

## 3. Environmental Program Information

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LLNL is committed to enhancing its environmental stewardship and to reducing any impacts its operations may have on the environment. This chapter describes the lead organizations that support LLNL's environmental stewardship and describes LLNL's Environmental Management System (EMS) and Pollution Prevention/Sustainability Program (P2S).

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### 3.1 Environmental Protection Program

Three organizations lead the environmental protection program and provide environmental expertise to the Laboratory: Environmental Functional Area (EFA), Radioactive and Hazardous Waste Management (RHWM) Division, and Environmental Restoration Department (ERD). Spill response and energy, water, and fleet management are also key components of environmental protection and sustainability.

#### 3.1.1 Environmental Functional Area

EFA is responsible for environmental monitoring and environmental regulatory interpretation and implementation guidance in support of LLNL's programs. EFA prepares and maintains environmental plans, reports, and permits; maintains the environmental portions of the *Environment, Safety, and Health (ES&H) Manual*; informs management about pending changes in environmental regulations pertinent to LLNL; represents LLNL in day-to-day interactions with regulatory agencies and the public; develops and provides institutional environmental training; and assesses the effectiveness of pollution control programs. A principal part of EFA's mission is to work with LLNL programs to ensure that operations are conducted in a manner that limits environmental impact and is in compliance with regulatory requirements. The LLNL EMS is managed within EFA through the EMS Team, which has representatives from each Principal Directorate and the Director's Office.

#### 3.1.2 Radioactive and Hazardous Waste Management Division

RHWM manages all hazardous, radioactive, and mixed wastes generated at LLNL facilities in accordance with local, state, and federal requirements. RHWM processes, stores, packages, treats, and prepares waste for shipment and disposal, recycling, or discharge to the sanitary sewer. As part of its waste management activities, RHWM tracks and documents the movement of hazardous, mixed, and radioactive wastes from waste accumulation areas (WAAs), which are typically 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. RHWM prepares numerous reports

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in support of its mission including those required by regulation and various guidance and management plans.

RHWM meets regulations for the treatment of LLNL's mixed waste in accordance with the requirements of the FFCA. The schedule for this treatment is negotiated with California and involves utilizing on-site treatment options as well as finding off-site alternatives.

#### **3.1.3 Environmental Restoration Department**

ERD evaluates and remediates soil and groundwater contaminated by past hazardous materials handling and disposal practices and from leaks and spills that have occurred at the Livermore site and Site 300 prior to and during LLNL operations. ERD conducts field investigations at both 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 water and soil-vapor extraction and treatment, and for decontamination, decommissioning, and demolition of closed facilities in a manner that prevents environmental contamination and completes the facility life cycle. As part of its responsibility for CERCLA compliance issues, ERD plans, directs, and conducts assessments to determine both the impact of past releases on the environment and the restoration activities needed to reduce contaminant concentrations to protect human health and the environment.

#### **3.1.4 Response to Spills and Other Environmental Emergencies**

LLNL has an active spill response program to investigate and evaluate all spills and leaks (releases) at LLNL that are potentially hazardous to the environment. During working hours, incidents can be reported to the EPD environmental analysts supporting program areas or the LLNL Fire Dispatch for investigation and response. Off-hour incidents are reported to Fire Dispatch which notifies the Environmental Duty Officer (EDO) and the on-site Fire Department if required. The EDO, who is available 24 hours a day, seven days a week, maximizes efficient and effective emergency environmental response. The EDO and environmental analysts also notify and consult with LLNL management and have seven-day-a-week, 24-hour-a-day access to the Office of Laboratory Counsel for questions concerning regulatory reporting requirements.

#### **3.1.5 Energy, Water and Fleet Management**

The Facilities and Infrastructure Directorate implements Laboratory-wide programs for energy and water conservation, fleet management, high performance sustainable building, and renewable energy. These programs are designed to meet the requirements of DOE Order 430.2B, Departmental Energy, Renewable Energy and Transportation Management. The programs contribute to environmental protection through implementation of lab-wide reduction initiatives.

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## **3.2 Environmental Management System**

LLNL established its EMS to meet the requirements of International Organization for Standardization (ISO) 14001:1996 in June 2004. In 2006, LLNL enhanced its EMS to meet the

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requirements of ISO 14001:2004, and developed a number of Environmental Management Plans (EMPs) to address lab-wide significant environmental aspects. In October 2009, LLNL successfully achieved ISO 14001:2004 registration and has subsequently demonstrated continuous improvement through ongoing system enhancements and successful completion of two external surveillance audits.

#### 3.2.1 Environmental Management Plans

In 2010, LLNL environmental aspects were re-evaluated and seven new institutional EMPs were implemented to address significant environmental aspects affected (or potentially affected) by Laboratory operations. An eighth EMP is currently being implemented to address environmental aspects associated with the use of hazardous materials and generation of hazardous waste. Previous directorate and institutional EMPs were closed; incomplete tasks from the previous EMPs were carried over to the new EMPs as appropriate.

The new institutional EMPs have been re-designed to increase focused efforts toward achieving measurable environmental objectives and targets and provide for continuous improvement. The new EMP template utilizes a two-part format: Part A documents senior management's commitment to high-level objectives and targets; Part B incorporates several project management elements to identify required resources, milestones, and timeframes. Part B also enhances progress reporting by providing a means of tracking task completion within the form. Contributory tasks and accomplishments can be added as they occur, allowing LLNL to recognize employee grass-roots and unplanned efforts in improving environmental stewardship. **Table 3-1** is a list of the active EMPs managed for LLNL through the EMS.

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**Table 3-1.** Environmental Management Plans (EMP)

Title	Significant Aspect(s) Addressed	EMP Objective(s)
Improving Environmentally Preferable Purchasing (EPP)	Nonhazardous Materials Use Municipal Waste Generation	Improve Environmentally Preferable Purchases at LLNL through benchmarking with other sites and identifying and implement best purchasing practices
Municipal Waste Reduction	Municipal Waste Generation	Optimize use of printer/copier supplies and reduce municipal waste through recycling
Greenhouse Gas Emissions Reductions	Greenhouse Gas Emissions	Reduce LLNL greenhouse gas emissions through management of SF6 and fleet
Energy Conservation	Electrical Energy Use Greenhouse Gas Emissions Fossil Fuel Consumption	Meet or exceed DOE O 430.2B and EO 13514 energy conservation goals
Water Conservation	Water Use	Meet or exceed Performance Evaluation Plan (PEP) 7.5.3, DOE O 430.2B and EO 13514 water conservation goals
Fossil Fuel Consumption	Fossil Fuel Consumption	Reduce government vehicle fossil fuel consumption, replacement of light duty fleet with alternative fueled vehicles, and promote alternative fuels usage
Radioactive Materials use	Radioactive Materials Use	Reduce significantly the amount of radioactive materials on-site in accordance with PEP 7.3.1

#### 3.2.2 EMS Audits and Reviews

The Laboratory successfully completed two external independent audits of its ISO 14001 EMS program (April 26-29 and September 7-10) with recommendations from the auditor to continue LLNL's ISO 14001:2004 registration. These independent audits were conducted by NSF International Strategic Registrations, an internationally recognized ISO auditor, and validated the Laboratory's strong commitment to environmental stewardship.

##### 3.2.2.2 Internal Assessments and Reviews

In May 2010, a Senior Management Review of the EMS was conducted, reaffirming its commitment to the Lab's environmental policy and stewardship through the implementation of EMS.

In accordance with LLNL’s EMS the Laboratory’s environmental compliance is evaluated through reviews of internal assessments including Management Self Assessments; Management Observations, Verifications and Inspections (MOVIs); and walk-throughs and work-control assessments. In addition external agency inspections, assessments, and audits are considered in conjunction with the compliance and monitoring reports that are submitted to the various regulatory agencies. As a result of these reviews LLNL has identified areas for continuous improvement in the management of LLNL’s environmental requirements. All the issues identified in these reviews have been corrected and LLNL continues to maintain its commitment to environmental compliance.

### 3.3 Pollution Prevention/Sustainability Program

LLNL’s P2S Program (formerly known as Pollution Prevention, or P2) operates within the framework of the Integrated Safety Management System (ISMS) and EMS and in accordance with applicable laws, regulations, and DOE orders as required by contract. It encompasses stewardship and maintenance, waste stream analysis, reporting of waste generation and P2S accomplishments, and fostering of P2S awareness through presentations, articles, and events. The PS2 Program supports institutional and directorate P2S activities via environmental teams, including implementation and facilitation of source reduction and/or reclamation, recycling, and reuse programs for hazardous and nonhazardous waste; facilitation of environmentally preferable procurement; and preparation of P2S opportunity assessments.

The P2S Program at LLNL strives to systematically reduce all types of waste generated and to eliminate or minimize pollutant releases to all environmental media from all aspects of the operations at the Livermore site and Site 300. These efforts help protect public health and the environment by reducing or eliminating waste, improving resource usage, and reducing inventories and releases of hazardous chemicals. These efforts also benefit LLNL by reducing compliance costs and minimizing the potential for civil and criminal liabilities under environmental laws. In accordance with EPA guidelines and DOE policy, the P2S Program uses a hierarchical approach to waste reduction (i.e., source elimination or reduction, material substitution, reuse and recycling, and treatment and disposal), which is applied, where feasible, to all types of waste. Waste generation is tracked using RHW’s HazTrack database. By reviewing the information in this database, program managers and P2S Program staff can monitor and analyze waste streams to determine cost-effective improvements to LLNL operations.

#### 3.3.1 Routine Hazardous, Transuranic, and Radioactive Waste

Routine waste listed in **Table 3-2** includes waste from ongoing operations produced by any type of production, analysis, and research and development taking place at LLNL.

**Table 3-2. Routine hazardous waste at LLNL, FY 2007–2010.**

Waste category	FY 2007	FY 2008	FY 2009	FY 2010
Routine hazardous waste generated (MT)	138	248	159	116

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**Table 3-3. Routine transuranic and radioactive waste at LLNL, FY 2010.**

<b>Waste category</b>	<b>FY 2009<sup>(a)</sup></b>	<b>FY 2010</b>
Routine low-level waste generated (m <sup>3</sup> )	203.5	211.2
Routine mixed waste generated (m <sup>3</sup> )	24.6	21.0
Routine TRU/mixed TRU waste generated (m <sup>3</sup> )	9.4	0.6

(a) In FY 2009, a new volumetric calculation and reporting method was put in place for transuranic and radioactive wastes.

#### 3.3.2 Diverted Waste

LLNL maintains an active waste-diversion program, encouraging recycling and reuse of both routine and nonroutine waste. During 2010, DOE changed the annual reporting requirements for waste diversion in response to Executive Order 13514, issued October 5, 2009. This change required separate accounting for construction/demolition and municipal solid wastes and is reflected in the tables below.

##### 3.3.2.1 Municipal Solid Waste

Together, the Livermore site and Site 300 generated 2875 MT of routine nonhazardous solid waste in FY 2010. This volume includes diverted waste (e.g., material diverted through recycling and reuse programs) and landfill waste.

Both sites combined diverted a total 1991 MT of routine nonhazardous waste in FY 2010, which represents a diversion rate of 69%. The diverted routine nonhazardous waste includes waste recycled by RHWM and materials diverted through the surplus sales program. The portion of routine nonhazardous waste sent to landfill was 884 MT. See **Table 3-4**.

In 2010, LLNL transferred or donated for reuse 59 laptops and desktop computers and recycled 5,075 computers, monitors, and laptops, which were managed as universal waste.

LLNL recycled 55 MT of large and small batteries, which were also managed as universal waste.

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**Table 3-4.** Routine municipal waste in FY 2010, Livermore site and Site 300 combined.

<b>Destination</b>	<b>Waste description</b>	<b>Amount in FY 2010 (MT)</b>
Diverted	Baled paper	51
	Beverage containers	5
	Corrugated Cardboard	104
	Cooking grease	13
	Mixed metals	911
	Office paper	165
	Tires and scrap	12
	Toner cartridges	10
	Greenwaste (chips, compost, mulch)	720
	<b>TOTAL diverted</b>	<b>1991</b>
Landfill	Compacted (landfill)	884
	<b>TOTAL landfill</b>	<b>884</b>
<b>TOTAL routine nonhazardous waste</b>		<b>2875</b>

#### 3.3.2.2 Construction and Demolition (C&D) Waste

C&D wastes include excavated soils, wastes and metals from construction, decontamination and demolition activities. The Livermore site and Site 300 generated a total of 5638 MT of waste related to construction and demolition activities in FY 2010.

In FY 2010, the two sites combined diverted 4601 MT of nonroutine nonhazardous solid waste through reuse or recycling, which represents a diversion rate of 82%. Diverted C&D waste includes soil reused either on site for other projects or as cover soil at Class II landfills. See **Table 3-5**.

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**Table 3-5.** Construction and Demolition waste in FY 2010, Livermore site and Site 300 combined.

<b>Destination</b>	<b>Waste description</b>	<b>Amount in FY 2010 (MT)</b>
Diverted	Class II cover soil (reused at landfill)	2802
	Class II concrete (reused at landfill)	1767
	Scrap metals (recycled)	32
<b>TOTAL diverted</b>		<b>4601</b>
Landfill	Construction and demolition (noncompacted landfill)	1037
	<b>TOTAL landfill</b>	<b>1037</b>
<b>TOTAL nonroutine nonhazardous waste</b>		<b>5638</b>

(a) RHWM Waste Data Management System

#### 3.3.3 Environmentally Preferable Purchasing

LLNL has a comprehensive Environmentally Preferable Purchasing (EPP) program that includes preferential purchasing of recycled content and biobased products. In 2010, the EPP program continued to include a preference for Electronic Product Environmental Assessment Tool (EPEAT) registered products. 69 % of all desktop electronics purchases in FY 2010 were EPEAT Silver or EPEAT Gold, indicating that the products meet or exceed the Institute of Electrical and Electronics Engineers (IEEE) 1680-2006 environmental performance standard for electronic products.

#### 3.3.4 Pollution Prevention/Sustainability Activities

##### *3.3.4.1 Environmental Stewardship Accomplishments and Awards*

Each year, the P2S Program submits nominations for the NNSA environmental awards program, which recognizes exemplary performance in integrating environmental stewardship practices to reduce risk, protect natural resources, and enhance site operations. In 2010, LLNL received three Environmental Stewardship awards.

The LLNL Ferrite Core and Power Conditioning Equipment Recovery project won in the Waste/Pollution prevention category for the reuse of over 800 ferrite cores and 50,000 pounds equipment from a decommissioned facility. Reusing the cores in another project saved over \$2 million and diverted approximately 39,000 pounds of waste from the municipal waste stream.

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The LLNL Water Conservation Test Bed project won an NNSA Environmental Stewardship award in the Sustainable Design/Green Building category and a DOE honorable mention for its water conservation efforts. The 3.5-acre Water Conservation Test Bed conserves the use of potable domestic water and includes an automated landscape water management feature to transport rainwater collected from a non-industrial rooftop to underground storage tanks for use in landscape irrigation. The volume of rainwater to be collected is expected to be between 90,000 and 210,000 gallons annually. The system design allows for future expansion to other nearby sources so that ultimately no potable water will be needed for irrigation.

The P2S Program received the California Integrated Waste Management Board's 2010 Waste Reduction Award Program (WRAP) award for recycling accomplishments during the 2009 calendar year. The award recognizes California businesses and organizations that have made outstanding efforts to reduce nonhazardous waste by implementing resource-efficient practices, aggressive waste reduction, reuse and recycling activities, and procurement of recycled-content products. This is the third consecutive year that LLNL has won the WRAP award.

#### *3.3.4.2 High Performance Sustainable Buildings and Energy Conservation*

The Facilities and Infrastructure Directorate manages the implementation of DOE Order 430.2B objectives related to sustainable building materials and practices. In FY 2008, a Green Cleaning Policy was developed that meets the U. S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) requirements. The purpose and goal of the Policy is to reduce the usage of potentially hazardous cleaning chemicals and their adverse impact on indoor air quality, occupant health, and the environment. In FY 2009 and FY2010, LLNL continued to expand green cleaning lab-wide, with the goal to implement green cleaning at all applicable locations.

Also in FY 2009, two existing buildings (EB) at the Livermore site were awarded USGBC LEED-EB Operations and Maintenance certification. Building 142 received Silver certification and LLNL's Terascale Simulation Facility (TSF) received a Gold certification. The Terascale Simulation Facility also won a 2009 DOE/NNSA Federal Energy Management Program award for its two-year effort to conserve energy in TSF computer rooms and is estimated to save \$2.4 million annually in energy costs.

Another datacenter/office mixed-use building, Building 451, was submitted for USGBC LEED-EB Operations and Maintenance certification review in early FY11.

#### **3.3.5 Pollution Prevention Employee Training and Awareness Programs**

In 2010, LLNL partnered with Sandia National Laboratory California (Sandia/CA) for Earth Day. Jointly, the two sites conducted a number of activities to promote employee awareness of pollution prevention.

LLNL partnered with Sandia/CA to hold a recycled art contest for employees from both sites. Contest winners were announced during an onsite Earth Day event held at the LLNL central

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cafeteria. Also featured on Earth Day was a green business fair, including many vendors from LLNL's small business program.

Pollution prevention staff and volunteers from LLNL and Sandia/CA participated in the Livermore community Earth Day event. The event was sponsored by the City of Livermore and the Livermore Area Recreation and Park District, and included a community cleanup and a festival. Volunteer employees from LLNL and Sandia/CA staffed a table at the festival, which included a recycled art display. Information on LLNL, Sandia/CA and pollution prevention was also distributed to festival attendees.

The P2S Program conducted other awareness activities during the year. Articles on pollution prevention appeared in *Newsline* (the LLNL newspaper) and *NewsOnLine*. The P2S Program continues to conduct training for purchasing staff on Environmentally Preferable Purchasing requirements.

The P2S Program maintains an internal P2S website for LLNL employees. The website is a resource for employees who have questions regarding pollution prevention, energy efficiency, reuse and recycling of materials, green building, and other environmental topics. Employees can also use the site to suggest P2S ideas, ask questions about P2S planning and implementation, and find out about P2S current events.

The Green Hotline provides support for employees with questions, suggestions, or ideas regarding LLNL's pollution prevention and waste diversion endeavors, as well as other environmental issues.