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 that substantively reduce such effects. 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 2014, 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 FY15 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 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% from the FY08 baseline by FY20 (Site Sustainability Goal 1.1). Reduce Scope 3 GHG by 13% from the FY08 baseline by (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. Chemical reduction efforts should be closely coordinated with ChemTrack inventory efforts to provide greater efficiency. 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) as described in the Site Sustainability Plan in support of the Executive Order goal of reducing Federal Agency use by 30% by FY15 from the FY03 baseline (Site Sustainability Plan 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) as described in the Site Sustainability Plan in support of the Executive Order goal of reducing Federal Agency use by 26% by FY20 from the FY07 baseline (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 (July 2014) 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 October 2014, 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 Radioactive and Hazardous Waste Management's (RHWM) 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 hazardous waste in 2014 was due to construction debris, equipment disposal, and facility maintenance activities. The increase in routine Low-Level Waste (LLW) volumes beginning in 2011 is due to NIF, PLS and WCI activities (largely wipe cleaning wastes and personal protective equipment (PPE) disposal).

Table 3-2. Routine hazardous waste at LLNL, FY 2011–2014.

Waste category	FY 2011	FY 2012	FY 2013	FY 2014
Routine hazardous waste generated Metric Tons (MT)	143	232	131	202

Table 3-3. Routine transuranic and radioactive waste at LLNL, FY 2011–2014.

Waste category	FY 2011	FY 2012	FY 2013	FY 2014
Routine LLW generated (m^3)	678	862	741	896
Routine mixed waste generated (m^3)	27.4	46	32	31
Routine TRU/mixed TRU waste generated (m^3)	0.4	4.8	7.5	9.5

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 2,331 MT of routine nonhazardous solid waste in FY 2014. This volume includes diverted waste (e.g., material diverted through recycling and reuse programs) and landfill waste.

Both sites combined diverted a total 1,697 MT of routine nonhazardous waste in FY 2014, which represents a diversion rate of 73%. The portion of routine nonhazardous waste sent to landfill was 634 MT. See **Table 3-4**. In 2014, LLNL recycled 4,290 computers, monitors, and laptops, which

were resold or managed as universal waste. LLNL recycled 25 MT 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 2014, 18.75 MT of plastics were recycled, this is up from 11.4 MT in 2013. The comingled recycling and composting program initiated in May 2011 was continued during 2014, diverting 45 MT of comingled recycling and 67 MT of compostable material from the landfill.

As part of FY 2014 housekeeping activities, 30 transportainer units were identified for clean out and abatement and sent to the Laboratory's Donation, Utilization, and Sales (DUS) group for resale or recycling. This contributed to the overall mixed metal recycling total of 610 MT. Disposition of unneeded transportainers will continue in FY 2015.

Table 3-4. Routine municipal waste in FY 2014, Livermore Site and Site 300 combined.

Destination	Waste description	Amount in FY 2014 (MT)
Diverted	Baled paper	65
	Corrugated cardboard	71
	Cooking grease (including grease traps)	25
	Mixed metals	610.5
	Scrap lead (Pb)	7
	Plastic (new in 2012)	19
	Office paper	170
	Scrap tires	4
	Toner cartridges	9
	Greenwaste (chips, compost, mulch)	375
	Wood	229
	Comingled recycling	45
	Compost (food scraps, paper towels, food containers)	67
	TOTAL diverted	**1,697**
Landfill	Compacted (landfill)	634
	TOTAL landfill	**634**
TOTAL routine nonhazardous waste		**2,331**

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 933 MT of waste related to construction and demolition activities in FY 2014. The two sites combined diverted 749 MT of non-routine nonhazardous solid waste through reuse or recycling, which represents a

diversion rate of 80% in FY 2014. 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 2014, Livermore Site and Site 300 combined.

Destination	Waste description	Amount in FY 2014 (MT)
Diverted	Class II cover soil (reused at landfill)	300
	Class II concrete (reused at landfill)	443
	Scrap metals (recycled)	6
	TOTAL diverted	**749**
Landfill	Construction and demolition (non-compacted landfill)	184
	TOTAL landfill	**184**
	TOTAL non-routine non-hazardous waste	**933**

3.2.3 Sustainable Acquisition

LLNL has a comprehensive Sustainable Acquisition program that includes preferential purchasing of recycled content and bio-based products. In 2014, the Sustainable Acquisition program continued to include a preference for Electronic Product Environmental Assessment Tool (EPEAT) registered computers and monitors, imaging equipment, and televisions. Ninety-five percent of all desktop electronics, imaging equipment, and television purchases in FY 2014 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 an internal Craigslist-like service in 2013 called ReUseIt to encourage reuse of property and material. Employees are encouraged to check ReUseIt before purchasing products. Many items were exchanged through ReUseIt in 2014 and outreach materials were distributed to employees to encourage use of the site. Additional sustainable acquisition highlights can be found in the *LLNL FY15 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 2014, LLNL received one

NNSA Sustainability award, one DOE Sustainability award, and a DOE GreenBuy Program Gold award for sustainable acquisition.

LLNL won a 2014 NNSA Sustainability Award in the Water category for its efforts to reduce potable water use at the site. A significant portion of the potable water used at LLNL is for cooling towers; therefore, a pilot project was implemented to cool equipment and research facilities using treated groundwater in place of potable water. This approach to water conservation has the potential to significantly reduce potable water consumption at each of LLNL's five cooling towers, which account for nearly 45 percent of Lab potable water consumption, or approximately 100 million gallons annually. A reduction of 2.3 million gallons has already been realized through the pilot study and the Lab is exploring plans to expand the process to additional cooling towers. LLNL has also converted additional turf to native landscaping, which has reduced water use by 7 million gallons so far this year through irrigation reductions or elimination. Given the serious drought conditions California is experiencing, the Lab increased its focus on employee outreach on water conservation efforts for work and home, and also reached out to the San Francisco Public Utilities Commission who manages the Lab's water source, Hetch-Hetchy Reservoir, to explore programs to help the Lab conserve its overall water use. The combination of water conservation efforts targeting the Lab's most significant potable water uses has resulted in a running 12-month total water reduction of almost 13% in FY14 to date as compared to the base year FY07, and about 9% this fiscal year alone.

LLNL won a 2014 DOE Sustainability Award in the Climate Change Adaptation category for data center sustainability accomplishments. LLNL's Weapons and Complex Integration's High Performance Computing data center experts, in collaboration with the Laboratory's Operations & Business enterprise data center experts, leveraged LLNL's HPC Strategic Facility Master Plan to prepare and execute a Data Center Sustainability Master Plan. As a result, LLNL shut down 23 data centers since 2011, representing 26,000 square feet of space, resulting in $305,000 annual energy savings and $43,000 annual maintenance savings to date. More than 500 servers were moved into the Lab's Enterprise Data Center as a direct result. An additional benefit to the Lab was that this effort eliminated the need to install and maintain electrical meters in the shutdown data centers, as required by DOE's sustainability requirements. This represents a cost avoidance of approximately $10 million to $15 million and a total cost savings of $348,000 to date.

LLNL received a gold-level DOE GreenBuy Award for achievement in sustainable acquisition. The GreenBuy Awards program recognizes DOE facilities that purchase products with leadership-level sustainability attributes that save energy, conserve water and reduce health and environmental impacts. Federal policy requires DOE and its contractors to purchase environmentally friendly products and report integration of sustainable acquisition requirements in new contract actions; sites can elect to report on purchases of specific products in a number of categories to qualify for the GreenBuy recognition program.

3.2.4.2 High-Performance Sustainable Buildings and Energy Conservation

The Facilities and Infrastructure Directorate manages the implementation of DOE Order 436.1 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. The conversion to floor wax products without heavy metals has resulted in a significant reduction in the volume of floor wax effluent that must be managed as hazardous waste. In FY15, it is anticipated that nearly all floor surfaces will have been stripped of the metal containing floor wax and the resulting floor wax effluent generated will be non-hazardous.

Due to the unavailability of funding for the continuation of the High Performance Sustainable Building (HPSB) Assessments in FY 2014, no new buildings were studied and assessed using the HPSB Assessment tool. While a list of potential buildings to be studied has been compiled, funding for these building assessments has not yet been identified for FY14 and is not probable for FY15.

3.2.5 Pollution Prevention/Sustainability Employee Training and Awareness Programs

In celebration of Earth Day 2014, P2S staff offered a week's worth of earth friendly events, including a presentation by a greywater expert discussing common greywater systems and the basics of rainwater harvesting, sponsorship of low cost on-site document shredding for employee personal documents, and a demonstration and presentation by repurpose designer Greg Kloehn who designs fully functioning houses out of shipping containers, dumpsters and other found items. 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. At the June market, city and county water resource representatives provided outreach on water related topics and had a variety of indoor and outdoor water conservation materials. P2S staff continued to assist with 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. LLNL conducted several green

events in FY 2014 at which a centralized ‘Waste Station’ was provided to encourage recycling and composting, and reuse and conservation practices were promoted. Events included several group picnics and the Annual Environment, Safety, Security, and Health Fair. An additional 780 pounds of compost and 96 pounds of comingled recycling were collected from the events where waste was actively managed. The P2S Program continues to conduct training for purchasing staff on Sustainable Acquisition requirements, and a Green Hotline continues to provide 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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