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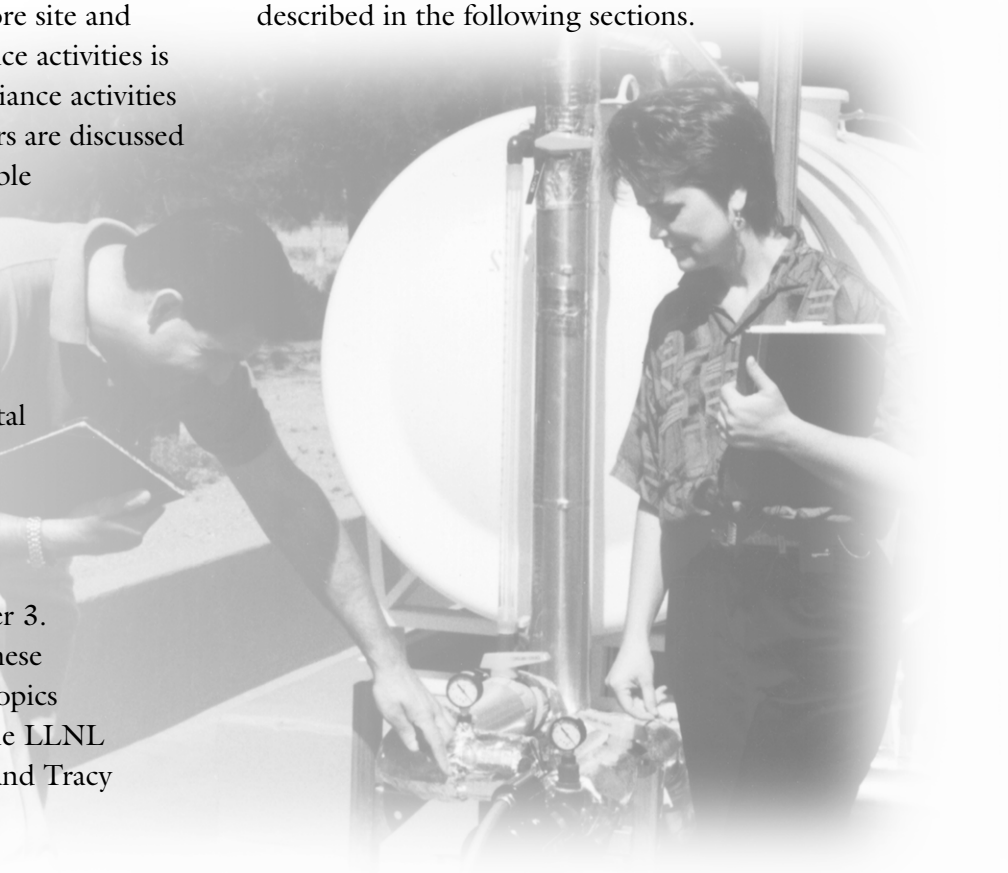
Compliance Summary

Introduction

During 2000, Lawrence Livermore National Laboratory (LLNL) participated in numerous activities to comply with federal, state, and local environmental regulations as well as internal requirements and applicable Department of Energy (DOE) orders. This chapter, which is organized according to the various laws and regulations that drive LLNL's compliance activities, describes those activities the Laboratory carried out related to air, water, waste, waste reduction, community "right to know," protection of sensitive resources, and other environmental issues at the Livermore site and Site 300. A wide range of compliance activities is summarized in this chapter. Compliance activities specific to the applicable DOE orders are discussed in the chapters that follow. Applicable DOE orders are those identified in LLNL's Work Smart Standards (WSS), a set of environmental, safety, and health standards specific to operations at the Laboratory (see Chapter 3). Other environmental program information, including the Environment, Safety, and Health Management System and pollution prevention and waste minimization activities, is also discussed in Chapter 3. Many documents concerned with these activities and other environmental topics are available for public viewing at the LLNL Visitors Center and the Livermore and Tracy public libraries.

Comprehensive Environmental Response, Compensation and Liability Act

The Livermore Site Groundwater Project (GWP) and the Site 300 CERCLA Project are under the jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act, Title 1. As part of work on these projects, DOE and LLNL also continued with environmental restoration and community relations activities. These projects and activities are described in the following sections.



Livermore Site Groundwater Project

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 (SFBRWQCB). 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), continuous monitoring, and remediation of groundwater. The groundwater contaminants (constituents of concern) are volatile organic compounds (VOCs), primarily trichloroethene (TCE) and tetrachloroethene (PCE). For the most part, these contaminants are present within the site boundary and to some extent at the site boundary and beyond, mainly to the west and south of the site (see **Figures 8-3** to **8-8**). In 2000, GWP activities included preparing the required CERCLA documents, meeting milestones, operating groundwater treatment facilities, and maintaining liaison with community groups.

In 2000, DOE and LLNL submitted documents required by the CERCLA and the Livermore Site FFA. In addition, DOE and LLNL continued environmental restoration and community activities as discussed below.

Documentation

As required by the FFA, DOE and LLNL issued the *Ground Water Project 1999 Annual Report* (Aarons et al. 2000) on schedule on March 31, 2000. DOE and LLNL also issued six final Remedial Project Managers' (RPMs') meeting summaries. Quarterly self-monitoring data were reported in letter reports (Bainer and Joma 2000a; Bainer and Abbott, 2000a,b, 2001).

An Explanation of Significant Differences was issued on February 28, 2000, that described a change to the groundwater treatment system at Trailer 5475 to allow groundwater containing both VOCs and tritium above their maximum contaminant levels (MCLs) to pass through an above-ground facility to treat VOCs (Berg 2000). Treated water still containing tritium is subsequently recharged back into the same hydrostratigraphic unit (HSU) via two adjacent recharge wells.

DOE and LLNL also issued an Action Memorandum on March 6, 2000, for a time-critical removal action that documented the removal of soil containing residual polychlorinated biphenyls (PCBs) from the East Traffic Circle (Joma 2000).

Milestones and Activities

Three milestones were completed ahead of schedule and one was delayed three months with regulatory concurrence to accommodate an adjacent construction project unrelated to GWP activities. For the first milestone, LLNL began operation of Treatment Facility 518 North solar treatment unit on January 26, 2000. With regulatory approval, LLNL began operation of Treatment Facility D Southshore miniature treatment unit (MTU) three months late on June 30, 2000. In addition, two other milestones were achieved by beginning operation of Treatment Facility E Southeast MTU on June 27, 2000, and Treatment Facility 5475-3 catalytic reductive dehalogenation unit on September 27, 2000.

Other activities related to the Livermore CERCLA project included the investigation and analysis of data associated with recently discovered high VOC concentrations in a perched water-bearing zone in the Building 518 area. LLNL also destroyed five offsite wells on property north of East Avenue, south of Arroyo Seco, and west of Vasco Road to accommodate a new housing development.

Treatment Facilities

DOE and LLNL operated all facilities in treatment facilities TFA, TFB, TFC, TFD, TFE, TFG, TF406, TF518, and TF5475 areas in 2000. A total of 80 groundwater extraction wells operated at 25 separate locations at an average flow rate of 3,641,170 L/day. Vapor treatment facilities VTF518 and VTF5475 operated at an average flow of 841 m^3/day. Together, the groundwater and vapor treatment facilities removed approximately 269 kg of VOC mass in 2000. Since initial operation, approximately 5.4 billion L of groundwater and 695,000 m^3 of vapor have been treated, removing more than 1,021 kg of VOCs.

Community Relations

The Community Work Group (CWG) met twice in 2000 to discuss the DOE budget, long-term stewardship, technology deployments, and progress of the Livermore site cleanup. Correspondence and communication continued with CWG members throughout the year. DOE and LLNL met twice with members of Tri-Valley Communities Against a Radioactive Environment (CAREs) and their scientific advisor as part of the activities funded by an Environmental Protection Agency Technical Assistance Grant.

Other Livermore site community relations activities in 2000 included communicating and meeting with neighbors, local, regional and national interest groups, and other community organizations; giving public presentations including those to local Realtors; producing and distributing the Environmental Community Letter; maintaining the information repositories and the administrative record; conducting tours of the site environmental activities; and responding to public and news media inquiries. In addition, community questions were addressed by telephone and electronic mail. Documents, letters, and public notices were posted on a public website at the following address: http://www-envirinfo.llnl.gov.

Site 300 CERCLA Project

Investigations and remedial activities are ongoing at Site 300, which became a CERCLA/Superfund site in 1991, 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), California EPA's DTSC, and the authority of an FFA for the site. (There are separate FFAs for Site 300 and the Livermore site.)

During 2000, LLNL submitted all required regulatory documents (see Chapter 8) on or ahead of schedule, performed all actions stipulated in the FFA, and maintained liaison with community groups. Results and status for Site 300 environmental restoration operable units are discussed in Chapter 8. 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).

Documentation

LLNL submitted all required documentation to oversight agencies on time in 2000. The *Final Proposed Plan for Environmental Cleanup at Lawrence Livermore National Laboratory Site 300* (Dresen et al. 2000), *Draft Final Interim Site-Wide Record of Decision for Lawrence Livermore National Laboratory Site 300* (U.S. DOE 2000), quarterly reports, and work plans were among the documents submitted.

On November 3, 2000, DOE issued a Finding of No Significant Impact (FONSI) for the *Environmental Assessment of the Remediation of Environmental Contaminants at the Lawrence Livermore National Laboratory Experimental Test Facility, Site 300*, which was prepared by LLNL.

Milestones and Activities

LLNL has completed all the 2000 FFA milestones for Site 300 on or ahead of schedule. For a detailed list of these milestones and corresponding dates, see **Table 8-2**.

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 groundwater. Eight treatment facilities that remove and treat VOCs operated throughout 2000. Additionally, three new treatment facilities were constructed and began operation at Site 300 during 2000. These facilities are discussed in more detail in Chapter 8. Fourteen wells that extract groundwater only and 25 wells that extract both groundwater and soil vapor operated during 2000, treating about 102.5 million L of groundwater. The 25 wells that extract both vapor and groundwater together removed 352,905 m^3 of vapor. In 2000, the Site 300 treatment facilities removed approximately 27.7 kg of VOCs. Since remediation efforts began in 1990, more than 702 million L of groundwater and approximately 2.21 million m^3 of vapor have been treated, to yield about 185 kg of removed VOCs. See Chapter 8 for maps of the operable units and details of the distribution of contaminants in groundwater at Site 300.

Community Relations

The Site 300 CERCLA project maintains proactive communication with the surrounding communities of Tracy and Livermore. Community relations activities in 2000 included maintenance of the information repositories and administrative records; off-site, private well-sampling activities; mailings to stakeholders; and interviews with the news media. Meetings were held with Tri-Valley CAREs, which receives an annual technical assistance grant from EPA to independently evaluate CERCLA activities at Site 300.

On May 5, 2000, the remedial project managers held a public meeting to present to the community the preferred remedial alternatives outlined in the *Final Proposed Plan for Environmental Cleanup* (Dresen et al. 2000). Prior to the meeting, LLNL held a public workshop to help the public understand the proposed plan.

Site Evaluations Prior to Construction

Before any construction begins, the CERCLA Record of Decision (ROD) for the Livermore site requires that the project site 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 analytical results, soil may be reused on site or disposed of according to established procedures. Depending on the potential for radioactive contamination, rubble may be either surveyed or analyzed for radioactivity. During 2000, soil and rubble were evaluated at 51 construction sites.

Agency for Toxic Substances and Disease Registry Assessment

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency whose mission is to prevent adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution in the environment. ATSDR is mandated by Congress to conduct public health assessments (PHAs) of communities such as Livermore that are adjacent to hazardous waste sites. During the PHA process, in response to ATSDR queries, members of the Livermore community expressed specific concerns related to the environmental monitoring and dose evaluation of tritium at a meeting on April 19. To address these concerns, in 2000 ATSDR convened a panel of five experts in the

fields of tritium analysis and dosimetry to complete a health consultation on tritium related to LLNL operations.

The health consultation, which will be part of the final PHA for LLNL, will assess concerns related to tritium releases from the Laboratory. The health consultation, while based on the findings of the expert panel, will recommend action if there is any doubt that risks to the public are not being adequately assessed.

ATSDR reports and other related regulatory documents can be viewed in the "Off-site Environmental Studies (Livermore Site)" section of the Environmental Community Relations website at the following address: http://www-envirinfo.llnl.gov.

Superfund Amendment and Reauthorization Act, Title III

Title III of the Superfund Amendment and Reauthorization Act (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 those chemicals to organizations responsible for emergency response planning. Executive Order 13148 directs all federal agencies to comply with the requirements of EPCRA, including SARA 313, Toxic Release Inventory Program.

EPCRA requirements and LLNL compliance are summarized in **Table 2-1**. **Tables 2-2** and **2-3** identify those chemicals and their hazards reported during 2000 by LLNL for the Livermore site and Site 300, respectively, under Title III, Section 311.

Clean Air Act—Air Quality Management Activities

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) for Site 300. In 2000, LLNL operated 129 air emission sources for the Livermore site. BAAQMD inspectors found no deficiencies at the Livermore site (see **Table 2-4**). Also in 2000, LLNL applied for a Synthetic Minor Operating Permit as required by BAAQMD Regulation 2-6-312. The purpose of the document is to provide BAAQMD with an accounting of data about the potential to emit regulated pollutants from LLNL operations, a list of the permitted and exempt sources on site, a proposed limit on any regulated pollutant that exceeds the limits set in the regulation, and an explanation of how LLNL will comply with the conditions set forth in the permit. BAAQMD received and accepted the permit application on October 20, 2000, and committed to making a final decision on the application no later than April 18, 2001. In 2000, SJVUAPCD issued or renewed air permits for 42 air emission sources for Site 300 (see **Table 2-5**). At Site 300 SJVUAPCD conducted an inspection of emission sources and observed a leak test of the vapor recovery system for the Site 300 gasoline fuel tank; no deficiencies were found (see **Table 2-4**).

National Emission Standards for Hazardous Air Pollutants

To demonstrate compliance with the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for radiological emissions (40 Code of Federal Regulations [CFR] 61, Subpart H), LLNL is required to monitor certain air release points and evaluate all potential sources of radionuclide air emissions to determine the possible effective dose

Table 2-1. Summary of LLNL compliance with EPCRA in 2000

EPCRA requirement	Brief description	Compliance
302 Planning Notification	Operator must notify SERC[a] of presence of extremely hazardous substances. In California, operator must notify CEPRC[b] of presence of extremely hazardous substances above threshold planning quantities.	Originally submitted May 1987.
303 Planning Notification	Operator must designate a facility representative to serve as emergency response coordinator.	Updates submitted March 23, 2000, and August 8, 2000.
304 Release Notification	Releases of certain hazardous substances must be reported to SERC and LEPC.[c]	No EPCRA-listed extremely hazardous substances were released above reportable quantities.
311 MSDS[d]/ Chemical Inventory	Operator must submit MSDSs or chemical list to SERC, LEPC, and Fire Department.	**Tables 2-2** and **2-3**. Updated March 23, 2000, and August 8, 2000.
312 MSDS/Chemical Inventory	Operator must submit hazardous chemical inventory to local administering agency (county).	Business plans and chemical inventory submitted to San Joaquin County (January 14, 2000) and Alameda County (March 1, 2000, August 11, 2000).
313 Toxic Release Inventory	Operator must submit Form R to U.S. EPA and California EPA for toxic chemicals released.	Form R for Freon 113 submitted June 21, 2000, to DOE; DOE forwarded it to U.S. EPA and California EPA on June 27, 2000.

a SERC = State Emergency Response Commission

b CEPRC = Chemical Emergency Planning and Response Commission

c LEPC = Local Emergency Planning Committee

d MSDS = material safety data sheet

equivalent to the maximally exposed individual of the public. These evaluations include modeling (using EPA-sanctioned computer codes) based on radionuclide inventory data, air effluent (source emission) monitoring, or air surveillance monitoring.

The *LLNL NESHAPs 2000 Annual Report* (Gallegos et al. 2001), submitted to DOE and EPA, reported that the estimated total site-wide maximally exposed individual radiological doses for the Livermore site and Site 300 were 0.38 µSv (0.038 mrem) and 0.19 µSv (0.019 mrem), respectively, for 2000. Disregarding the EPA-mandated assumption that gaseous tritium be treated as though it were tritiated water yielded a slightly lower dose of 0.37 µSv (0.037 mrem) for Livermore site operations.

The reported doses include contributions from both point and diffuse sources. The totals were well below the 100 µSv/y (10 mrem/y) dose limits defined by the NESHAPs regulations. The details of these data are included in this report (see Chapter 13).

Table 2-2. Livermore site, SARA, Title III, Section 311, Chemical List, 2000

Livermore site chemicals	Physical hazard[a]			Health hazard[a]	
	Fire	Pressure	Reactivity	Acute	Chronic
Ammonium hydroxide				•	
Argon		•		•	
Carbon, activated	•				
Carbon dioxide		•	•	•	
Chlorine		•	•	•	
Chromium(III) chloride				•	•
Cobalt	•			•	•
Diesel fuel	•			•	•
Freon 11		•		•	
Freon 113				•	
Gasoline	•			•	•
Glass cleaner		•		•	
Helium		•		•	
Hydrochloric acid				•	•
Hydrofluoric acid		•[b]	•	•	•
Hydrogen	•	•		•	
Hydrogen peroxide (<52%)			•		
Insulating oil, inhibiting	•				
Lead (bricks and ingots)				•	•
Lithium hydride	•		•	•	
Methane	•	•		•	
Methyl alcohol	•			•	
Methylene chloride				•	•
Nitric acid	•		•	•	•
Nitric oxide	•	•	•	•	
Nitrogen		•			
Oil, DTE-26	•				
Oxygen		•	•		
Paint	•				
Potassium cyanide				•	
Potassium hydroxide			•	•	•

Table 2-2. Livermore site, SARA, Title III, Section 311, Chemical List, 2000 (continued)

Livermore site chemicals	Physical hazard[a]			Health hazard[a]	
	Fire	Pressure	Reactivity	Acute	Chronic
Propane	•	•		•	
Sodium hypochlorite				•	
Sulfuric acid			•	•	•
Tantalum				•	
Thinner, lacquer	•			•	•

a Physical and health hazard information obtained primarily from material safety data sheets

b Some containers have a pressure hazard.

Table 2-3. Site 300, SARA, Title III, Section 311, Chemical List, 2000

Site 300 chemicals	Physical hazard[a]			Health hazard[a]	
	Fire	Pressure	Reactivity	Acute	Chronic
Argon		•		•	
Carbon, activated	•				
Chlorine		•	•	•	
Bis(2,2-dinitro-2-fluoroethyl) formal in methylene chloride	—[b]		—[b]	•	•
Diesel fuel	•			•	•
Gasoline	•			•	•
High explosives			•		
Lead (bricks)				•	•
Nitrogen		•			
Oil, hydraulic	•			•	
Oil, inhibited insulating	•				
Oil, transformer	•				
Phosphorous trichloride			•	•	
Sulfuric acid			•	•	•

a Physical and health hazard information obtained primarily from material safety data sheets

b Dangerous fire or explosion risk in neat form (solvent evaporates)

Table 2-4. Inspections and tours of the Livermore site and Site 300 by external agencies in 2000

Medium	Description	Agency[a]	Date	Finding[a]
Livermore Site[b]				
Air	Emission sources	BAAQMD	5/4 5/25 6/15 6/29	No violations
Sanitary sewer	Annual compliance sampling	LWRP	11/6	No violations
	Categorical sampling		10/19 11/2	No outstanding deficiencies at time of sampling. However, one notice of violation was received in January 2001 as a result of a sample collected on 11/2.
Waste	Hazardous waste facilities	DTSC	3/21, 3/22, 3/23, 3/24, 4/18	Received an SOV with five initial findings but have not received final SOV
	Medical waste	ACDEH	9/6	No violations
Storage tanks	Compliance with underground storage tank upgrade requirements and operating permits.	ACHCS	2/15 10/4 11/2	No violations
Waste minimization	Compliance with Section 6002 of RCRA	EPA	2/17	No violations
Groundwater	Three remediation sites	SFBRWQCB, EPA, DTSC	6/9	No violations
Site 300				
Air	Emission sources Witness leak test of vapor recovery system for fuel tank	SJVUAPCD	4/20 9/26	No violations
Water	Permitted operations	CVRWQCB	3/17 4/18 10/20	No violations; however, as a result of the 10/20 inspection, the CVRWQCB requested LLNL prepare work plan for repair of overflowing cooling tower percolation pit at Building 827A
Waste	Various facilities	DTSC	6/28–6/29	One violation[c]
Storage tanks	Compliance with underground storage tank upgrade requirements and operating permits.	SJCEHD	2/14	No violations

a See Acronyms and Abbreviations for list of acronyms

b There were no water agency inspections at the Livermore site in 2000.

c DTSC determined that Site 300 returned to compliance on 8/15/00.

Table 2-5. Summary of permits active in 2000[a,b]

Type of permit	Livermore site	Site 300
Air	BAAQMD issued 129 permits for operation of various types of equipment, including boilers, emergency generators, cold cleaners, ultrasonic 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, image tube fabrication, optic coating operations, storage tanks containing VOCs in excess of 1.0%, plating tanks, drum crusher, semiconductor operations, diesel air-compressor engines, groundwater air strippers/dryers, ovens, material-handling equipment, sewer diversion system, oil and water separator, fire test cells, gasoline-dispensing operation, paper-pulverizer system, and firing tanks.	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, and drying ovens.
Water	WDR Order No. 88-075 for discharges of treated groundwater from Treatment Facility A to percolation pits and recharge basin. 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, DWTF Site ID No. 201S305140, Soil Reuse Project ID No. 2015305529 and National Ignition Facility, Site ID No. 201S306762, for discharges of storm water associated with construction activities affecting two hectares or more. WDR Order No. 99-086 for the Arroyo Las Positas Maintenance Project. Two ongoing projects permitted under streambed alteration agreements. Nationwide Permit 18 for the Arroyo Las Positas Maintenance Project. FFA for groundwater investigation/remediation.	WDR Order No. 99-08-DWQ, NPDES California General Construction Activity Permit No. CAS000002, Contained Firing Facility/Chemistry Magazine Loop, Site ID No. 5B39S307131 for discharges of storm water associated with construction activities impacting two hectares or more. WDR Order No. 93-100 for post-closure monitoring requirements for two Class I landfills. WDR Order No. 94-131, NPDES Permit No. CA0081396 for discharges of storm water associated with industrial activities and from cooling towers. (Rescinded August 2000) WDR Order No. 96-248 for operation of two Class II surface impoundments, a domestic sewage lagoon, and percolation pits. WDR Order No. 97-03-DWQ, NPDES California General Industrial Activity General Permit No. CAS000002 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. CA0082651 for large volume discharges from the drinking water system that reach surface waters. One ongoing project permitted under a streambed alteration agreement. FFA for groundwater investigation/remediation. 57 registered Class V injection wells.

Table 2-5. Summary of permits active in 2000[a,b] (continued)

Type of permit	Livermore site	Site 300
Hazardous waste	EPA ID No. CA2890012584. Authorization to mix resin in Units CE231-1 under conditional exemption tiered permitting.[c] Final Closure Plan submitted to DTSC for the Building 419 interim status unit (February 2001). Authorizations to construct the permitted units of Building 280, Building 695, and additions to Building 693. Authorization under hazardous waste permit to operate 18 waste storage units and 14 waste treatment units. Continued authorization to operate seven waste storage units and eight waste treatment units under interim status.	EPA ID No. CA2890090002. Part B Permit—Container Storage Area (Building 883) and Explosives Waste Storage Facility (issued May 23, 1996). Part B Permit—Explosives Waste Treatment Facility (issued October 9, 1997). Docket HWCA 92/93-031. Closure and Post-Closure Plans for Landfill Pit 6 and the Building 829 Open Burn Facility. Post Closure Permit Application submitted for Building 829 Open Burn Facility (September 2000)
Sanitary sewer	Discharge Permit No. 1250 (00/01) for discharges of wastewater to the sanitary sewer. Permit 1510G (00) for discharges of sewerable groundwater from CERCLA restoration activities.	
Storage tanks	Nine operating permits covering 13 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; 322-R2U2 Permit No. 6504; 365-D1U2 Permit No. 6492; 490-R3U1 and 490-R3U2 Permit No. 6509; 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 Permit numbers are based on actual permitted units or activities maintained and renewed by LLNL during 2000.

b See Acronyms and Abbreviations for list of acronyms.

c A second unit, CE443-1, which was authorized to mix resins under conditional exemption tiered permitting, was officially closed on July 6, 2000.

In 2000, LLNL continuously monitored radionuclide emissions from Building 331 (the Tritium Facility), Building 332 (the Plutonium Building), and portions of four other facilities (see Chapter 4). There were no unplanned atmospheric releases at the Livermore site or at Site 300 in 2000.

Clean Water Act and Related State Programs

Preserving clean water is one objective of local, state, and federal regulations. The National Pollutant Discharge Elimination System (NPDES) under the Federal Clean Water Act 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. The regional water quality control boards are responsible for issuing and enforcing both permits.

Several agencies issue other water-related permits. The Livermore Water Reclamation Plant (LWRP) requires permits for discharges of sewerable water to the city sanitary sewer system. The Army Corps of Engineers (ACOE) issues permits for work in navigable waterways below the ordinary high-water mark and for controlling fill operations in waters of the United States. The State Water Resources Control Board (SWRCB) can issue water quality certifications or WDRs. The California Department of Fish and Game (CDFG) under the Fish and Game Code Section 1601 et seq. requires streambed alteration agreements 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. The Clean Water Act also requires facilities meeting specific storage requirements to have and implement Spill Prevention Control and Countermeasure (SPCC) plans for oil-containing equipment and tanks. Finally, Alameda County Health Care Services (ACHCS) and San Joaquin County Environmental Health Services issue permits for operating underground storage tanks containing hazardous materials or hazardous waste as required under the California Health and Safety Code. Water-related permits are summarized in **Table 2-5** and discussed in detail in Chapters 6, 7, and 9.

Groundwater and Surface Water

In 2000, LLNL discharged storm water associated with industrial activities, low-threat equipment wastewater, process wastewater, sanitary sewage, treated groundwater, and domestic drinking water to surface waters, percolation pits, surface impoundments, septic systems, and a sewage lagoon under six NPDES permits, four WDRs, waivers, and agreements developed under CERLCA (**Table 2-5**). Details about surface water discharges are found in Chapter 7 of this report and in quarterly and annual compliance monitoring reports. Details about groundwater monitoring and discharges from CERCLA remediation actions are found in Chapters 8 and 9 of this report and in quarterly and annual compliance monitoring and groundwater program reports.

In August 2000, the CVRWQCB rescinded WDR 94-131 as part of their permit management strategy to reduce individual NPDES permits for discharges to surface waters by covering these discharges through applicable existing general permits. In July 2000, LLNL submitted two Notices of Intent to permit storm water discharges associated with industrial activities under WDR 97-03-DWQ and large domestic water system discharges to surface waters under WDR 5-00-175. At the same time, LLNL also submitted a Report of Waste Discharge to the CVRWQCB requesting that several low threat equipment discharges going to ground be added to WDR 96-248. The low threat discharges include serveral discharges previously believed to be discharging to surface waters. The CVRWQCB is currently in the process of amending WDR 96-248 to include these discharges. In addition, to simplify the various administrative mechanism that currently cover wastewater discharges occurring at Site 300, LLNL requested that discharges covered by waivers of WDRs be consolidated into WDR 96-248.

WDR 95-174 expired in August 2000. LLNL submitted a Report of Waste Discharge and a technical report to the SFBRWQCB requesting they renew WDR 95-174. In November 2000, the SFBRWQCB issued an administrative continuance of WDR 95-174 for storm water discharges associated with industrial activity and several low threat non-storm water discharges to surface waters.

During 2000, LLNL continued construction of four projects that were covered by the California General Construction Activity permit (see **Table 2-5**). Continuing operations included

construction of the Decontamination and Waste Treatment Facility (DWTF), the Soil Reuse Project, and the National Ignition Facility (NIF) at the Livermore site and the Contained Firing Facility/Chemistry Magazine Loop Project at Site 300.

LLNL received no Notices of Violation (NOVs) in 2000 from the regional water quality control boards that issued the NPDES permits and WDRs; however, LLNL identified administrative nonconformances with one of the six NPDES permits (see **Table 2-6**). These events are documented in the annual compliance certification required by NPDES CAS000002 and were reported to the SFBRWQCB at its request. In addition, LLNL was unable to comply with prohibitions in WDR 96-248 on four occasions and had occasional readings exceeding receiving water quality criteria during arroyo maintenance activities covered in WDR 99-086. These discharges were reported to the applicable regional boards and are discussed further in Chapters 7 and 9.

The CVRWQCB inspected the Site 300 permitted facilities in March, April, and October 2000. No violations were found during these inspections (see **Table 2-4**). However, the CVRWQCB requested that LLNL eliminate discharges from an overflowing percolation pit designed to receive cooling-tower discharges from B827A. The CVRWQCB requested that the percolation pit be repaired to eliminate discharges by April 15, 2001.

Sewerable Water

The Livermore site's sanitary sewer discharges are sampled continuously, daily, weekly, and monthly to satisfy various permit requirements. The monitoring results for the LLNL effluent were reported monthly to the LWRP. In 2000, LLNL had three discharges in violation of the LWRP permit covering wastewater discharges to the sanitary sewer (see **Table 2-7**).

Table 2-6. Summary of NPDES permit nonconformance

Permit No.	Outfall	Nonconformance	Date(s) of non-conformance[b]	Description–solution
CAS000002	Arroyo Las Positas (Livermore site)	Decontamination and Waste Treatment Facility—Failure to update SWPPP[a] by deadline.	11/17/99–12/13/99	Construction operations were suspended and the site was stabilized when the deadline for the SWPPP amendment occurred. The SWPPP was revised prior to re-commencing construction activities.
CAS000002	Arroyo Las Positas (Livermore site)	National Ignition Facility—Failure to date inspection forms.	10/99–4/00	Revised form to include an inspection date field.

a SWPPP = Storm Water Pollution Prevention Plan

b These dates reflect the construction reporting period of June 1999 through May 2000. The actual nonconformance may not have occurred over the entire time; however, specific nonconformance dates cannot be determined.

Table 2-7. Summary of nonconformance with LWRP permit limits for discharges to the sanitary sewer

Permit No	Nonconformance	Date(s) of nonconformance	Description–solution
1250	Cyanide in the January monthly effluent sample exceeded the permit limit. LWRP issued a notice of violation dated March 9, 2000.	1/5/00	An effluent sample collected March 1, 2000, confirmed LLNL's return to compliance.
	Silver in the June 26, 2000 daily composite sample exceeded the permit limit. LWRP issued a notice of violation dated July 31, 2000.	6/26/00	The daily composite sample for June 27, 2000, confirmed effluent discharges returned to compliance.
	Discharges from a water jet process exceeded categorical process discharge limits for chromium and nickel. LWRP issued a notice of violation dated January 12, 2001.	11/2/00–1/8/01	Discharges were discontinued on January 8, 2001. Additional settling and filtration was added to the wastewater treatment system. Return to compliance was demonstrated on February 1, 2001.

Self-monitoring continued during 2000, as required in the permit. Two samples collected in 2000 had constituents that exceeded permit effluent limits. The January monthly effluent sample collected on January 5, 2000, exceeded the discharge limit for cyanide. The LWRP issued an NOV for this discharge dated March 9, 2000.

On June 26, 2000, LLNL's real-time sewer monitoring station identified and diverted wastewater containing silver concentrations above alarm levels. The wastewater was diverted to the LLNL Sewer Diversion Facility for 10 minutes. The daily composite sample collected for June 26 was analyzed and confirmed silver concentrations in the discharge for that day exceeded the permit discharge limit. The daily composite sample for June 27 was analyzed and confirmed LLNL's return to compliance. On July 31, 2000, the LWRP issued an NOV for this incident.

On November 6, 2000, the LWRP collected split samples of site effluent as part of the annual compliance sampling. Sample results confirmed compliance with effluent discharge limits. LLNL and LWRP also inspected and sampled identified federally regulated processes and their wastestreams on October 19 and November 2. No outstanding facility deficiencies were noted during any of the inspections (**Table 2-4**). However, subsequent to the November inspection, analytical data received for a sample collected at a water jet process exceeded the chromium and nickel federal categorical discharge limits. LLNL discontinued discharges from the process on January 8, 2001. The LWRP issued an NOV for the November 2, 2000, sample on January 12, 2001. LLNL promptly began upgrading the wastewater treatment system for the discharge. Several follow-up samples were collected during 2001 with the sample collected February 1, 2001, confirming that the discharge from the water jet complied with federal categorical discharge limits.

In addition, LLNL conducts self-monitoring of federally regulated processes and reports results to the LWRP semiannually.

LLNL monitors discharges from groundwater treatment facilities to sanitary sewer under Permit 1510G (2000) as they occur. Data are reported annually to the LWRP. In 2000, LLNL complied with all the terms and conditions of Permit 1510G. Chapter 6 discusses the self-monitoring programs and the analytical results for the site effluent, categorical processes, and discharges from groundwater treatment facilities.

Streambed Alteration Agreements and Nationwide Permits

CDFG, SFBRWQCB, and ACOE all issue permits for work in streambeds (**Table 2-8**). ACOE issued Nationwide Permit (NWP) 18 for the installation of check dams associated with the Arroyo Las Positas Maintenance Project in 2000. Prior to issuing this permit in August 2000, the ACOE staff visited the Livermore site to evaluate permitting requirements for the project. LLNL continued operations allowed under a five-year streambed alteration agreement and WDR issued for the Arroyo Las Positas Maintenance Project. Operations also continued under a streambed alteration agreement issued for vegetation management in Arroyo Seco. No projects at Site 300 required permits from ACOE during 2000.

Tank Management

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, underground storage tanks contain diesel fuel gasoline, waste oil, and process wastewater; aboveground storage tanks contain diesel fuel, insulating oil, and process wastewater. Some wastewater systems are a combination of underground storage tanks and aboveground storage tanks. **Table 2-9** shows the status of tanks at the Livermore site and Site 300 as of December 31, 2000. All regulated underground storage tanks at the Livermore site were inspected by the regulating agency in 2000, and no violations were found (see **Table 2-4**).

In December 1998, LLNL performed the triennial review and evaluation of the SPCC plans for Site 300 and the Livermore site. No significant changes were made to the technology or practices documented in the *Spill Prevention Control and Countermeasures Plan* (Campbell 1995). The changes noted in the review reflect a reduction in the number of oil-containing tanks and equipment managed at the Livermore site and Site 300. The Site 300 SPCC was updated in December 1999. The Livermore site SPCC will be amended in 2001.

Resource Conservation and Recovery Act and Related State Laws

The Resource Conservation and Recovery Act (RCRA) and its corresponding regulations provide 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 (HWCA) 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 program authorization was delegated to the State of California in 1992, LLNL works with DTSC on compliance 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 695 and 693 of the 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). A final closure plan for the Building 419 Interim Status Facility has been submitted to DTSC for approval.

Table 2-8. Summary of streambed alteration agreements, 404 nationwide permits, and 401 waivers or Waste Discharge Requirements

Project	Location	Agency/type of permit	Year submitted
Storm-generated debris removal and vegetation management (five-year agreement)	Arroyo Seco	CDFG/SAA	1999
Arroyo Las Positas Maintenance Project (five-year agreement)	Arroyo Las Positas	CDFG/SAA SFBRWQCB/WDR ACOE/NWP 18	1998 1999 2000

a See Acronyms and Abbreviations for list of acronyms.

Table 2-9. Summary of in-service tanks, December 31, 2000

Tank type	Livermore site			Site 300		
	Permitted	Permits not required	Total	Permitted	Permits not required	Total
Underground storage tanks						
Diesel fuel	7	0	7	4	0	4
Gasoline	2	0	2	1	0	1
Waste oil	1	0	1	0	0	0
Process wastewater	3	31	34	0	7	7
Subtotal	13	31	44	5	7	12
Aboveground storage tanks						
Diesel fuel	0	26	26	0	6	6
Insulating oil	0	1	1	0	3	3
Process wastewater	10[a]	56	66	0	11	11
Subtotal	10	83	93	0	20	20
TOTAL	23	114	137	5	27	32

a These 10 tanks are located at the LLNL Treatment and Storage Facility.

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 the new DWTF, and Area 514 will be closed. The Building 233 Container Storage Facility will be closed.

In May 1998, DTSC conducted a compliance evaluation inspection of the hazardous waste storage and treatment facilities at the Livermore site. On April 25, 2000, LLNL received notification of a Summary of Violations (SOV) resulting from this inspection.

In May 1999, DTSC signed the hazardous waste 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 the 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, which challenges many of the environmental impact evaluations made in the DTSC initial study, which formed the basis of the CEQA Negative Declaration determination. The lawsuit was not resolved in 2000.

In June, July, and August 1999, DTSC conducted a compliance evaluation inspection of the hazardous waste storage and treatment facilities at the Livermore site. In August 1999, LLNL responded to DTSC's SOV. LLNL received the final inspection report and SOV in December 1999. On February 15, 2000, LLNL responded to DTSC regarding the alleged violations and information request. LLNL has not received a response from DTSC.

On March 21–24; and April 17 and 18, 2000, DTSC conducted a compliance inspection of the hazardous waste storage and treatment facilities at the Livermore site. A preliminary report of findings was received by LLNL. LLNL responded to DTSC and did not receive a final SOV in 2000.

Site 300

A post closure permit application for the Building 829 Open Burn Facility was submitted to DTSC for approval in September 2000. The Open Burn Facility was replaced by the Explosives Waste Treatment Facility (EWTF) in 1999.

On June 28 and 29, 2000, DTSC conducted a compliance evaluation inspection of Site 300 hazardous waste generator areas, the Building 883 Container Storage Area, Explosives Waste Storage Facility (EWSF), and EWTF. As a result of the inspection, on August 15, 2000, DTSC issued an SOV under the category of "Minor Violations/ Notice to Comply" for failing to provide initial "Explosives Waste Storage and Treatment Operations" training to the facility manager within six months of the date hired (see **Table 2-4**). LLNL provided the required training on August 3, 2000, and submitted a certification of course completion to DTSC on August 9, 2000. After reviewing the submittal, DTSC issued a letter, dated August 15, 2000, stating that Site 300 is again in compliance.

Hazardous Waste Reports

LLNL completed two annual hazardous waste reports, one for the Livermore site and the other for Site 300, which address the 2000 transportation, storage, disposal, and recycling of hazardous wastes. The annual reports, required under 22 CCR 66262.41, were completed and submitted to meet DTSC's April 1, 2001, deadline. These same reports, *2000 Hazardous Waste Report—Mainsite* and *2000 Hazardous Waste Report— Site 300* (Galles and Gilbert 2000a, b), were submitted to the EPA under Sections 3002 and 3004 of RCRA, which requires a biennial reporting of hazardous wastes. DTSC is authorized to receive the reports for EPA.

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).

Conditions for registration may include annual inspections of transport vehicles and trailers by the California Highway Patrol (CHP), biennial terminal inspections, and special training and annual physical examinations for drivers. DTSC renewed LLNL's registration in November 2000. The CHP opted not to conduct inspections of LLNL vehicles in 2000.

Waste Accumulation Areas

In January 2000, there were 20 waste accumulation areas (WAAs) at the Livermore site. One WAA and three temporary WAAs were put into service, and two temporary WAAs were taken out of service. Program representatives conducted formal inspections at least weekly at all WAAs to ensure that they were operated in compliance with regulatory requirements. Approximately 1093 formal WAA inspections were conducted at the Livermore site.

One WAA was in operation at Site 300 during 2000. Program representatives conducted 52 formal 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, Health and Safety Code Sections 117600–118360, Chapters 1–11. The Medical Waste Management Act 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 the State Department of Health Services (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. The September 2000 ACDEH inspection of buildings at Health Services and the Biology and Biotechnology Research Program did not result in any compliance issues or violations (see **Table 2-4**).

Federal Facility Compliance Act

LLNL is continuing to work with DOE to maintain compliance with the Federal Facilities Compliance Act Site Treatment Plan (STP) for Lawrence Livermore National Laboratory that was signed in February 1997. A milestone extension was requested for one waste stream that contains classified mixed waste. The extension was granted to allow time to develop the procedures necessary to handle and treat this waste. All other milestones for 2000 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.

Toxic Substances Control Act

The Federal Toxic Substances Control Act (TSCA) and implementing regulations found in Title 49, *Code of Federal Regulations,* Parts 700–789, govern the uses of newly developed chemical substances and TSCA-governed waste by establishing requirements for recordkeeping, reporting, disposal standards, employee protection, compliance and enforcement, and cleanup standards.

In 2000, LLNL generated TSCA PCB waste from CERCLA cleanup projects, PCB oil drained from electrical equipment, electrical equipment contaminated with PCBs, liquid PCBs used to

calibrate analytical equipment, and TSCA-regulated asbestos from building demolition or renovation projects.

All TSCA-regulated waste was disposed of in accordance with TSCA, state, and local disposal requirements except for radioactively contaminated PCB waste. Radioactive PCB waste, typically known as transuranic (TRU) mixed waste or mixed waste, is currently stored at one of LLNL's hazardous waste storage facilities until the Waste Isolation Pilot Project, or other approved facility, accepts this waste for final disposal.

National Environmental Policy Act

The National Environmental Policy Act (NEPA; 42 U.S. Code [USC] 4321 et seq.) established federal policy for protecting environmental quality. The major method for achieving established NEPA goals is the requirement of preparing 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 (FONSI) 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., preparation of either an EA or EIS). DOE NEPA implementing procedures (61 FR 36222 and 57 FR 15122) 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.

In 2000, one FONSI for the EA of the Site 300 CERCLA Remediation Project was issued by DOE. Preparation of another EA for the decommissioning and demolition of Buildings 222 and 412 was continued from 1999. Thirty-nine 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 March 1999, DOE issued a *Supplement Analysis* (U.S. DOE 1999) that concluded that 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) did not need to be supplemented and remained adequate.

California Environmental Quality Act

In November 1992, the University of California (UC) and LLNL made a commitment to implement 67 mitigation measures identified by the *1992 EIS/EIR* and to provide annual reports on their implementation. The measures are being implemented in accordance with the approved 1992 Mitigation Monitoring and Reporting Program associated with that joint DOE/UC EIS/EIR. The 1997–1999 fiscal year Mitigation Monitoring reports will be published in 2001.

National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA), as amended through 1992, requires federally operated and funded installations such as LLNL to balance agency missions with cultural values by integrating historic preservation into federal agency programs. Federal agencies must take into account the effects their projects may

have on "historic properties" (cultural resources), and they must allow a reasonable time period for the Advisory Council on Historic Preservation (the Council) to comment. LLNL has three significant types of cultural resources: (1) prehistoric, (2) historic (turn-of-the-century homesteading, ranching, and industrial), and (3) historic (World War II and Cold War science and technology).

A draft programmatic agreement (PA) was developed by LLNL in 1997 in consultation with the U.S. Department of Energy Oakland Office (DOE/OAK), the Council, and the California State Historic Preservation Office (SHPO) to help LLNL implement applicable federal and state cultural resource laws and regulations. Activities included cultural overviews, development of theme and context for significance evaluation, research designs, archaeological site identification and evaluation methods, and records and collection management. The activities will also generate needed data and methods in order to develop a Cultural Resource Management Plan (CRMP), the final objective of the PA.

As a result of continuing consultation with DOE/OAK, the Council, and SHPO, a revised PA was prepared in 2000 and is undergoing internal LLNL review. Based upon input from the Council and SHPO, the PA has been expanded and reorganized to focus efforts on undertaking the historic building inventory for the Main site and Site 300, and mitigating impacts to any historic buildings that may be proposed for demolition, while at the same time protecting known and potential archaeological resources. DOE extended invitations to participate in the PA process to Alameda and San Joaquin counties, the cities of Tracy and Livermore, to LLNL, and Native American representatives (Ohlone/Costanoan, Northern Valley Yokut, and Bay Minok).

During 2000, LLNL completed a historic evaluation of one building (Building 177 Chemistry/Physics Development Laboratory) and initiated evaluations for four additional buildings. Based on the historic evaluation of Building 177, the building is not eligible for listing in the National Register of Historic Places.

Endangered Species Acts and Sensitive Natural Resources

LLNL must meet the requirements of the U.S. Endangered Species Act, the California Endangered Species Act, and the California Native Plant Protection Act as they pertain to Endangered or Threatened species and their habitats, other species of special concern, and critical habitats that may exist or are known to exist at the LLNL sites. For example, in implementing the 1992 Mitigation Monitoring and Reporting Program in 2000, biological assessment surveys were performed for special-status species at 82 LLNL Site 300 project construction (ground-disturbing) areas. Presence data for the San Joaquin kit fox (*Vulpes macrotis mutica*), American badger (*Taxidea taxus*), and western burrowing owl (*Speotyto cunicularia hypugaea*) were collected at each project location, and other applicable mitigation measures were implemented where appropriate.

During 2000, at Site 300, no active San Joaquin kit fox dens were discovered, but three potential dens were found. Three occupied American badger dens were discovered, and ten unoccupied dens were identified. Eleven active burrowing owl dens were discovered and monitored throughout the breeding and wintering season. For the second year, owls were marked with aluminum leg bands to initiate long-term studies, monitoring, and conservation of the species in the rugged topography of Site 300. Also, Site 300 populations of

the federally-listed threatened California red-legged frog (*Rana aurora draytonii*) and a federal species of concern, the California tiger salamander (*Ambystoma californiense*), were monitored at wetland locations sitewide.

A critical habitat area (CHA) was formally designated by the U.S. Fish and Wildlife Service for the Alameda whipsnake (*Masticophis lateralis euryxanthus*) and includes about one-third of the Site 300 property in the southwest corner of the site. CHA was designated by the U.S. Fish and Wildlife Service for the California red-legged frog and roughly 80% of Site 300 lies within this CHA.

Livermore site populations of the California red-legged frog were monitored in accordance with the 1997 and 1998 amended Service Biological Opinion for the Arroyo Las Positas Maintenance Project. One-hundred- to three-hundred-foot checkerboard sections in the Arroyo were managed for excess in-stream vegetation and 64 California red-legged frogs were protected from harm in project locations during the maintenance process. A CHA for the California red-legged frog was proposed by the U.S. Fish and Wildlife Service that encompasses parts of the Livermore site and surrounding areas.

The DRB was drained in a proactive attempt to eradicate recently discovered non-native bullfrogs (*Rana catesbeiana*), which are a predator of the California red-legged frog. The project successfully dried the DRB during December 2000 and halted further colonization of habitat onsite.

At the Livermore site, one pair of white-tailed kites (*Elanus leucurus*), a state-listed protected bird-of-prey, attempted to nest. The nest was abandoned for unknown reasons shortly after the nestlings hatched. No other nests were recorded in 2000. This low nesting success trend was observed statewide and is probably due to cyclical climatic variations and the reduction of prey items such as rodents.

Four rare plant populations were monitored at Site 300 in 2000. These were the large-flowered fiddleneck (*Amsinckia grandiflora*, a federally-listed endangered plant species), the big tarplant (*Blepharizonia plumosa* ssp *plumosa*, listed on the California Native Plant Society Rare Plant 1B List), the diamond-petaled poppy (*Eschscholzia rhombipetala*, a plant thought to be extinct until rediscovered in 1993 and thus on the California Native Plant Society 1A list) and the gypsum-loving larkspur (*Delphinium gypsophilum* ssp *gypsophilum*, listed on the California Native Plant Society Rare Plant 4 list). The results of the work on these four plant species is described in more detail in an annual progress report (Carlsen et al. 2001).

Two of the three known natural populations of the large-flowered fiddleneck (*Amsinckia grandiflora*), a federally-listed endangered plant species, occur at Site 300. A portion of Site 300 has been designated as CHA for the plant. In April 2000, this area was designated the *Amsinckia grandiflora* Reserve through a declaration by Secretary of the U.S. Department of Energy. A memorandum of agreement was signed between the DOE and the U.S. Fish and Wildlife Service concerning activities within the reserve. LLNL has also established an experimental population within the reserve. LLNL is working with the U.S. Fish and Wildlife Service on continued monitoring of native and experimental *Amsinckia* populations, and to further develop habitat restoration and maintenance techniques. The annual progress report prepared by LLNL will be submitted to the U.S. Fish and Wildlife Service in May 2001 (Carlsen et al. 2001).

The smaller of the two on-site native populations of fiddleneck was extirpated in 1997 when the bank containing the population washed away. No plants

have been observed at this site since 1998. The number of fiddleneck plants in the larger native population remain low (40 plants in 2000) but is up from the six plants observed in 1999. The number of fiddleneck plants observed in the experimental population (45 plants) is similar to that observed during the past two years (42 plants in 1999 and 61 plants in 1998). The experimental population was expanded in 2000 to investigate more fully the use of fire as a management tool. Of the 200 *Amsinckia grandiflora* seedlings transplanted into twenty native bunch grass-restored plots, a total of 178 survived to flowering.

The low numbers of *Amsinckia grandiflora* plants observed over the past several years at Site 300 have also been observed in other existing natural and experimental populations of the fiddleneck. A dramatic increase in nutlet predation by small rodents was observed in the Site 300 experimental population in 1998 and 1999. However, nutlet predation was much reduced in 2000. During a two week experimental removal period, only one rodent was trapped, indicating the numbers of this primary seed predator to be very low. The experimental population will be monitored next year to determine if the reduction in nutlet predation results in an increase in plant numbers.

Monitoring of the big tarplant (*Blepharazonia plumosa*), and the diamond-petaled poppy (*Eschscholzia rhombipetala*) continued in 2000. The big tarplant remained widespread throughout Site 300, with the number and size of the populations increasing from 1999. Detailed monitoring of populations located in areas undergoing controlled burning is also being conducted to determine the impacts of fire on the population dynamics of this species. A total of 273 diamond-petaled poppy plants were observed in 2000 (a dramatic increase from the nine plants observed in 1999). The majority of these plants produced seed-bearing pods.

In addition, this year populations of the gypsum-loving larkspur (*Delphinium gypsophilum* ssp *gypsophilum*) were mapped. Two locations of this species were confirmed. It was determined that a more common species of larkspur had been misidentified as the gypsum-loving larkspur in many locations during previous surveys.

Antiquities Act (of 1906): Paleontological Resources

During soil excavation for the National Ignition Facility at the Livermore site in 1997, a molar from a 14,000-year-old mammoth was found at a depth of about 10 m below the surface. After this discovery, LLNL obtained an excavation permit from the Department of Interior under the provisions of the Antiquities Act of 1906 and removed bones from the construction area in late 1997 and early 1998. The bones (including 11 ribs, 3 vertebrae, 1 humerus, 1 complete and 1 partial tusk, and a partial skull with palate, jawbone, and molars) were accessioned into the UC Berkeley Museum of Paleontology collection in 1999 and have been partially prepared for possible later presentation at LLNL. The bones were displayed for the public during Family Days at LLNL in October, 2000.

Environmental Occurrences

Notification of environmental occurrences is required under a number of environmental laws and regulations as well as DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information*. DOE Order 232.1 provides guidelines to contractor facilities regarding categorization and reporting of environmental occurrences to DOE and divides occurrences into two categories: unusual occurrences and off-normal occurrences. Operational emergencies are also reported under DOE Order 232.1; however, DOE Order 151.1,

Categorization and Classification of Operational Emergencies, defines the criteria for categorization and classification of operational emergency events.

The Environmental Protection Department's (EPD) response to environmental occurrences is part of the larger LLNL on-site emergency response organization that also includes representatives from Hazards Control (including the LLNL Fire Department), Health Services, Plant Engineering, Public Affairs, Safeguards and Security, and Site 300. In 2000, nine environmental incidents were reportable under DOE Order 232.1 and were categorized as off-normal occurrences according to DOE Order 232.1.

None of the environmental occurrences, summarized in **Table 2-10**, caused any adverse impact to the public or the environment. Agencies notified of these incidents included DOE and DTSC.

Table 2-10. Tabulation of environmental occurrences reported under the Occurrence Reporting (OR) System, 2000

Date[a]	Occurrence category	Description[b]
March 13	Off-Normal	LLNL received an NOV on March 13, 2000, from the LWRP. The NOV was issued because LLNL exceeded the permit limit for cyanide. The January compliance sampling result for cyanide indicated a concentration of 0.051mg/L in the sanitary effluent. The LLNL limit is 0.04 mg/L. Receiving an NOV meets the requirements of an Off-Normal Occurrence. OR 2000-0012.
March 16	Off-Normal	Two oil-filled transformers leaked approximately 55 gallons of oil into a waste container. An estimated 15 gallons of the oil leaked onto the paved area in the salvage yard. It was determined that the amount of oil released did not exceed any reporting limits. However, there was a chance that the oil could have been transported offsite within the container. This was reported under the Off-Normal category. OR 2000-0014
March 28	Off-Normal	A Hazardous Waste technician was processing laboratory waste from the Biology and Biotechnology Research Program at Building 612 (Hazardous Waste Yard). The waste was labeled >99% laboratory trash (paper, plastic, and rubber) with 2-mercaptoethanol, phenol and chloroform. The waste bag also contained at least two hypodermic needles that were not listed on the waste label. One of the needles penetrated the bag and stuck the Hazardous Waste technician in the arm. This was reported under the Off-Normal category. OR 2000-0016.
April 19	Off-Normal	LLNL was notified by DTSC of an SOV on April 18. The SOV resulted from a CEI conducted by DTSC on March 20–24. The SOV was issued for: (1) failure to mark the date on a waste container, (2) storage of incompatible wastes, (3) storage of a waste container for more than one year, (4) failure to follow the waste analysis plan, and (5) failure to record required information. Receiving an SOV meets the requirements of an Off-Normal Occurrence. OR 2000-0022
April 26	Off-Normal	LLNL was notified by DTSC of an SOV on April 25. The SOV resulted from a CEI conducted two years earlier on May 26 and 27, and July 7, 1998. Receiving an SOV meets the requirements of an Off-Normal Occurrence. OR 2000-0028
June 12	Off-Normal	On June 1, 2000, an HWM technician was verifying the contents of a 55-gallon drum containing four carboys at the 883 Waste Accumulation Area. While the technician was visually inspecting the drum, the drum lid popped up and flipped over. Pressure and a visible light grey cloud escaped from the drum. The waste in the drum resulted from synthesis work with phosphorus trichloride. This was reported under the Off-Normal category. OR 2000-0035

Table 2-10. Tabulation of environmental occurrences reported under the Occurrence Reporting (OR) System, 2000 (continued)

Date[a]	Occurrence category	Description[b]
June 30	Off- Normal	On June 20, 2000, an empty container used to store low-level waste was surveyed for radioactivity. This survey was conducted for the purpose of releasing the container from Building 332 for disposal. The container had been unused and was in storage for approximately 5 years. The survey detected the presence of a radioactive isotope at approximately 800 cpm alpha activity. This incident was reported under the Facility Category D: loss of Radioactive Material/Spread of Radioactive Contamination as an Off-Normal Occurrence. OR 2000-0044
July 27	Off-Normal	On July 27, 2000, DTSC issued LLNL an SOV. The SOV was a result of a CEI conducted by DTSC on July 12, 2000. The SOV was issued for failure to provide all required training to new personnel within six months of the date hired. Receiving an SOV meets the requirements of an Off-Normal Occurrence. OR 2000-0050
July 31	Off-Normal	LLNL received an NOV from the LWRP. The NOV was issued because LLNL exceeded its permit limit for silver on June 26, 2000. Analysis of the daily compliance sample for June 26 indicated silver at 0.31 mg/L; LLNL's permit limit is 0.20 mg/L. Receiving an NOV meets the requirements of an Off-Normal Occurrence. OR 2000-0053

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

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