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 LLNL's Environmental Management System (EMS) and Pollution Prevention/Sustainability Program (P2S).

3.1 Environmental Management System

LLNL continues to enhance its EMS through systematic process improvements and increased focus on establishing specific environmental objectives and performance measures contained in Environmental Management Plans (EMPs). Progress toward goals is regularly measured and provided to senior management and other interested parties through a variety of means including periodic senior management reports and the yearly update of this Environmental Report. The Laboratory's EMS has successfully maintained its International Organization for Standardization (ISO) 14001 registration since 2009 and is audited annually by a third-party internationally recognized ISO registrar for continued conformance and certification.

3.1.1 Environmental Management Plans

EMPs are designed and implemented to address the Laboratory's most significant environmental effects (aspects) and to achieve environmental objectives and performance measures (targets) that substantively reduce these. EMPs are updated annually to incorporate new initiatives and effectively demonstrate LLNL's commitment to continuous improvement. **Table 3-1** lists the eight EMPs for FY 2013, along with the significant environmental aspects each addresses, the Lab-wide environmental objectives, and the related DOE sustainability goals. LLNL's status towards meeting each of the DOE sustainability goals listed in **Table 3-1**, along with planned actions to ensure continued progress towards attaining these goals can be found in the *LLNL FY14 Site Sustainability Plan* in **Appendix D**.

Table 3-1. Environmental Management Plans (EMPs) and Related DOE Sustainability Goals.

Title	Significant Environmental Aspect(s) Addressed	EMP Objective(s)	Related DOE Sustainability Goal(s)
Sustainable Acquisition	• Nonhazardous Materials Use • Municipal Waste Generation	Promote lab-wide sustainable acquisition to meet Site Sustainability Goal 6.1 and to support DOE in meeting its EO 13514 requirements by including necessary provisions and clauses to affect new purchases, such as ensuring a procurement preference for EPEAT-registered electronic products.	6.1: Procurements meet sustainability requirements and include sustainable acquisition clause (95% each year).
Municipal Waste Reduction	• Municipal Waste Generation	Divert at least 50% of non-hazardous solid waste (including construction and demolition debris) by FY2015 to meet Site Sustainability Goals 5.1 and 5.2 and increase recycling.	5.1: Divert at least 50% of nonhazardous solid waste, excluding construction and demolition debris by FY15. 5.2: Divert at least 50% of construction and demolition materials and debris by FY15.
Greenhouse Gas Reduction	• Greenhouse Gas Emissions	Reduce Scope 1 & 2 GHG by 28% by FY20 from the FY08 baseline to meet Site Sustainability Goal 1.1. Reduce Scope 3 GHG by 13% by FY20 from the FY08 baseline to meet Site Sustainability Goal 1.2.	1.2: 13% Scope 3 GHG reduction by FY20 from a FY08 baseline. 3.2: 2% annual reduction in fleet petroleum consumption by FY20 relative to a FY05 baseline. 3.4: Reduce fleet inventory of non-mission critical vehicles by 35% by FY13 relative to a FY05 baseline. 7.3: Electronic Stewardship - 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY12.

Table 3-1. (cont.) Environmental Management Plans (EMPs) and Related DOE Sustainability Goals.

Title	Significant Environmental Aspect(s) Addressed	EMP Objective(s)	Related DOE Sustainability Goal(s)
Hazardous Materials Use and Hazardous Waste Generation	• Hazardous Materials Use Hazardous Waste Generation	Reduce the use and inventory of hazardous materials. Minimize the generation of routine hazardous, mixed low-level, and/or low-level waste.	n/a
Ecological Resources Disturbances	Ecological Resources Disturbances	Protect native species, sensitive wetland areas, and prohibit the release of invasive species in support of DOE/NNSA's compliance and long-term natural resource stewardship responsibilities.	n/a
Energy Conservation	• Electrical Energy Use • Greenhouse Gas Emissions Fossil Fuel Consumption	Reduce energy intensity (BTU per gross square foot) by 30% by FY15 from the FY03 baseline to meet Site Sustainability Goal 2.1.	2.5: 15% of existing buildings greater than 5,000 gross square feet (GSF) are compliant with the Guiding Principles (GPs) of HPSB by FY15. 2.6: All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs and where the work exceeds $5 million, each are LEED® certified. 7.2: Maximum annual weighted average Power Utilization Effectiveness (PUE) of 1.4 by FY15. 7.3: Electronic Stewardship - 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY12.

Table 3-1. (cont.) Environmental Management Plans (EMPs) and Related DOE Sustainability Goals.

Title	Significant Environmental Aspect(s) Addressed	EMP Objective(s)	Related DOE Sustainability Goal(s)
Water Conservation	• Water Use	Reduce potable water intensity (Gal per gross square foot) by 26% by FY20 from the FY07 baseline to meet Site Sustainability Goal 4.1.	4.1: 26% potable water intensity (gallons per gross square foot) reduction by FY20 from a FY07 baseline. 4.2: 20% water consumption (gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY20 from a FY10 baseline.
Fossil Fuel Consumption	• Fossil Fuel Consumption	Reduce fleet petroleum consumption by 2% annually by FY20 relative to the FY05 baseline to meet Site Sustainability Goal 3.2.	3.1: 10% annual increase in fleet alternative fuel consumption by FY15 relative to a FY05 baseline. 3.2: 2% annual reduction in fleet petroleum consumption by FY20 relative to a FY05 baseline. 3.3: 100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY15 and thereafter (75% FY2000–2015).

3.1.2 EMS Audits and Reviews

The Laboratory successfully completed one external third-party independent audit of its ISO 14001 EMS program (March 2013) with recommendations from the auditor to continue LLNL's ISO 14001 registration. This independent audit was conducted by NSF International Strategic Registrations and validated the Laboratory's solid commitment to environmental stewardship.

3.1.2.2 Internal Assessments and Reviews

In January and August 2013, Senior Management Reviews of the EMS were conducted, reaffirming management 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 regularly evaluated through reviews of internal assessments including Management Self Assessments (MSAs); Management Observations, Verifications and Inspections (MOVIs); regulatory inspections; internal and external monitoring and compliance reports; and facility walk-throughs and work-control assessments. As a result of these reviews, LLNL identifies specific practices and recommendations for corrective and preventive measures, demonstrating the Laboratory's commitment to environmental compliance.

3.2 Pollution Prevention/Sustainability Program

LLNL's P2S Program 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 P2S Program supports institutional and directorate P2S activities via environmental teams and includes implementation and facilitation of source reduction and/or reclamation, recycling, and reuse programs for hazardous and nonhazardous waste; facilitation of sustainable acquisition; and preparation of P2S opportunity assessments.

The P2S Program at LLNL strives to systematically reduce all types of waste generated and 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 lastly treatment and disposal), which is applied to all types of waste. Waste generation is tracked using RHWM'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.

3.2.1 Routine Hazardous, Transuranic, and Radioactive Waste

Routine waste listed in **Tables 3-2 and 3-3** includes waste from ongoing operations produced by any type of production, analysis, and research and development taking place at LLNL. The increase in routine hazardous waste in 2012 was due to an evaporator unit that was out of commission for part of the year and roofing debris from various projects. The increase in routine Low-Level Waste (LLW) volumes beginning in 2011 are due to NIF, PLS and WCI activities (largely wipe cleaning wastes and personal protective equipment (PPE) disposal). NIF implemented several improvements that reduced its contribution to the LLW between FY12 and FY13 sixty-five percent.

Table 3-2. Routine hazardous waste at LLNL, FY 2009–2013.

Waste category	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Routine hazardous waste generated (MT)	159	116	143	232	131

Table 3-3. Routine transuranic and radioactive waste at LLNL, FY 2009–2013.

Waste category	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Routine LLW generated (m^3)	203.5	211.2	678.3	861.7	741
Routine mixed waste generated (m^3)	24.6	21.0	27.4	45.9	32
Routine TRU/mixed TRU waste generated (m^3)	9.4	0.6	0.4	4.8	7.5

3.2.2 Diverted Waste

LLNL maintains an active waste-diversion program, encouraging recycling and reuse of both routine and non-routine waste which prevents waste from going to the landfill. In 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 **Tables 3-4 and 3-5**.

3.2.2.1 Municipal Solid Waste

Together, the Livermore Site and Site 300 generated 2,638 MT of routine nonhazardous solid waste in FY 2013. This volume includes diverted waste (e.g., material diverted through recycling and reuse programs) and landfill waste.

Both sites combined diverted a total 1,994 MT of routine nonhazardous waste in FY 2013, which represents a diversion rate of 76%. The portion of routine nonhazardous waste sent to landfill was 644 MT. See **Table 3-4**. In 2013, LLNL recycled 6,459 computers, monitors, and laptops, which were resold or managed as universal waste. LLNL recycled 24MT of large and small batteries, which were also managed as universal waste.

LLNL continued to expand recycling opportunities for plastics beyond the comingled recycling program. In 2013, 11.4 MT of plastics were recycled, this is up from 2.5 MT in 2012. The comingled recycling and composting program initiated in May 2011 was continued during 2013, diverting 44 MT of comingled recycling and 65 MT of compostable material from the landfill.

Table 3-4. Routine municipal waste in FY 2013, Livermore Site and Site 300 combined.

Destination	Waste description	Amount in FY 2013 (MT)
Diverted	Baled paper	81
	Corrugated cardboard	74.2
	Cooking grease (including grease traps)	29
	Mixed metals	748
	Scrap lead (Pb)	3
	Plastic (new in 2012)	11.4
	Office paper	187
	Scrap tires	2
	Toner cartridges	8.4
	Greenwaste (chips, compost, mulch)	605
	Wood	136
	Comingled recycling	44
	Compost (food scraps, paper towels, food containers)	65
	TOTAL diverted	**1,994**
Landfill	Compacted (landfill)	644
	TOTAL landfill	**644**
TOTAL routine nonhazardous waste		**2,638**

3.2.2.2 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 2,161 MT of waste related to construction and demolition activities in FY 2013. The two sites combined diverted 1,626 MT of non-routine nonhazardous solid waste through reuse or recycling, which represents a diversion rate of 75% in FY 2013. Diverted C&D waste includes soil and concrete reused either on site for other projects or as cover at Class II landfills. See **Table 3-5**.

Table 3-5. Construction and Demolition waste in FY 2013, Livermore Site and Site 300 combined.

Destination	Waste description	Amount in FY 2013 (MT)
Diverted	Class II cover soil (reused at landfill)	949
	Class II concrete (reused at landfill)	669
	Scrap metals (recycled)	8
	TOTAL diverted	**1,626**
Landfill	Construction and demolition (non-compacted landfill)	535
	TOTAL landfill	**535**
	TOTAL non-routine non-hazardous waste	**2,161**

3.2.3 Sustainable Acquisition

LLNL has a comprehensive Sustainable Acquisition program that includes preferential purchasing of recycled content and bio-based products. In 2013, the Sustainable Acquisition program continued to include a preference for Electronic Product Environmental Assessment Tool (EPEAT) registered computers and monitors, as well as products in two new EPEAT categories; imaging equipment and televisions. Standards for imaging equipment and televisions were finalized in 2012 and EPEAT qualified products in these categories became available in early 2013. Ninety-five percent of all desktop electronics, imaging equipment, and television purchases in FY 2013 were EPEAT Bronze, EPEAT Silver or EPEAT Gold, indicating that the products meet or exceed the Institute of Electrical and Electronics Engineers (IEEE) 1680-2009; 2012 environmental performance standard for electronic products.

To further support sustainable acquisition, LLNL launched a new internal Craigslist-like service called ReUseIt to encourage reuse of property and material. Employees are encouraged to check ReUseIt before purchasing products. Additional sustainable acquisition highlights can be found in the *LLNL FY14 Site Sustainability Plan* in **Appendix D**.

3.2.4 Pollution Prevention/Sustainability Activities

*3.2.4.1 Environmental Stewardship Accomplishments and Awar*ds

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. P2S also submits nominations for various other awards recognizing excellence in P2S projects. In 2013, LLNL received three NNSA Sustainability awards and was recognized by U.S. EPA's Federal Green Challenge (FGC) program.

"Active Risk Management at LLNL's National Ignition Facility Results in Lower Consumption and Less Waste" won an NNSA 2013 Best in Class Award in the Waste Reduction and Pollution Prevention category for significantly reducing low-level radiological waste generation, product use, and costs and time spent managing hazards. When NIF introduced radioactive fuel (tritium) to the facility in September 2010, hazard management protocols emphasized safety. As the program progressed, NIF collected data from more than 10,000 surveys to verify the effectiveness of engineering controls and also ensured the workforce was properly trained to manage hazards. With a better understanding of radiological risks and refinement of employee's skills, NIF was able to identify and implement several program adjustments to right-size safety protocols with actual hazards to improve overall operational efficiency. This 'active risk management' approach resulted in a reduction of an estimated 12,240 cubic feet of radiological waste per year, $1.3 million in consumables and 40,000 person-hours per year of time spent managing NIF hazards.

"Getting Connected to Build a Holistic Waste Reduction Program" won an NNSA Best in Class Award in the Innovation and Holistic Approach category for developing a holistic cross-disciplinary program to expand reuse and recycling opportunities and benefits across the site.

With the P2s at the hub, ties were made with individuals representing internal programs, as well as committees directing related Lab initiatives. Connections also went beyond LLNL's boundaries to tap into local and regional entities, and the greater DOE complex. All of these links made it possible to expand the types of items recycled and promote a culture that considers reuse first.

To evaluate the effectiveness of this approach, a database was established to track reuse transactions and special recycling projects. To date, an estimated $524,000 has been saved through reuse activities, and over 30,000 pounds of items for which a recycling pathway was not previously available, were recycled. The reuse and cost savings data also provided valuable evidence to support development of an internal 'Craigslist' application to facilitate reuse exchanges site-wide and better manage reuse of property.

"LLNL's Sustainable Landscape" won an NNSA Environmental Stewardship Award in the Water category for implementing sustainable landscape practices. LLNL has taken several measures to reduce irrigation water use by implementing 'smart' irrigation controllers and drought tolerant planting schemes that are compatible with the local climate. In FY11, LLNL developed a Sustainable Landscape Concept Plan to incorporate sustainability recommendations and guidelines in landscaping and irrigation practices on site, augmenting the existing Landscape Architecture Master Plan and the Laboratory's landscape program.

The plan provides design directions and a planting palette for future projects and also earmarks existing areas for lawn reduction and drought tolerant planting conversion improvements as funding allows. To date, 14 satellite irrigation controllers have been installed on site to use water more effectively, and in FY12 LLNL tackled its largest xeriscaping project to date by replacing a 20,000 square foot lawn with drought tolerant and native plants. Each controller provides an

estimated 30 percent water savings, and landscape modifications from the FY12 project are expected to save more than 400,000 gallons of water per year.

LLNL received accolades for its 2012 achievements in waste reduction and green purchasing as part of its participation in the Federal Green Challenge (FGC). The FGC is a voluntary partnership program sponsored by the EPA that challenges federal agencies to reduce their greenhouse gas emissions. FGC participants commit to a minimum 5 percent reduction in two of six target areas: Energy, electronics, purchasing, transportation, water and waste.

3.2.4.2 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 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. LLNL continues to expand green cleaning lab-wide, with the goal to implement green cleaning at all applicable locations. Alternative solutions are evaluated as the industry improves and more green products that perform effectively become available. In FY 2012, the program identified additional products for floor care, making 98% of the products purchased for floor care Green Seal certified. The new floor care products have been used in 99% of facilities.

Due to the unavailability of funding for the continuation of the High Performance Sustainable Building (HPSB) Assessments in FY2014, no new buildings were studied and assessed using the HPSB Assessment tool. In FY 2015, assessments for Buildings 1879, 5627, 1739, and 6925 will be completed, and nine additional buildings have been targeted for study.

3.2.5 Pollution Prevention/Sustainability Employee Training and Awareness Programs

In celebration of Earth Day 2013, P2S staff offered a week's worth of earth friendly events, including showings of the award-winning documentary Bag It, a low cost on-site document shredding for employee's personal documents, a preview to the monthly Farmers' Market, and an inspiring presentation and book signing by Beth Terry author of *Plastic Free: How I Kicked the Plastic Habit and How You Can Too*. Neighboring SNL/CA Laboratories employees were invited to participate in the Earth Week activities.

LLNL and SNL/CA Laboratories also worked together to continue a monthly Farmers' Market held May through October. The P2S Program collaborated with the Farmers' Market project team to incorporate sustainability measures into the market events. P2S staff continued the recycling and composting program for the market and worked with vendors to provide more sustainable packaging options.

The P2S Program conducted other awareness activities during the year. Articles on pollution prevention were published in NewsLine (LLNL's internal online newsletter), and the P2S Program continued to provide support for implementation of green events. Four large site-wide

and four program area green events were held in 2013 and resulted in diversion of over 1,300 pounds of compostable waste and 155 pounds of recyclable waste. Waste diversion at events was enhanced by use of a single Waste Station approach including specific signage and compost and recycling bins to provide a universal system that is easily recognizable by employees and provides consistent messaging at LLNL events. The P2S Program continues to conduct training for purchasing staff on Sustainable Acquisition requirements.

The EFA 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

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