution Prevention Act of 1990 required significant modifications to the existing LLNL hazardous waste data reporting procedures; and the Land Ban placed new restrictions on the generation of mixed wastes.

Other changes resulted from new definitions, requirements, and restrictions. These include the reduction by DOE of the level of radioactivity that defines waste as radioactive or mixed; new offset requirements for local air emissions that have increased the difficulty of obtaining air permits; an Executive Order issued in September 1991 that requires new emphasis on the use of recycled materials by all federal facilities; California's increased restrictions on the quantities of nonhazardous wastes that may be disposed of in landfills; and the directives by the DOE Secretary to participate in the EPA 33/50 program to reduce emissions of 17 priority chemicals, submit progress reports on the program, phase out Class I ozone-depleting chemicals by the end of 1995, and submit progress reports on this phase-out.

LLNL is continuing to address these changes and to follow the strategies proposed in the original 1991 *Waste Minimization and Pollution Prevention Awareness Plan*. The plan includes the following three actions: first, each Laboratory program is continuing to conserve resources, minimize waste generation, and prevent pollution. This includes creating incentives for pollution prevention; developing specific goals and schedules for waste minimization activities; promoting the use of nonhazardous materials; substituting, reformulating, modifying, managing, and/or recycling waste materials to achieve minimal adverse effects; targeting policies, procedures, or practices that may be barriers to waste minimization; and integrating and coordinating waste generators and waste managers on waste minimization issues. The second action is to enhance communication of waste minimization goals and ideas. This has involved developing and implementing employee pollution prevention awareness activities, including regular articles in *Newsline* (the LLNL biweekly newspaper) or other periodicals. It also includes collecting and disseminating waste minimization information through technology transfer and outreach and through presentations at conferences and internal LLNL meetings. The third action involves characterizing waste streams and developing a baseline of waste generation data.

LLNL conducted a number of activities in support of the plan, continued to communicate management's commitment to curtail pollution, and publicized the goals of pollution prevention through posters and articles in *Newsline* and the *Pollution Prevention Advisor*. LLNL conducted formal training on pollution prevention and on the responsibilities of waste generators. Pollution prevention displays and handouts are regularly presented during Earth Week at Earth Day fairs, and at an on-site Energy Fair. Environmental Alerts (one-page flyers) were

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published and distributed to all LLNL employees, conveying information on environmental concerns, possible solutions, recommended practices, and pertinent environmental regulatory issues. Changes and additions to regulatory requirements, new technologies, and management changes related to environmental issues continued to be conveyed in 1994 by the environmental analysts assigned to specific site areas.

Pollution Prevention Activities

LLNL prepared the *Annual Report on Waste Generation and Waste Minimization Progress* (Celeste 1994) for DOE in October 1994. The Laboratory also submitted a report to Alameda County concerning recycling of non-RCRA hazardous wastes, which described LLNL's waste minimization achievements and successes.

LLNL's operating contract now includes waste minimization and pollution prevention performance measures. In 1994, reductions of 5% for three specific streams and a 10% reduction in the aggregate total were established. The three specific streams are discussed below.

Contaminated gravel and debris from the firing tables at Site 300 are generated as a result of explosive testing. The segregation of debris from gravel, administrative controls, and material substitution of nonhazardous for hazardous material, when possible, has reduced this waste stream from 95 metric tons in 1993 to 77 metric tons in 1994 (1 metric ton = 10^3 kilograms). Additionally, a new gravel washer has been purchased to allow the reuse of gravel and reduce this waste stream. The gravel washer is scheduled to be on-line in 1995.

Aqueous liquids from the paint shop spray booth have been significantly reduced by improving the process. A microseparator has been installed to separate the spray paint solids from the water, which allows the reuse of the water in the spray booth. The total wastewater for 1994 was 8.7 metric tons compared to 11.7 metric tons for 1993, a reduction of about 27%. There should only be about one 55-gallon (208-liter) drum of solid paint sludge generated per year from now on.

Spent aqueous coolant wastes are generated from machine tools when the coolant becomes unusable. A product recovery system was installed to separate the tramp oils and solids from the water/oil emulsion, which is then reused. This waste stream has been reduced from 32.7 metric tons in 1993 to 24.5 metric tons in 1994. A portable recycling unit is being evaluated to process hazardous machine coolant wastes in small machine shops that do not justify the expense of a large, permanently installed unit. The portable recycler filters out particulates and coalesces tramp oils, and may extend the coolant life from one month to as much as seven months.

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LLNL has begun to differentiate routine from nonroutine waste generation. Nonroutine wastes include remediation projects and construction projects. We have established a soil management program to maximize the reuse of soil on site instead of shipping the soil to a landfill.

Reduction of waste is a continuing effort at LLNL. A significant part of this effort has been to reduce hazardous organic solvents that are disposed of as liquid hazardous waste or that may evaporate into the air. The Pollution Prevention Group solicits from LLNL programs parts that are currently cleaned with solvents such as chlorofluorocarbons (CFCs) or halogenated hydrocarbons. After cleaning with alternative solvents, they are returned to the programs with suggestions for alternative solvent use. To date, approximately 25 shops or laboratories on site have converted to environmentally friendly chemistries in their cleaning operations.

A contamination analysis sensor is currently being developed to measure the cleaning performance of different solvents in near-real time, which will help redesign cleaning processes to be more efficient and present less environmental risks. The sensor will be field-tested in the aerospace and electronics industry in the coming year.

LLNL is now recycling its ethanol laser dye solution and its CFCs off site. The reprocessed CFCs are sent back to LLNL for reuse. Laser users are also experimenting with the use of carbon dioxide snow and pellet sprays for precision cleaning of optics, electronics, and other assemblies. After cleaning, the carbon dioxide sublimates, leaving no solvent waste.

Many LLNL programs and directorates have recently implemented significant pollution prevention technologies. The Electronics Engineering Department has improved pollution control at its Rapid Prototype Facility (RPF), one of several on-site electronics fabrication facilities. Aqueous solvents and alternative cleaning equipment have decreased air emission and hazardous waste sources. In addition, dilute nitric acid has replaced chromium-based desmutting, and cyanide has been eliminated from conversion-coating operations for metal finishing. Plant Engineering has replaced a CFC degreaser in its instrument shop with a triple-rinse aqueous system, cutting CFC use by 1,500 liters per year.

Chlorinated solvents in the Engineering Directorate's machine shops have been largely replaced with nonhazardous cleaners. Engineering's electroplating shop has evaluated alternatives to hexavalent chromium plating and is using a dialysis unit to recycle nickel from electrolyte plating baths. The shop has also installed equipment for recycling aqueous detergent-based cleaning chemicals.

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LLNL continues to operate a successful Chemical Exchange Warehouse (CHEW) to receive, temporarily store, and track excess usable chemicals in order to make them available to other users. By reusing chemicals, the hazardous waste stream is lessened, thereby reducing chemical procurement and disposal costs. LLNL has also shipped over 380 metric tons of hazardous material for recycling in 1994.

Materials Recycling

In 1994, 314 metric tons of paper (including destroyed classified and nonclassified paper wastes) were collected and recycled. In 1994 LLNL's wood recycling (410 metric tons), excess food donation (0.96 metric tons), toner cartridge recycling (2.01 metric tons), composting, and Buy Recycle programs continued to grow.

In the second of two nonhazardous waste stream assessments, LLNL sampled and categorized solid wastes from more than 25 dumpsters according to their types. Total paper waste constituted approximately 50% (by weight) of the material sampled. The paper waste was categorized as white paper, cardboard, newsprint, colored paper, coated paper, computer (green bar) paper, and paper towels. Quantities of white paper observed during the assessment indicated that the white paper recycling program is successful, but there is a need for additional awareness programs that would increase participation even more. These 1993 findings were the basis of the expansions discussed below.

Cardboard comprised the largest single waste stream category. LLNL will implement full-site collection in 1995. In addition, LLNL expanded the paper recycling program to include colored paper. Non-LLNL phone book recycling was expanded to a full-year program in 1994.

LLNL maintains a Buy Recycle Committee in response to Executive Order 12873 that mandates federal facilities to increase use of recycled materials. LLNL Stores now carry white photocopier and printer paper containing 50% recycled fiber content (with 10–25% post-consumer waste), refillable bottles that replace aerosol cans, aqueous-based correction fluid, low alkalinity dishwashing compound, rechargeable batteries, and refurbished laser printer toner cartridges. The Technical Information Department demonstrated that recycled paper could be used in most copiers and laser printers, resulting in acceptance by many other departments.

Property Management's Donation Utilization and Sales (DUS) Group has a project to divert scrap material from being dumped into landfills and make it available for LLNL reuse at no cost to the programs. The most common types of reuse items are moving boxes, wooden pallets, box pallets, office supplies and furniture, and general hardware, such as nuts, bolts, and screws. Scrap metals that are not picked up for reuse are sold under term contracts, as are tires, cardboard, telephone books, electronic scrap, and destroyed/baled classified

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paper. In 1994, programs were implemented to recycle magazines and newspapers, and DUS recycled over 1,190 metric tons of scrap material. DUS is working closely with the Pollution Prevention Group to explore new avenues of recycling. In 1994, DUS's Education Program donated over \$5 million worth of excess equipment (under DOE guidelines) to schools around the state.

LLNL received a certificate of appreciation from DOE in 1994 commending the Laboratory's contribution to pollution prevention.

Building Inspections

Formal, detailed building inspections for each LLNL facility are conducted based on a schedule established by the Facility Manager and the appropriate Environmental Safety and Health (ES&H) team. The ES&H teams are made up of health, safety, and environmental discipline specialists who assist LLNL to maintain compliance with ES&H requirements.

The inspections scrutinize proper handling and management of hazardous and radioactive wastes and waste streams, management and maintenance of WAAs, potential release pathways to the environment (e.g., storm and sanitary sewer drains), hazardous product storage areas, wastewater retention systems, operating equipment (e.g., vacuum pumps, transformers, capacitors, and baghouses), and laboratory and machine shop areas. An inspection report is prepared for a program or department, and follow-up checks are conducted to ensure implementation of recommendations or corrections. Walkthrough inspections are conducted on an as-needed basis. During 1994, the ES&H teams conducted 122 formal building inspections at the Livermore site. At Site 300, the team conducted nine formal building inspections. EPD conducted 10 audits of the HWM facilities at the Livermore site and 10 audits of the HWM facilities at Site 300.

Waste Accumulation Area Inspections

Program representatives conducted inspections at least weekly at all WAAs to ensure that WAAs are operated in compliance with regulatory requirements. An inspection checklist is completed, and corrective actions are implemented. In addition, EPD conducted biweekly, routine checks at all WAAs to help ensure that programs manage their WAAs and wastes in compliance with state and federal requirements. Chapter 2 provides additional inspection information under the subsection on Waste Accumulation Areas.

Spill Response

Investigation, sampling, and evaluation of all spills and leaks that are potentially hazardous to the environment are conducted when necessary. The spill response process includes identifying the spill or leak, shutting off the source (if safe to do so), eliminating ignition sources, contacting appropriate emergency personnel, cordoning off the area, containing the spill or leak, absorbing and neutralizing

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the spill or leak, assisting in cleanup of the spill or leak, determining if a spill or leak must be reported to regulatory agencies, and verifying that cleanup (including decontaminating and replenishing spill equipment) is complete. Environmental analysts also provide guidance to the programs on preventing spill recurrence.

Spill Reporting

Under authority of the *San Francisco Bay Water Quality Control Plan*, the San Francisco Bay RWQCB requires a report of all releases to the ground or surface waters that are not specifically allowed in permits. LLNL negotiated a spill reporting procedure with the San Francisco Bay RWQCB to replace an existing requirement to report minor spills. The procedure identifies what types of spills must be reported and when the spills are considered to be of so little consequence that records can be kept on file rather than reported. If a spill of a reportable quantity of material occurs or one that is not contained, the appropriate agencies are contacted immediately.

Site Evaluations Prior to Construction

Soil and debris from construction sites are sampled and analyzed for potential contamination. Soil is disposed of according to established procedures, based on analytical results. During 1994, environmental analysts conducted preconstruction site evaluations for 96 construction projects.

Environmental Training

Major efforts are ongoing to provide LLNL employees with training on environmental topics aimed at improved compliance. Training tasks address both specialized training for environmental professionals and training in a variety of environmental topics for employees at all levels throughout LLNL. Courses presented by EPD's Training Section are listed in **Table 3-1**.

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Table 3-1. EPD training courses.

Advanced Environmental Law and Regulation	Packaging Operations
Air Source Management	Placarding: Hazardous Waste Transport
Asbestos Hazards (HWM)	Radioactive Materials
Chemical Compatibility	RCRA Facility Management
Emergency Response Briefing—Removal	RCRA Operations
Environmental Law and Regulation	Safety
General Awareness/Familiarization	SARA/OSHA Refresher Training
Hazardous Waste Generation and Certification	SARA/OSHA Supervisory Training
Hazardous Waste Sampling	SARA/OSHA Training 24 Hour
Hazardous Waste Transportation	SARA/OSHA Training 40 Hour
Identification of Hazardous Material	Separation for Highway Transport
Labeling of Packages	Shipping Papers
Low-Level Waste Certification Overview	Spill Prevention, Control, and Countermeasures
Low-Level Waste Generation and Certification	TRU Waste Generation and Certification
Marking of Packages	Unique Moves
NEPA Overview	Waste Accumulation Area Operations
Overview of Environmental Law and Regulation	Waste Accumulation Area Overview