

## 2. Compliance Summary

Lawrence Livermore National Laboratory (LLNL) activities comply with applicable federal, state, and local environmental regulations, internal requirements, Executive Orders, and U.S. Department of Energy (DOE) Orders as specified in Contract DE-AC52-07NA27344. This chapter provides an overview of LLNL's compliance programs and activities during 2022, as well as a listing of all active environmental permits.

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### 2.1 Environmental Restoration and Waste Management

#### 2.1.1 Comprehensive Environmental Response, Compensation and Liability Act

Ongoing remedial investigations and cleanup activities for legacy contamination of environmental media at LLNL fall under the jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Title I of the Superfund Amendments and Reauthorization Act (SARA). CERCLA is commonly referred to as the Superfund Act.

CERCLA compliance activities for the Livermore Site and Site 300 are summarized in **Sections 2.1.1.1** and **2.1.1.2**. Community relations activities conducted by DOE/LLNL are also part of these projects. See **Chapter 7** for more information on the activities and findings of the investigations.

##### *2.1.1.1 Livermore Site Groundwater Project*

The Livermore Site came under CERCLA in 1987 when it was placed on the National Priorities List. The Livermore Site Groundwater 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 Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). As required by the FFA, the GWP addresses compliance issues by investigating potential contamination source areas (e.g., suspected old release sites, solvent-handling areas, leaking underground tank systems), monitoring water quality through an extensive network of wells, and remediating contaminated soil and groundwater. The primary soil and groundwater contaminants (constituents of concern) are volatile organic compounds (VOCs), primarily trichloroethylene (TCE) and perchloroethylene (PCE). Background information on LLNL Livermore Site environmental characterization and restoration activities is presented in the *CERCLA Remedial Investigation Report for the LLNL Livermore Site* (Thorpe et al. 1990). The *LLNL Groundwater Project 2022 Annual Report* (Noyes et al. 2023) presents the status of cleanup at the Livermore Site.

**Regulatory Deliverables.** In calendar year 2022, the following Livermore Site deliverables were submitted to the regulatory agencies:

- *The Livermore Site Fourth Quarter 2021 Self-Monitoring Report*
- *LLNL Groundwater Project 2021 Annual Report*

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- *Sixth Five-Year Review for the Lawrence Livermore National Laboratory, Livermore Site*
- *First, Second, and Third Quarter 2022 Self-Monitoring Reports*
- Work plans for well and borehole drilling at the Livermore Site in Fiscal Year 2022

**Treatment Facilities.** During 2022, the Livermore GWP maintained 27 groundwater and eight soil vapor treatment facilities. The groundwater extraction wells and dual extraction wells extracted about 961 million L of groundwater during 2022. The dual extraction wells and soil vapor extraction wells together removed approximately 4.0 million m<sup>3</sup> of soil vapor.

In 2022, the Livermore GWP treatment facilities removed about 42 kg of VOCs. Since remediation efforts began in 1989, more than 27.4 billion L of groundwater and approximately 40.5 million m<sup>3</sup> of soil vapor have been treated, removing approximately 3,508 kg of VOCs.

Livermore Site restoration activities in 2022 were focused on enhancing and optimizing ongoing operations at treatment facilities. Evaluation of technologies that may accelerate cleanup of the Livermore Site contaminant source areas and address areas of co-mingled VOC and low-level tritium plumes continued. Beneath the site, groundwater concentration and hydraulic data indicate subtle but consistent declines in VOC concentrations and areal extent of contaminant plumes in 2022. Hydraulic containment along the western and southern boundaries of the site was fully maintained in 2022 and progress was made toward interior plume and source area cleanup. See Noyes et al. (2023) for more information.

**Community Relations.** Livermore Site community relations activities in 2022 included maintaining information repositories and an administrative record; sending letters to neighbors living to the west of LLNL, providing an update on the progress of the off-site groundwater plume cleanup; and disseminating environment-related news releases and internal/external newsletter articles. Additionally, DOE/LLNL environmental documents, letters, and public notices were posted on a public website: <https://enviroinfo.llnl.gov/>. DOE/LLNL was unable to conduct CERCLA community tours of the Livermore Site during 2022 due to the COVID-19 pandemic. Tri-Valley Communities Against a Radioactive Environment (Tri-Valley CAREs) did not request any Technical Assistance Grant meetings during 2022.

### 2.1.1.2 Site 300 Environmental Restoration Project

Remedial activities are ongoing at Site 300, which became a CERCLA site in 1990 when it was placed on the National Priorities List. Remedial activities are overseen by the U.S. EPA, the Central Valley Regional Water Quality Control Board (CVRWQCB), and DTSC, under the authority of an FFA for the site. Contaminants of concern present within the different environmental restoration operable units (OUs) at Site 300 include VOCs (primarily TCE), high-explosive compounds, tritium, depleted uranium, silicone-based oils, nitrate, perchlorate, polychlorinated biphenyls, dioxins, furans, and metals. See Webster-Scholten (1994) and Ferry et al. (1999) for background information on LLNL environmental characterization and restoration activities at Site 300. The *Annual 2022 Compliance Monitoring Report* (Buscheck et al. 2023) presents the cleanup status at Site 300.

**Regulatory Deliverables.** During calendar year 2022, the following Site 300 deliverables were submitted to the regulatory agencies:

- *Draft Building 834, Pit 6, and Site-Wide Operable Units Consolidated Five-Year Review*
- *Annual 2021 Compliance Monitoring Report*
- *First Semester 2022 Compliance Monitoring Report*
- Work plans for well drilling and decommissioning at Site 300 in 2022

All calendar year 2022 milestones were met or renegotiated with the regulatory agencies.

**Treatment Facilities.** During 2022, the Site 300 Environmental Restoration Project (ERP) operated 16 groundwater and five soil vapor treatment facilities at Site 300. The groundwater extraction wells and dual extraction wells extracted approximately 26.9 million L of groundwater during 2022. The dual extraction wells and soil vapor extraction wells together removed approximately 2 million m<sup>3</sup> of soil vapor.

In 2022, the Site 300 treatment facilities removed approximately 5.2 kg of VOCs, 0.075 kg of perchlorate, 1,091 kg of nitrate, 0.086 kg of the high-explosive compound RDX, and 0.003 kg of uranium. Since groundwater remediation began in 1990, approximately 1,839 million L of groundwater and 42 million m<sup>3</sup> of soil vapor have been treated, resulting in removal of approximately 648 kg of VOCs, 2.0 kg of perchlorate, 24,500 kg of nitrate, 3.1 kg of RDX, 9.5 kg of silicone oils, and 0.1 kg of uranium.

Site 300 restoration activities in 2022 were focused on enhancing and optimizing groundwater and soil vapor extraction and treatment, continuing bioremediation treatability studies, and monitoring of groundwater remediation progress. Groundwater monitoring data indicate declines in contaminant concentrations in 2022 and progress toward off-site and on-site plume and source area cleanup. See Buscheck et al. (2023) for more information.

**Community Relations.** Site 300 community relations activities in 2022 included maintaining information repositories and an administrative record. DOE/LLNL environmental documents, letters, and public notices were posted on two public websites: <https://erd.llnl.gov/library/> and <https://enviroinfo.llnl.gov/>. DOE/LLNL did not conduct any CERCLA community tours of Site 300 during 2022. Tri-Valley CARES did not request any Technical Assistance Grant meetings during 2022.

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

Title III of SARA, known as the Emergency Planning and Community Right-to-Know Act (EPCRA), requires owners and operators of facilities who handle certain hazardous chemicals on-site to provide information on the release, storage, and use of these chemicals to organizations responsible for emergency response planning. Executive Order 13834: Efficient Federal Operations directs all federal agencies to comply with the requirements of the EPCRA, including SARA, Section 313, the Toxic Release Inventory (TRI) Program. EPCRA requirements and LLNL compliance are summarized in **Table 2-1**.

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LLNL has reported lead release data via Form R for Site 300 since 2002. Form R is used for reporting TRI chemical releases and includes information about waste management and waste minimization activities. Over 99 percent of lead releases are associated with activities at the Site 300 Small Firearms Training Facility (SFTF). Data for the 2021 TRI Form R for lead at Site 300 was submitted to DOE/National Nuclear Security Administration (NNSA) on May 4, 2022.

LLNL reported mercury release data via Form R for the Livermore Site last year. Data for the 2021 TRI Form R for mercury at the Livermore Site was submitted to DOE/NNSA on May 4, 2022.

**Table 2-1.** Compliance with EPCRA

<b>EPCRA Section</b>	<b>Brief Description of Requirement</b>	<b>LLNL Action</b>
302	Notify SERC of presence of extremely hazardous substances.	Originally submitted May 1987.
303	Designate a facility representative to serve as emergency response coordinator.	Last update submitted 12/29/20 to San Joaquin County for Site 300 and 12/30/20 to the LPFD for the Livermore Site.
304	Report releases of certain hazardous substances to SERC and LEPC.	No EPCRA-listed extremely hazardous substances were released above reportable quantities in 2022.
311	Submit SDSs or chemical list to SERC, LEPC, and Fire Department.	Per the California Governor's Office of Emergency Services, the EPCRA Section 311 requirement is satisfied by the EPCRA Section 312 submittal and the filing of necessary amendments within 30 days of handling a previously undisclosed hazardous material subject to Section 312 inventory requirements.
312	Submit hazardous chemical inventory to local administering agency (county).	Submitted to San Joaquin County and the LPFD on 12/29/21 and 02/28/2022, respectively.
313	Submit Form R to U.S. EPA and California EPA for toxic chemicals released above threshold levels.	Form R for lead at Site 300 submitted to DOE on 05/04/2022 – DOE forwarded it to U.S. EPA and California EPA on 06/08/22.  Form R for mercury at the Livermore Site submitted to DOE on 05/04/2022 – DOE forwarded it to U.S. EPA and California EPA on 06/08/22.

**Note:** See the **Acronyms and Glossary** section for acronym definitions.

### 2.1.3 California Accidental Release Prevention Program

The California Accidental Release Prevention (CalARP) Program is the combined federal and state program for the prevention of accidental release of regulated toxic and flammable substances. The goal of the combined program is to eliminate the need for two separate and distinct chemical risk management programs. The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases occur, and to satisfy Community Right-to-Know laws. The CalARP program is implemented at the local government level by Certified Unified Program Agencies (CUPAs). The related federal regulations are the Clean Air Act (CAA) Section 112(r)

and Title 40, Code of Federal Regulations, Part 68 (40 CFR Part 68).

LLNL submitted a revised Livermore Site CalARP Level 1 risk management plan (RMP) in September 2021. The Livermore Site RMP includes lithium hydride and nitric acid.

### 2.1.4 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) provides the framework at the federal level for regulating solid wastes, including wastes designated as hazardous. The California Hazardous Waste Control Law (HWCL) and California Code of Regulations (CCR) Title 22 set requirements for managing hazardous wastes and implementing RCRA in California. LLNL works with DTSC and CUPA to comply with these regulations and obtain hazardous waste permits.

The hazardous waste management facilities at the Livermore Site consist of permitted units in Area 625 plus Buildings 693, 695, and 696, which make up the Decontamination and Waste Treatment Facility (DWTF). Permitted waste-management units include container storage, tank storage, and various treatment processes (e.g., wastewater filtration, blending, and neutralization). A new Livermore Site Hazardous Waste Facility Permit was issued to LLNL, effective for 10 years from October 31, 2022 – October 31, 2032. This replaced the original permit that LLNL had been operating under since 1999. This permit does not significantly change hazardous waste operations at the Livermore Site.

The hazardous waste management facilities at Site 300 consist of three operational RCRA-permitted facilities. The Explosives Waste Storage Facility (EWSF) and the Explosives Waste Treatment Facility (EWTF) are permitted to store and treat explosives waste, respectively. The Building 883 container storage area (CSA) is permitted to store routine facility-generated hazardous waste such as spent acids, bases, contaminated oil, and spent solvents. Site 300 has one post-closure permit for the RCRA-closed Building 829 High Explosives Burn Pit. DTSC issued the Hazardous Waste Facility Permit (HWFP) for EWSF, EWTF, and the CSA on June 29, 2017. The HWFP is effective for 10 years from August 7, 2017 – August 7, 2027. DTSC issued the Building 829 post-closure permit on April 28, 2017. The post-closure permit is effective for 10 years from April 27, 2017 – April 27, 2027. Transportation of hazardous or mixed waste over public roads occurs by DTSC-registered transporters, including LLNL.

### 2.1.5 California Medical Waste Management Act

All LLNL medical waste management operations are conducted in accordance with the California Medical Waste Management Act (MWMA). The program is administered by the California Department of Public Health (CDPH) and is enforced by the Alameda County Department of Environmental Health (ACDEH) at the Livermore Site and the San Joaquin County Environmental Health Department (SJCEHD) at Site 300. LLNL's medical waste permits are renewed annually and cover medical waste generation and treatment activities for the Biosafety Level (BSL) 2 facilities and one BSL 3 facility. LLNL revised the BSL 2 and BSL 3 Medical Waste Management Plans to incorporate new requirements pursuant to California Assembly Bill (AB) 333, which became effective in January 2016. The BSL 2 and BSL 3 Medical Waste

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Management Plans and Emergency Action Plans were most recently submitted to the ACDEH in November 2021.

### **2.1.6 Radioactive Waste and Mixed Waste Management**

LLNL manages radioactive waste and mixed waste in compliance with applicable sections of DOE Order 435.1, DOE Manual 435.1-1, DOE Notice 435.1, and the LLNL-developed Radioactive Waste Management Basis for the Lawrence Livermore National Laboratory (LLNL 2019), which summarizes radioactive waste management controls relating to waste generators and treatment and storage facilities.

### **2.1.7 Release of Property**

LLNL does not release property (e.g., vehicles, equipment, soil, or other materials) to the public with residual radioactivity above the authorized limits, compliant with DOE Order 458.1. Pursuant to written procedures, items that are potentially contaminated or activated are either surveyed prior to release to the public or a process knowledge evaluation is conducted to verify that the material has not been exposed to radioactive material or energy capable of inducing radioactivity in the material. In some cases, both a radiological survey and a process knowledge evaluation are performed. Excessed items that meet the requirements for unrestricted release are donated to interested state agencies, federal agencies, or universities; redeployed to other on-site users; or released to LLNL's Donation, Utilization, and Sales group. In 2022, approximately 14,582 equipment release swipes were processed by LLNL's Radiological Measurements Laboratory; the equipment may have subsequently been used on-site or released to the public. Utilizing a graded approach, LLNL only keeps track of high value released items (e.g., those items worth greater than \$100,000). In 2022, no high value items were released.

DOE issued a moratorium in January 2000 prohibiting the release of volume-contaminated metals and subsequently suspended the release of metals for recycling purposes from DOE radiological areas in July 2000. No metals subject to the moratorium or suspension were released from LLNL in 2022. Excess property with residual radioactivity above the authorized limits is either transferred to other DOE facilities for reuse or transferred to LLNL's Radioactive and Hazardous Waste Management (RHWM) department for disposal as radioactive waste.

In 2021, DOE distributed a memorandum approving the use of the ANSI/HPS N13.12-2013 volumetric screening levels as pre-approved authorized limits per DOE Order 458.1 for the release and clearance of personal property. In 2022, LLNL obtained approval by the Livermore Field Office (LFO) to utilize these authorized limits. However, no property was released under these limits in 2022.

### **2.1.8 Federal Facility Compliance Act**

LLNL continues to work with DOE to maintain compliance with the Federal Facilities Compliance Act (FFCA) Site Treatment Plan (STP) for LLNL, which was signed in February 1997. LLNL completed eleven milestones during 2022. An additional 149.62 m<sup>3</sup> of newly generated mixed waste was accepted into the approved storage facilities and added to the STP.

LLNL removed approximately 71.04 m<sup>3</sup> of mixed waste from LLNL in 2022.

Reports and certification letters were submitted to DOE as required. LLNL continued using available commercial treatment and disposal facilities that are permitted to accept LLNL mixed waste. These facilities provide LLNL greater flexibility in pursuing the goals and milestones outlined in the STP.

### 2.1.9 Toxic Substances Control Act

The Federal Toxic Substances Control Act (TSCA) and implementing regulations found in 40 CFR Parts 700 – 789 govern the uses of newly developed chemical substances and TSCA-governed waste. In 2022, 15 containers of TSCA-regulated polychlorinated biphenyl (PCB) waste with an aggregate weight of 3,673 kilograms were transported and disposed at RCRA-permitted, Clean Harbors Treatment, Storage, and Disposal Facilities in Aragonite, Utah and Energy Solutions, Utah.

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## 2.2 Air Quality and Protection

### 2.2.1 Clean Air Act

All activities at LLNL are evaluated to determine the need for air permits or equipment registrations. Air permits are obtained from the Bay Area Air Quality Management District (BAAQMD) for the Livermore Site and from the San Joaquin Valley Air Pollution Control District (SJVAPCD) and/or BAAQMD for Site 300. The BAAQMD also administers a boiler registration program for natural gas-fueled boilers with rated heat input capacities greater than 2 million British Thermal Units per hour (BTU/hr) and less than 10 million BTU/hr.

Both the BAAQMD and the SJVAPCD are overseen by the California Air Resources Board (CARB), which also oversees the statewide permitting for portable diesel fuel-driven equipment such as portable generators and portable air compressors. In addition, CARB presides over the state-wide registration of in-use off-road diesel vehicles (e.g., diesel-powered forklifts, loaders, backhoes, graders, and cranes), on-road heavy-duty diesel vehicles with a gross vehicle weight rating > 14,000 pounds (e.g., garbage trucks, street sweepers, and bucket trucks) and large spark-ignition (LSI) engine vehicles (e.g., gasoline, propane and electric forklifts, scrubbers/sweepers, and industrial tow tractors).

In 2022, LLNL operated 109 permitted air-pollutant emission sources at the Livermore Site and 33 permitted air-pollutant emission sources at Site 300. In addition, LLNL maintained the registrations for 38 natural gas-fired boilers with the BAAQMD at the Livermore Site. LLNL also maintained registrations with CARB for 13 portable diesel engines powering various portable equipment, 91 in-use off-road diesel vehicles, 13 on-road heavy-duty diesel vehicles, and 128 LSI engine vehicles at the Livermore Site and Site 300.

In 2022, LLNL continued to maintain a Synthetic Minor Operating Permit (SMOP) with the BAAQMD to ensure that facility-wide actual emissions of regulated air pollutants from the Livermore Site did not exceed federal CAA Title V emission limits. The source categories covered under the SMOP include solvents, fuel dispensing, remediation and wastewater, and

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combustion. BAAQMD initially issued LLNL the SMOP in 2002 after it was determined that LLNL had the potential to emit regulated air pollutants exceeding federal CAA Title V emission limits if all emission sources at the Livermore Site were to operate at maximum capacity. As a result, LLNL agreed to receive federally enforceable permit conditions in the SMOP that limit actual emissions of regulated air pollutants from sources rather than potential emissions from sources. LLNL has demonstrated that its actual emissions are well below CAA Title V emission limits through extensive monitoring and record keeping of source emissions and meeting significantly reduced SMOP air pollutant emissions limits. Therefore, LLNL is not classified as a “major facility” of air pollutant emissions per 40 CFR Part 70.2.

On July 15, 2016, Site 300 was reclassified by SJVAPCD from a Title V Major Facility to a Minor Facility with potential to emit (PTE) less than 10 tons of VOCs per year. As a Minor Facility, Site 300 is no longer required to tally its rolling 12-month emissions. Additionally, Site 300 now conducts compliance inspections biennially instead of annually.

Under the authority of AB 32, California adopted several regulations to reduce greenhouse gas emissions. California’s Mandatory Reporting of Greenhouse Gas Emissions Regulation (for calendar years 2008-2011) initially required certain facilities to annually report greenhouse gas emissions from natural gas combustion when annual emissions exceeded 25,000 metric tons of CO<sub>2</sub> equivalent (CO<sub>2</sub>e). The regulation was amended, and the reporting threshold was lowered to 10,000 metric tons per year of CO<sub>2</sub>e starting with calendar year 2012. Since 2008, the Livermore Site’s annual greenhouse gas emissions from natural gas combustion have been slightly below 25,000 metric tons CO<sub>2</sub>e, which means that LLNL is not subject to the California Cap-and-Trade program. LLNL began reporting the Livermore Site’s greenhouse gas emissions from natural gas combustion for calendar year 2012 and continues to report these emissions annually.

The CARB regulation aims to reduce greenhouse gas emissions from semiconductor operations that use fluorinated gases or fluorinated heat transfer fluids (HTFs). Facilities are required to report fluorinated gas emissions beginning with calendar year 2010 and each calendar year thereafter. In 2022, LLNL’s annual emissions of fluorinated gases from semiconductor operations were below the 800 metric ton (MT) CO<sub>2</sub>e threshold. Facilities that exceed the 800 MT CO<sub>2</sub>e threshold are required to meet strict emission standards for semiconductor operations.

Also under the authority of AB 32, California adopted regulations pertaining to sulfur hexafluoride (SF<sub>6</sub>) due to its high global warming potential. LLNL was required to submit an annual report to the CARB describing SF<sub>6</sub> research uses, SF<sub>6</sub> purchases, and measures taken to control the SF<sub>6</sub> emissions from research activities. Furthermore, LLNL was required to record the amounts of SF<sub>6</sub> (and other greenhouse gases) contained in and emitted from gas insulated equipment during calendar year 2022 with an annual emission limit of 1% of its annual average CO<sub>2</sub>e capacity. For CY2022, GHG emissions from LLNL’s gas-insulated equipment (GIE) is calculated to be 470.6 MT CO<sub>2</sub>e which is 0.9% of LLNL’s total GIE system CO<sub>2</sub>e capacity of 52,140.9 MT CO<sub>2</sub>e. Therefore, LLNL complied with the CY2022 emissions limit of 1% of its total GIE system CO<sub>2</sub>e capacity.

Additionally, LLNL continues to implement reductions and controls to minimize CO<sub>2</sub> emissions. For example, LLNL regularly replaces diesel engines, boilers, and hot water heaters with new



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equipment that is more efficient in terms of fuel use and CO<sub>2</sub> air emissions. Site 300 CO<sub>2</sub> emissions are much lower than the Livermore Site emissions because there is no natural gas service at Site 300.

Like California's regulation, the EPA has a Mandatory Reporting of Greenhouse Gases regulation for stationary emission sources. LLNL is currently below the EPA's mandatory reporting threshold of 25,000 metric tons per year at both the Livermore Site and Site 300.

The federal American Innovation and Manufacturing (AIM) Act of 2020 seeks to reduce hydrofluorocarbon (HFC) greenhouse gas consumption and production to 15% of a 2011-2013 baseline by 2036. The AIM Act authorizes EPA to establish production and consumption allowances, sector-specific controls (e.g., global warming potential limits), refrigerant management practices, and penalties for circumventing AIM Act rules. At LLNL, HFC uses include but are not limited to refrigeration equipment, fire suppression systems, research and development operations, semiconductor etching, precision optics processing, and testing equipment, aerosols, and spray foams. AIM Act HFCs purchased during CY 2022 and in inventory (in containers, not in equipment) on December 31, 2022 are included in Table 2-2.

**Table 2-2.** AIM Act HFC Purchases and Inventory at the Livermore Site and Site 300, 2022

HFC	Purchases <sup>1</sup> (pounds)	Inventory <sup>1</sup> (pounds)
HFC-43-10mee	133	478
R-134a	740	873
R-23	45	64
R-32	0	6
R-401A	0	660
R-401B	0	90
R-402B	0	39
R-404A	24	522
R-407C	350	575
R-408A	0	116
R-410A	325	425
R-500	0	371
R-503	0	20
R-507	0	25
R-508B	0	30

1 – Purchases and inventory from ChemTrack database.

During CY 2022 LLNL undertook an outreach effort to identify personnel who may potentially be impacted by the AIM Act. A survey was circulated to these personnel regarding their future HFC needs and usage timelines. Impacted personnel were encouraged to plan accordingly and seek potential alternatives to AIM Act HFCs. LLNL uses a significant quantity of HFCs in chillers. Plans are underway to replace four chillers each containing 2,155 pounds of the refrigerant R-134a with chillers that use more climate-friendly refrigerants such as R-513A or R-

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514A. This will significantly decrease future purchases of R-134a.

### 2.2.2 National Emission Standards for Hazardous Air Pollutants, Radionuclides

To demonstrate compliance with 40 CFR Part 61, Subpart H (National Emission Standards for Hazardous Air Pollutants [NESHAPs] for radiological emissions from DOE facilities), LLNL monitors certain air-release points and evaluates the maximum potential dose to the public. The *LLNL NESHAPs 2022 Annual Report* (Wilson et al. 2023) reported that the estimated maximum radiological dose from radioactive air emissions were  $2.9 \times 10^{-2} \mu\text{Sv}$  ( $2.9 \times 10^{-3} \text{ mrem}$ ) for the Livermore Site and  $2.8 \times 10^{-3} \mu\text{Sv}$  ( $2.8 \times 10^{-4} \text{ mrem}$ ) for Site 300. The totals are well below the  $100 \mu\text{Sv/y}$  ( $10 \text{ mrem/y}$ ) site-wide dose limits defined by the NESHAPs regulation. The *LLNL NESHAPs 2022 Annual Report* is in Appendix C of this report.

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## 2.3 Water Quality and Protection

LLNL complies with requirements of the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act, the Safe Drinking Water Act (SDWA), the California Aboveground Petroleum Storage Act (APSA), the California Water Code, the California Health and Safety Code (CH&SC), and the City of Livermore ordinances by obtaining permits issued by the appropriate regulatory agencies whose mission is to protect water quality.

### 2.3.1 Storm Water, Wastewater, and Drinking Water

LLNL complies with the requirements of National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permits and Water Quality Certifications issued by Regional Water Quality Control Boards (RWQCBs) and the State Water Resources Control Board (SWRCB) for discharges to waters of the U.S. and waters of the state. Discharges to the City of Livermore's sanitary sewer system are governed by permits issued by the Water Resources Division (WRD). The SDWA requires that LLNL register Class V injection wells with the EPA and LLNL obtains permits from the Army Corps of Engineers (ACOE) for work in wetlands and waters of the U.S.

### 2.3.2 SPCC/APSA

The Spill Prevention, Control, and Countermeasures (SPCC) Rule is published under the authority of Section 311 of the CWA to prevent oil discharges into navigable waters of the U.S. or adjoining shorelines. The APSA program regulates non-transportation related facilities in California with aggregate aboveground petroleum storage capacities greater than or equal to 1,320 gallons that have the potential to discharge petroleum into waters of the state. Both the CWA and APSA require LLNL to prepare and implement SPCC plans at the Livermore Site and Site 300, which include inventories, procedures, methods, and inspections to prevent and mitigate potential discharges of oil for applicable aboveground oil containers and oil-filled equipment systems.

The Livermore Site SPCC Plan had two technical amendments in 2022 (May and October) that were certified by a registered Professional Engineer (P.E.) and included the permanent closure of 12 existing systems and the addition of 13 new systems. The Site 300 SPCC Plan had one technical amendment in 2022 (June) that was certified by a P.E. and included the permanent

closure of one existing system and the addition of one new system. The end of year 2022 total oil storage capacities were 707,610 gallons for 498 equipment systems at the Livermore Site and 54,803 gallons for 86 equipment systems at Site 300. The total aboveground petroleum oil storage capacities, as submitted in the California Environmental Reporting System (CERS), were 595,144 gallons for the Livermore Site and 36,391 gallons for Site 300.

### 2.3.3 Underground Storage Tanks

LLNL has underground storage tanks (USTs) at the Livermore Site and Site 300 that store petroleum products (diesel, gasoline, and ethanol) for vehicle fuel dispensing and to supply emergency backup generators. USTs that store hazardous substances in California are regulated by the EPA, the SWRCB, and the local CUPAs.

There are nine UST systems at the Livermore Site and three UST systems at Site 300 (see **Table 2-3**). The Livermore-Pleasanton Fire Department (LPPFD) and the SJCEHD issue permits for operating these USTs, as required by the CCR and the CH&SC (see **Table 2-4**). The tank owner and operator for the permitted UST systems at LLNL is DOE/NNSA and Lawrence Livermore National Security, LLC (LLNS), respectively.

Three of the USTs at the Livermore Site (611TFUD01, 611TFUG01, 611TFUG02) are single-walled systems that are required to be permanently closed by December 31, 2025 in accordance with the CH&SC. Ongoing efforts are being made to close these UST systems to meet the upcoming regulatory deadline.

**Table 2-3.** UST Inventory at the Livermore Site and Site 300, 2022

Equipment ID	Location	Size	Type	Material	Contents
111TFUD01	B-111	350 Gallons	Emergency Generator	DW Steel-FRP Wrap Tank DW Steel-Fiberglass Piping	Diesel
112TFUD01	B-112	350 Gallons	Emergency Generator	DW Steel-FRP Wrap Tank DW Steel-Fiberglass Piping	Diesel
152TFUD01	B-152	1,000 Gallons	Emergency Generator	DW Steel-FRP Wrap Tank DW Flexible Piping	Diesel
271TFUD02	B-271	1,000 Gallons	Emergency Generator	DW Fiberglass Tank DW Flexible-Fiberglass Piping	Diesel
365TFUD01	B-365	500 Gallons	Emergency Generator	DW Steel-HDPE Tank DW Flexible Piping	Diesel
611TFUD01	B-611	10,000 Gallons	Fueling Station	DW Fiberglass Tank SW Steel Piping	Diesel
611TFUG01	B-611	12,000 Gallons	Fueling Station	DW Fiberglass Tank SW Steel Piping	Unleaded Gasoline

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**Table 2-3. (cont.)** UST Inventory at LLNL Livermore Site and Site 300, 2022

Equipment ID	Location	Size	Type	Material	Contents
611TFUG02	B-611	12,000 Gallons	Fueling Station	DW Fiberglass Tank SW Steel Piping	Unleaded Gasoline
611TFUE01	B-611	12,000 Gallons	Fueling Station	DW Steel-FRP Wrap Tank DW Fiberglass Piping	Ethanol (E-85)
879TFUD01	B-879	5,000 Gallons	Fueling Station	DW Steel-FRP Wrap Tank SW Steel Piping	Diesel
879TFUG01	B-879	15,000 Gallons	Fueling Station	DW Steel Tank DW Fiberglass Piping	Unleaded Gasoline
882TFUD01	B-882	1,500 Gallons	Emergency Generator	DW Steel Tank DW Steel-Fiberglass Piping	Diesel

Note: See the **Acronyms and Glossary** section for acronym definitions.

## 2.4 Other Environmental Statutes

### 2.4.1 National Environmental Policy Act and Floodplains and Wetland Assessments

The National Environmental Policy Act (NEPA) of 1969 is the U.S. government’s basic environmental charter. When considering a proposed project or action at LLNL, DOE/NNSA must (1) consider how the action would affect the environment, and (2) make certain that environmental information is available to public officials and citizens before decisions are made and actions are taken. The results of the evaluations and notice requirements are met through publication of “NEPA documents,” such as environmental impact statements (EISs) and environmental assessments (EAs) under DOE NEPA Implementing Procedures in 10 CFR Part 1021.

In 2005, DOE/NNSA completed the Final Site-Wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SWEIS 2005) (U.S. DOE/NNSA 2005). In 2011, DOE/NNSA prepared a Supplement Analysis (SA) (DOE/EIS-0348-SA-03) of the 2005 SWEIS to consider whether the 2005 SWEIS should be supplemented, a new EIS should be prepared, or no further NEPA documentation is required (U.S. DOE/NNSA 2011). The SA concluded that a supplement to the 2005 SWEIS or a new SWEIS was not needed. Both the 2011 SA and the 2005 SWEIS are available online at <https://enviroinfo.llnl.gov/nepa>. DOE/NNSA is currently preparing a new SWEIS to analyze the impacts of continued operations at LLNL for the foreseeable future. DOE/NNSA issued the Draft SWEIS for public review on November 4, 2022. Preparation of the response to public comments and the Final SWEIS are in progress.

In 2022, no EISs or EAs were completed. One Categorical Exclusion under DOE NEPA Regulations (10 CFR Part 1021) was completed as follows:

- *Site 300 Well 21 (NA I-22)*

### 2.4.2 National Historic Preservation Act

The National Historic Preservation Act (NHPA) provides protection and preservation of historic properties that are significant in the nation's history. LLNL resources subject to NHPA consideration range from prehistoric archeological sites to remnants of LLNL's own history of scientific and technological endeavors. The responsibility to comply with the provisions of the NHPA rests with DOE/NNSA as the lead federal agency. LLNL supports the agency's NHPA responsibilities with direction from DOE/NNSA.

LLNL and DOE/NNSA have completed the necessary inventory, evaluations, and consultations to identify National Register of Historic Places (NRHP) eligible buildings and archaeological sites at both the Livermore Site and Site 300. In 2005, in consultation with DOE/NNSA, the California State Historic Preservation Officer (SHPO) formally determined that five archaeological resources, five individual buildings, two historic districts (encompassing 13 non-contiguous individual buildings), and selected objects in another building at LLNL are eligible for listing in the NRHP. As of 2020, based on DOE consultations with the SHPO and the Advisory Council on Historic Preservation (ACHP), all previously eligible facilities have been removed from the eligibility list. As final mitigation for loss of integrity for the historic significance period, LLNL and DOE/NNSA prepared Historic American Engineering Report (HAER) documentation for each of these facilities.

### 2.4.3 Antiquities Act of 1906

The Antiquities Act provides protection for items of antiquities (i.e., archaeological sites and paleontological remains). The NRHP-eligible archaeological sites noted in Section 2.4.2 are protected under the Antiquities Act. No paleontological remains subject to the provisions of the Antiquities Act were identified in 2022.

### 2.4.4 Endangered Species Act and Sensitive Natural Resources

LLNL meets requirements of the Federal and State Endangered Species Acts (ESAs), the Eagle Protection Act, the Migratory Bird Treaty Act, and other applicable regulations as they pertain to endangered species, threatened species, and other special-status species (including their habitats) and designated critical habitats that exist at LLNL sites.

On August 29, 2018, the U.S. Fish and Wildlife Service issued a sitewide biological opinion to DOE/NNSA for continued operations and maintenance of the LLNL Experimental Test Site, Site 300. Two projects were completed under this biological opinion in 2022: the Building 812 Monitoring Well (W-812-3811) and Mud Pit and the Building 850 Monitoring Well (W-850-3812) and Mud Pit.

At the Livermore Site, the following projects were conducted under the 2013 biological opinion for infill construction and redevelopment: Building 449 Science Office Facility (STAR), Building 226 New AME Joining Capabilities and Vapor Disposition Facility, Site 200 Compressed Air and Miscellaneous Valve Replacement Project, Building 265 Environmental Safety & Health Office, Building 654 Expansion for Stockpile Science, Building 310 New Nondestructive Evaluation Building, and the Building 321G Manufacturing Building.

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Annual flood control maintenance within the Livermore Site reach of Arroyo Las Positas was completed under the 1997 biological opinion, as well as subsequent amendments for the arroyo maintenance project on Arroyo Las Positas.

All Terms and Conditions and Conservation Measures required by the biological opinions described above were successfully implemented in 2022.

### 2.5 Environmental Permits, Inspections, and Occurrences

LLNL’s various missions require a variety of permits. **Table 2-4** is a summary of active permits in 2022 at the Livermore Site and Site 300. The external agencies that issue the permits may also perform inspections required by the permits. **Table 2-5** lists environmental inspections and findings from both LLNL sites in 2022.

Notification of environmental occurrences is required under several environmental laws and regulations as well as DOE Order 232.2A (Occurrence Reporting and Processing of Operations Information). **Table 2-6** provides a list of environmental occurrences reportable under DOE Order 232.2A.

**Table 2-4.** Active Permits at the Livermore Site and Site 300 in 2022<sup>a</sup>

<b>Type of Permit</b>	
<b>Livermore Site</b>	<b>Site 300</b>
<b>Hazardous Waste</b>	
<p>EPA ID No. CA2890012584. Hazardous Waste Facility Permit Number 2022/23-HWM-07 and RCRA Part A/B permit application – to operate hazardous waste management facilities. Agency – DTSC.</p> <p>Registered Hazardous Waste Hauler authorized to transport regulated wastes on public roadway. Permit number 1351. Agency – DTSC.</p> <p>Facility I.D. # 10697. Hazardous Waste Generator Program, on-site treatment of hazardous waste (tiered permitting) program: Conditionally Exempt Specified Wastestream, CE231-1, Hazardous Materials Business Program, Above Ground Petroleum Tank Program, and CA Accidental Release Program. Agency – LPFD CUPA.</p>	<p>EPA ID No. CA2890090002. Hazardous Waste Facility Permit and RCRA Part A/B permit application to operate CSA (Building 883), EWTF and EWSF. Agency – DTSC.</p> <p>EPA ID No. CA2890090002. Hazardous Waste Facility Post-Closure Permit and RCRA Site 300 Building 829 Post-Closure Operation Plan. Agency – DTSC.</p> <p>Facility I.D. # FA0003934 RCRA Hazardous Waste Generator category: waste generation in an amount equal to or more than 50 tons, but less than 250 tons. Agency – SJCEHD CUPA.</p>
<b>Medical Waste</b>	
<p>ACDEH issued a Large Quantity Medical Waste Generator permit (PT0200461/PT0305526) that covers medical waste generation and treatment activities for BSL 2 facilities at B132 North and South, B150 Complex, B360 Complex, B663, and the BSL 3 facility.</p>	<p>Registered with SJCEHD as a Small Quantity Medical Waste Generator.</p>

**Table 2-4. (cont.)** Active Permits at the Livermore Site and Site 300 in 2022<sup>a</sup>

Type of Permit	
Livermore Site	Site 300
<b>Air</b>	
<p>BAAQMD renewed the Permit-to-Operate (PTO) issued to LLNL Livermore Site (Plant No. 255) which covers 165 existing various air emission sources (109 permitted sources, 38 registered sources, and 18 exempt sources). BAAQMD conducted compliance inspections on 82 air emission sources.</p> <p>BAAQMD issued a revision to the SMOP in 2015, which was initially issued in 2002 to ensure the NOx and HAPs emissions from the site do not exceed federal Clean Air Act Title V emission limits.</p> <p>BAAQMD issued one Asbestos Renovation Permit and three Asbestos Demolition Permits.</p>	<p>SJVAPCD renewed the PTO issued to LLNL Site 300 (Facility ID N-472) which covers 33 existing various air emission sources.</p> <p>BAAQMD renewed the PTO issued to LLNL Site 300 (Plant No. 15611) which covers one existing standby diesel engine powering an emergency generator.</p> <p>SJVAPCD approved a Prescribed Burn Plan for the burning of 1,905 acres of grassland at LLNL Site 300.</p> <p>SJVAPCD conducted one start-up compliance inspection on two air emission sources.</p> <p>SJVAPCD issued two Asbestos Renovation Permits and five Asbestos Demolition Permits.</p> <p>BAAQMD approved a Prescribed Burn Plan for the burning of 139.1 acres of grassland at LLNL Site 300.</p> <p>CARB renewed two PERP registrations for portable diesel engines powering various portable equipment.</p>
<b>Underground Storage Tanks</b>	
<p>UST permit (1016-09202018) issued by LPFD from September 20, 2018 – September 19, 2023, covering the operation of nine USTs and the approved monitoring program and emergency response plan for these systems.</p>	<p>One operating permit covering three underground petroleum storage tanks assigned individual permit numbers (PT0006785 [879TFUD01], PT0006530 [882TFUD01], and PT0007967 [879TFUG01]).</p>
<b>Sanitary Sewer</b>	
<p>Discharge Permit 1250<sup>(b)</sup> for discharges of wastewater to the sanitary sewer.</p> <p>Permit 1510G for groundwater discharges from CERCLA restoration activities to the sanitary sewer.</p>	<p>WDR R5-2008-0148 for operation of sewage evaporation and percolation ponds, septic systems, cooling tower discharges, mechanical equipment wastewater discharges, and other low-threat discharges.</p>

## 2. Compliance

**Table 2-4. (cont.) Active Permits at the Livermore Site and Site 300 in 2022<sup>a</sup>**

<b>Type of Permit</b>	
<b>Livermore Site</b>	<b>Site 300</b>
<b>Water</b>	
<p>WDR No. 88-075 for discharges of treated groundwater from Treatment Facility A to recharge basin.<sup>(c)</sup></p> <p>NPDES General Permit 2014-0057-DWQ (Waste Discharge Identification Number [WDID] 2 01I025682) for discharge of storm water associated with industrial activities.</p> <p>NPDES General Permit 2009-0009-DWQ for discharges of storm water associated with construction activities affecting 0.4 hectares (1 acre) or more.</p> <p>FFA for groundwater investigation/remediation.</p> <p>Domestic Water Supply Permit 02-04-20P-0110701.</p>	<p>WDR No. 93-100 for post-closure monitoring requirements for two Class I landfills.<sup>(d)</sup></p> <p>WDR R5-2008-0148 for operation of sewage evaporation and percolation ponds, septic systems, cooling tower discharges, mechanical equipment wastewater discharges, and other low-threat discharges.</p> <p>NPDES General Permit 2014-0057-DWQ (WDID 5S39I021179) for discharge of storm water associated with industrial activities.</p> <p>NPDES General Permit 2009-0009-DWQ for discharges of storm water associated with construction activities affecting 0.4 hectares (1 acre) or more.</p> <p>WDR R5-2022-0006 and NPDES No. CAG995002 for limited threat discharges to surface water from the Site 300 drinking water system.</p> <p>Water Code Section 13267 Order, Submittal of Technical and Monitoring Reports for the Active Building 851 Firing Table, Lawrence Livermore National Laboratory Site 300, San Joaquin County.</p> <p>Site 300 Domestic Water Supply Permit Amendment No. 01-10-16PA-003 and the Site 300 Granulated Activated Carbon Treatment Facility – Approval to Operate, October 15, 2019.</p> <p>FFA for groundwater investigation/remediation.</p> <p>Approximately 32 registered Class V injection wells.</p>

**Note:** See the **Acronyms and Glossary** section for acronym definitions.

- <sup>(a)</sup> Numbers of permits are based on actual permitted units or activities maintained and/or renewed by LLNL during 2022.
- <sup>(b)</sup> Permit 1250 includes some wastewater generated at Site 300 and discharged at the Livermore Site.
- <sup>(c)</sup> Recharge basin referenced in WDR Order No. 88-075 is located south of East Avenue within Sandia National Laboratories/California boundaries. The discharge no longer occurs; however, the agency has not rescinded the permit.
- <sup>(d)</sup> On July 22, 2020, the transfer of Site 300 Closed Landfill Pit 1 from Resource Conservation and Recovery Act (RCRA) Post-Closure Monitoring to Comprehensive Environmental Compensation and Liability Act (CERCLA) was completed. WDR No. 93-100 was rescinded, and Pit 1 post-closure compliance monitoring will be conducted under CERCLA oversight.



**Table 2-5.** External Agency Inspections at the Livermore Site and Site 300 in 2022

<b>Medium</b>			
<b>Description</b>	<b>Agency</b>	<b>Date</b>	<b>Finding</b>
<b>Air</b>			
Air Pollutant Emission Sources (Livermore Site)	BAAQMD	03/29/22	No violations
		05/10/22	No violations
		06/14/22	No violations
		08/09/22	No violations
		10/04/22	No violations
Air Pollutant Emission Sources (Site 300)	SJVAPCD	05/03/22	No violations
<b>Hazardous Materials Business Plan</b>			
CUPA Inspection (Livermore Site)	LPFD	10/24/22 – 10/27/22	No violations
CUPA Inspection (Site 300)	SJCEHD	N/A	No violations
<b>Sanitary Sewer</b>			
Annual Inspection of the Sewer Monitoring Complex (Livermore Site)	WRD	10/05/22	No violations
Annual Categorical Sampling and Inspection, Building 153 (Livermore Site)	WRD	10/04/22	No violations
Café Grease Interceptor Inspections, Buildings 125 and 471 (Livermore Site)	WRD	10/05/22	No violations

## 2. Compliance

**Table 2-5. (cont.)** External Agency Inspections at the Livermore Site and Site 300 in 2022

<b>Medium</b>			
<b>Description</b>	<b>Agency</b>	<b>Date</b>	<b>Finding</b>
<b>SPCC/APSA, UST and Aboveground Tank Closures</b>			
Annual CUPA Inspection – APSA/SPCC Program (Livermore Site)	LPFD	10/24/22 – 10/27/22	No violations
Annual Spill Container Test/Annual Monitoring System Certification (Site 300)	SJCEHD	07/28/22	No violations
Triennial Cathodic Protection Survey for B611 Fuel Station USTs with Single-walled Piping (Site 200)	LPFD	11/28/22	No violations
Annual Spill Container Test/Annual Monitoring System Certification for Emergency Generator USTs (Livermore Site)	LPFD	07/26/22 – 07/27/22	LPFD issued one violation requiring an epoxy pack inside the sump of 111TFUD01 to be placed inside an electrical junction box. This corrective action was implemented, and documentation was provided to LPFD.
Annual Spill Container Test/Annual Monitoring System Certification for B611 Fuel Station USTs (Livermore Site)	LPFD	07/26/22 08/11/22	LPFD issued one violation due to the failure of hydrostatic testing of the 611TFUG02 spill container. LPFD issued a corrective action to repair the spill bucket and retest it. This corrective action was implemented, with LPFD representative witnessing repair and retest.
Triennial Secondary Containment Testing for B611 Fuel Station USTs (Livermore Site)	LPFD	09/21/22	No violations
Triennial Line Leak Detection Testing for B611 Fuel Station USTs with Single-walled Piping (Site 200)	LPFD	07/25/22	No violations

**Table 2-5. (cont.)** External Agency Inspections at the Livermore Site and Site 300 in 2022

<b>Medium</b>			
<b>Description</b>	<b>Agency</b>	<b>Date</b>	<b>Finding</b>
<b>Waste</b>			
CUPA Inspection (Livermore Site)	LPFD	10/24/22 – 10/27/22	No violations
CUPA Inspection (Site 300)	SJCEHD		No inspection in 2022
Hazardous Waste Facilities Compliance Evaluation Inspection (CEI) (Livermore Site)	DTSC	10/25/22 – 10/26/22	A minor violation was issued as the result of an employee not having all permit-required trainings completed within 6 months of assignment to their position.
Hazardous Waste Facilities Compliance Evaluation Inspection (CEI) (Site 300)	DTSC	03/22/22	No violations
Medical Waste Facilities Inspection	ACDEH	11/29/22	No violations
<b>Water</b>			
Permitted Operations (Site 300 Drinking Water)	SWRCB	N/A	No inspection in 2022
Permitted Operations (Livermore Site Drinking Water)	SWRCB	N/A	No inspection in 2022
Waste Discharge Requirements (WDR R5-2008-0148) for Sewage Pond, Percolation Pits, Septic Systems, Cooling Tower Discharges, Mechanical Equipment Wastewater Discharges, and Other Low-threat Discharges	CVRWQCB	04/12/22	No violations
		10/24/22	No violations
Industrial and Construction General Permits: Storm Water Pollution Prevention Plans (Livermore Site)	SFRWQCB	11/08/22	No violations
Industrial and Construction General Permits: Storm Water Pollution Prevention Plans (Site 300)	CVRWQCB	N/A	No inspection in 2022

Note: See the **Acronyms and Glossary** section for acronym definitions

## 2. Compliance

**Table 2-6.** Environmental Occurrences Reported in the Occurrence Reporting System in 2022

Date <sup>(a)</sup>	Occurrence Category/Group	Description
12/08/22	Report Level I Occurrence under Group 9(1) OR 22-51	On December 8, 2022, LLNL received a Summary of Violation following a Compliance Evaluation Inspection (CEI) at the Livermore Site conducted on October 25 – 26, 2022. A minor violation was issued because an employee had not completed all permit-required training within 6 months of assignment to their position. The individual completed the single missing course on 10/26/2022 and no further action was required.
07/29/22	Report Level I Occurrence under Group 9(1) OR 22-29	On July 29, 2022, LLNL received two violations following an inspection by LPFD of the Livermore Site UST systems during the annual monitoring system certification and spill bucket testing conducted on July 26 – 27, 2022. The first violation was for a spill bucket (611TFUG02) hydrostatic test failure. The second violation was for an incorrect wiring configuration inside sump 111TFUD01 that was inconsistent with the manufacturer's installation instructions.

**Note:** See the **Acronyms and Glossary** section for acronym definitions.

<sup>(a)</sup> Date the occurrence was categorized, not discovered.

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