
Compliance Summary

Introduction

During 1997, Lawrence Livermore National Laboratory participated in numerous activities to comply with federal, state, and local environmental regulations as well as internal requirements and Department of Energy (DOE) orders. Activities related to air, water, waste, waste reduction, community “right to know,” protection of sensitive resources, and other environmental issues were carried out at the Livermore site and Site 300. Many documents concerned with these activities and other environmental issues are available for public viewing at the LLNL Visitors Center and the Livermore and Tracy public libraries. A wide range of compliance activities are summarized in the following sections.

CERCLA/SARA, Title I

LLNL has two projects that are under the jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Superfund Amendment and Reauthorization Act (SARA), Title 1. These are the Livermore Site Ground Water Project and the Site 300 Ground Water Project.

Livermore Site Ground Water Project

The Ground Water Project (GWP) 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 (RWQCB). As required by the agreement, the project addresses compliance issues through investigations of potential contamination source areas (such as suspected old release sites, solvent handling areas, and leaking underground tank systems), continued monitoring of ground water, and remediation. The ground water constituents of concern are volatile organic compounds (VOCs), primarily trichloroethene (TCE) and tetrachloroethene (PCE). These contaminants are present primarily within the site boundary but to some extent at the site boundary and beyond, mainly to the west and south of the site. Locations of ground water and vapor treatment facilities are shown in **Figure 2-1**. On-site treatment facilities



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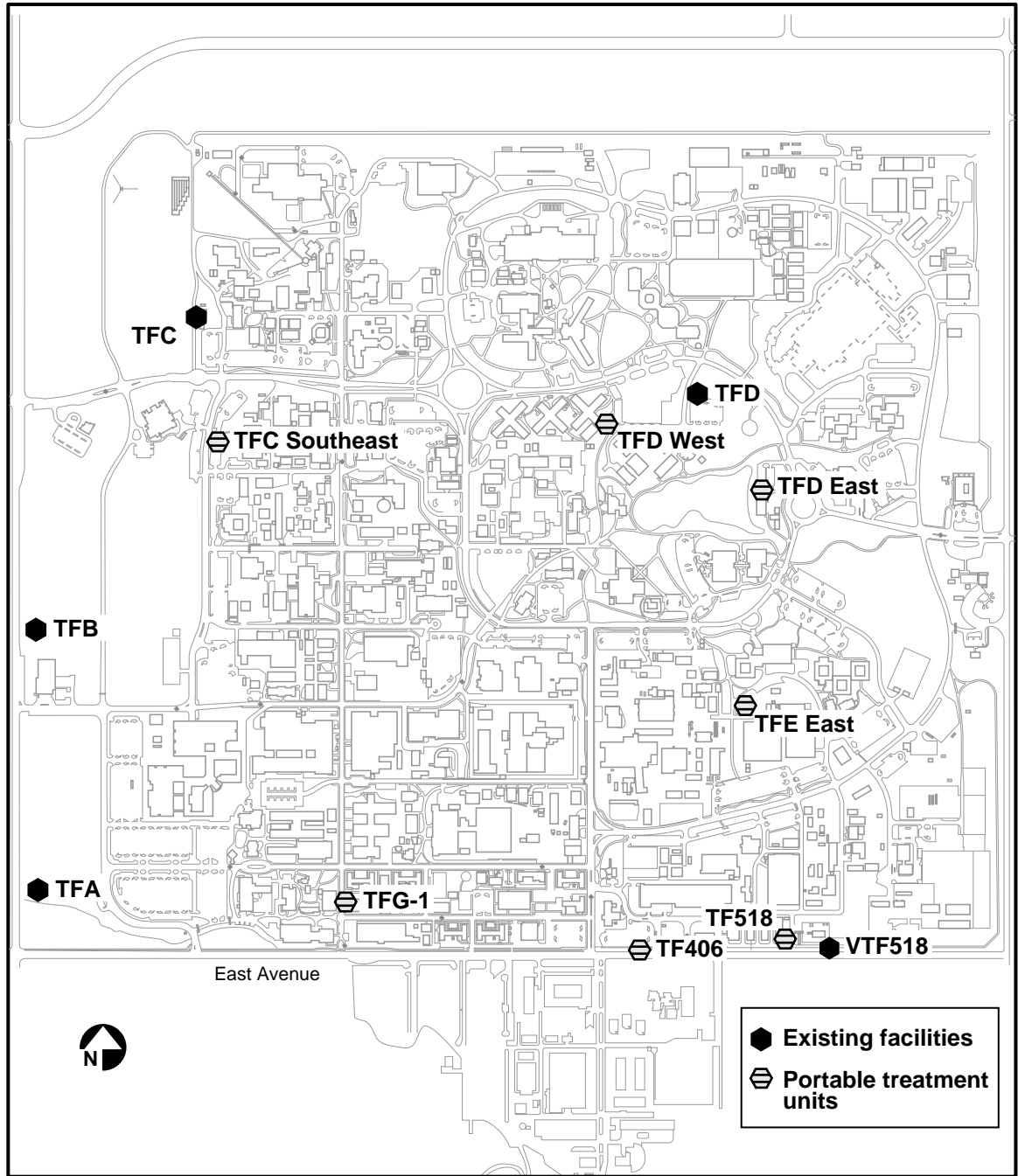


Figure 2-1. Location of existing ground water and vapor (V) treatment facilities.



are generally situated in areas of high concentrations of VOCs. (See **Figure 8-4** in Chapter 8 for an isoconcentration contour map of VOCs at the Livermore site and environs.) However, Treatment Facilities A, B, and C (TFA, TFB, and TFC) are located at areas of lower contaminant concentrations downgradient from high concentration “hot spots” to aid in remediation of contaminated ground water at and beyond the site boundary.

Pump-and-treat, the primary treatment technology employed at the Livermore site to remediate contaminated ground water, employs a dense network of ground water extraction wells, monitoring wells, pipelines, and surface treatment facilities.

In 1997, LLNL increased its use of portable treatment units (PTUs). These relatively inexpensive units provide an alternative to the fixed treatment units that have been used since 1989.

Documentation

Documentation required by the regulatory agencies in 1997 was submitted and is summarized in Appendix C. The first Five-Year Review for the Livermore site (Berg et al. 1997a) was approved by the U.S. Environmental Protection Agency (EPA) in December 1997. The review concluded that Livermore site remedial actions continue to meet the objectives of the 1992 Record of Decision. Two Explanations of Significant Differences (ESDs) were also prepared and approved by the regulatory agencies. The first ESD described a change in remediation treatment from ultraviolet light/hydrogen peroxide (UV/H₂O₂) and air stripping to air stripping only at TFA and TFB (Berg et al. 1997b). The second ESD concerned a change in metals discharge requirements based on wet and dry season beneficial use (Berg et al. 1997c). Both ESDs were issued in April 1997. A Draft Action Memorandum (Bainer and Berg 1997) for an emergency removal action was prepared in response to the discovery of undocumented buried capacitors and drums during excavation for the National Ignition Facility (NIF). Appropriate public notification and information activities were conducted in support of this removal action. The Draft Action Memorandum was submitted on October 31, 1997, for a 30-day community review and comment period. A Closeout Report for the emergency removal action was submitted in December 1997 (Bainer and Littlejohn 1997). After responding to community comments, DOE/LLNL issued the final Action Memorandum in February 1998.

Milestones and Activities

The six 1997 Remedial Action Implementation Plan milestones (Dresen et al. 1993) for the Livermore site were reached ahead of schedule. Greater quantities of VOCs were



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removed from ground water in 1997 by using more wells and more PTUs. Remediation activities at the Livermore site are summarized in **Table 2-1** and discussed in greater

Table 2-1. Volatile organic compounds (VOCs) removed from ground water and soil at the Livermore site.

Treatment facility ^(a)	Startup date	1997		Cumulative totals	
		Water treated (ML) ^(b)	VOCs removed (kg)	Water treated (ML) ^(b)	VOCs removed (kg)
TFA	9/89	483	18.4	1475	93.4
TFB	10/90	64	6.8	246	26.8
TFC	10/93	87	9.4	136	15.4
TFD	9/94	181	55.0	230	73
TFE	11/96	36	15.9	38	16.7
TFG1	4/96	12	0.6	15	1.2
TF406	8/96	8.7	0.9	10	1.1
		Soil vapor treated (m ³)	VOCs removed (kg)	Soil vapor treated (m ³)	VOCs removed (kg)
VTF518 ^(b)	9/95	123,000	40.6	175,000	106.6

^a Includes fixed and portable units.

^b ML = 1 million liters.

detail in Chapters 7 and 8. In short summary, Livermore site environmental restoration activities in 1997 included the following:

- A high-efficiency air stripper began operation at TFA in June 1997. The air stripper, which is more cost effective and operates at a higher capacity, replaces the UV/H₂O₂ system that had been in use since 1989.
- In situ pilot testing of catalytic reductive dehalogenation at Trailer 5475 began on August 8, 1997. This technology is based on the reaction of dissolved hydrogen with VOCs on a palladium-alumina catalyst to form ethane and chloride. Tests showed that the efficiency of VOC removal was greater than 95% and that mass removal rates were high.
- Buried drums and capacitors discovered during excavation for the NIF were removed (Bainer and Berg 1997) and transported to licensed disposal facilities in Utah.



- Alameda County Flood Control and Conservation District, Zone 7 (Zone 7) joined with LLNL to discuss a cooperative effort to model the water needs for the Livermore Valley's increasing population and agricultural needs. As part of a preliminary investigation, LLNL employed the two-dimensional CFEST flow model (Tompson et al. 1995) to estimate ground water flow in the basin and test the influence of different rates of extraction and reinjection within the basin.
- Construction of ground water Treatment Facility 518 (TF518) began in 1997, and PTU518 started operating in January 1998.

Community Relations

In August 1997, DOE/LLNL celebrated five years of successful environmental restoration at the Livermore site. The celebration was attended by elected officials, DOE, regulatory agencies, LLNL, and community representatives.

The Community Work Group (CWG) met twice in 1997 to discuss the DOE budget, progress of Livermore site cleanup, the procedural changes outlined in the two ESDs, the Priority List/Consensus Statement (Lamarre and Littlejohn 1997), the Five-Year Review, and the Draft Remedial Design Report No. 4 (Berg et al. 1997a). Correspondence and communication with CWG members continued throughout the year.

Other Livermore site community relations activities in 1997 included communicating and meeting with local, regional, and national interest groups; public presentations including those to local realtors, national and northern California peace leaders, and international student and business groups; producing and distributing the *Environmental Community Letter*; maintaining the Information Repositories and the Administrative Record; conducting tours of site environmental activities; and responding to public and news media inquiries. DOE/LLNL met three times with members of Tri-Valley Citizens Against a Radioactive Environment (CAREs) and their technical advisor as part of the activities funded by an EPA technical assistance grant.

Site 300 Ground Water Project

At Site 300, remedial investigations, feasibility studies, engineering evaluation and cost analyses, remedial designs, and remedial actions are ongoing. Environmental investigations and cleanup activities began in 1981. Site 300 became a CERCLA/Superfund site in 1991, when it was placed on the National Priorities List (NPL).



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Site 300 investigations and remedial actions are conducted under the joint oversight of the EPA, the Central Valley RWQCB, and the DTSC and the authority of a federal facility agreement (FFA) for the site. (There are separate FFAs for Site 300 and the Livermore site.) During November 1996, an addendum containing updated scope and milestone due dates was added to the FFA after approval by the regulatory agencies (U.S. Department of Energy 1996a). During 1997, LLNL submitted all required regulatory documents (see Appendix C) and performed all actions stipulated in the FFA on or ahead of schedule. The study areas are shown in **Figure 2-2**. The major constituents of concern are listed in **Table 2-2**.

Four treatment facilities that remove and treat VOCs, primarily TCE, are currently in operation at Site 300. **Table 2-3** summarizes 1997 and cumulative totals of volumes and masses of contaminants removed from ground water and soil vapor.

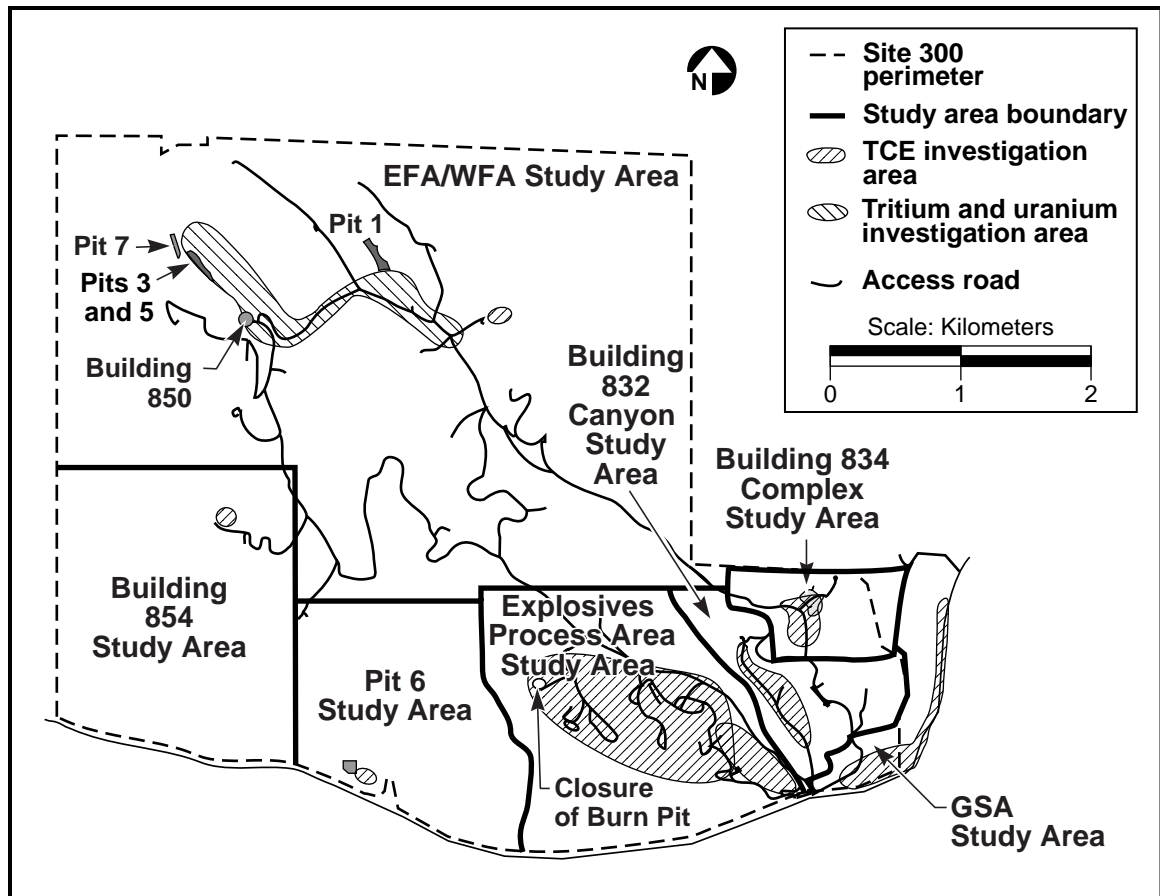


Figure 2-2. Environmental restoration study areas and activities at Site 300.



Table 2-2. Major constituents of concern found in soil, rock, and ground water at Site 300.

Study area	Constituent of concern
General Services Area (GSA)	VOCs (primarily TCE)
Building 834 Complex	VOCs (primarily TCE), organosilicate oil
High Explosives Process Area	VOCs (primarily TCE) HE ^(a) (primarily HMX ^(b))
East and West Firing Areas (EFA/WFA)	Tritium Depleted uranium VOCs (primarily TCE)
Building 854	VOCs (primarily TCE)
Pit 6	VOCs (primarily TCE)
Building 832 Canyon	TCE

^a HE = high explosives.

^b HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

Table 2-3. Volatile organic compounds (VOCs) removed from ground water and soil at Site 300.

Treatment area	Startup date	1997		Cumulative totals	
		Water treated (ML) ^(a)	VOCs removed (kg)	Water treated (ML) ^(a)	VOCs removed (kg)
General Services Area					
Eastern GWTF ^(b)	6/91	80.8	0.35	409	5.0
Central GWTF	4/93	0.7	0.73	3.2	5.6
Building 834	10/95	90.8	5.2	91.0	16.7
		Soil vapor treated (m ³)	VOCs removed (kg)	Soil vapor treated (m ³)	VOCs removed (kg)
General Services Area					
Central	1994	47,438	0.72	446,135	30.3

^a ML = million liters.

^b GWTF = ground water treatment facility.



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Study Area Highlights and Activities

Background information for LLNL 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 in previous Environmental Reports (Harrach et al. 1996 and 1997). Remediation activities are summarized in **Table 2-3**. See Chapters 7 and 8 for a more complete discussion of 1997 monitoring activities and results for Site 300 environmental restoration study areas.

General Services Area (GSA). Details of 1997 activities are contained in the following reports: *The Final Record of Decision for the GSA Operable Unit* (U.S. Department of Energy 1997), which was signed on February 7, 1997, and the *Draft Remedial Design* document (Rueth et al. 1997), submitted to the regulatory agencies in August 1997. The remedial design document includes the Contingency Plan and Compliance Monitoring Plan for the GSA operable unit (OU). There are two ground water TCE plumes and two corresponding treatment facilities in each of the Eastern and Central GSAs.

In the Eastern GSA, the air-sparging ground water treatment system (GWTS) and tank in the Eastern GSA were replaced by several aqueous-phase granulated activated carbon (GAC) adsorption units, which are effective in removing VOCs from ground water, less complex in both design and operation than air-sparging technology, and less expensive than the sparging tanks. The units also eliminated the need for the air permit previously required by the San Joaquin Valley Unified Air Pollution Control District for treatment of the contaminated vapor stream; this will reduce regulatory compliance monitoring and reporting requirements.

LLNL estimates that eight more years of ground water extraction and treatment will be required to achieve and maintain ground water VOC concentrations below maximum contamination levels (MCLs) at the Eastern GSA.

In the Central GSA, air-sparging treatment tanks have been replaced with air-strippers in a portable treatment unit (PTU), which is more cost effective and easier to deploy to another Site 300 operating unit. Trichloroethene (TCE) concentrations in Central GSA GWTS influent have been reduced from 9400 ppb in April 1993 to 380 ppb in October 1997.

Building 834 Complex. The Building 834 GWTS was operated continuously from October 1996 through May 1997, when the system was shut down to prepare for a small-scale test to assess the potential of enhancing TCE recovery through the use of a surfactant. The Building 834 GWTS is expected to resume operation in 1998.



Explosives Process Area. Continued assessment of chemical data indicate that although natural attenuation is reducing the extent and maximum concentration of VOCs at the Building 815 operable unit, contaminants continue to migrate toward the southern Site 300 boundary. Consequently, a Building 815 OU engineering evaluation/cost analysis report was submitted to regulatory agencies who accepted the report in December.

East and West Firing Area. This year, an assessment of annual tritium inventories in ground water from 1985 to 1997 was completed. The analysis, which included the inventories of tritium in the vadose zone available for leaching to ground water indicated that the two tritium plumes emanating from the landfill are stable with regard to measured tritium concentrations and area impacted, while the Building 850 plume is decreasing at the radioactive decay rate. Although tritium continues to leach into ground water from landfilled materials from past operations, the long term trend in total ground water tritium activity is one of decreasing activity at approximately the radioactive decay rate of tritium.

Total uranium activities in excess of the California MCL continued to be measured in ground water samples from several monitoring wells at the Pits 3 and 5 areas; several of these wells also yielded water samples bearing isotopic ratios indicative of depleted uranium. Conversely, samples of ground water from several wells in the area contain uranium activities that exceed the state MCL, but bear natural-uranium isotopic signatures. Analyses of ground water samples from several wells adjacent to Building 850 also indicate depleted-uranium signatures; these samples do not exceed the California MCL for uranium. Three small plumes of uranium in ground water emanate from each of Pits 5 and 7 and the Building 850 firing table. Conservative ground water fate and transport modeling indicates that total uranium activity will be at background levels by the time any depleted-uranium-bearing ground water reaches the Site 300 boundary.

In 1997, LLNL submitted to the regulatory agencies the *Draft Engineering Evaluation/Cost Analysis Report for the Building 850/Pits 3 and 5 Operable Unit* (Taffet, et al. 1997). The document contains an analysis of a number of removal action elements for the operable unit.

Trichloroethene occurs in a small ground water plume monitored by two wells at the Building 801 firing table. Since monitoring began in 1987, concentrations have dropped from a maximum of 6 $\mu\text{g}/\text{L}$, to less than 2 $\mu\text{g}/\text{L}$. Freon 113 at ground water concentrations significantly below the California MCL of 1.2 ppm is present near Pit 1 and is the result of spills at Building 865 Advanced Testing Accelerator. Remedial investigations for these areas are planned for the future.



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Building 854 Study Area. During 1997, LLNL determined the extent of TCE in soil, soil vapor, and ground water. Trichloroethene in the ground water was found to arise principally from leaks in the former overhead TCE brine system at Buildings 854E and 854F. During 1997, LLNL began preparation of the *Characterization Summary Report for the Building 854 OU*; this document will be submitted to the regulatory agencies in 1998.

Pit 6 Area. The Title II design package for the capping of Pit 6 was submitted to the regulatory agencies on December 18, 1996. A public meeting was held on January 15, 1997. During 1997, a 2.4-acre engineered cap was constructed over the landfill as a CERCLA non-time-critical removal action. The objectives of the capping are to: (1) isolate the buried waste from infiltrating rain water; (2) divert surface water from the landfill; (3) eliminate safety hazards from subsidence into voids in the buried waste; (4) mitigate risk from potential inhalation of vapors from the subsurface; and (5) reduce ground water recharge near the contaminant plumes. The total cost of constructing the landfill cap was about \$1,500,000. Selectively substituting geosynthetic for natural materials (clay) saved more than \$500,000, while maintaining the same high performance standards for impermeability and durability.

Building 832 Canyon Study Area. Ground water samples collected from wells in the Building 832 Canyon area contain TCE and nitrates at concentrations in excess of MCLs. The maximum concentration of TCE reported in ground water was 7 ppm. Samples of surface water and water from shallow wells indicate that a plume of TCE in ground water has reached the southern Site 300 boundary.

In 1997, the *Characterization Summary for the LLNL Site 300 Building 832 Canyon Operable Unit* (Ziagos and Ko 1997) was submitted to regulatory agencies. This report contains the results of the last several years of intensive drilling, sampling, and data analysis in the operable unit. Ongoing analysis of the nature and extent of subsurface contamination has indicated that the dominant chemical of concern is TCE, which has been found at a maximum concentration of 30 ppb in shallow alluvial ground water. The TCE plume in the Building 832 Canyon appears to have its origin in releases at deactivated test cells at Buildings 832 and 830. Trichloroethene from these source areas has migrated into the Building 832 Canyon and forms a plume of relatively continuously diminishing TCE that extends 900 m (3000 ft) to the Site 300 boundary, where it is at concentrations of about 1 ppb. As the TCE moves into and down the canyon, it occurs in several deeper hydrogeologic units.

The first step toward TCE mass removal in the operable unit was completed with the submittal and acceptance of the "Building 832 Canyon Operable Unit Treatability Study Workplan" in November 1997. This workplan sets forth plans for ground water and soil vapor TCE extraction and treatment in 1998 and beyond, using portable treatment units,



solar-powered water activated-carbon treatment units, and soil vapor extraction systems. Also under consideration is the use of a subsurface iron filings permeable reactive treatment wall in the lower canyon area to intercept the TCE-laden ground water, destroy the TCE and degradation products, and help control the migration of the TCE plume off site.

Community Relations

LLNL Site 300 community relations activities in 1997 included communications and meetings with local, regional, and national interest groups; other community organizations; public presentations, including those to local realtors; maintaining the Information Repositories and the Administrative Record; conducting tours of site environmental restoration activities; and responding to public and news media inquiries. DOE/LLNL met three times with members of Tri-Valley Citizens Against a Radioactive Environment (CAREs) and their technical advisor as part of the activities funded by an EPA Technical Assistance Grant. A public workshop for the Pit 6 Removal Action capping was held on January 15, 1997.

SARA, Title III

Title III of the Superfund Amendment and Reauthorization Act (SARA) of 1986 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 12856, signed by President Clinton in August 1993, directs all federal agencies to comply with the requirements of EPCRA, including the SARA 313 Toxic Release Inventory Program.

EPCRA requirements and LLNL compliance are summarized in **Table 2-4**. **Tables 2-5** and **2-6** identify those chemicals reported by LLNL for the Livermore site and Site 300, respectively under Title III Section 311 during 1997.

Activities Requiring Permits

Permits are required for a number of LLNL environmental activities related to air, water, hazardous waste, sewerable waste, storage tanks, and medical waste. **Table 2-7** summarizes these permits. Inspections and tours by the permitting agencies in 1997 are summarized in **Table 2-8**.



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Table 2-4. Summary of LLNL compliance with EPCRA in 1997.

EPCRA requirement	Brief description	Compliance
302 Planning notification	Operator must notify SERC ^(a) of presence of extremely hazardous substance.	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.	Update submitted March 28, 1997.
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/Chem inventory	Operator must submit MSDSs or chemical list to SERC, LEPC, and fire department.	Tables 2-5 and 2-6.
312 MSDS/Chem inventory	Operator must submit hazardous chemical inventory to appropriate county.	Business Plans and chemical inventory submitted to San Joaquin County (January 14, 1997) and Alameda County (January 15, 1997).
313 Toxic Release Inventory	Operator must submit Form R to USEPA ^(d) and California EPA for toxic chemicals released.	Form R for Freon 113 submitted June 27, 1997 to DOE; DOE forwarded to USEPA and California EPA on July 30, 1997.

^a State Emergency Response Commission.

^b Chemical Emergency Planning and Response Commission.

^c Local Emergency Planning Committee.

^d U.S. Environmental Protection Agency.

**Table 2-5.** Livermore site, SARA, Title III, Section 311, Chemical List.^(a)

Livermore site chemicals	Physical hazards			Health hazards	
	Fire	Pressure	Reactivity	Acute	Chronic
Ammonium hydroxide				X	
Argon		X		X	
Brayco 889, coolant	X				
Carbon, activated	X				
Chlorine		X	X	X	
Diesel fuel	X				
Ethyl alcohol	X			X	X
Freon 113				X	
Gasoline	X			X	X
Helium		X		X	
Hydrochloric acid				X	X
Hydrofluoric acid		Some containers	X	X	X
Hydrogen	X	X		X	
Hydrogen peroxide (<52%)			X		
Insulating oil, inhibiting	X				
Lead (bricks and ingots)				X	X
Methane	X	X		X	
Nitric acid	X		X	X	X
Nitric oxide		X	X	X	
Nitrous oxide		X		X	
Nitrogen		X		X	
Oxygen		X	X		
Paint	X				
Sulfuric acid			X	X	X

^a Physical and health hazard information obtained primarily from Material Safety Data Sheets (MSDS).



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Table 2-6. Site 300, SARA, Title III, Section 311, Chemical List.^(a)

Site 300 chemicals	Physical hazards			Health hazards	
	Fire	Pressure	Reactivity	Acute	Chronic
Chlorine		X		X	
Bis(2,2-dinitro-2-fluoroethyl) formal in methylene chloride	— ^b		— ^b	X	X
Diesel fuel	X				
Gasoline	X			X	X
High explosives			X		
Lead (bricks)				X	X
Nitrogen		X			
Oil, hydraulic	X				
Oil, inhibited insulating	X				
Oil, transformer	X				

^a Physical and health hazard information obtained primarily from Material Safety Data Sheets (MSDS).

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

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 1997, BAAQMD issued or renewed air permits for 140 air emission sources for the Livermore site. For 1997, SJVUAPCD issued or renewed air permits for 43 air emission sources for Site 300 (see **Table 2-7**). During 1997, air district inspectors found no deficiencies at the Livermore site. At Site 300, the only issue raised was related to the joint Air Resources Board (ARB)/SJVUAPCD review of long-standing policies regarding waste explosives burning, as discussed in the Hazardous Waste Permitting section, later in this chapter.



Table 2-7. Summary of permits active in 1997.

Type of permit	Livermore site	Site 300
Air	<p>140 permits from BAAQMD. Various 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, diamond turning machine cleaning operation, image tube fabrication, optic coating operations, gravity retort, storage tanks containing volatile organic compounds (VOCs) in excess of 10%, planetary mixers, plating tanks, drum crusher, semiconductor operations, diesel air compressor engines, ground water air strippers/dryers, ovens, material handling equipment, sewer diversion system, wave soldering machine, oil and water separator, fire test cells, oil shale hopper and preheater, oil shale combustor, gasoline dispensing operation, resin mixing operation, paper pulverizer system, and firing tank.</p>	<p>43 permits from SJVUAPCD. Various equipment, including boilers, emergency generators, paint spray booth, ground water air strippers, soil vapor extraction units, woodworking cyclone, gasoline dispensing operation, and drying ovens.</p>
Water	<p>WDR Order No. 88-075 for discharges of treated ground water from TFA to percolation pits and recharge basin.</p> <p>WDR Order No. 95-174, NPDES Permit No. CA0030023 for discharges of storm water associated with industrial activities and low-threat non-storm water discharges to surface waters.</p> <p>WDR Order No. 92-08-DWQ, NPDES General Permit No. CAS000002, Bldg. 132, Site ID No. 201S300881, DWTF Site ID No. 201S305140, Soil Reuse Project ID No. 2015305529 and National Ignition Facility, Site ID No. 201S306762, and for discharges of storm water associated with construction activities impacting two hectares or more.</p> <p>One project completed under Army Corps of Engineers Nationwide Permit and 401 Waiver of Water Quality Certification, three streambed alteration agreements.</p> <p>FFA, ground water investigation/remediation.</p>	<p>WDR Order No. 92-08-DWQ, NPDES General Permit No. CAS000002, Contained Firing Facility Chemistry Magazine Loop, Site ID No. 5B39S307131.</p> <p>WDR Order No. 93-100 for post-closure for discharges of storm water associated with construction activities impacting two hectares or more monitoring requirements for two Class I landfills.</p> <p>WDR Order No. 94-131, NPDES Permit No. CA0081396 for discharges of storm water associated with industrial activities and from cooling towers.</p> <p>WDR Order No. 96-248 for operation of two Class II surface impoundments, a domestic sewage lagoon, and percolation pits.</p> <p>WDR Order No. 97-242, NPDES Permit No. CA0082651 for discharges of treated ground water from the eastern General Services Area treatment unit.</p> <p>One streambed alteration agreement.</p> <p>FFA ground water investigation/remediation.</p> <p>Fifty-two registered, Class V injection wells.</p>



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Table 2-7. Summary of permits active in 1997 (continued).

Type of permit	Livermore site	Site 300
Waste	<p>EPD ID No. CA2890012584.</p> <p>Authorization to perform waste resin mixing in Unit CE231-1 and Unit CE443-1 under Conditional Exemption tiered permitting.</p> <p>Authorization to construct and operate Building 612 Size Reduction Unit, Area 514-1 Container Storage/Treatment Unit Group and Area 514 Quadruple Tank Unit under interim status modification.</p> <p>Closure under interim status of the Area 514 Storage Tank 514-R501 Unit (25,000-gallon Storage Tank).</p> <p>Continued authorization to operate 19 waste storage units and 13 waste treatment units under interim status.</p>	<p>EPA ID No. CA2890090002.</p> <p>Part B Permit—Site 300 and Container Storage Area (B-883) Explosives Waste Storage Facility (issued May 23, 1996).</p> <p>Part B Permit—Explosives Waste Treatment Facility—Site 300 (issued October 9, 1997).</p> <p>Docket HWCA 92/93-031.</p>
Sewer	<p>Discharge Permit Nos. 1250 (97/98), for discharges of wastewater to the sanitary sewer.</p> <p>1510G (97) for discharges of sewerable ground water from sitewide ground water restoration activity.</p>	
Tanks	Thirteen underground petroleum and hazardous waste storage tank permits.	One permit covering five underground petroleum product tanks.
Other	ACEHS medical waste permit for treatment and storage.	SJCPHS medical waste limited quantity hauling exemption

^a Permit numbers are based on actual permitted units maintained and renewed by LLNL during 1997.

National Emission Standards for Hazardous Air Pollutants

Demonstration of compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclide emissions to air (Radionuclide NESHAPs, 40 CFR 61, Subpart H) requires that all potential sources be evaluated and the potential radiological dose to the sitewide maximally exposed public individual (SW-MEI) be determined.

Compliance with two dose limits must be evaluated. First, the integrated dose to the SW-MEI from all sources of radionuclide emissions to air at a site must not exceed 100 microsieverts per year ($\mu\text{Sv}/\text{y}$) (10 millirem per year [mrem/y]). Second, each source (stack) with the potential for unmitigated emissions resulting in any dose greater than 1 $\mu\text{Sv}/\text{y}$ (0.1 mrem/y) must be continuously monitored using systems that meet requirements stated in the regulations.

**Table 2-8.** Inspections and tours of LLNL facilities by external agencies in 1997.

Medium	Description	Agency	Date	Finding
Livermore site				
Air	Emission sources	BAAQMD	1/22 2/5 2/18 3/12 3/19	No violations
Water/natural and cultural resources	Streambed alteration	CDFG	6/30 9/15	No violations
	Sediment sampling	DTSC	7/29	No violations
	Arroyo Maintenance Project	USFWS	9/9	No violations
	Visit archeological site	ACOE	9/15	No violations
	Mammoth bones/NIF excavation	DOI	12/21	No violations
Waste	Hazardous-waste management facilities and waste accumulation areas	DTSC	3/17–3/21	3 violations ^(a)
	Storage and treatment facilities	DTSC	10/28	No violations
	Vehicles used for transporting hazardous materials	CHP	12/9–12/10	7 minor violations
Sewer	Building 321, Building 341 abrasive machining operations, Building 432, general inspection	LWRP	2/4	No violations
	Compliance sampling	LWRP	10/1–10/2 10/16	No violations
	Categorical sampling	LWRP	11/25	No violations
Tanks	Installation and closure of USTs	ACEHS	1/16 11/18	No violations
Other	Medical waste	ACEHS	9/10	No violations
Site 300				
Air	Emission sources	SJVUAPCD	8/19	No violations
	Radionuclide NESHAPs site inspection	EPA	9/3	No violations
Waste	Hazardous-waste storage and treatment facilities, waste accumulation areas, and satellite accumulation areas	DTSC	1/29	No violations ^(a)
Wastewater	Permitted operations	CVRWQCB	4/16 9/16	No violations

^a During these inspections there were also issues raised relative to low-level radioactive waste containing California-only hazardous constituents. These issues are being resolved in a Memorandum of Understanding between DOE and DTSC.



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The *LLNL NESHAPs 1997 Annual Report* (Gallegos et al. 1998) reported to DOE and EPA the total calculated SW-MEI radiological doses for the Livermore site and Site 300 to be 0.97 $\mu\text{Sv}/\text{y}$ (0.097 mrem/y) and 0.20 $\mu\text{Sv}/\text{y}$ (0.020 mrem/y), respectively. The reported doses include contributions from both point sources and diffuse sources. Modeling was based on a combination of effluent monitoring data and radionuclide inventory data. The totals are well below the 100 $\mu\text{Sv}/\text{y}$ (10 mrem/y) dose limits defined by the NESHAPs regulations. The details of these data are included in this report (see Chapter 12, Radiological Dose Assessment). These 1997 dose values are comparable to those reported for 1996, which were 0.93 $\mu\text{Sv}/\text{y}$ (0.093 mrem/y) and 0.33 $\mu\text{Sv}/\text{y}$ (0.033 mrem/y) for the Livermore site and Site 300, respectively.

There was one unplanned atmospheric radionuclide release from the Livermore site in 1997, which released curium-244 from Building 513 during waste shredding activities. Several types of data were recorded during and subsequent to the initial release event, including routine surveillance air monitoring data recorded outside the building at several field locations, and respirator data, continuous air monitoring data, and high-volume air sampler data recorded inside the building. Based on these data, several different analytical approaches were used to quantify the amount of curium-244 released into the atmosphere by this incident and to evaluate the maximum potential dose to the public. The “best estimates” were that several hundred nanocuries were released, producing a dose to the SW-MEI of 2.1×10^{-3} μSv (2.1×10^{-4} mrem). This incident and its analyses are described in greater detail in a letter from LLNL to EPA Region IX (Fisher 1998), and in this report’s Chapter 12: Radiological Dose Assessment, and in the *LLNL NESHAPs 1997 Annual Report* (Gallegos et al. 1998a). There were no unplanned atmospheric releases at Site 300 in 1997.

In 1997, LLNL maintained continuous radionuclide emissions monitoring of Building 331 (the Tritium Facility), Building 332 (the Plutonium Building), the seismically strengthened portion of Building 251, and three other buildings (see Chapter 12).

On September 3, 1997, the U.S. EPA Region IX made a radionuclide-NESHAPs inspection of Site 300, with DOE in attendance. LLNL personnel summarized operations at Site 300 and construction of the Contained Firing Facility (CFF), reviewed the modeling protocol for Site 300 explosives experiments, reviewed diffuse source calculations, and gave a NESHAPs compliance overview. A facilities tour included the CFF construction site and ambient air monitoring stations. EPA and DOE personnel were briefed on the unplanned release from Building 513 mentioned earlier and detailed written information required by EPA was provided. This incident and its analyses are described in the NESHAPs Annual Report and in a detailed letter from LLNL to EPA Region IX, as noted above. LLNL’s Site 300 activities were found to be in compliance with 40 CFR 61 Subpart H, and no additional compliance activities were required.



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 navigable waterways. In addition, the State of California requires permits, known as Waste Discharge Requirements (WDRs), for any discharges of wastes affecting the beneficial uses of waters of the state. The regional water quality control boards (RWQCBs) are responsible for issuing and enforcing both 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 dredge and fill operations in waters of the United States. The State Water Resources Control Board (SWRCB) issues water quality certifications for this work if the regional water quality control boards do not waive the requirement for the water quality certification. 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. Finally, the Safe Drinking Water Act (SWDA) requires registration and management of injection wells to protect underground sources of drinking water. Water permits are summarized in **Table 2-7** and discussed in detail in Chapters 6, 7, and 8.

Ground Water and Surface Water

Discharges of treated ground water to surface water drainage courses and percolation ponds at LLNL are governed by NPDES permits, WDRs, and CERCLA Records of Decision (see **Table 2-7**). Details of surface water discharges are found in Chapter 7 of this report. Details of ground water monitoring are found in Chapter 8 of this report, the *LLNL Ground Water Project 1996 Annual Report* (Hoffman et al. 1997), and the LLNL Remedial Program Manager's quarterly reports (McConachie and Brown 1996; Ko et al. 1996; Littlejohn and Lamarre 1996 and 1997). LLNL discharges storm water associated with industrial activities, low-threat nonstorm water, and various process waters to surface waters, percolation pits, surface impoundments and a sewage lagoon under four NPDES permits and three WDRs (see Chapters 7 and 8). LLNL received no Notices of Violation (NOVs) in 1997 from the regional water quality control boards that issued the NPDES and WDR permits. However, LLNL identified nonconformance with one of the four permits. NPDES nonconformances are summarized below in **Table 2-9**.



2 Compliance Summary

Table 2-9. Summary of compliance with NPDES permits.

Permit No.	Outfall	Nonconformance	Date(s) of nonconformance	Description-solution
CAS000002	Arroyo Las Positas (Livermore site)	Building 132: Required inspections not performed	3/97	Revise LLNL construction program
		Building 132: Improper storage of materials, spill	4/97	Cleaned up contaminated material
		Building 132: Work commenced prior to SWPPP ^(a) submittal	5/97	Require SWPPP prior to issuing Notice to Proceed
CA0030023	Arroyo Las Positas and Arroyo Seco (Livermore site)	None	None	None
CA0081396	Corral Hollow Creek (Site 300)	None	None	None
CA0082651	Corral Hollow Creek (Site 300)	None	None	None

^a SWPPP = Storm Water Pollution Prevention Plan.

In addition, LLNL was unable to comply with prohibitions in WDR No. 96-248 on March 27 and on July 16. On March 27, the retention tank pump for B823 at Site 300 failed, resulting in a release of between 1.5 to 2 gallons of wastewater to ground. On July 16, two more spills occurred at Site 300. One spill resulted from an algae plug in the wastewater line at B817 and resulted in a release of 5 gallons of untreated wastewater. The other also released 5 gallons of wastewater when a pump at B823 overheated and shut down. Wastewater overflowed the retention tank and secondary containment with a small volume being discharged to the ground. These discharges were reported orally and in writing to the Central Valley RWQCB. Finally, on April 16 the TCE concentration (5.5 µg/L) in discharges from TFA exceeded the discharge limit in WDR 88-075 for total volatile organic compounds (5.0 µg/L). Details can be found in Chapter 8, Ground Water Remediation.

LLNL continued construction operations for three projects and started operations for two other projects. These activities are covered by the California General Construction Activity permit (see **Table 2-7**). Continuing operations included construction of Building 132, the nonhazardous waste portions of the Decontamination and Waste Treatment Facility (DWTF), and the Soil Reuse Project (previously referred to as the North Buffer Zone Regrading). In 1997, LLNL submitted two Notices of Intent (NOIs) for the construction of the National Ignition Facility at the Livermore site and the Contained Firing Facility and Chemistry Magazine Loop project at Site 300.



In December 1997, the Central Valley RWQCB issued WDR Order No. 97-242 (NPDES Permit No. CA0082651) for the continued discharge of treated ground water from the Eastern General Services Area at Site 300 to Corral Hollow Creek. This order replaced WDR Order No. 92-052.

At the request of the San Francisco Bay RWQCB, LLNL submitted a Report of Waste Discharge (ROWD) for the Soil Reuse Project in April. This project beneficially reuses excess soil generated from on-site construction projects in various regrading and landscaping projects throughout the Livermore site. The San Francisco Bay RWQCB has not acted on the ROWD formally; however, they provided verbal approval to proceed with certain portions of the project.

The Central Valley RWQCB inspected the Site 300 permitted facilities in April 1997 with the result of no violations. An additional visit to Site 300 in September was made by the Central Valley RWQCB to see a tear in the liner of the lower surface impoundment in the Explosives Process Area. The San Francisco Bay RWQCB did not inspect any Livermore site facilities in 1997.

Sewerable Water

The Livermore site's sanitary sewer discharges are sampled continuously, daily, weekly, and monthly to satisfy various permit compliance requirements. The monitoring results for the LLNL effluent are reported monthly to the LWRP. In 1997, LLNL achieved greater than 99% compliance with LWRP Permit 1250 covering wastewater discharges to the sanitary sewer. However, five Notices of Violation (NOVs) were written for permit violations that occurred in 1997. (The LWRP issued three of the NOVs in 1997 and two in 1998.) The first NOV, issued in March 1997, was for silver and pH exceedances on February 5 and 12, respectively. The NOV specifically targeted these two discharges, but treated the pH exceedance as a continuation of the low pH exceedances of 1996. In September 1997, the LWRP issued the second NOV for a July 4 mercury exceedance. The third NOV (and final NOV for 1997) was issued in October 1997 for a pH exceedance on August 21, 1997. The NOV specifically targeted the August 21 discharge, but considered the exceedance as part of a pattern of pH exceedances that began in January 1996. The fourth and fifth NOVs were issued in January 1998 for events that occurred in 1997. The fourth NOV, was for lead exceedances on October 31 and November 1, 1997. The fifth NOV was for four different pH exceedances in December 1997, although these exceedances were considered to be part of the pattern of pH exceedances discussed in the third NOV (October). LWRP permit exceedances and corrective measures are summarized in **Table 2-10** and discussed in detail in Chapter 6.



2 Compliance Summary

Table 2-10. Summary of compliance with LWRP permit limits for discharges to the sanitary sewer.

Permit No.	Exceedance	Date(s) exceeded	Description-solution
1250	Low pH	2/12 8/21 11/21 12/5 12/15 12/19 12/24	Continue investigating for sources and processes; provide enhanced education to the Laboratory's population regarding proper disposal of wastewater; short-term traceback; and install engineering control to contain all low-pH material.
	High pH ^(a)	2/21 4/7	Investigate for sources and provide enhanced education to the LLNL population regarding proper disposal of wastewater.
	Silver	2/5	Review waste disposal procedures for photoprocessor operations. Further educate LLNL population about proper disposal of wastewater.
	Mercury	7/4	Examine existing potential sources for mercury-bearing materials; identify new laboratory processes that may use or mobilize mercury; examine retention tank release records; and conduct a study to assess potential links between sewer line cleaning activities and levels of metals in LLNL effluent.
	Lead	10/31 11/1	No activities suggested or required by the LWRP.
1510G	None	None	None

^a LWRP chose not to enforce these exceedances because they did not exceed the duration criteria of 40 CFR 401.17 and this type of exceedance is not addressed in 40 CFR 403.5.

In 1996, LLNL continued to seek an EPA exemption from continued compliance with federal Categorical Standards, 40 CFR 403.6B, because of the belief that the categorical wastewater standards were not written or intended for research and development facilities. The LWRP suspended the requirements for self-monitoring of categorical processes through 1996 while the applicability of the categorical standards was evaluated. With the renewal of permit number 1250 (96-97), LWRP and EPA determined LLNL was not eligible for the exemption. However, the permit renewal resulted in a reduced number of processes subject to categorical requirements. Self-monitoring of these processes was reinstated in 1997, as required in the permit.

At LLNL's request, the LWRP combined the terms of 1996 permits 1508G and 1510G, for discharge of sewerable waste from TFF and for discharges from sitewide treatability studies, into a single 1997 sitewide treatability permit, 1510G. Discharges to sanitary sewer under 1510G (97) are monitored as they occur and reported



annually to the LWRP. These self-monitoring programs and the associated analytical results documenting compliance with the self-monitoring provisions of the permit are detailed in Chapter 6. In 1997, LLNL achieved 100% compliance with the permit limits of 1510G.

The LWRP toured the abrasive (water) machining operation in Buildings 321 and 341 on February 4, 1997. Also on February 4, the LWRP conducted a general inspection of Building 432 operations. On October 1, 2, and 16, LWRP collected split samples of site effluent at Building 196 as part of the annual compliance sampling. LWRP staff also inspected ground water treatment facilities on October 2, 1997. On November 25, LWRP collected categorical process samples from abrasive (water) jet machines and semiconductor processes in Buildings 321 and 153, respectively. Results of LWRP inspections are summarized in **Table 2-8**.

Streambed Alteration Agreements and 404 Nationwide Permits

California Department of Fish and Game (CDFG) issued three streambed alteration agreements for construction and maintenance projects within arroyos at the Livermore site during 1997 (see **Table 2-11**). The Fish and Game Warden made a site visit to Arroyos Las Positas and Seco prior to issuing two of the streambed alteration agreements. One of these projects was also subject to Clean Water Act Section 404 permitting requirements and was covered by Army Corps of Engineers (ACOE) nationwide permits. The ACOE project manager and two ACOE archeologists visited Arroyo Seco when LLNL uncovered an archeological site while stabilizing the bank. The San Francisco Bay RWQCB issued a waiver from 401 Water Quality Certification for the project covered by a nationwide permit. See **Table 2-8** for a summary of the inspections.

Table 2-11. Summary of streambed alteration agreements and 404 nationwide permits.

Project	Location	Agency	Date submitted
Bank stabilization	Arroyo Seco	CDFG 401 Waiver 404 Nationwide permit 13	5/29/97 5/29/97 5/29/97
Vegetation cutting (non-wetland)	Arroyo Las Positas	CDFG	5/29/97
Vegetation cutting (wetland)	Arroyo Las Positas	CDFG	7/30/97
Maintenance (five-year agreement)	Site 300 drainage culverts	CDFG	1995



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At Site 300, LLNL continued to operate under a five-year CDFG streambed alteration agreement issued in 1995 for maintenance of drainage channels.

Injection Wells

LLNL continues to operate injection wells registered with EPA at Site 300. LLNL has 32 active and 20 inactive Class V injection wells at Site 300. The majority of the active injection wells are sanitary septic systems and percolation pits receiving small volumes of wastewater from equipment such as boilers and cooling towers.

Spill Prevention Control and Countermeasures Plan

No significant changes were made in 1997 to the technology or practices documented in the Spill Control and Countermeasures Plan (Campbell 1995).

Tank Management

LLNL manages its underground storage tanks (USTs) and aboveground storage tanks (ASTs) through the use of underground tank permits, monitoring programs, operational plans, closure and leak documentation, and inspections. These topics are discussed in the following sections.

Tank Systems

At LLNL, underground tanks contain diesel fuel, gasoline, waste oil, and process wastewater; aboveground tanks contain diesel fuel, insulating oil, and process wastewater. Some of the wastewater systems are a combination of underground storage tanks and aboveground storage tanks. **Table 2-12** tabulates the status of the Livermore site and Site 300 tanks as of December 31, 1997.

Upon completion of closure activities, closure reports for underground hazardous product, hazardous waste, and mixed waste USTs must be submitted to the regulatory agencies for review and approval. (A mixed waste UST stores waste that has the characteristics of both hazardous and radioactive waste.) Three closure reports for hazardous product and mixed waste USTs were submitted to the Alameda County Health Care Services Agency for review in 1997. These are awaiting approval.

**Table 2-12.** Status of in-service tanks, December 31, 1997.

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	50	53	0	10	10
Subtotal	13	50	63	5	10	15
Aboveground storage tanks						
Diesel fuel	0	25	25	0	7	7
Insulating oil	0	8	8	0	4	4
Process wastewater	6 ^(a)	58	64	0	10	10
Subtotal	6	91	97	0	21	21
TOTAL	19	141	160	5	31	36

^a These six tanks are located at the LLNL Treatment, Storage, and Disposal Facility and are operated under interim status as part of the RCRA Part B permit application.

Two closure plans were completed in 1997. These closure plans were prepared for aboveground hazardous-waste tank systems.

Tank Upgrade Project

In 1992, LLNL began to upgrade or close wastewater retention tanks (for nonhazardous, hazardous, mixed, and radioactive waste) and product retention tanks (for petroleum products) in accordance with existing local, state, and federal tank regulations, or to decrease the potential for environmental contamination as the result of a release from a tank or its appurtenances. Work has been completed to bring LLNL into compliance with California and federal requirements for underground storage tanks, one year ahead of the December 1998 deadline. As of December 1997, construction had been completed for 153 tanks and was in progress for four aboveground hazardous and mixed-waste tanks.

The latter four tanks, known as the Quad Tank System, are located in the Hazardous Waste Management Division facility at Building 514. The Quad Tank System will be used to collect and store hazardous and non-DTSC regulated radioactive wastewater generated



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by LLNL activities. The aboveground Quad Tanks, each having a 4600-gallon capacity, replace one 25,000-gallon aboveground tank at the same location.

Closure and Leak Documentation

Closure requirements for hazardous USTs include the preparation and approval of closure plans, quarterly reports if leaks have been identified, and a report upon completion of closure activities. The closure plans must include a detailed review of the uses of the tank, a sampling plan, a site plan, and other information to verify that no environmental contamination has occurred or, if it has occurred, to ensure its cleanup. Hazardous waste ASTs must also meet regulatory requirements for closure plans, field activities, and closure reports.

Inspections

For every installation and closure of hazardous waste, mixed waste, and hazardous product USTs, there is an inspection in which a representative from Alameda County Environmental Health Services (ACEHS) (for the Livermore site) or San Joaquin County Public Health Services (for Site 300) participates. Inspections are summarized in **Table 2-8**.

Resource Conservation and Recovery Act

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 (HWCA) sets 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 now works solely with California Department of Toxic Substances Control (DTSC) on compliance issues and in obtaining hazardous waste permits.



Hazardous Waste Permits

Livermore Site

The Livermore site hazardous waste storage and treatment management units continued to operate under interim status provisions (ISD CA2890012584) while DTSC continued to review and consider the latest modification to the Livermore site Part B permit application. Waste management units include container storage, tank storage, and various treatment processes (e.g., wastewater filtration, blending, and size reduction).

LLNL submitted a revised Part B application on June 28, 1996. This application includes some existing hazardous waste facilities as well as the proposed Decontamination and Waste Treatment Facility (DWTF), which will be constructed in order to consolidate, replace, upgrade, and augment existing LLNL waste management capabilities. The revised Part B application, if approved by DTSC, will provide a mechanism for LLNL to operate portions of the existing hazardous waste facilities under interim status until DWTF is permitted and fully functional. A revised Health Risk Assessment was developed to supplement the Part B application and was submitted to DTSC in February 1997 (Hall et al. 1997).

A public hearing was held on October 9, 1997, regarding the draft hazardous waste facility permit, including the proposed negative declaration for the facility. A number of comments were received at the public hearing and during the subsequent public comment period. Permit issues and responses to comments are being reviewed in consultation with DTSC.

In response to the shredder incident previously described in the National Emission Standards for Hazardous Air Pollutants Section of this chapter, Barbara Barry of DTSC visited LLNL on November 12, 1997, and February 5, 1998. Her investigation of the incident resulted in a Summary of Violations dated February 9, 1998. The shredder involved in the incident is undergoing formal interim status closure and will be permanently removed from service.

Immediately after the shredder incident occurred on July 2, 1997, LLNL filed an Occurrence Report (OR number SAN-LLNL-LLNL-1997-0038), as required by DOE Order 232.1. LLNL also appointed an accident committee, but this committee was disbanded when DOE/OAK established a Type B Accident Investigation Committee. The Committee issued their report, which included several Judgments of Need (JONs), on August 29, 1997. LLNL submitted an action plan responding to the JONs on October 31, 1997. The plan included 47 actions designed to prevent a recurrence of an incident of this type. LLNL also filed a Price-Anderson Amendments Act (PAAA) notification report on July 23, 1997. On March 9, 1998, LLNL received a Preliminary



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Notice of Violation from DOE/HQ/EH-10, with fines totaling \$159,375. The fines were waived because nonprofit Maintenance and Operations contractors are exempt from fines under the PAAA. As a result of high radiation contamination levels in the shredder area following the accident, LLNL has chosen to dispose of the shredder as radioactive waste rather than risk worker contamination during cleanup operations. Loss of shredding capability will result in the need to reschedule some milestones in place under the Federal Facilities Compliance Act that required some mixed-waste processing in the shredder.

During the period of March 17 through March 21, 1997, DTSC conducted a Compliance Evaluation Inspection of Livermore site hazardous waste storage and treatment facilities, waste accumulation areas, and satellite accumulation areas. DTSC reviewed the following types of records and documents: inspection logs, hazardous waste manifests, land disposal restriction notifications, stored waste inventory, hazardous waste container tracking system, hazardous waste hauling license, and interim status documents.

As a result of the inspection, DTSC issued a Summary of Violations dated April 4, 1997, including "Minor Violations/Notice to Comply" and "Minor Violations Corrected During the Inspection." The "Minor Violations/Notice to Comply" pertained to the emergency response training of a larger number of environmental analysts. The "Minor Violations Corrected During the Inspection" pertained to the storage of lead acid batteries in a waste accumulation area without containment pallets and appropriate labeling. LLNL responded to the April 4 DTSC Summary of Violations by letter dated May 6, 1997.

In addition to the three violations noted during the inspection, issues regarding combined waste were raised. Combined waste is waste containing radioactive constituents in combination with constituents that are categorized as "hazardous" under California regulations, but not federal regulations. Negotiations continue with DTSC on a statewide issue of the regulatory status of "combined waste." While this issue is under discussion, and until it is resolved, a Memorandum of Understanding between DTSC and DOE is in effect.

Site 300

The Site 300 Building 883 hazardous waste container storage area operates under the provisions of the Part B permit (Part B CA28990090002) issued by DTSC in November 1989 and renewed in May 1996. The renewed permit also authorized the construction and operation of the Explosives Waste Storage Facility (EWSF), which augments the storage capability at Site 300 by providing a separate dedicated facility to store explosives waste. The EWSF became operational in March 1998.



A new, open-burning, open-detonation facility called the Explosives Waste Treatment Facility (EWTF) was proposed for Site 300. The proposed facility will replace the existing Building 829 Open Burn Facility. A Part B permit application for the proposed EWTF was submitted to DTSC in May 1993 and last revised in September 1995. The Part B application was supplemented by an Environmental and Exposure Assessment (EEA) submitted in May 1993 and last revised in September 1996. The EWTF permit was issued on October 9, 1997. It is anticipated that the EWTF facility will be operational in September 1998.

The Building 829 Open Burn Facility for explosives waste continues to operate under a stipulation order issued by DTSC in September 1993. Upon completion and operation of the EWTF, the Building 829 Open Burn Facility will undergo formal interim status closure. A closure plan was submitted to DTSC in July 1993, and a revised plan submitted to DTSC in April 1997. The closure plan was approved by DTSC on October 9, 1997. The closure will involve removal of all equipment and capping and grading of the area, in compliance with regulatory requirements for in-situ closure of a hazardous waste unit. Closure of this facility is anticipated by October 1998.

An emergency permit was issued by DTSC on November 6, 1997, for the treatment of 600 lb of off-specification propellant. The material was burned in a single burn at the existing Building 829 Open Burn Facility. A subsequent summary report was filed with DTSC. Subsequent to the issuance of the emergency permit by DTSC, the San Joaquin Valley Unified Air Pollution Control District verbally notified LLNL on November 12, 1997, to stop all open burning operations. Air emissions from these burning activities are reported to the agencies by means of quarterly burn reports and daily burn notifications. This agency notification resulted in a letter dated January 14, 1998, indicating that the burning of waste explosives was prohibited, pending the results of a formal air permitting process or other administrative procedure.

On January 29, 1997, DTSC conducted a Focused Compliance Inspection of Site 300 hazardous waste storage and treatment facilities, waste accumulation areas, and satellite accumulation areas. The inspection resulted in an amended inspection report dated April 22, 1997, which asserted that the characterization and storage practices for "combined waste" were in violation of regulations. This issue is under discussion between DOE and DTSC as part of the Memorandum of Understanding discussed in the Livermore site portion of this Hazardous Waste Permit section.



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Hazardous Waste Reports

Two Annual Facilities reports, one for the Livermore site and the other for Site 300, were completed and submitted to meet DTSC's adjusted June 30, 1997, deadline. They address 1996 waste handling information. The annual reports are required under 22 CCR 66264.75 and are on file at LLNL.

The biennial reports, *Hazardous Waste Report—Mainsite* and *Hazardous Waste Report—Site 300*, are required under 40 CFR 262.41, 264.75, and 265.75. These reports were completed and delivered to DTSC by the March 1, 1998, deadline. They address 1997 waste handling information.

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. The registration was renewed by DTSC in November 1996.

The CHP in Alameda County opted to conduct a vehicle safety compliance check of eight vehicles assigned to the Livermore site. This inspection occurred on December 9–10, 1997. Seven violations requiring corrective actions were noted. However, the violations were perceived as minor as indicated by LLNL receiving a satisfactory "current terminal rating."

Waste Accumulation Areas

Beginning in January 1997, there were 38 waste accumulation areas (WAAs) at the Livermore site and one at the Livermore Airport. Consolidation efforts resulted in the closure of 13 WAAs at the Livermore site. The Livermore Airport WAA was also closed during July 1997. One temporary WAA was put into service at the Livermore site, leaving a total of 26 WAAs. Program representatives conducted formal inspections at least weekly at all WAAs to ensure they were operated in compliance with regulatory requirements. About 1600 formal WAA inspections were conducted at the Livermore site and 21 at the Livermore Airport WAA. In addition, EPD personnel conducted informal biweekly walkthroughs at all WAAs to assist programs in managing their



WAAs and wastes in compliance with state and federal regulatory requirements. EPD personnel performed 644 biweekly WAA walkthroughs at the Livermore site and 11 biweekly WAA walkthroughs at the Livermore Airport.

During 1997, there were two WAAs at Site 300. Program representatives conducted 104 formal inspections of these WAAs. EPD personnel performed 38 biweekly WAA walkthroughs at Site 300 during 1997.

Medical Waste

LLNL is registered with the Alameda County Environmental Health Services (ACEHS) as a generator of medical waste and has a treatment permit.

During an inspection of LLNL's medical waste generator and treatment facilities on September 10, 1997, an ACEHS inspector determined that there were no compliance issues and no violations were found.

Building Inspections

Formal, detailed building inspections for each LLNL facility are conducted based on a schedule established by the facility manager and the appropriate Environmental, Safety, and Health (ES&H) Team. During 1997, the ES&H teams conducted 148 formal building inspections at the Livermore site and 25 at Site 300. Building inspections include buildings, trailers, and tents. Twelve audits of Hazardous Waste Management (HWM) Division facilities at the Livermore site and 12 audits of the HWM container storage facility at Site 300 were conducted by EPD personnel. Informal walkthroughs of buildings and associated areas are conducted on an as-needed basis.

Site Evaluations Prior to Construction

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Record of Decision for the LLNL Livermore site requires that a preconstruction site evaluation be completed prior to any soil excavation at the Livermore site. The preconstruction site evaluation is conducted to determine if soil or rubble (concrete and asphalt) is contaminated. Soil is sampled and analyzed for potential radioactive or hazardous contamination. Depending on the analytical results, soil may be reused on site or disposed of according to established procedures.



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Depending on the results of the initial preconstruction site evaluation, rubble may be either surveyed or analyzed for radioactivity. During 1997, soil and rubble were evaluated at 93 construction sites.

Federal Facility Compliance Act

LLNL is working with DOE to maintain compliance with the Site Treatment Plan (STP) that was signed in February 1997. LLNL is cooperating with off-site facilities to establish profiles and dispose of the waste in a timely manner. Since February 1997, over 5000 cubic feet of waste has been characterized and shipped off site for treatment and disposal, which allowed LLNL to reach five of its STP milestones.

Toxic Substances Control Act

In September 1997, EPA approved the receipt of small amounts of polychlorinated biphenyls (PCBs) at LLNL from off site for the purpose of conducting research and development on new treatment and disposal methods for PCBs.

National Environmental Policy Act

The National Environmental Policy Act (NEPA—42 U.S.C. 4321 et seq.) established federal policy for protecting environmental quality. The major method for achieving established NEPA goals is the requirement for 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 the 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) 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 1997, no FONSI for Environmental Assessments or Records of Decision (RODs) for EISs were issued by DOE pertaining to LLNL operations. Forty-five categorical exclusion applications were approved by DOE, and there were no proposed actions at LLNL that required separate DOE floodplain or wetlands assessments under 10 CFR 1022.

California Environmental Quality Act

An Environmental Impact Report Addendum (EIR Addendum) for the Continued Operation of the Lawrence Livermore National Laboratory was prepared and used by the Regents of the University of California to support their decision to extend the contract with the DOE from October 1997 through September 2002. The Notice of Determination was issued September 19, 1997.

In November 1992, UC and LLNL made a commitment to implement 67 mitigation measures identified by the *1992 Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore* (U.S. Department of Energy and University of California 1992a and b) (1992 Sitewide 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 fiscal year 1995 annual report was published in April 1997; the next annual report will cover fiscal year 1996 activities.

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 consultation with DOE/OAK, the Council, and the California State Historic Preservation Office (SHPO)



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with the intention of initiating activities that will help LLNL implement applicable federal and state cultural resource laws and regulations. These activities include cultural overviews, development of theme and context for significance evaluation, research designs, archaeological site identification and evaluation methods, 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. A stipulation of the PA is that the draft CRMP will be submitted to the California SHPO and the Advisory Council within four years of a signed PA. Another stipulation requires that an annual progress report be generated and submitted to the Council and the SHPO.

A plan was developed in 1997 for the acquisition of Global Positioning System equipment and computer Geographical Information System hardware and software. These will help create an efficient and economical means of collecting, storing, analyzing, and retrieving data.

LLNL is now beginning the second phase of the development and implementation program, which includes finalizing the PA and implementing the activities outlined in that document in order to develop a CRMP.

Endangered Species Acts and Sensitive Natural Resources

LLNL must meet the requirements of both the U.S. Endangered Species Act and the California Endangered Species Act as they pertain to endangered or threatened species and other species of special concern that may exist or are known to exist at the LLNL sites. For example, in implementing the 1992 Mitigation Monitoring and Reporting Program in 1997, biological assessment surveys were performed for special-status species at 83 LLNL project construction (ground disturbance) areas. Presence data for the San Joaquin kit fox (*Vulpes macrotis mutica*), American badger (*Taxidea taxus*), and Western burrowing owl (*Speotyto cunicularia*) were collected at each project location, and other applicable mitigation measures were implemented when required.

During 1997, no active San Joaquin kit fox dens were discovered, but 11 potential dens were found. Six occupied American badger dens were discovered, and 38 unoccupied dens were identified. Nine active burrowing owl dens were discovered (one at the Livermore site and eight at Site 300), and six potential dens were identified. In addition, two new populations of the federally threatened red-legged frog (*Rana aurora draytonii*) and one of the federal candidate species California tiger salamander (*Ambystoma tigrinum*) were found at wetlands locations at Site 300.



In 1997, red-legged frogs (*Rana aurora draytonii*) were also identified in the eastern portion of Arroyo Las Positas on the Livermore site. Measures to mitigate the potential for future impacts to the frogs are being developed with the U.S. Fish and Wildlife Service. Also at the Livermore site, two separate pairs of white-tailed kites (*Elanus leucurus*), a state-protected raptor, successfully nested and fledged young.

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 critical habitat for the plant.

LLNL is currently 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. This will include continued investigations into the use of herbicides, controlled burns, and native bunch grass transplantation to reduce the amount of exotic grass cover.

In 1997, it was found that the numbers of fiddleneck plants in the two native populations had drastically declined; these populations contained only 17% of the number of plants observed in 1996. In addition, it is feared that the smaller of the two native populations was extirpated as a result of heavy rain runoff through the canyon where the population was located. This resulted in the bank containing the population being washed away. Only a single small senescent plant was observed in 1997. The number of fiddleneck plants observed in the experimental population was not significantly different from that observed in 1996.

The decline in the number of plants in the remaining native population was likely due to the increased exotic grass cover as a result of the heavy rains experienced during the winter. The experimental population had undergone significant restoration of native bunch grasses, which helped to maintain a lower amount of exotic grasses. Herbicide treatment of the native population will be conducted next year in an effort to reduce exotic grass cover.

At Site 300, two additional sensitive plant species were identified in 1997. The big tarplant (*Blepharazonia plumosa*), a California Native Plant Society "rare" plant, was found to be widely distributed within the grassland ecoregion. Also, a population of a plant not seen in California since 1950, the Diamond-petaled poppy (*Eschscholzia rhombipetala*), was identified in the southwestern portion of the site. One new stand of the blue elderberry bush (*Sambucus mexicana*), a plant species that serves as habitat for the endangered valley elderberry longhorn beetle (*Desmocerus Californicus dimorphus*), was also identified at Site 300.



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Paleontological Resources

During soil excavation for the National Ignition Facility (NIF) at the Livermore site, 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 and removed bones from the construction area that are to be prepared in 1998 for later presentation. The bones (including 11 ribs, 3 vertebrae, 1 humerus, 1.5 tusks, and a partial skull with palate, jawbone, and molars) will be accessioned into the U.C. Berkeley Museum of Paleontology collection and, most probably, displayed at LLNL in the future.

Environmental Occurrences

Notification of environmental occurrences is required under a number of environmental laws and regulations, plus DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information* and DOE Order 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*. DOE Order 232.1 provides guidelines to contractor facilities regarding categorization and reporting of environmental occurrences to DOE. DOE Order 232.1 divides occurrences into three categories: emergency, unusual and off-normal occurrences. That order refers to DOE Order 151.1, *Comprehensive Emergency Management System*, for the categorization of all emergencies.

The 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 1997, eleven environmental incidents were categorized as Off-Normal Occurrences and one as an Unusual Occurrence according to the DOE Order 232.1 Implementing Procedures. None of the environmental occurrences, summarized in **Table 2-13**, caused any adverse impact to the public or the environment. Agencies notified of these incidents included DOE, Alameda County Health Care Services Agency, San Joaquin County Public Health Services, San Francisco Bay RWQCB, Central Valley RWQCB, Office of Emergency Services, and DTSC.



Table 2-13. Tabulation of environmental occurrences reported under the Occurrence Reporting System, 1997.

Date(a)	Occurrence category	Description
Mar 18	Off-Normal	Approximately 22,500 gallons of potable water were discharged because of a break in a water line northwest of Building 490. The release was reported to the San Francisco Bay RWQCB as required in NPDES Permit No. CA0030023, WDR 95-174. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence. OR 1997-0017
Apr 3	Off-Normal	Under terms stipulated in LLNL's permit to discharge sanitary sewer wastewater to the Livermore Water Reclamation Plant (LWRP), LLNL reported two separate releases above permit limits to the LWRP. The first was a release of silver on February 5, 1997. The second was a release of low-pH material on February 12. On April 3, 1997, LLNL received a Notice of Violation (NOV) from the LWRP for violation of sanitary sewer permit discharge limits for silver and pH. Receipt of an NOV meets the requirements of an Off-Normal Occurrence. OR 1997-0021
Apr 4	Off-Normal	As a result of a regulatory inspection by the DTSC, LLNL was issued a Summary of Violations (SOV) for improper labeling of recyclable batteries and improper training documentation. Receiving an SOV meets the requirements for an Off-Normal Occurrence. OR 1997-0022
Apr 9	Off-Normal	As a result of a regulatory inspection by the DTSC at Site 300 on January 29, 1997, LLNL was issued an NOV for improper storage of 71 containers of California Combined Waste at Building 804. Receiving an NOV meets the requirements for an Off-Normal Occurrence. OR 1997-0024
Jul 8	Off-Normal	A drum containing spent carbon material, contaminated with halogenated solvents, was shipped off-site to a treatment, storage, and disposal facility (TSDF) without the proper labeling as required by the DOT. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section. OR 1997-0048
Aug 22	Off-Normal	A golden eagle was found electrocuted when, because of its wing span, it had simultaneously touched two circuits on a utility power line near Building 834 at Site 300. The golden eagle is a federally protected species and this incident was therefore reportable, in writing, to the U.S. Fish and Wildlife Services. Arrangements were made with the U.S. Fish and Wildlife Services to ship the bird carcass to Oregon for further evaluation. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence. OR 1997-0049
Sept 3	Unusual	During excavation work on the NIF site, several large capacitors were discovered. Initial cleanup activities began within 24 hours of discovery of the capacitors and contaminated soil. The California Office of Emergency Services was immediately notified. Notifications within four hours or less to an outside regulatory agency meet the requirements of an Unusual Occurrence. OR 1997-0054



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Table 2-13. Tabulation of environmental occurrences reported under the Occurrence Reporting System, 1997 (concluded).

Date(a)	Occurrence category	Description
Oct 2	Off-Normal	Under terms stipulated in LLNL's permit to discharge sanitary sewer wastewater to the Livermore Water Reclamation Plant (LWRP), LLNL reported a finding of mercury above the permit limit to the LWRP. The July 4, 1997, daily composite sample had a mercury concentration of 0.017 mg/L. On October 2, 1997, LLNL received a Notice of Violation (NOV) from the LWRP for violation of the 0.01 mg/L permitted discharge limit for mercury. Receipt of an NOV meets the requirements of an Off-Normal Occurrence. OR 1997-0060
Oct 13	Off-Normal	Under terms stipulated in LLNL's permit to discharge sanitary sewer wastewater to the Livermore Water Reclamation Plant (LWRP), LLNL reported an August 21, 1997, release of sanitary sewer effluent with a pH below the permitted limit of 5.0 on October 10, 1997. LLNL received a Notice of Violation (NOV) from the LWRP for violation of the sanitary sewer permit discharge limit for pH. Receipt of an NOV meets the requirements of an Off-Normal Occurrence. OR 1997-0063
Nov 24	Off-Normal	A container of waste was shipped to a treatment, storage, and disposal facility (TSDF) as a nonhazardous DOT material. When the shipment arrived, the TSDF performed a random sample analysis for flashpoint. The waste was determined to be ignitable, making it a DOT hazardous material. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section. OR 1997-0068
Dec 18	Off-Normal	The labeling on a 55-gallon drum of hazardous waste shipped to a TSDF did not indicate the entire contents of the waste drum. The drum contained several aerosol cans. The DOT label indicated the incorrect Hazard Class. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section. OR 1998-0001
Dec 23	Off-Normal	A container was shipped and sampled for pH at the TSDF. The pH was 1; the labeling on the container was incorrect. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section. OR 1997-0073

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

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