



2

Environmental Compliance and Program Summaries



Lawrence Livermore National Laboratory is committed to operating in a manner that preserves the quality of the environment. As stated in LLNL's Environmental Policy signed by LLNL's Director in July 2004, LLNL is committed to providing responsible stewardship of the environmental resources in our care. Environmental stewardship is integrated into our strategic planning and decision-making processes and into the management of our work activities through the Integrated Safety Management System.

In support of this policy, LLNL commits to:

- Work to continuously improve the efficient and effective performance of our environmental management system
- Comply with applicable environmental laws and regulations
- Incorporate pollution prevention, waste minimization, and resource conservation into our planning and decision-making processes
- Ensure that interactions with our regulators, DOE, and our community are based upon integrity, openness, and adherence to national security requirements
- Establish appropriate environmental objectives and performance indicators to guide these efforts and measure our progress

This chapter provides a brief summary of LLNL's compliance with environmental regulations and LLNL's environmental management programs.

COMPLIANCE SUMMARY

Lawrence Livermore National Laboratory participates in numerous activities to comply with federal, state, and local environmental regulations as well as internal requirements and applicable U.S. Department of Energy (DOE) orders. The following describes regulations and guidance applicable to LLNL during 2003, including a summary of permits active in 2003, and inspections of the Livermore site and Site 300 by external agencies. The following summaries also provide references for more information where available.

Environmental Restoration and Waste Management

Comprehensive Environmental Response, Compensation and Liability Act

Ongoing groundwater investigations and remedial activities at the Livermore site and Site 300 are called the Livermore Site Ground Water Project (GWP) and the Site 300 CERCLA Project, respectively. These activities fall under the jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Title I of the Superfund Amendments and Reauthorization Act (SARA). As part of work on these projects, DOE and LLNL also continued community relations activities. CERCLA compliance activities are summarized in the following sections; program activities and findings are further described in [Chapter 7](#).

Livermore Site Ground Water Project

The Livermore site became a CERCLA site in 1987 when it was placed on the National Priorities List. The GWP at the Livermore site complies with provisions specified in a Federal Facility Agreement (FFA) entered into by the U.S. Environmental Protection Agency (EPA), DOE, the California EPA's Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). As required by the FFA, the project addresses compliance issues by investigating potential contamination source areas (such as suspected old release sites, solvent-handling areas, and leaking underground tank systems), through continuous monitoring, and by the remediation of groundwater. The groundwater contaminants (constituents of concern) are volatile organic compounds (VOCs), primarily trichloroethylene (TCE) and perchloroethylene (PCE).

Significant 2003 Livermore site GWP restoration activities include installing 2 groundwater monitor wells, 1 dual (groundwater and soil vapor) extraction well, 21 soil vapor wells, and abandoning 1 borehole; installing 4 new anode wells and abandoning 2 anode wells; conducting 3 hydraulic tests; and conducting 17 soil vapor extraction tests. LLNL met all DOE milestones by starting the Treatment Facility C Northeast (TFC -NE) remediation, Treatment Facility G North (TFG-N), and the soil Vapor Treatment Facility E Eastern Landing Mat (VTFE ELM).

Treatment Facilities: In 2003, LLNL operated groundwater treatment facilities in the following treatment facility (TF) areas: A, B, C, D, E, G, 406, 518, and 5475. A total of 78 groundwater extraction wells supplied water to 26 treatment facilities at a combined average flow rate of about 2020 liters per minute. In 2003, these facilities treated more than 1 billion liters of groundwater and removed about 90 kilograms of VOCs compared to 108 kilograms in 2002. The lower quantity of mass removed in 2003 is partially due to decreasing concentrations in TFD and TFE area groundwater extraction wells. Since remediation began in 1989, approximately 8.5 billion liters of groundwater have been treated, resulting in a mass removal of about 1012 kilograms.

of VOCs. In addition, LLNL operated two soil vapor treatment facilities (VTFs): VTF5475 and VTF ELM. In 2003, these facilities treated about 311 cubic meters of vapor and removed an estimated 84 kilograms of VOCs compared to about 38 kilograms in 2002. The higher quantity of mass removed in 2003 is due to increased flow rates at VTF5475 and activation of VTF ELM. Since initial operation, the three VTFs (VTF5475, VTF ELM, and VTF518) have treated more than 1.4 million cubic meters of vapor and removed about 543 kilograms of VOCs. The groundwater and soil vapor treatment systems removed 174 kilograms of VOC in 2003, and have removed about 1555 kilograms of VOCs from the subsurface since remediation began in 1989. See [Chapter 7](#) for further information.

Community Relations: Livermore site community relations activities in 2003 included communications and meetings with neighbors and local, regional, and national interest groups and other community organizations; making public presentations; producing and distributing the Environmental Community Letter; maintaining the Information Repositories; conducting tours of the site environmental activities; and responding to public and news media inquiries. In addition, DOE and LLNL met three times with members of Tri-Valley Communities Against a Radioactive Environment (Tri-Valley CAREs) and their scientific advisor as part of the activities funded by an EPA Technical Assistance Grant (TAG). Community questions were also addressed via electronic mail, and project documents, letters, and public notices were posted on a public website at www-envirinfo.llnl.gov.

Documentation: In 2003, DOE/LLNL submitted the [*LLNL Ground Water Project 2002 Annual Report*](#) (Dibley et al. 2003 [reference included on report CD]) and quarterly self-monitoring reports on schedule. In addition, DOE/LLNL completed all 2003 Remedial Action Implementation Plan milestones ahead of schedule (Dresen et al. 1993).

Site Evaluations Prior to Construction: LLNL was placed on the National Priorities List in 1987 based on historical contamination of soil and groundwater. The *CERCLA Record of Decision for the Lawrence Livermore National Laboratory Livermore Site* (LLNL 1992) identifies selected remedial actions agreed upon by the EPA, SFRWQCB, and DTSC. The Record of Decision requires that before any construction begins, the project site must be evaluated to determine if soil or rubble (concrete and asphalt) is contaminated. Soil is sampled and analyzed for potential radioactive and/or hazardous contamination. Depending on the potential for radioactive contamination, rubble may be either surveyed or analyzed for radioactivity. During 2003, soil and rubble were evaluated at 85 construction sites. Based on the analytical results, the soil was either reused on site or disposed of according to established procedures.

Site 300 CERCLA Project

Investigations and remedial activities are ongoing at Site 300, which became a CERCLA site in 1990, when it was placed on the National Priorities List. Investigations and remedial activities are conducted under the joint oversight of the EPA, the Central Valley Regional Water Quality Control Board (CVRWQCB), DTSC, and the authority of an FFA for the site. (There are separate FFAs for Site 300 and the Livermore site.) The groundwater contaminants (constituents of concern) for Site 300 vary within the

different environmental restoration operable units at the site. Background information for LLNL environmental characterization and restoration activities at Site 300 can be found in the *Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300* (Webster-Scholten 1994) and *Final Site-Wide Feasibility Study for Lawrence Livermore National Laboratory Site 300* (Ferry et al. 1999).

LLNL completed all the 2003 FFA milestones for Site 300 on or ahead of schedule. These included construction of the Building 830-SRC groundwater and soil vapor extraction and treatment facility, and construction of the Building 817-SRC groundwater extraction and treatment facility. Installation of monitoring wells and surface soil sampling at Building 812 and remedial investigation field activities at the Pit 7 Complex were also completed on schedule. See [Chapter 7](#) for a further discussion of the treatment areas.

Treatment Facilities: VOCs (primarily TCE) are the main contaminants at Site 300. High explosives, tritium, depleted uranium, organosilicate oil, nitrate, and perchlorate are also found in the groundwater. LLNL operated 11 treatment facilities during 2003. Twenty-three wells extracted groundwater only, 8 wells extracted soil vapor only, and 13 wells extracted both groundwater and soil vapor. About 108.9 million liters of groundwater were extracted and treated. The 13 wells that extract both vapor and groundwater and the 8 wells that extract only vapor together removed 332.3 thousand cubic meters of vapor. In 2003, the Site 300 treatment facilities combined removed approximately 2.87 kilograms of VOCs. Since remediation efforts began in 1990, more than 977.2 million liters of groundwater and approximately 4.3 million cubic meters of vapor have been treated, to yield about 234 kilograms of removed VOCs. See [Chapter 7](#) for further information.

Community Relations: The Site 300 CERCLA project maintains continuing communications with the surrounding communities of Tracy and Livermore. Community relations activities in 2003 included maintenance of the Information Repositories; a public meeting; mailings to stakeholders; and interviews with the news media. LLNL hosted several TAG meetings with Tri-Valley CAREs. These meetings provided a forum for focused discussions on CERCLA activities at the various operable units at Site 300. Tri-Valley CARES receives the annual TAG grant from EPA. The grant also supports an environmental consultant to review Site 300 CERCLA activities.

Documentation: LLNL submitted all required documentation to oversight agencies on time in 2003. The *Final Interim Remedial Design Report for the Building 854 Operable Unit Treatment Facility at Lawrence Livermore National Laboratory Site 300* (Daily et al. 2003), *First Semester 2003 Compliance Report for Lawrence Livermore National Laboratory Site 300* (Carlsen et al. 2003a), quarterly reports, and work plans were among the documents submitted.

Agency for Toxic Substances and Disease Registry Assessment

The Agency for Toxic Substances and Disease Registry (ATSDR), a public health agency of the U.S. Department of Health and Human Services, released for public comment on February 20, 2004, a public health assessment (PHA) addressing potential offsite (community) exposures of radioactive and nonradioactive hazardous substances released from the Livermore site. The ATSDR is required by the U.S. Congress to conduct such PHAs for all CERCLA sites. The PHA evaluates the potential for community exposure to, and potential health effects from, LLNL-released substances that may be present in off-site groundwater, surface water, soil and sediment, air, and locally grown foodstuffs. The ATSDR assesses the health impacts of these substances singly and in combination, on adults and children. The ATSDR assessment found that LLNL environmental monitoring program and the resulting analytical data provided adequate environmental information to address the public health concerns of the Livermore community. Based on its evaluation and findings, ATSDR states:

...past and ongoing operations and releases from the LLNL facility, including the Naval Air facility previously on this site, are No Apparent Public Health Hazard. This conclusion means that although community exposures to site-related contaminants may have, or may still be occurring, the resulting doses are unlikely to result in any adverse health effects and are, consequently, below levels of health concern. (ATSDR 2004)

In 2003, ATSDR also addressed community concerns about the health impacts of releases of tritium from LLNL. An ATSDR report, *Health Consultation on Tritium Releases and Potential Offsite Exposures* (ATSDR 2002) was based on the ATSDR's findings and those of a panel of five tritium experts. In the report, the ATSDR concluded that total tritium doses to the communities surrounding LLNL, including potential contributions from organically bound tritium, tritiated water, and tritiated hydrogen gas, are below levels of public health concern and are adequately assessed by current monitoring and modeling.

As part of an effort to address concerns about the 1965 and 1970 releases that account for about 80% of all the tritium released by LLNL, the ATSDR issued a draft report in May 2002, titled *Focused Public Health Assessment of 1965 and 1970 Accidental Tritium Releases at the Lawrence Livermore National Laboratory*. The public comment period was extended to March 31, 2003. In this document, the ATSDR presented doses predicted by modeling both releases based on the best available information, including meteorological conditions. Preliminary conclusions indicate that, though some public exposure to tritium probably did occur as the result of the accidental releases, the maximum exposures predicted were below levels that might cause adverse health effects.

The ATSDR also issued a PHA in early 2003, *Plutonium 239 in Sewage Sludge Used as a Soil or Soil Amendment in the Livermore Community* (ATSDR 2003). A release, well within regulatory limits, of about 32 millicuries (1.2×10^{-9} Bq) of plutonium over several weeks in 1967 led to community concerns. The plutonium ended up in sewage sludge that was available to the community and public organizations. Both the California

Department of Health Services (DHS) and the Atomic Energy Commission found no public health concern at the time. Public sludge distribution by the Livermore Water Reclamation Plant (LWRP) ended in the mid-1970s. The ATSDR PHA determined there was no apparent public health hazard from the sludge. ATSDR stated that, while exposure may have occurred or may still be occurring, the resulting doses will not cause sickness or death. The ATSDR determined that any potential radiological doses are below levels of health concern. It stated it had no recommendations concerning additional soil sampling in areas of known or unknown sludge distribution. The agency found that available data and evaluations provide an adequate basis for these public health conclusions. It added that any additional sampling data would be subject to the same types of uncertainties as existing historical data. The agency recommended public outreach on this topic, which it conducted in February 2003. It also recommended that LLNL continue required routine regulatory monitoring.

Both ATSDR PHAs are expected to become final in 2004. Additional information concerning these ATSDR findings may be read in the environmental repositories or at LLNL's environmental information website <http://www-envirinfo.llnl.gov/>.

Emergency Planning and Community Right-to-Know Act and Toxics Release Inventory Report

Title III of SARA is known as the Emergency Planning and Community Right-to-Know Act (EPCRA). It requires owners or operators of facilities that handle certain hazardous chemicals on site to provide information on the release, storage, and use of these chemicals to organizations responsible for emergency response planning. Executive Order 13148 directs all federal agencies to comply with the requirements of the EPCRA, including SARA Section 313, "Toxics Release Inventory (TRI) Program."

As a result of greatly reduced TRI reporting thresholds, LLNL submitted to DOE on June 19, 2003, the TRI Form R for lead detailing environmental release estimates for Site 300. A 2.1% reduction in lead releases was achieved as a result of the substitution of nontoxic, nonlead (frangible) ammunition. LLNL's source reduction efforts are further described in the "[Source Reduction and Pollution Prevention](#)" section of this chapter.

EPCRA requirements and LLNL compliance are summarized in [Table 2-1](#).

Resource Conservation and Recovery Act and Related State Laws

The Resource Conservation and Recovery Act (RCRA) provides the framework at the federal level for regulating the generation and management of solid wastes, including wastes designated as hazardous. Similarly, the California Hazardous Waste Control Act and the California Code of Regulations (CCR) Title 22 set requirements for managing hazardous wastes in California. RCRA and HWCA also regulate hazardous waste treatment, storage, and disposal facilities, including permit requirements. Because RCRA

Compliance Summary

Table 2-1. Compliance with EPCRA

EPCRA requirement ^(a)	Brief description of requirement ^(a)	LLNL action
302 Planning Notification	Notify SERC of presence of extremely hazardous substances.	Originally submitted May 1987.
303 Planning Notification	Designate a facility representative to serve as emergency response coordinator.	Update submitted May 16, 2003.
304 Release Notification	Report releases of certain hazardous substances to SERC and LEPC.	No EPCRA-listed extremely hazardous substances were released above reportable quantities in 2003.
311 MSDS/Chemical Inventory	Submit MSDSs or chemical list to SERC, LEPC, and Fire Department.	Update submitted May 16, 2003.
312 MSDS/Chemical Inventory	Submit hazardous chemical inventory to local administering agency (county).	Business plans and chemical inventory submitted to San Joaquin County (January 15, 2003) and Alameda County (April 4, 2003).
313 Toxics Release Inventory	Submit Form R to U.S. EPA and California EPA for toxic chemicals released above threshold levels.	Form R for lead (Site 300 only) was submitted to DOE June 19, 2003; DOE forwarded it to U.S. EPA and California EPA June 27, 2003.

^a See [Acronyms and Abbreviations](#) for list of acronyms.

program authorization was delegated to the State of California in 1992, LLNL works with DTSC on compliance with federal and state issues and in obtaining hazardous waste permits.

Hazardous Waste Permits

Livermore Site: The hazardous waste management facilities at the Livermore site consist of permitted units (located in Area 612 and Buildings 693 and 695 of the Decontamination and Waste Treatment Facility [DWTF]) and units that operate under interim status (Area 514 Facility and the Building 233 Container Storage Facility). Permitted and interim status waste management units include container storage, tank storage, and various treatment processes (e.g., wastewater filtration, blending, and size reduction). LLNL sent letters to DTSC on April 13, 2001, and November 4, 2003, to request the removal of Building 280 from its permit and to specify plans to use Building 280 for non-DTSC regulated activities. During 2003, LLNL also submitted several Class 1 and Class 2 permit modification requests to DTSC and all the requested Class 1 permit modifications have been implemented. Many of these modification requests are related to as-built changes and consolidation of storage and treatment of hazardous waste at the DWTF complex. See [Table 2-2](#) for a summary of permits active in 2003. See [Table 2-3](#) for a summary of inspections and [Table 2-6](#) for a description of a Summary of Violations (SOVs) received as a result of a DTSC's Compliance Evaluation Inspection (CEI) conducted during March 2003. All four of the violations noted as part of the March 2003 CEI have been resolved as shown in [Table 2-6](#). These violations were incorporated into a Consent Order agreed to by LLNL with DTSC and were part of a \$15,661 penalty and \$15,638 in reimbursement costs paid for violations in 2000, 2001, and 2003.

Table 2-2. Permits active in 2003

Type of permit	Livermore site ^{(a)(b)}	Site 300 ^{(a)(b)}
Hazardous waste	EPA ID No. CA2890012584. Hazardous Waste Facility Permit Number 99-NC-006 to operate hazardous waste management facilities including Building 280, Area 612, and DWTF complex. Authorization to mix resin in Unit CE231-1 under a Conditionally Exempt Specified Wastestream permit.	EPA ID No. CA2890090002. Part B Permit—Container Storage Area (Building 883) and Explosives Waste Storage Facility. Part B Permit—Explosives Waste Treatment Facility. Part B Permit—RCRA-Closed Building 829 High Explosives Open Burn Facility, Post-Closure Permit.
Medical waste	One permit for large quantity medical waste generation and treatment covering the Biology and Biotechnology Research Program, Health Services Department, Forensic Science Center, Medical Photonics Lab, Tissue Culture Lab, and Chemistry and Materials Science Department.	Limited Quantity Hauling Exemption for small quantity medical waste generator.
Air	BAAQMD issued 180 permits for operation of various types of equipment, including boilers, emergency generators, cold cleaners, degreasers, printing press operations, manual wipe-cleaning operations, metal machining and finishing operations, silk-screening operations, silk-screen washers, paint spray booths, adhesives operations, optic coating operations, storage tanks containing VOCs in excess of 1.0%, drum crusher, semiconductor operations, diesel air-compressor engines, groundwater air strippers, soil vapor extraction units, woodworking cyclone, gasoline-dispensing operation, explosive waste treatment units, drying ovens, and the Contained Firing Facility.	SJVUAPCD issued 42 permits for operation of various types of equipment, including boilers, emergency generators, paint spray booth, groundwater air strippers, soil vapor extraction units, woodworking cyclone, gasoline-dispensing operation, explosive waste treatment units, drying ovens, and the Contained Firing Facility.
Water	WDR Order No. 88-075 for discharges of treated groundwater from Treatment Facility A to percolation pits and recharge basin. ^(c) WDR Order No. 95-174, NPDES Permit No. CA0030023 for discharges of storm water associated with industrial activities and low-threat nonstorm water discharges to surface waters. WDR Order No. 99-08-DWQ, NPDES California General Construction Activity Permit No. CAS000002; Terascale Simulation Facility, Site ID No. 201C317827; Sensitive Compartmented Information Facility, Site ID No. 201C317621; Soil Reuse Project, Site ID No. 201C305529; and National Ignition Facility, Site ID No. 201C306762; East Avenue Security Upgrade Project, Site ID No. 201C320036; 5th Street Project, Site ID No. 201C321420; Central Cafeteria, Site ID No. 201C320518, for discharges of storm water associated with construction activities affecting 0.4 hectares (1 acre) or more.	WDR Order No. 93-100 for post-closure monitoring requirements for two Class I landfills. WDR Order No. 96-248 for operation of two Class II surface impoundments, a domestic sewage lagoon, and percolation pits. ^(c) WDR Order No. 97-03-DWQ, NPDES California General Industrial Activity General Permit No. CAS000001 for discharge of storm water associated with industrial activities. WDR Order No. 97-242, NPDES Permit No. CA0082651 for discharges of treated groundwater from the eastern General Services Area treatment unit. WDR Order No. 5-00-175, NPDES Permit No. CAG995001 for large volume discharges from the drinking water system that reach surface waters. Nationwide Permit 27 for enhancing red-legged frog breeding ponds.

Compliance Summary

Table 2-2. Permits active in 2003 (continued)

Type of permit	Livermore site ^{(a)(b)}	Site 300 ^{(a)(b)}
Water (continued)	WDR Order No. 99-086 for the Arroyo Las Positas Maintenance Project. Nationwide Permit 33 for the Arroyo Las Positas Maintenance Project. FFA for groundwater investigation/remediation.	Water Quality Certification for red-legged frog breeding ponds, WDID # 5B39CR00047. FFA for groundwater investigation/remediation. 34 registered Class V injection wells.
Sanitary sewer	Discharge Permit 1250 ^(d) (2002/2003 and 2003/2004 ^(e)) for discharges of wastewater to the sanitary sewer. Permit 1510G (2002/2004 ^(f)) for discharges of groundwater from CERCLA restoration activities to the sanitary sewer.	
Storage tanks	Seven operating permits covering 10 underground petroleum product and hazardous waste storage tanks: 111-D1U2 Permit No. 6480; 113-D1U2 Permit No. 6482; 152-D1U2 Permit No. 6496; 271-D2U1 Permit No. 6501; 321-D1U2 Permit No. 6491; 365-D1U2 Permit No. 6492; and 611-D1U1, 611-G1U1, 611-G2U1, and 611-O1U1 Permit No. 6505.	One operating permit covering five underground petroleum product tanks assigned individual permit numbers: 871-D1U2 Permit No. 008013; 875-D1U2 Permit No. 006549; 879-D1U1 Permit No. 006785; 879-G3U1 Permit No. 007967; and 882-D1U1 Permit No. 006530

a Numbers of permits are based on actual permitted units or activities maintained and renewed by LLNL during 2003.

b See [Acronyms and Abbreviations](#) for list of acronyms.

c Recharge basins referenced in WDR Order No. 88-075 are located south of East Avenue within Sandia National Laboratory boundaries.

d Permit 1250 includes wastewater generated at Site 300 and discharged at the Livermore site.

e The Discharge Permit 1250 period is from May 15 to May 14; therefore, two permits were active during the 2003 calendar year.

f Permit 1510G is a two-year (January to December) permit.

In accordance with the document *Transition Plan: Transfer of Existing Waste Treatment Units to the Decontamination and Waste Treatment Facility* (EPD 1997), operations in the Area 514 Facility will eventually be replaced by those in DWTF, and Area 514 will be closed. The Building 233 Container Storage Facility also will be closed. Final closure plans for the Building 419 Interim Status Facility was submitted to DTSC February 2001 and for Area 514 Facility and the Building 233 Container Storage Facility in May 2000. DTSC is continuing its review of these closure plans and LLNL has provided additional information DTSC requested.

In May 1999, DTSC signed the Hazardous Waste Facility Permit and issued a Notice of Final Permit Decision for DWTF. In July 1999, Tri-Valley CAREs et al. filed a petition for review to appeal the permit decision. The appeal was denied by DTSC in November 1999, and the permit immediately became effective. Tri-Valley CAREs et al. filed a California Environmental Quality Act (CEQA) lawsuit in December 1999 that challenges many of the environmental impact evaluations made in the DTSC initial study, which formed the basis of the CEQA Negative Declaration determination by DTSC. A Settlement Agreement was reached on June 26, 2001, between Tri-Valley CAREs et al.

Table 2-3. Inspections of Livermore site and Site 300 by external agencies in 2003

Medium	Description ^(a)	Agency ^(a)	Date	Finding ^(a)
Livermore Site				
Multimedia	Compliance with air, water, hazardous waste, tanks, and other environmental regulations and permits	U.S. EPA	11/4-11/7	Received an inspection report 5/21/04 with three potential violations. ^(b)
Waste	Hazardous waste facilities CEI	DTSC	3/17-3/19, 3/21	Received an inspection report and SOV 4/10/03. See Table 2-6 for description and resolution.
	Waste generator areas and LLNL Business Plan	ACDEH	6/9 8/12	Received Notice to Comply 6/9/03. See Table 2-6 for description and resolution.
	Medical waste	ACDEH	9/24	No violations
Air	Emission sources	BAAQMD	2/25, 2/28 3/25, 4/9, 4/17, 5/7, 5/21, 6/25 8/6, 9/23 10/22	Received one NOV 4/9/03. See Table 2-6 for description and resolution.
Sanitary sewer	Annual compliance sampling	LWRP	10/7-10/8	No violations
	Categorical sampling		10/9, 10/29	No violations
	Process evaluation		10/29	Building 231 Plastics Shop will not be regulated as Categorical process
Storage tanks	Compliance with underground storage tank requirements and operating permits	ACDEH	10/23 10/29	No violations
Site 300				
Waste	Permitted hazardous waste operational facilities (E WTF, EWSF, Building 883 CSA), RCRA-closed, post-closure permitted facility Building 829 HE Open Burn Facility, Building 883 WAA, Satellite Accumulation Areas, waste generating areas, and a review of hazardous waste-related documentation.	DTSC	10/28-10/29	Received an inspection report 1/20/04 with a violation. ^(c)
Air	Emission sources	SJVUAPCD	7/10	No violations
Water	Permitted operations	CVRWQCB	11/18	No violations
Storage tanks	Compliance with underground storage tank requirements and operating permits	SJCEHD	5/14, 5/15 6/9, 6/10, 6/25, 6/26 9/29, 10/23	No violations

a See [Acronyms and Abbreviations](#) for list of acronyms.

b Incorrect dates on two hazardous waste containers were corrected during the inspection. Potential SPCC Plan violations are discussed further in the “[Tank Management](#)” section.

c LLNL is currently working with DTSC on an alleged personnel training violation issued January 20, 2004, subsequent to the October 2003 inspection. See discussion in the “[Hazardous Waste Permits](#)” section for Site 300.

and the Regents of the University of California and DOE. As part of the Settlement Agreement, DTSC, the Regents, and DOE agreed to comply with all of the items listed under Section 6 (Actions by Respondents) of the Settlement Agreement. The Regents are currently in compliance with their responsibilities described in Section 6. The Regents deliver all information requested by DTSC, on an ongoing basis, to support an evaluation to determine the need for additional permit conditions or modifications. DTSC finalized their determination in June 2003.

Site 300: The hazardous waste management facilities at Site 300 consist of three RCRA-permitted facilities. The Explosives Waste Storage Facility and Explosives Waste Treatment Facility are permitted to store and treat explosives waste only. The Building 883 Container Storage Area is permitted to store routine facility-generated waste such as spent acids, bases, contaminated oil, and spent solvents. See [Tables 2-2](#) and [2-3](#) respectively for a summary of permits active and inspections at Site 300 in 2003. Though no violations were issued at the conclusion of the inspection, after investigating one potential compliance issue, DTSC issued a violation on January 20, 2004, for noncompliance with the personnel training regulation. However, prior to the permit being issued, LLNL had discussed the training plan with DTSC and DTSC had determined that training was not necessary and did not include a training requirement in the permit. For this reason, LLNL has contested the violation and is awaiting a response from DTSC.

Hazardous Waste Reports

LLNL completes two annual hazardous waste reports, one for the Livermore site and the other for Site 300, that address the 2003 transportation, storage, disposal, and recycling of hazardous wastes at the respective sites. The 2003 Hazardous Waste Report-Mainsite and 2003 Hazardous Waste Report-Site 300 were submitted to the DTSC by April 1, 2004.

Hazardous Waste Transport Registration

Transportation of hazardous waste over public roads (e.g., from one LLNL site to another) requires DTSC registration (22 CCR 66263.10). DTSC renewed LLNL's registration in November 2003.

Waste Accumulation Areas

LLNL Programs maintain waste accumulation areas (WAAs) in compliance with waste generator requirements specified in 40 Code of Federal Regulations (CFR) part 262, and 22 CCR part 26262.10, for the temporary storage (less than 90 days) of hazardous waste prior to transfer to a treatment, storage, and disposal facility. In January 2003, there were 23 WAAs at the Livermore site. Three temporary WAAs were put into service, while five temporary WAAs and one permanent WAA were taken out of service. Program representatives conducted inspections at least weekly at all WAAs to ensure that they were operated in compliance with regulatory requirements. Approximately 1175 prescribed WAA inspections were conducted at the Livermore site. One WAA was in operation at Site 300 during 2003. Program representatives conducted 52 prescribed inspections of the WAA at Site 300.

California Medical Waste Management Act

All LLNL medical waste management operations comply with the California Medical Waste Management Act, which establishes a comprehensive program for regulating the management, transport, and treatment of medical wastes that contain substances that may potentially infect humans. The program is administered by California DHS and is enforced by the Alameda County Department of Environmental Health (ACDEH).

LLNL is registered with the ACDEH as a generator of medical waste and has a treatment permit. No violations were issued as a result of the September 2003 ACDEH inspection of buildings at LLNL Health Services, the Biology and Biotechnology Research Program, and the Medical Photonics. (See **Tables 2-2** and **2-3**.)

Radioactive Waste and Mixed Waste Management

LLNL manages radioactive waste and mixed waste in compliance with applicable sections of DOE Order 435.1, as described in LLNL's online *ES&H Manual*, Document 36.1, "Hazardous, Radioactive, and Biological Waste Management Requirements." LLNL has also written the "Radioactive Waste Management Basis," which summarizes radioactive waste management controls relating to waste generators and treatment and storage facilities.

Federal Facility Compliance Act

LLNL continues to work with DOE to maintain compliance with the Federal Facilities Compliance Act (FFCA) Site Treatment Plan (STP) for LLNL that was signed in February 1997. All milestones for 2003 were completed on time. Reports and certification letters were submitted to DOE as required. LLNL continued to pursue the use of commercial treatment and disposal facilities that are permitted to accept mixed waste. These facilities provide LLNL greater flexibility in pursuing the goals and milestones set forth in the STP. The FFCA STP provides coverage for all Mixed Waste stored for one year or longer in a Radioactive and Hazardous Waste Management facility.

Toxic Substances Control Act

The Federal Toxic Substances Control Act (TSCA) and implementing regulations found in 40 CFR Part 700-789 govern the uses of newly developed chemical substances and TSCA-governed waste by establishing the following partial list of requirements: record-keeping, reporting, disposal standards, employee protection, compliance and enforcement, and clean up standards.

In 2003, LLNL generated TSCA-regulated polychlorinated biphenyl (PCB) waste from electrical equipment contaminated with PCBs, liquid PCBs used to calibrate analytical equipment, and asbestos from building demolition or renovation projects.

All TSCA-regulated waste was disposed in accordance with TSCA, state, and local disposal requirements except for radioactively contaminated PCB waste. Radioactive PCB waste is currently stored at one of LLNL's hazardous waste storage facilities until an approved facility accepts this waste for final disposal.

Air Quality and Protection

Clean Air Act

All activities at LLNL are evaluated to determine the need for air permits. Air permits are obtained from the Bay Area Air Quality Management District (BAAQMD) for the Livermore site and from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) and/or BAAQMD for Site 300.

LLNL operated 180 air emission sources for the Livermore site in 2003. During an inspection in April 2003, the BAAQMD issued a notice of violation (NOV) for a record keeping violation during the time period September 2002 to February 2003 (see **Table 2-3**). LLNL was subsequently assessed a \$2650 penalty.

The BAAQMD finalized LLNL's Synthetic Minor Operating Permit in November 2002. The Synthetic Minor Operating Permit conditions require LLNL to ensure that the emissions of regulated air pollutants are below the permitted threshold values. These values limit emissions from combustion sources to less than 50 tons per year for oxides of nitrogen and emissions from solvent evaporating sources to less than 50 tons per year for precursor organic compounds and to less than 23 tons per year for all hazardous air pollutants. In accordance with permit conditions, LLNL submitted to the BAAQMD an annual report summarizing emissions through June 30.

In 2003, the SJVUAPCD issued or renewed air permits for 42 air emission sources for Site 300 (see **Table 2-2**). There were no violations issued from 2003 air inspections of Site 300 facilities (see **Table 2-3**).

National Emission Standards for Hazardous Air Pollutants, Radionuclides

To demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radiological emissions, LLNL is required to monitor certain air release points and evaluate all potential sources of radionuclide air emissions to determine the maximum possible dose to the public. These evaluations include modeling (using EPA-sanctioned computer codes) based on radionuclide inventory data, air effluent (source emission) monitoring, and air surveillance monitoring. The *LLNL NESHAPs 2003 Annual Report* (Harrach et al. 2004), submitted to DOE and EPA, reported that the estimated maximum radiological doses to the public were 0.44 µSv (0.044 mrem) for the Livermore site and 0.17 µSv (0.017 mrem) for Site 300 in 2003.

The reported doses include contributions from both point and diffuse sources. The totals were well below the 100 $\mu\text{Sv}/\text{y}$ (10 mrem/ y) dose limits defined by the NESHAPs regulations. Additional information on the data are described in [Chapter 6](#).

In 2003, LLNL continuously monitored radionuclide emissions from Building 331 (the Tritium Facility), Building 332 (the Plutonium Building), and portions of five other facilities (see [Chapter 3](#)). There were no unplanned atmospheric releases at the Livermore site or at Site 300 in 2003. Monitoring activities and results related to air are described further in [Chapter 3](#).

Water Quality and Protection

Clean Water Act and Related State Programs

Preserving clean water is an objective of local, state, and federal regulations. The National Pollutant Discharge Elimination System (NPDES) under the federal Clean Water Act (CWA) establishes permit requirements for discharges into waters of the United States. In addition, the State of California, under the Porter Cologne Water Quality Control Act, requires permits, known as Waste Discharge Requirements (WDRs), for any waste discharges affecting the beneficial uses of waters of the state. These permits, as well as water quality certifications for discharges authorized under Section 401 of the CWA, are issued by local Regional Water Quality Control Boards (RWQCBs) and the State Water Resources Control Board. RWQCBs enforce both the regional and state issued permits. Section 401 state certifications are required when the Army Corps of Engineers issues permits under Section 404 of the CWA.

Several agencies issue other water-related permits. The LWRP requires permits for discharges to the city's sanitary sewer system. The California Department of Fish and Game (CDFG), under the Fish and Game Code, requires streambed alteration agreements (SAAs) for any work that may disturb or impact rivers, streams, or lakes. The Safe Drinking Water Act requires registration with the EPA and management of injection wells to protect underground sources of drinking water.

As required by state and federal regulations, LLNL began complying with the Phase II storm water program in March 2003. These compliance activities included:

- Obtaining coverage under the California NPDES General Permit for Storm Water Discharges Associated with Construction Activity (WDR 99-08-DWQ, NPDES Permit No. CAS000002) for projects disturbing 0.4 hectares (1 acre) (previously the size threshold was 2 hectares [5 acres])
- Submitting an NPDES permit application for the operation of a municipal separate storm sewer system for the Livermore site

Compliance Summary

In 2003, LLNL also updated its inventory of Class V injection wells registered with EPA, reducing the inventory to eliminate redundancies and those subject to CERCLA oversight.

Water-related permits and inspections from outside agencies are summarized in **Tables 2-2** and **2-3**, respectively. LLNL received no NOVs in 2003 from the Livermore site and Site 300's respective RWQCB. However, LLNL identified administrative nonconformances with permit conditions at two construction projects, both of which are permitted by NPDES permit number CAS000002. These instances are discussed in the required annual compliance certification.

During 2003, LLNL received no NOVs from the LWRP. LLNL did receive a Letter of Warning dated March 20, 2003, regarding a finding of lead slightly exceeding the permit limit of 0.20 milligrams per liter (mg/L). Lead was detected at 0.235 mg/L in a sample representing January 15, 2003. This was reported to the LWRP in both the routine Monthly Sewer Monitoring Report and a 5-Day Report. The Letter of Warning stated that adequate measures had been taken and no further action was necessary. The LWRP also determined no further action was necessary for a low pH excursion on May 4, 2003. See **Table 2-4** for a summary of nonconformance with water related permits. Monitoring activities and results related to water permits are described in **Chapter 4**.

Table 2-4. Water-related permit nonconformance

Permit No ^(a)	Nonconformance ^(a)	Date(s) of nonconformance	Description–solution ^(a)
1250, LWRP sanitary sewer permit	24-hour composite sample exceeded the 0.20 mg/L permit limit for lead.	1/16/03 ^(b)	Daily effluent samples collected January 17 through February 14 demonstrated a return to compliance.
	Excursion below pH permit limit of 5; approximately 200 gallons of effluent within pH range 5.2 to 4.8 released to LWRP.	5/4/03	Remainder of effluent captured and contained on-site by Sewer Diversion Facility.
CAS000002, discharge to ALP	Central Cafeteria—Began construction prior to approval and certification of SWPPP. Failure to inspect after three significant storm events	3/10/03 – 5/8/03 ^(c)	Immediately halted subcontractor work and required installation of sediment control measures. SWPPP was approved and certified. Incident was reported to the SFBRWQCB.
CAS000002, discharge to ALP	National Ignition Facility—Failure to inspect project during and following certain significant storm events.	12/28/02–12/29/02 2/12/03, 2/16/03 4/4/03, 4/21/03, 4/28/03, 5/2/03 ^(c)	Incidents were identified to project management and noted in compliance certification.

a See **Acronyms and Abbreviations** for list of acronyms.

b Analytical sample collected and dated January 16, 2003, represented effluent from January 15, 2003.

c These dates reflect the construction reporting period of June 2002 through May 2003.

Tank Management

The CWA and California Aboveground Petroleum Storage Act require facilities meeting specific storage requirements to have and implement Spill Prevention Control and Countermeasure plans for aboveground, oil-containing containers, including equipment and tanks. ACDEH and San Joaquin County Environmental Health Department (SJCEHD) also issue permits for operating underground storage tanks containing hazardous materials or hazardous waste as required under the California Health and Safety Code.

LLNL manages its underground and aboveground storage tanks through the use of underground tank permits, monitoring programs, operational plans, closure plans and reports, leak reports and follow-up activities, and inspections. At LLNL, permitted underground storage tanks contain diesel fuel, gasoline, and used oil; aboveground storage tanks contain fuel, insulating oil, and process wastewater. Some non-permitted wastewater tank systems are a combination of underground storage tanks and above-ground storage tanks. **Table 2-5** shows the status of in-service tanks at the Livermore site and Site 300 as of December 31, 2003. All permitted underground storage tanks were inspected by the regulating agencies in 2003. See **Table 2-3** for summary of inspections. During the November 2003 multimedia inspection, U.S. EPA identified potential SPCC Plan violations that require LLNL to update the SPCC Plan in accordance with 40 CFR, Part 112 and enhance LLNL's current maintenance inspections of aboveground oil containers. These corrections are in process.

Table 2-5. In-service tanks in 2003

Tank type	Livermore site		Site 300	
	Permitted	Permits not required	Permitted	Permits not required
Underground storage tanks				
Diesel fuel	7	0	4	0
Gasoline	2	0	1	0
Used oil	1	0	0	0
Process wastewater	0	45	0	11
Subtotal	10	45	5	11
Aboveground storage tanks				
Diesel fuel	0	24	0	7
Insulating oil	0	1	0	4
Process wastewater	19(a)	58	0	16
Miscellaneous non-waste tanks	0	11	0	0
Subtotal	19	94	0	27
Total	29	139	5	38

a Nine tanks are located at Building 695, the Decontamination and Waste Treatment Facility. Ten tanks are located at the Building 514 Treatment and Storage Facility.

Other Environmental Statutes

National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes federal policy for protecting environmental quality. The major method for achieving established NEPA goals is the requirement to prepare an environmental impact statement (EIS) for any major federal or federally funded project that may have significant impact on the quality of the human environment. If the need for an EIS is not clear, or if the project does not meet DOE's criteria for requiring an EIS, an environmental assessment (EA) is prepared. A Finding Of No Significant Impact is issued when an EIS is determined to be unnecessary.

Certain groups of actions that do not have a significant effect on the environment either individually or cumulatively can be categorically excluded from a more in-depth NEPA review (i.e., from the preparation of either an EA or EIS). DOE NEPA implementing procedures identify those categorical exclusions and the eligibility criteria for their application. If a proposed project does not clearly fit one of the exclusion categories, DOE determines which type of assessment document may be needed.

There were no LLNL projects in 2003 that required DOE EAs. Thirty-three categorical exclusion applications were approved by DOE, and there were no proposed actions at LLNL that required separate DOE floodplain or wetlands assessments under DOE regulations in 10 CFR 1022.

In 2003, DOE prepared the draft *Site-wide Environmental Impact Statement for the Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement (LLNL SW/SPEIS)*. The new *LLNL SW/SPEIS* will replace the *1992 Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore (1992 EIS/EIR)* (U.S. DOE and UC 1992a,b) and its March 1999 Supplement Analysis.

The draft *LLNL SW/SPEIS* was issued for a 90-day public comment period (February 27 to May 27, 2004). Three public hearings were scheduled in 2004: April 27 in Livermore, April 28 in Tracy, and April 30 in Washington, D.C. The final *LLNL SW/SPEIS* is scheduled to be complete in fall 2004 with a Record of Decision in January 2005.

Since November 1992, the University of California (UC) and LLNL have implemented 67 mitigation measures identified by the *1992 EIS/EIR*. An addendum to the *1992 EIS/EIR* was prepared in 1997. The measures are being implemented in accordance with the approved 1992 Mitigation Monitoring and Reporting Program associated with the *1992 EIS/EIR*. The 2000 mitigation monitoring reports was published in 2003. The 2001, 2002, and 2003 mitigation monitoring reports will be published in 2004.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) applies to historically important places and things affected by the federal government. LLNL contains resources subject to NHPA consideration. These range from prehistoric archeological sites to remnants of LLNL's own history of scientific and technological endeavor. The responsibility to comply with the provisions of NHPA rests solely with DOE as a federal agency. LLNL and UC as its contractor operator support DOE NHPA responsibilities. LLNL does so in a limited manner with direction from DOE.

The two primary NHPA sections that apply to LLNL are Sections 106 and 110. Section 106 requires federal agencies to take into account the effects their projects may have on historic properties. The agencies must allow and consider comments of the federal Advisory Council on Historic Preservation. The Section 106 rules outline a five-step review process that is conducted on a project-by-project basis. Section 110 sets forth broad affirmative responsibilities to balance agency missions with cultural values. Its purpose is to ensure full integration of historic preservation into federal agency programs.

LLNL has taken two approaches to streamline historic preservation efforts and focus on important historic properties in its holdings. First, DOE, UC, and the State Historic Preservation Office reached an agreement in July 2003 that governs all historic preservation program activities until inventory and assessment activities specified in the agreement are complete. The goal is to reduce the amount of paperwork necessary to ensure protection of important historic properties by reaching a consensus on where and how to effectively focus LLNL's efforts. Second, which is specified in the agreement, is to complete within a reasonable timeframe an inventory of places (prehistoric and historic, archeological, and architectural) that meets a statutory threshold of historic importance. LLNL is on schedule with this inventory and assessment effort. During 2003, LLNL completed a baseline inventory of archeological sites as well as finishing all of the fieldwork necessary to complete an historic context. LLNL also completed fieldwork necessary to support future National Register of Historic Places determinations for buildings, structures, and objects at the Livermore site and Site 300. National Register determinations will be made in 2004.

Antiquities Act

Provisions of the Antiquities Act provide for recovery of paleontological remains. After the discovery of mammoth remains in conjunction with the National Ignition Facility construction in 1997, LLNL has remained vigilant for other fossil finds. No remains subject to the provisions of the Antiquities Act were identified in 2003.

Endangered Species Act and Sensitive Natural Resources

Requirements of the U.S. Endangered Species Act, the California Endangered Species Act, the Eagle Protection Act, the Migratory Bird Treaty Act, and the California Native Plant Protection Act are met as they pertain to endangered or threatened species and other special-status species, their habitats, and designated critical habitats that exist at the LLNL sites. For example, DOE consults with the U.S. Fish and Wildlife Service (USFWS) when activities will result in an impact to federally endangered or threatened species, surveys for the presence of species of special concern, and follows mitigation requirements in WDRs and biological opinions. A biological assessment (BA) for the implementation of the Arroyo Seco Management Plan was prepared and submitted to USFWS on August 14, 2003. USFWS is currently reviewing the BA. A BA for the implementation of the Arroyo Mocho Road Improvement and Anadromous Fish Passage Project was prepared and submitted to USFWS on November 6, 2003. USFWS responded with their biological opinion for the Arroyo Mocho project on February 10, 2004. A BA for the Livermore site and Site 300 regarding the *Site-wide Environmental Impact Statement for the Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* was prepared and submitted to USFWS on April 9, 2004. USFWS is currently reviewing the BA. Biological surveys for special-status species and monitoring results are described in [Chapter 5](#).

Environmental Occurrences

In 2003, notification of environmental occurrences was required under a number of environmental laws and regulations as well as DOE Order 232.1A, which was replaced by DOE Order 231.1A, “Environmental, Safety and Health Reporting.” LLNL’s Implementing Procedures for DOE Order 231.1A and DOE Manual 231.1-2 was subsequently revised and became effective December 1, 2003. These orders provide guidelines to contractor facilities regarding categorization and reporting of environmental occurrences to DOE and divides occurrences into categories.

LLNL’s response to environmental occurrences is part of the larger on-site emergency response organization that includes representatives from Hazards Control (including the LLNL Fire Department), Health Services, Plant Engineering, Public Affairs, Safeguards and Security, and Environmental Protection. In 2003, three environmental incidents, summarized in [Table 2-6](#), were reportable under DOE Order 232.1A (because they occurred before Order 231.1A became effective on August 19, 2003) and were categorized as off-normal occurrences according to DOE Order 232.1A. DOE was notified of these incidents. Other regulatory agencies involved are described in [Table 2-6](#) for each of the incidents.

Table 2-6. Environmental Occurrences reported under the OR System in 2003

Date ^(a)	Occurrence category	Description ^(b)
April 9	Off-Normal	LLNL received an NOV from BAAQMD on alleged record keeping violations as a result of the BAAQMD's record review of permitted on-site portable internal combustion (IC) engines. Seven of the permitted on-site portable IC engines were found to be out of compliance with weekly usage record keeping requirements identified in their associated permit conditions. The alleged violation was for September 2, 2002, through February 14, 2003. No corrective action was required since weekly usage records existed for the seven IC engines after February 14, 2003. LLNL paid a civil penalty of \$2,650. The seven IC engines were physically inspected by the BAAQMD during their inspections on February 28, March 25, April 9, and April 17, 2003, and found to be in compliance with all applicable regulations and other permit conditions. Receiving an NOV meets the definition of an Off-Normal Occurrence. OR 2003-0014
April 10	Off-Normal	<p>LLNL received an SOV from DTSC for four alleged violations observed during the 2003 CEI of permitted hazardous waste handling operations. The alleged violations and resolutions were as follows:</p> <ul style="list-style-type: none"> • Training records for six individuals indicated that multiple courses had not been completed in the specified frequencies. The most recent course completion dates were not provided to the inspectors. The inspector was later provided the corrected dates, and the corrections were noted in the exit meeting. • Storage of two mixed waste containers for greater than one year in the Building 612 Facility. A storage extension request letter was submitted to the DTSC. • Operating record discrepancies. Information on Container Content Reports (CCRs) was either not complete or did not reflect accurate information on the status of the container location and storage, treatment and disposal facility start date. The information on the CCRs was corrected and submitted to the inspector. • According to the inspector, inadequate aisle spacing was observed in the Building 614 west cell. Waste containers were rearranged to provide adequate aisle spacing. <p>Receiving an SOV meets the requirements of an Off-Normal Occurrence. OR 2003-0015.</p>
June 9	Off-Normal	LLNL received a Notice to Comply from the ACDEH following the March waste generation area inspection. During the inspection, a 15-gallon, unlabeled container containing liquid was found in poor condition outside a WAA. It was later determined that the liquid was sea water, which is a nonhazardous material. The sea water and container were appropriately disposed. Receiving a Notice to Comply meets the requirements of an Off-Normal Occurrence. OR 2003-0022.

a The date indicated is the date when the occurrence was categorized, not the date of its discovery.

b See Acronyms and Abbreviations for list of acronyms.

PROGRAM SUMMARY

Integrated Safety Management System

LLNL implements an Integrated Safety Management System (ISMS) designed to ensure the systematic integration of environment, safety, and health (ES&H) considerations into management and work practices so that missions are accomplished safely. “Safety,” used in this context, is synonymous with environment, safety, and health to encompass protection of the public, workers, and the environment, including pollution prevention and waste minimization. LLNL regards protection of the environment an essential component in its overall safety management system.

The core requirements of ISMS are based on DOE’s Seven Guiding Principles summarized as: (1) line management is responsible for ensuring the protection of employees, the public, and the environment; (2) clear roles and responsibilities for ES&H are established and maintained; (3) personnel competence is commensurate with their responsibilities; (4) resources are effectively allocated to address ES&H, programmatic, and operational considerations with balanced priorities; (5) ES&H standards and requirements are established that ensure adequate protection of the employees, the public, and the environment; (6) administrative and engineering controls to prevent and mitigate ES&H hazards are tailored to the work being performed; and (7) operations are authorized. How LLNL manages and performs work can be described by the Five Core Functions: (1) define the scope of work; (2) identify and analyze the hazards and environmental aspects associated with the work; (3) develop and implement hazard and aspect controls; (4) perform work within the controls; and (5) provide feedback on the adequacy of the controls for continuous improvement.

The implementation of a management system based on these principles and functions results in accountability at all levels of the organization, project planning with protection in mind, and excellence in program execution. The ISMS Program at LLNL employs a process of assessing hazards and the environmental implications of work; designing and implementing standards-based methods intended to control risks; and complying with applicable ES&H requirements. LLNL’s ISMS is detailed in *Integrated Safety Management System Description* (LLNL 2003) which can be found at the following website: http://www.llnl.gov/es_and_h/ism/ism-descriptionv6.pdf

Work Smart Standards

Work Smart Standards (WSS) are an integral part of an ISMS, whereby ES&H professionals identify hazards and environmental aspects, and establish standards of operation appropriate for a particular work environment. WSS are approved at the management level closest to and with the most expertise in the work. Since August 1999, the existing WSS set describes LLNL’s ES&H requirements. These standards are continually

reviewed and revised through the change control process as either new DOE orders are issued or regulations are adopted. The Change Control Board (CCB), with representatives from DOE, UC, and LLNL, manages the change control process. In addition, LLNL undertakes periodic review of all the requirements to ensure that the WSS set is current and complete.

The WSS set currently identified to satisfy the ES&H needs of the LLNL work environment are in Appendix G of the UC contract, and can be viewed at:
<http://labs.ucop.edu/internet/wss/wss.html>.

Environmental Management System

On January 15, 2003, the DOE issued Order 450.1, “Environmental Protection Program,” which requires DOE sites to implement an Environment Management System (EMS) integrated into their ISMS. The purpose of Order 450.1 is to align the DOE’s system for environmental protection with the requirements of Executive Order 13148, “Greening the Government Through Leadership in Environmental Management.” In February 2003, LLNL constituted a Standards Identification Team for the purpose of considering the adoption of, in whole or part, the Contractor Requirements Document of Order 450.1. This process considered all or parts of Order 450.1 for incorporation into the contract as necessary and sufficient under LLNL’s current integrated ES&H management system. As a result of this process, LLNL has agreed to incorporate ISO 14001 as a WSS. To better understand the status of LLNL’s ISMS, LLNL conducted a gap analysis in early 2004 to compare the LLNL program with ISO 14001 and DOE Order 450.1. The gap analysis compares the LLNL program and ISO 14001 EMS, using a tailored ISO 14001 Checklist, along the five key EMS elements:

- Policy and Commitment
- Planning
- Implementation
- Measurement and Evaluation
- Review and Improvement

The analysis evaluated the LLNL *ES&H Manual*, related ISMS documentation, and organizational implementation against 36 detailed elements of ISO 14001. Based on the findings of the gap analysis, LLNL is developing a strategy to enhance LLNL’s ISMS in order to self declare compliance with the requirements of Executive Order 13148 by December 2005.

Environmental Protection Department

As the lead organization at LLNL for providing environmental expertise and guidance on operations at LLNL, the Environmental Protection Department (EPD) is responsible for environmental monitoring, environmental regulatory interpretation and implementation guidance, environmental restoration, environmental community relations, and waste management in support of LLNL's programs. EPD prepares and maintains environmental plans, reports, and permits; maintains the environmental portions of the 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; and assesses the effectiveness of pollution control programs. EPD has also taken a leadership role in the decommissioning and decontamination (D&D) of DOE facilities as a result of the end of the Cold War. EPD's Space Action Team tactically implements LLNL's institutional D&D activities. Since 1998, more than 51 D&D projects have been completed at LLNL.

EPD monitors air, sewerable water, groundwater, surface water, soil, sediment, vegetation, and foodstuff, as well as direct radiation; evaluates possible contaminant sources; and models the impact of LLNL operations on humans and the environment. These monitoring activities in 2003 are presented in the remaining chapters of this report.

A principal part of EPD's mission is to work with LLNL programs to ensure that operations are conducted in a manner that limits environmental impacts and is in compliance with regulatory requirements. EPD helps LLNL programs manage and minimize hazardous, radioactive, and mixed wastes, as well as identify opportunities for pollution prevention, including minimization of nonhazardous waste; determines the concentrations of environmental contaminants remaining from past activities; cleans up environmental contamination to acceptable standards; responds to emergencies in order to minimize and assess any impact on the environment and the public; and provides training programs to improve the ability of LLNL employees to comply with environmental regulations. These functions are organized into three divisions within the department: Operations and Regulatory Affairs (ORAD), Radioactive and Hazardous Waste Management (RHWM), and Environmental Restoration (ERD).

Operations and Regulatory Affairs Division

ORAD consists of six groups that specialize in environmental compliance and monitoring and provide LLNL programs with a wide range of information, data, and guidance to make more informed environmental decisions. ORAD prepares the environmental permit applications and related documents for submittal to federal, state, and local agencies; provides the liaison between LLNL and regulatory agencies conducting environmental inspections; tracks chemical inventories; prepares NEPA documents and conducts related field studies; oversees wetland protection and floodplain management requirements; coordinates cultural and wildlife resource protection and management; facilitates and provides support for the pollution prevention and recycling programs; teaches environmental training courses; coordinates the tank environmental

compliance program; conducts compliance and surveillance monitoring; provides environmental impact modeling and analysis, risk assessment, and reporting; and develops new methods and innovative applications of existing technologies to improve environmental practices and assist LLNL in achieving its mission. ORAD also actively assists in responding to environmental emergencies such as spills. During normal working hours, an environmental analyst from the ORAD Environmental Operations Group (EOG) responds to environmental emergencies and notifies a specially trained Environmental Duty Officer (EDO). EDOs are on duty 24 hours a day, 7 days a week, and coordinate emergency response with other first responders and environmental specialists.

Radioactive and Hazardous Waste Management Division

RHWM manages all hazardous, radioactive, medical, 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, 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 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, including the annual and biennial hazardous waste reports required by the state and federal environmental protection agencies. RHWM also prepares waste acceptance criteria documents, safety analysis reports, and various waste guidance and management plans.

RHWM meets regulations requiring the treatment and disposal of LLNL's mixed waste in accordance with the requirements of the FFCRA. The schedule for this treatment is negotiated with the State of California and involves developing new on-site treatment options as well as finding off-site alternatives. RHWM is also responsible for implementing a program directed at eliminating the backlog of legacy waste (waste that is not at present certified for disposal). This effort includes a large characterization effort to identify all components of the waste and a certification effort that will provide appropriate documentation for the disposal site.

Environmental Restoration Division

ERD was established to evaluate and remediate soil and groundwater contaminated by past hazardous materials handling and disposal processes and from leaks and spills that have occurred at the Livermore site and Site 300, both prior to and during LLNL operations. ERD conducts field investigations at both the Livermore site and Site 300 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 groundwater and soil vapor extraction and treatment, and for assisting in closing inactive facilities in a manner designed to prevent environmental contamination. 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. ERD interacts with the community on these issues through Environmental Community Relations. Public workshops are held regularly and information is provided to the public as required in the ERD CERCLA Community Relations Plans. These CERCLA activities in 2003 are summarized in the “Environmental Restoration and Waste Management” section earlier in this chapter. ERD’s groundwater remediation activities in 2003 are further described in Chapter 7 of this report.

Response to Spills and Other Environmental Emergencies

All spills and leaks (releases) at LLNL that are potentially hazardous to the environment are investigated and evaluated. The release response process includes identifying the release, shutting off the source (if it is safe to do so), eliminating ignition sources, contacting appropriate emergency personnel, cordonning off the area containing the released material, absorbing and neutralizing the released material, assisting in cleanup, determining if a release must be reported to regulatory agencies, and verifying that cleanup (including decontaminating and replenishing spill equipment) is complete. ORAD staff also provide guidance to the programs on preventing spill recurrence.

As previously described, the EDO is available 24 hours a day, 7 days a week to maximize efficient and effective emergency environmental response. Specialized EDO training includes simulated incidents to provide the response personnel with the experience of working together to mitigate an environmental emergency, determine any reporting requirements to regulatory agencies and DOE, and resolve environmental and regulatory issues within the LLNL emergency response organization. The on-duty EDO can be reached by pager or cellular phone at any time.

During normal work hours, LLNL employees report all environmental incidents to an EOG environmental analyst assigned to support their program area. The EOG environmental analyst then notifies the on-duty EDO of the incident, and together with other ORAD staff, the team determines applicable reporting requirements to local, state, and federal regulatory agencies and to DOE. The EDO and the EOG environmental analyst also notify and consult with program management and have 7-day-a-week, 24-hour-a-day access to the office of Laboratory Counsel for questions concerning regulatory reporting requirements.

During off hours, LLNL employees report all environmental incidents to the Fire Dispatcher, who, in turn, notifies the EDO and the Fire Department, if required. The EDO then calls out additional EPD support to the incident scene as necessary, and follows the same procedures as outlined above for normal work hours.

Pollution Prevention

LLNL has a Pollution Prevention (P2) team whose role it is to help facilitate LLNL's P2 program in accordance with applicable laws, regulations and DOE orders as required within the UC Contract. Responsibilities include P2 program stewardship and maintenance, waste generation and P2 analysis and reporting, P2 opportunity assessment and high return-on-investment follow through, implementation of recycling, reuse and waste minimization programs for hazardous as well as non hazardous waste, and coordination of P2 programs and activities with other energy efficiency and resource conservation efforts at the Lab. The P2 team works within the structure of the LLNL ISMS to support P2 efforts and activities through environmental teams. In addition, the P2 team undertakes coordination of the affirmative procurement program and provides awareness presentations, articles, events, and other materials.

DOE Pollution Prevention Goals

In a memo dated November 12, 1999, the Secretary of Energy issued a new and challenging set of pollution prevention goals for the DOE Complex in response to the President's Executive Orders for Greening the Federal Government that require reduction of waste in [Table 2-7](#). The goals have expanded the scope of pollution prevention goals by including building and facility energy efficiency; reduction in releases of toxic chemicals, ozone depleting substances, and green house gases; increased fleet efficiency; use of alternative fuels; and the required purchase of environmentally preferable products.

The routine waste generation for the 1993 baseline year, the routine waste generation for 2003, and the percent reductions in routine waste generation since 1993 are presented in [Table 2-8](#). Routine waste described in this table includes waste from ongoing operations produced by any type of production, analytical, and/or research and development laboratory operations. Periodic laboratory or facility clean-outs and spill cleanups which occur as a result of these processes are also considered normal operations.

Since 2001, LLNL revised the method by which it calculates waste to better identify future P2 opportunities and to eliminate categories of wastes that would otherwise be counted twice under the new tracking system. The reported waste quantities for hazardous waste, low-level radioactive waste, and mixed low-level waste now include all wastes generated under requisition and tracked in the RHWM Division's Total Waste Management System (TWMS) database, which was replaced in FY 2004 with a new database called HazTrack. Not reported are secondary waste generated as a result of waste treatment activities at RHWM and recycled small batteries and automotive motor oil.

Table 2-7. Pollution prevention and energy efficiency leadership goals at DOE facilities

Goal(a)	Detail
Reduce Waste and Recycling	Reduce waste from routine operations by 2005, using a 1993 baseline, for these waste types: hazardous by 90%, low level radioactive by 80%, low level-mixed radioactive by 80%, and transuranic (TRU) by 80%
	Reduce releases of toxic chemicals subject to Toxic Chemical Release Inventory reporting by 90% by 2005, using a 1993 baseline.
	Reduce sanitary waste from routine operations by 75% by 2005 and 80% by 2010, using a 1993 baseline.
	Recycle 45% of sanitary wastes from all operations by 2005 and 50% by 2010.
	Reduce waste resulting from cleanup, stabilization, and decommissioning activities by 10% on an annual basis.
Buy Items with Recycled Content	Increase purchases of EPA-designated items with recycled content to 100%, except when not available competitively at a reasonable price or that do not meet performance standards.
Improve Energy Usage	Reduce energy consumption through life-cycle cost effective measures by 40% by 2005 and 45% by 2010 per gross square foot for buildings, using a 1985 baseline and 20% by 2005 and 30% by 2010 per gross square foot, or per other unit as applicable, for LLNL and industrial facilities, using a 1990 baseline.
	Increase the purchase of electricity from clean energy sources: (a) Increase purchase of electricity from renewable energy sources by including provisions for such purchase as a component of our requests for bids in 100% of all future DOE competitive solicitations for electricity. (b) Increase the purchase of electricity from less greenhouse gas-intensive sources including, but not limited to, new advanced technology fossil energy systems, hydroelectric, and other highly efficient generating technologies.
Reduce Ozone Depleting Substances and Greenhouse Gases	Retrofit or replace 100% of chillers greater than 150 tons of cooling capacity and manufactured before 1984 that use class I refrigerants by 2005.
	Eliminate use of class I ozone depleting substances by 2010, to the extent economically practicable, and to the extent that safe alternative chemicals are available for DOE class I applications.
	Reduce greenhouse gas emissions attributed to facility energy use through life-cycle cost-effective measures by 25% by 2005 and 30% by 2010, using 1990 as a baseline.
Increase Vehicle Fleet Efficiency and Use of Alternative Fuels	Reduce entire fleet's annual petroleum consumption by at least 20% by 2005 in comparison to 1999, including improving the fuel economy of new light duty vehicle acquisitions and by other means.
	Each year, acquire at least 75% of light duty vehicles as alternative fuel vehicles, in accordance with the requirements of the Energy Policy Act of 1992.
	Increase usage rate of alternative fuel in departmental alternative fuel vehicles to 75% by 2005 and 90% by 2010 in areas where alternative fuel infrastructure is available.

Waste Minimization/Pollution Prevention

The P2 Program at LLNL strives to systematically reduce solid, hazardous, radioactive, and mixed-waste generation, and eliminate or minimize pollutant releases to all environmental media from all aspects of the site's operations. These efforts help protect public

Table 2-8. Routine waste reduction in FY 2003

Waste category	1993 (baseline)	FY 2003	Reduction 2003 since 1993 (%)
Low-level radioactive	346 m ³	85 m ³	75
Mixed low-level	26 m ³	18 m ³	31
Hazardous	1054 MT ^{a)}	179 MT	83
Sanitary (nonhazardous solid waste)	5873 MT	4727 MT	20

a MT = metric tons

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 potential civil and criminal liabilities under environmental laws. In accordance with EPA guidelines and DOE policy, the P2 Program uses a hierarchical approach to waste reduction (i.e., source elimination or reduction, material substitution, reuse and recycling, and treatment and disposal) applied, where feasible, to all types of waste. The P2 team tracks waste generation using the TWMS database. By reviewing this database, program managers and P2 staff can monitor and analyze waste streams to find cost effective improvements to business and mission through pollution prevention.

In August 2003, LLNL submitted the 2002 Hazardous Waste Source Reduction and Management (SB-14) Review Report to the DOE/National Nuclear Security Administration (NNSA) Livermore Site Office in accordance with California Code of Regulation (CCR) Title 26, Section 22-67100.1 *et seq.* The DOE/NNSA Livermore Site Office in turn submitted the LLNL SB-14 Review Report, along with similar reports from Lawrence Berkeley National Laboratory (LBNL), Stanford Linear Accelerator Center (SLAC), and Sandia National Laboratories/California (Sandia/California), to the California DTSC. This report, which is completed every four years, includes 1) a plan that evaluates major LLNL waste streams and a review of possible source reduction measures four years into the future and 2) a performance report that describes LLNL's hazardous waste management practices and accomplishments since the previous SB-14 report and compares them to the baseline year.

LLNL successfully reduced or eliminated a significant portion of the California waste code wastes identified in the 1998 SB-14 Plan. Category B wastes were reduced by approximately 150,000 pounds and extremely hazardous wastes cut to roughly a quarter of what they were in 1998.

LLNL also has two institutional nonhazardous waste minimization projects. One is operated through the Donation, Utilization & Sales Area by selling excess equipment that still has a usable life span rather than disposing of it. In addition all four LLNL cafeterias have their cooking grease picked up by a vendor; it is then recycled into other products, such as soap.

Diverted Waste

Together, the Livermore site and Site 300 generated 4727 metric tons of routine nonhazardous solid waste in 2003. This volume includes diverted waste (for example, material diverted through recycling and reuse programs) and landfill wastes. LLNL generated 24,912 metric tons of nonroutine nonhazardous solid waste in FY 2003. This includes waste that is reused as cover soil at Class II landfills and through the non-routine metals recycling programs. Nonroutine nonhazardous solid wastes include wastes from construction, and decontamination and demolition activities. In FY 2003, the portion of nonhazardous waste (routine and nonroutine) sent to landfill was 3137 metric tons. The routine portion was 1546 metric tons and the nonroutine portion was 1591 metric tons. The breakdown for routine and nonroutine nonhazardous waste that was sent to landfills in FY 2003 is shown in [Table 2-9](#).

Together the Livermore Site and Site 300 diverted 3181 metric tons of routine nonhazardous waste in 2003. This represents a diversion rate of 67% from the 1993 baseline. This diversion rate includes waste recycled by RHWM and waste diverted through the surplus sales and pipette box recycling programs. The total routine and nonroutine waste diverted from landfills in FY 2003 was 26,502 metric tons as shown in [Table 2-10](#), which illustrates LLNL's comprehensive waste diversion program.

Source Reduction and Pollution Prevention

LLNL reported lead for the first time in 2003 as part of its TRI reporting for Site 300 (see “Emergency Planning and Community Right-to-Know Act and Toxics Release Inventory Report” section of this chapter). As a result, LLNL has reviewed potential source reduction opportunities for lead. One opportunity consists of using frangible bullets at the Site 300 firing range which reduces the quantity of discharged lead ammunition. During this time of heightened security, the firing range plays a critical role in the training of LLNL security personnel, such that decreasing range use is not an option. The Greenshield™ ammunition in use is a lead-free polymer compound that disintegrates to dust upon impact with a hard surface. Its use eliminates the contamination and health and safety issues associated with lead.

In a separate firing range source reduction effort, LLNL has partnered with Alameda County Sheriff’s Department to recycle brass shell casings from spent ammunition. Casings collected at the LLNL firing range are transported to a sheriff’s department facility to be recycled.

A second lead-reduction activity involves LLNL’s wildlife biologists, who are tasked with the protection of California red-legged frog and their habitat (see [Chapter 5](#)). In 2003, LLNL wildlife biologists converted to the use of non-lead air rifle ammunition (pellets) during their exotic species eradication efforts. Such a conversion is particularly beneficial as the eradication efforts often are focused on areas where lead pellets could enter a water body.

A water conservation pilot project was also implemented at the EPD T5475 facility. The EPD Facility Manager and P2 staff teamed with the Site Energy Management Program to replace all 10 urinals in the building with waterless urinals. The project was funded through FY 2003 DOE Federal Energy Management Program Retrofit Funding. Water

Table 2-9. Total nonhazardous waste sent to landfills in FY 2003

Nonhazardous waste	2003 total (metric tons)
Routine	
Compacted	1546
Nonroutine	
Construction demolition (noncompacted)	1533
Industrial	58
Nonroutine subtotal	1591
LLNL total	3137

Table 2-10. Diverted waste in FY 2003

Waste description	Cumulative 2003 total (metric tons)
Asphalt/concrete	21,495
Batteries	27
Beverage and food containers	4.2
Cardboard	155
Compost	721
Cooking grease/food	1.8
Diverted soil (includes Class II Cover)	1,259
Magazines, newspapers, and phone books	45
Metals	970
Miscellaneous	22
Nonroutine metals	610
Paper	278
Pipette box recycling	1.1
RHWM recycled	88
Surplus sales	260
Tires and scrap	15
Toner cartridges	4.9
Wood	545
LLNL diversion total	26,502

savings is estimated to be up to 20,000 gallons per urinal per year. Two other directorates have funded retrofit projects based on the success of the EPD pilot project. Substituting conventional flush-valve urinals with waterless urinals is also being reviewed for new building construction.

LLNL plans for the removal of chillers and halon fire suppression systems that contain class I ozone depleting substances are on track, as described in the *LLNL Report on Pollution Prevention and Energy Efficiency Leadership Goals* (2001). LLNL will complete removal of 4 of 7 chillers that have greater than 150 tons of cooling capacity by 2005. Three other chillers with 150 ton cooling capacities are scheduled for removal by 2007, and 8 other smaller chillers will be replaced as they achieve the end of their useful lives between 2010 and 2015. To date, 92% of the halon-containing fire suppression systems that were in place in 1995 have been replaced, leaving only 5 active systems on site.

In October 2003, EPD began participation in the Federal Electronics Challenge (FEC). The FEC is an EPA-coordinated, voluntary pilot program that is designed for federal agencies and facilities to collaborate with each other regarding the three life cycle phases of electronic equipment: acquisition and procurement, operations and maintenance, and end-of-life management. The specific goals of the FEC are to encourage participating partners to purchase greener electronic products, reduce impacts of electronic products during use, and manage obsolete electronics in an environmentally friendly way. EPD's participation in the FEC complimented efforts already underway to assess LLNL's management practices for electronic waste (e-waste), including preparation for reporting of the recycle/disposal of cathode ray tubes under SB 20 (Electronic Waste Recycling Act) in 2004.

Current ROI

DOE has traditionally funded P2 projects through the High-Return-on-Investment (ROI) P2 Program. In FY 2003, however, there was no new ROI funding available. One new ROI project, a mercury thermometer exchange, was paid for with carryover funds from FY 2002 (see [Table 2-11](#)). Other ROI work occurring in 2003 was associated with ongoing projects funded in previous years (also described in [Table 2-11](#)). Two ROI projects were recipients of EPA Champions of Green Government Awards: the Water Recovery/Drain Down System project and the Photovoltaic Demonstration project.

Review of New Processes, Programs, or Experiments

LLNL recently started two affirmative procurement programs. One targets recycled printer toner cartridges where LLNL's vendor automatically provides reconditioned cartridges when available. The second affirmative procurement program encourages the use of 30% post-consumer paper. Before virgin paper can be ordered, the Recycling Coordinator works with the requestor to verify that virgin paper is required. To date, only one brand of color copier is unable to utilize 30% post-consumer paper.

On an ongoing basis, the P2 team promotes a "front-end" review process of new programs, projects, or experiments that could have a significant impact on the environment. For small-scale activities such a review includes an assessment of the hazardous

Table 2-11. High ROI projects in FY 2003

Operation	Project
Mercury Thermometer Exchange Pilot	This pilot project was started in 2003 within the Chemistry & Chemical Engineering Division of the Chemistry & Material Science Directorate. The goal of the pilot is to reduce environmental, health, and safety risk by removing mercury-containing thermometers from use in specified LLNL laboratories. An associated goal is to evaluate how the alternative non-mercury thermometers are received by chemists with specialized temperature measurement needs.
Global Electric Motor-cars (GEM) Pilot study	This project funded the purchase of a limited number of Daimler-Chrysler GEMs for a pilot study by the Fleet Management Group. The study, carried out in 2003, evaluated the integration of electric vehicles into the LLNL fleet. Deemed a success, Directorates can now work with Fleet Management to purchase the GEM cars for continued on-site use.
Water Recovery/Drain Down System (completed in FY 2002)	This project funded the purchase and conversion of a water-tank trailer to facilitate removal, storage and replacement of chiller water during maintenance operations. This project, previously a winner of two federal water conservation awards, received an EPA 2003 Champions of Green Government Award.
Photovoltaic (PV) Demonstration Project	This demonstration project installed three types of photovoltaic arrays at the LLNL Discovery Center to demonstrate different PV technologies and deployment scenarios. This project received an EPA 2003 Champions of Green Government Award.

materials to be used and an estimate of the associated wastes. This type of review can also be applied to existing operations. For large processes or new programs, a more extensive review using a tool such as Design for Environment may be applied.

Green building, an integrative, “front-end” concept currently making inroads into new construction at LLNL, emphasizes the design of buildings that are efficient in their use of materials, energy, and other natural resources throughout their life cycle. Significant efforts to incorporate green building into LLNL design practices occurred in 2002 when EPD and Plant Engineering jointly sponsored a Leadership in Energy and Environmental Design (LEED) training session for specific LLNL, Sandia/California, and LBNL personnel.

Promotion of green building at LLNL continued during 2003. In June, the P2 Team sponsored the visit of the Dean and Assistant Dean of the University of California Santa Barbara Donald Bren School of Environmental Science and Management to discuss the green building achievements at their new Donald Bren Hall, which garnered a Platinum rating from the U.S. Green Building Counsel for its design, construction and performance. Attending an executive briefing were representatives from the UC Office of the President, the DOE /NNSA Livermore Site Office, and senior LLNL management from Plant Engineering, the Institutional Manager’s Office and the EPD. LLNL staff responsible for the design, project management, construction, and operations of LLNL buildings attended a second session. Guests from Stanford University, SLAC, LBNL and Sandia/California also attended.

A second green building event was held in August when the P2 team sponsored a design charrette for an LLNL generic office building using the LEED building rating system. Green building expert Bill Reed conducted the charrette, which was tailored to the project team for the series of generic office buildings and open to all in Plant Engineering. Training events such as these continue to familiarize LLNL architects, engineers, planners and other professionals with the knowledge and tools to increase the “green” properties of future LLNL buildings.

Pollution Prevention Employee Training and Awareness Programs

In 2003, LLNL conducted a number of activities to promote employee awareness of Pollution Prevention. A key event, the annual Earth Expo, was held in April to coincide with Earth Day. It featured representatives from LLNL environmental activities, businesses with environmentally friendly products, environmental conservation organizations, utilities, environmental agencies, and other organizations with environmental charters. During the course of the year, Pollution Prevention articles appeared in the LLNL newspaper, *Newsline*, and electronic newsletter, *NewsOnLine*. The P2 team conducted training for purchasing staff on EPA requirements for affirmative procurement. The P2 team also placed banners at entry gates for America Recycles Day and National Pollution Prevention Week.

In spring 2003 the P2 team brought a new internal P2 web site online for LLNL employees. The web page is a resource for employees regarding pollution prevention, energy efficiency, the reuse and recycling of materials, green building, and other environmental topics. Employees can also use the site to suggest P2 ideas, ask questions about P2 planning and implementation, and find out about P2 “current events.” The P2 team also operates the Earth Hotline. LLNL employees can call with questions, suggestions, or ideas regarding LLNL’s pollution prevention and waste diversion endeavors.

Contributing Authors

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