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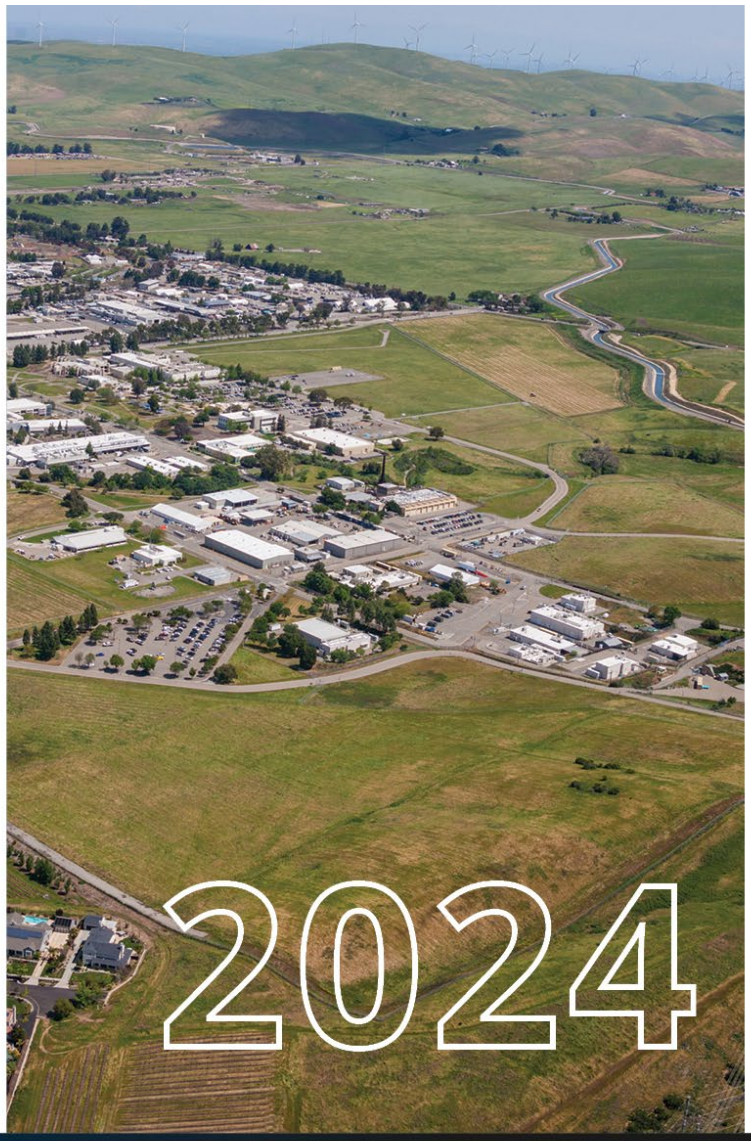

ANNUAL SITE ENVIRONMENTAL REPORT

LIVERMORE CALIFORNIA

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United States Department of Energy, National Nuclear Security Administration,
Sandia Field Office, Albuquerque, New Mexico

2024 Annual Site Environmental Report
for Sandia National Laboratories, Livermore, California

Prepared by
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7011 East Avenue
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for
U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office

Abstract

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly-owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration. The National Nuclear Security Administration's Sandia Field Office administers the Prime Contract and oversees contractor operations at Sandia National Laboratories, California. Activities at this multi-program engineering and science laboratory support the nuclear weapons stockpile program, energy and environmental research, homeland security, micro- and nanotechnologies, and basic science and engineering research.

The U.S. Department of Energy's National Nuclear Security Administration and its management and operating contractor are committed to fulfilling regulatory obligations, safeguarding the environment, assessing sustainability practices, and ensuring the validity and accuracy of the monitoring data presented in this annual site environmental report (ASER). This report provides a summary of environmental monitoring and compliance activities that occurred at Sandia National Laboratories, California, during calendar year 2024, unless noted otherwise. General site and environmental program information is also included. This report was prepared in accordance with DOE Order 231.1B, Admin Change 1, *Environment, Safety and Health Reporting.*

Acknowledgments

The following individuals provided their time and expertise to support production of this annual report for Sandia National Laboratories, California:

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Note to the Reader

This annual site environmental report (ASER) for Sandia National Laboratories, California, presents a summary of environmental performance and compliance data. In addition, the U.S. Department of Energy views this document as a valuable tool for maintaining a dialogue with the community about the environmental health of this site and as a commitment to protect our nation's valuable resources. To continually improve the quality and contents of this annual report, including information that is important to readers, you are invited to send feedback, comments, or questions to:

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Appendix Tables

Acronyms and Abbreviations

Term	Definition
A	
AD	Anno Domini
ASER	Annual Site Environmental Report
B	
BAAQMD	Bay Area Air Quality Management District
Bay Area	San Francisco Bay Area
C	
CARB	California Air Resources Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERS	California Environmental Reporting System
CFR	Code of Federal Regulations
CPNE	Catch per night effort
D	
DOE	U.S. Department of Energy
E	
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ES&H	Environment, Safety, and Health
F	
FFRDC	Federally Funded Research and Development Center
H	
HFC	hydrofluorocarbon
HVAC	heating, ventilation, and air-conditioning
I	
ISO	International Organization for Standardization
L	
LLNL	Lawrence Livermore National Laboratory
M	
MTCO2	metric ton carbon dioxide equivalent
N	
N/A	not applicable
ND	not detected
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NL	numeric limit
NNSA	National Nuclear Security Administration
NTESS	National Technology & Engineering Solutions of Sandia, LLC
O	
O	Order
P	
PCB	polychlorinated biphenyl
PFAS	perfluoroalkyl and polyfluoroalkyl substances
pH	potential of hydrogen
R	
RCRA	Resource Conservation and Recovery Act
S	
Sandia	Sandia National Laboratories
SARA	Superfund Amendments and Reauthorization Act
SF6	sulfur hexafluoride
SFPUC	San Francisco Public Utilities Commission
SFBRWQCB	San Francisco Regional Water Quality Control Board
SNL/CA	Sandia National Laboratories, California
SNL/NM	Sandia National Laboratories, New Mexico
SPCC	Spill Prevention, Controls and Countermeasures
spp.	unknown species, plural
SWEA	site-wide environmental assessment
SWEIS	site-wide environmental impact statement
SWRQB	state water resource control board
U	
U.S.	United States
Z	
Zone 7	Alameda County Flood Control and Water Conservation District

Units of Measure

Unit	Definition
°F	degrees Fahrenheit
Btu	British thermal unit
Btu/hr	British thermal units per hour
cm	centimeter
g	gram
kg	kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
m	meter

Unit	Definition
mb	millibar
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
mrem	millirem
mrem/year	millirems per year
mSv	millisievert
MTCO2	metric ton carbon dioxide equivalent

Executive Summary

Willows (*Salix* spp.) and Narrowleaf Cattail (*Typha angustifolia*)

Sandia National Laboratories (hereinafter *Sandia*), is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC (NTESS), a wholly-owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA, or just NNSA). This annual site environmental report (ASER) was prepared in accordance with and as required by DOE Order (O) 231.1B, Admin Change 1, *Environment, Safety and Health Reporting*, and is approved for public release. The NNSA and Sandia are committed to fulfilling regulatory obligations, safeguarding the environment, continually assessing sustainability practices, and ensuring the validity and accuracy of the monitoring data presented here. This report summarizes the environmental protection and monitoring programs in place for Sandia National Laboratories, Livermore, California (SNL/CA), during calendar year 2024, unless noted otherwise.

Environmental Management System

Sandia management identifies environmental stewardship as a core operating principle. A robust Environmental Management System was established at SNL/CA in 2006. This system ensures a structured approach to identifying environmental aspects, setting

environmental objectives, and monitoring environmental performance. Designed to meet the requirements of the globally recognized International Organization for Standardization (ISO) 14001:2015 standard, the SNL/CA site is ISO 14001:2015 certified under the corporate multisite certification. SNL/CA personnel follow the system's requirements, as verified by an external third-party audit in 2024. This Environmental Management System is Sandia's primary platform for implementing the environmental management programs that help achieve annual site sustainability goals. For fiscal year 2024, the significant aspects for SNL/CA operations were: air emissions/greenhouse gases; energy use/electricity consumption; energy emitted/wildfire potential; and hazardous waste.

Site Sustainability

A site sustainability plan is prepared annually and identifies contributions toward meeting DOE sustainability goals. Sandia's most recent plan, *Fiscal Year 2025 Site Sustainability Plan,* describes performance status for fiscal year 2024. Highlights at SNL/CA in 2024 include having reduced potable water intensity by 63.3 percent from the fiscal year 2021 baseline and 10.2 percent relative to fiscal year 2023. Energy intensity was also reduced by 2.1 percent relative to fiscal year 2023. Additionally, 70.5 percent of nonhazardous solid waste and 95 percent of construction and demolition waste were diverted from treatment and disposal facilities. Furthermore, electronics stewardship resulted in 96.5 percent of acquisitions meeting environmentally-sustainable electronics standards, 100 percent of operations using power management features during computer and monitor use, and 100 percent of end-of-life equipment being disposed of through government programs or certified recyclers.

Environmental Performance

NNSA assesses environmental performance through data measures and indicators and then reports on this as part of an annual performance evaluation. The performance evaluation is the NNSA report card that gives a rating for each of five key performance goals and an overall rating. During the most recent evaluation, Sandia earned a rating of "very good" for the Mission Enablement performance goal, which includes the objective of delivering effective, efficient, and responsive Environment, Safety, and Health quality. By exceeding almost all of the objectives and key outcomes under the performance goals, Sandia received an overall rating of "excellent" for fiscal year 2024.

Under DOE O 232.2A, Chg 1 (MinChg), *Occurrence Reporting and Processing of Operations Information* (DOE O 232.2A, Chg 1 (MinChg) 2017), *occurrences* are defined as "events or conditions that adversely affect, or may adversely affect, DOE (including the National Nuclear Security Administration) or contractor personnel, the public, property, the environment, or the DOE mission." For this ASER, the Occurrence Reporting and Processing System database was queried for occurrences related to environmental programs/compliance. During 2024, no occurrences met the criteria for reporting in this ASER.

All environmental monitoring in 2024 was conducted in accordance with program-specific plans that contain applicable quality assurance elements and meet appropriate federal, state, and local requirements for conducting sampling and analysis activities.

Environmental Programs

Air Quality Program. Air Quality Program personnel support compliance with air quality regulations, permits, and other requirements. In 2024, emissions from permitted and registered stationary sources were 1.44 tons of carbon monoxide, 0.59 tons of hazardous air pollutants, 2.40 tons of nitrogen oxide, 0.50 tons of particulate matter, 0.04 tons of sulfur dioxide, and 1.48 tons of volatile organic compounds. Annual emissions were calculated by multiplying the daily emissions reported in the Bay Area Air Quality Management District Permit to Operate by the number of days in a year. These emissions were within permitted limits. During fiscal year 2024, operations at SNL/CA directly emitted 181 metric ton carbon dioxide equivalent (MTCO2e) from fugitive and refrigerant emissions. In 2024, annual greenhouse gas emissions from natural gas combustion were 2,559 MTCO2e, which is lower than the annual reporting threshold of 10,000 MTCO2e. Therefore, operations at SNL/CA are not subject to the California Regulation for the Mandatory Reporting of Greenhouse Gas Emissions or the U.S. Environmental Protection Agency (EPA) Final Rule for Mandatory Reporting of Greenhouse Gases.

Chemical Management Program. Chemical Management Program personnel support all projects and activities involving the handling or use of chemicals at SNL/CA. In 2024, chemical containers at SNL/CA were tracked along with information about any related chemical hazards. In 2024, no chemicals were submitted to the Chemical Exchange Program.

Cultural Resources Program. Cultural Resources Program personnel review projects which could adversely impact any undiscovered archaeological remains or any above-ground historic buildings. In 2024, archaeological staff reviewed more than 17 outdoor projects such as utility work and building modification for potential impact, but to date there are no recognized archaeological sites on SNL/CA property.

Sandia's historian recommended that eleven modern buildings at the site are eligible for the National Register of Historic Places and proposed a historic district consisting of the four buildings that initially comprised the Combustion Research Facility (CRF). These have a consistent architectural design, and the CRF has housed work of exceptional historical significance. The other seven buildings appear to be individually eligible for the National Register of Historic Places. In 2025, NNSA is expected to consult with the California State Historic Preservation Officer on the determination of which buildings are eligible at SNL/CA.

Ecology Program. Ecology Program personnel perform several monitoring, compliance, and staff support activities throughout each year, including vegetation monitoring and surveillance; ecological restoration and revegetation; herpetofauna (reptile and amphibian), avian (bird), and wildlife surveillance; passive bat monitoring using bioacoustic recordings; and Eco Ticket responses.

During 2024 reptile and amphibian field monitoring, six species were recorded as present on-site: two snake species, one lizard species, and three amphibian species. The California red-legged frog (*Rana draytonii*), a federal and state threatened species, was seen on-site in April within the wildlife preserve during a nighttime survey.

In 2024, three species of bats were documented at SNL/CA using passive bioacoustic recordings of bat calls at two sites. The California myotis (*Myotis californicus*) and the Mexican free-tailed bat (*Tadarida brasiliensis mexicana*) were the most frequently detected bats at both sites. Bird surveys and nesting surveys were conducted from March to August to compare avifauna (local bird) use at restoration sites and control sites as well as to monitor the active nests on campus.

Ecology Program personnel maintain two wildlife game cameras along the Arroyo Seco: one inside a restoration site and one outside the restoration area inside the on-site preserve. The cameras are active from May through December each year to monitor the presence of wildlife and compare wildlife use of the restoration areas to use of the undisturbed portions of the Arroyo Seco. In 2024, the restoration site camera captured images of 8 different species, with the most common sighting being racoon (*Procyon lotor*). At the control location, 11 species were observed, with the most common sighting being wild turkey (*Meleagris gallopavo*).

Sandia personnel use Eco Ticket, a web-based ticketing system, for reporting wildlife issues or concerns. In 2024, 46 wildlife issues or requests were received through Eco Ticket. The "Trapped Wildlife" category was requested most often with eleven tickets; birds and snakes were the most common animals in this category. There were nine snake removal (non-injured) tickets in 2024. Of the nine tickets, none were for venomous snakes. The remaining 26 tickets were for dead, injured, bird nest, or "other" wildlife incidents.

National Environmental Policy Act Program. NEPA Program personnel coordinate with DOE/NNSA to ensure NEPA compliance and to provide technical assistance in project planning at SNL/CA. NEPA program personnel document compliance with an internal checklist and verify whether federally proposed projects and activities and their associated environmental impacts have been evaluated in existing NEPA documentation. In 2024, NEPA program personnel reviewed 60 federally proposed projects through the NEPA online tool. In addition to reviewing checklists, Sandia NEPA program personnel continued working on the 2023 Corrective Action Plan that was developed to create efficiencies and ensure deliverables are comprehensive, actionable, and adherent to statutory and regulatory requirements.

Oil Storage Program. Oil storage containers and equipment are managed, operated, and maintained to prevent inadvertent releases to the environment and to comply with applicable regulations. In 2024, the inventory of oil storage containers operating under the SNL/CA Spill Prevention, Control, and Countermeasure (SPCC) plan included bulk storage containers and oil-filled operation equipment containers. Bulk storage containers include fixed, portable, and mobile containers. Oil-filled operational equipment containers are associated with electrical, hydraulic, and metal machining equipment. Oil storage container capacities at SNL/CA range from 55 gallons to 2,400 gallons. No underground oil storage tanks are present at SNL/CA. There were no reportable oil spills in 2024.

Pollution Prevention and Waste Minimization. The Pollution Prevention and Waste Minimization Program is in place to help reduce the volume and toxicity of waste streams generated in office and lab settings throughout the campus. Pollution Prevention and Waste Minimization Program personnel educate, influence, and track compliance with Federal

Acquisition Regulation and DOE Acquisition Regulation clauses in the Prime Contract, which outline the need to procure products that meet various environmental specifications, such as biobased and recycled content and energy and water efficiency standards. Pollution Prevention and Waste Minimization Program personnel provide educational materials and recycling receptacles and conduct outreach and promotion to ensure that personnel can participate in recycling efforts.

To increase acquisition of sustainable products, SNL/CA uses an automated Oracle process to identify applicable contract categories that need to incorporate the 350APR clause; these include construction and demolition contracts over $250,000. Sustainable acquisition requirements are also included in the Request for Information and Request for Quote process to further communicate requirements to interested subcontractors.

In 2024, the following amounts of nonhazardous solid waste and construction and demolition debris were managed and shipped off site for disposal at a municipal landfill: 249,160 pounds of municipal solid waste (trash) and 63,288 pounds of construction and demolition debris. In 2024, the following amounts of nonhazardous solid material and waste and construction and demolition debris were managed and shipped off site for recycling: 543,430 pounds of nonhazardous solid waste and 163,112 pounds of construction and demolition debris.

Radionuclide National Emission Standards for Hazardous Air Pollutants. There are no radionuclide emission sources at SNL/CA that are subject to 40 Code of Federal Regulations 61, National Emission Standards for Hazardous Air Pollutants, monitoring requirements.

Safe Drinking Water Protection Program. Lawrence Livermore National Laboratory (LLNL) owns and maintains the nonpublic drinking water distribution system that serves both LLNL and SNL/CA. LLNL is designated as the Public Water System (PWS) by the State Water Resources Control Board, operating under PWS number CA0110701. The potable water supplied to LLNL is primarily sourced from the San Francisco Public Utilities Commission, with the Alameda County Flood Control and Water Conservation District (Zone 7) serving as a backup source.

Both the San Francisco Public Utilities Commission and Zone 7 are responsible for monitoring the quality of the incoming water at LLNL. Additionally, LLNL is required to develop and distribute a Consumer Confidence Report (CCR) to Sandia personnel, demonstrating compliance with the regulations set forth by the EPA and the California State Water Resources Control Board. The most recent CCR indicated no known concerns regarding the drinking water quality at SNL/CA.

Stormwater Program. Environmental Management personnel maintain regulatory compliance with federal and state stormwater requirements for SNL/CA. Stormwater Program activities include preparing stormwater pollution prevention plans and stormwater management plans, conducting routine inspections, monitoring stormwater quality, and providing training on stormwater pollution prevention practices. Compliance with these permits reduces the impact of construction, industrial, and municipal activities on the environment.

Operations at SNL/CA comply with the California State Water Resources Control Board's General Permit for Stormwater Discharges Associated with Industrial Activities (aka Industrial General Permit) and General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (aka Construction General Permit). During the Industrial General Permit's reporting year of 2023 to 2024, numeric action levels were exceeded for iron and aluminum. These exceedances are not a violation of the Industrial General Permit; however, they trigger an exceedance response action report that must outline the elevated parameters and future mitigations. Operations at SNL/CA comply with the Industrial General Permit, and exceedance response action reports have been submitted to the California State Water Resources Control Board. Construction projects under the Construction General Permit complied with the permit's requirements, and stormwater runoff from these activities was contained on site properly.

Terrestrial Surveillance Program. The Terrestrial Surveillance Program is designed to address DOE O 458.1, Change 4 (LtdChg), *Radiation Protection of the Public and the Environment* (DOE O 458.1, Change 4 (LtdChg 2020), which establishes standards and requirements to protect the public and the environment from undue risk from radiation associated with radiological activities under NNSA control.

Ambient external gamma radiation levels are measured using environmental dosimeters. On-site sources that could contribute to gamma radiation include small, unsealed radioactive isotopes; sealed sources; and several radiation-generating devices. Dosimeters are used to measure the cumulative ambient external radiation dose and to approximate the dose potentially received from natural and nonnatural sources.

Environmental dosimeters that measure exposure to ambient gamma radiation indicated levels within natural background radiation values in 2024.

Currently there are no operations on site that require Sandia personnel at SNL/CA to collect environmental media (soil, sediment, surface water, groundwater, and vegetation) radiological samples.

Waste Management Program. Waste Management Program personnel are responsible for managing all of the wastes generated on site. Program personnel collect waste from the point of generation and transfer it to on-site waste storage facilities for storage, consolidation, commingling, and packaging. Program personnel also establish and maintain contracts for off-site recycling, treatment, and disposal of wastes. In addition, Waste Management Program personnel provide regulatory oversight in accordance with federal, state, and local regulations; manage the RCRA and tiered permit process; and implement RCRA and tiered permit conditions.

A variety of waste streams are generated at SNL/CA, including hazardous, medical, low-level radioactive, low-level mixed (combination of radioactive low-level and Resource Conservation and Recovery Act (RCRA) and/or non-RCRA hazardous), and solid waste during ongoing operations.

The wastes are collected and managed (i.e., stored, treated, and packaged) at SNL/CA before shipment to off-site permitted facilities. In 2024 the following amounts of waste were

handled and shipped: 69,752 pounds of hazardous waste and 121 pounds of medical waste. No low-level radioactive or mixed low-level radioactive waste was shipped off site in 2024.

The waste management facility at SNL/CA is managed and operated under an RCRA hazardous waste facility permit issued by the California Department of Toxic Substances Control. The permit allows for storing, consolidating, commingling, and packaging hazardous waste. The current permit was issued in October 2018 and is in effect for 10 years. The California Department of Toxic Substances Control conducted an audit in December 2024, and there were no findings or observations.

Two facilities at SNL/CA generate medical waste. One is a small-quantity generator with no on-site treatment, and the other is a large-quantity generator with on-site treatment. The Alameda County Department of Environmental Health conducted an audit in December 2024; there were no findings or observations.

Wastewater Program. Wastewater effluent generated at SNL/CA consists of sanitary and laboratory discharges. Sanitary effluent is discharged directly to the sewer system. Sewer discharges exit the site through a sewer outfall located at the northern boundary and join with the LLNL sewer system. Laboratory discharges are generated from general research activities and from operations that qualify as categorical processes subject to federal pretreatment standards. Laboratory effluent from most laboratory areas is diverted to liquid effluent containment system holding tanks prior to discharge to the sanitary sewer. Environmental Management personnel monitor wastewater at the sewer outfall, the liquid effluent containment system tanks, and categorical process point sources.

Wastewater is discharged to the City of Livermore Water Reclamation Plant, a publicly-owned treatment works. The Livermore plant maintains a National Pollutant Discharge Elimination System permit and regulates industry discharges into its sewer system. A wastewater discharge permit issued by the City of Livermore Water Resources Division regulates wastewater discharges at SNL/CA and sets sampling requirements. In 2024, all liquid effluent discharged from the outfall complied with the site outfall discharge limits for all parameters.

The City of Livermore Water Resources Division conducted an inspection in October 2024. The inspection included sampling wastewater and inspecting monitoring and sampling equipment. No concerns or findings were identified.

Chapter 1. Introduction to Sandia National Laboratories, Livermore, California

Aerial View of Sandia California

OVERVIEW ▪ Sandia National Laboratories, California, was established in 1956 to provide a closer relationship with Lawrence Livermore National Laboratory and its nuclear weapons design work. Operating for the National Nuclear Security Administration, the core mission is to provide science and engineering support for the nation's nuclear weapons stockpile. In addition, Sandia personnel collaborate with government agencies, the industrial sector, and universities to develop and commercialize new technologies.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC (NTESS), a wholly-owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA, or just NNSA). The NNSA Sandia Field Office administers the Prime Contract and oversees contractor operations. Building on its original nuclear weapons mission, Sandia research and development programs support a wide variety of national security missions, resulting in technologies for nonproliferation, homeland security, energy and infrastructure, and defense systems and assessments.

This annual site environmental report (ASER) was prepared in accordance with and as required by the DOE Order (O) 231.1B, Admin Change 1, *Environment, Safety and Health Reporting*. This report describes the environmental protection programs currently in place at

SNL/CA, located in Livermore, California, and is made available to the public in electronic form at Sandia Environmental Reports.

While most 2024 program activities were performed continuously, they are reported on a calendar-year basis unless otherwise noted. Programs based on the fiscal year operate from October 1 through September 30, annually.

1.1 Purpose

Operating since 1949, Sandia's core purpose is to render exceptional service in the national interest. As a Federally Funded Research and Development Center (FFRDC), Sandia operates in the public interest with objectivity and independence, free from organizational conflicts of interest, maintaining core competencies in missions of national significance. Our principal mission is to deliver on commitments to nuclear deterrent, nuclear nonproliferation, and critical work for the national security community. Sandia personnel anticipate and resolve emerging national security challenges and inform the national debate for which technology policy is critical to preserving security and freedom throughout the world. Information about new technologies and accomplishments can be found at Sandia News (Sandia n.d.).

1.2 History

Sandia operations began in 1945 as Z Division, the ordnance design, testing, and assembly arm of Los Alamos Scientific Laboratory (now Los Alamos National Laboratory). The division moved to Sandia Base, located on the perimeter of Albuquerque, to be near an airfield and to work closely with the military. In 1948, Z Division became a separate branch of the Los Alamos Scientific Laboratory and was renamed Sandia Laboratory. On November 1, 1949, Sandia Corporation, a wholly-owned subsidiary of Western Electric, began managing and operating Sandia Laboratory. In 1979, Congress recognized the facility as a national laboratory. From 1993 to mid-2017, Sandia Corporation was a wholly-owned subsidiary of Martin Marietta (merging with Lockheed Corporation in 1995 to form Lockheed Martin Corporation). In May 2017, the management and operating contractor changed to NTESS.

Sandia National Laboratories, California

SNL/CA was established in 1956 to provide a closer relationship with Lawrence Livermore National Laboratory (LLNL) and its nuclear weapons design work. The SNL/CA facility evolved into an engineering research and development laboratory by the early 1960s and into a multi-program engineering and science laboratory during the 1970s. As international arms control efforts increased in the late 1970s and throughout the 1980s, the United States emphasized treaty monitoring, safety, security, and control of the national nuclear weapons stockpile. With the end of the Cold War in the late 1980s, supporting stockpile stewardship at SNL/CA—ensuring nonproliferation and continued safety, security, and reliability—took on greater importance.

There were approximately 2,094 Sandia employees and contractors at SNL/CA in 2024.

1.3 Location Description

SNL/CA resides approximately 40 miles east of San Francisco, within the City of Livermore in eastern Alameda County. The site lies at the western base of the Altamont Hills on relatively flat terrain with low relief sloping gently northwest and north. Figure 1-1 shows the site's regional location.

Comprising 407 acres, the main SNL/CA campus (158 acres) is surrounded by the remaining undeveloped land (249 acres) on the east, south, and west as shown on Figure 1-2. To the north of SNL/CA are East Avenue and LLNL. Land use to the east and south of the site is agricultural and low-density residential. A residential development is located along the site's western boundary.

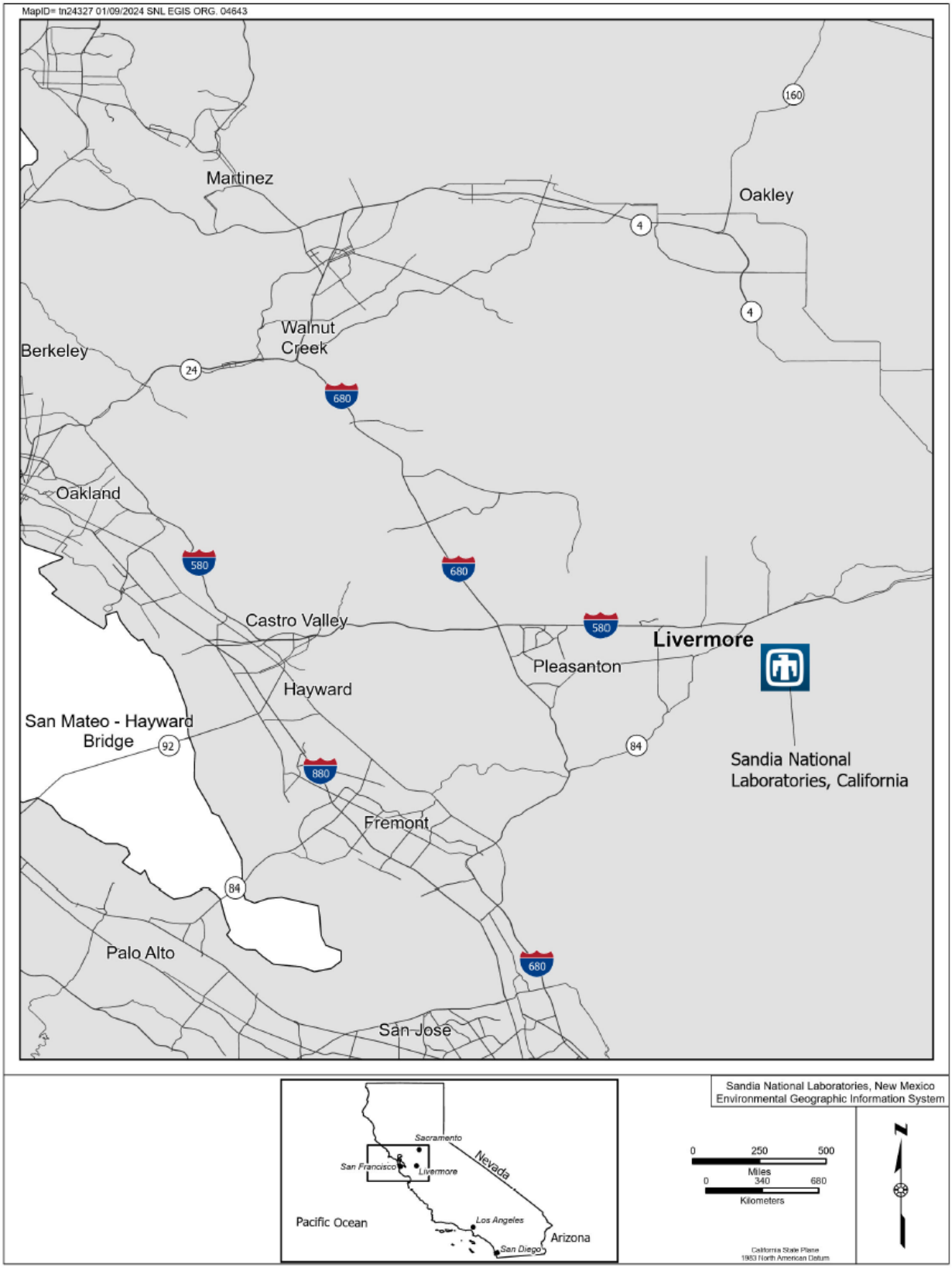


Figure 1-1. SNL/CA regional location

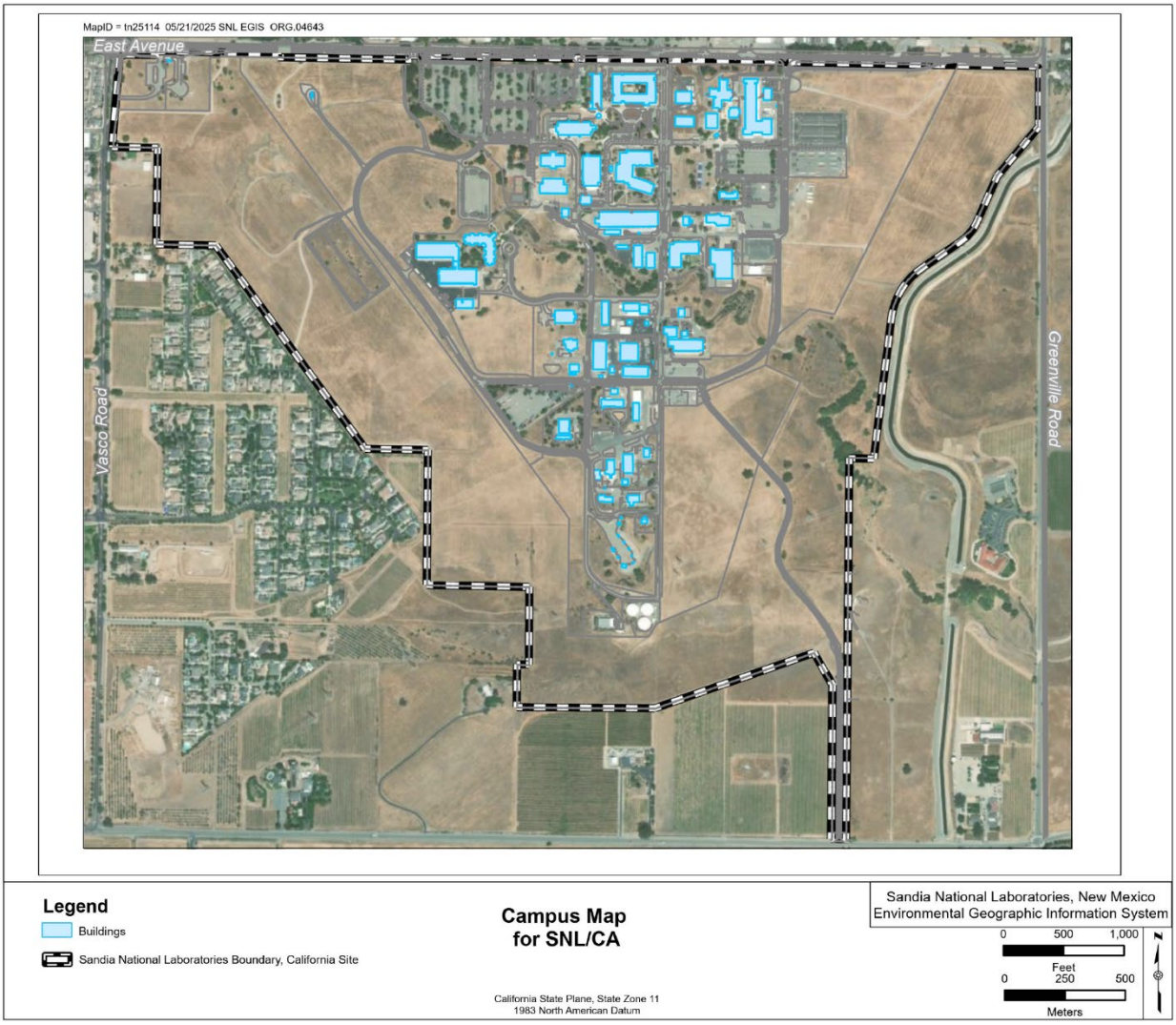


Figure 1-2. SNL/CA site

1.4 Demographics

California is the third-largest state in the United States, encompassing approximately 163,700 square miles (U.S. Census Bureau 2025). California's population was approximately 39 million in 2024. The City of Livermore is located within Alameda County, which is one of nine counties that make up the San Francisco Bay Area (Bay Area). The total population of the Bay Area in 2024 was approximately 7.59 million. Alameda is the second-largest county in the Bay Area with a population of approximately 1.64 million. Figure 1-3 shows the various counties surrounding SNL/CA. As of January 1, 2024 (the most recent date for which data is available), the City of Livermore's estimated population was 84,828 (California Department of Finance, 2025).

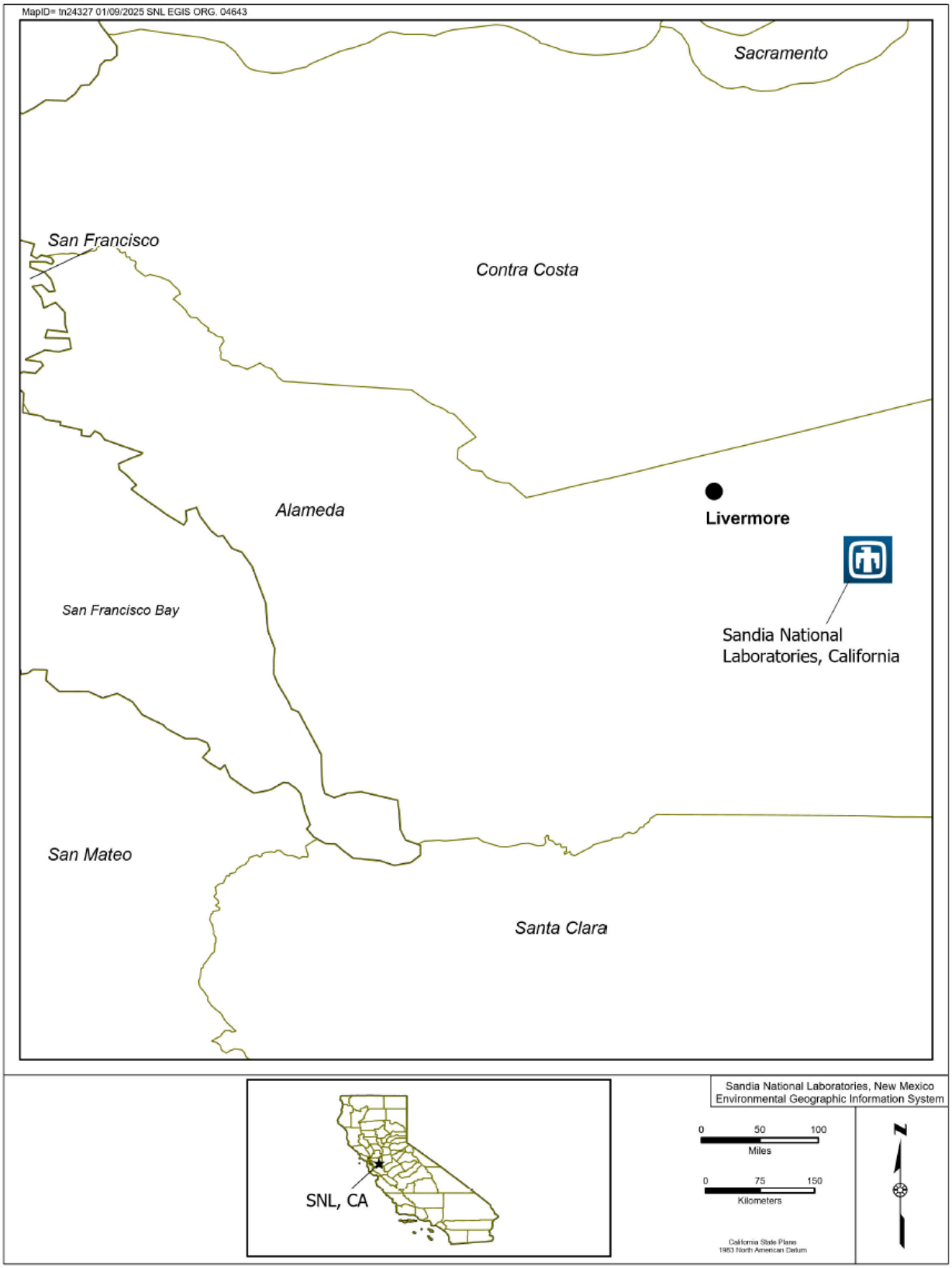


Figure 1-3. Counties around SNL/CA

1.5 Environmental Setting

The environmental setting at SNL/CA is described in the following sections. Additional information can be found in the Final *Site-wide Environmental Assessment of the Sandia National Laboratories/California* (DOE 2003a).

1.5.1 Geology and Soils

SNL/CA resides in the California Coast Ranges geologic province in the southeastern portion of the Livermore Valley. The valley forms an irregularly shaped lowland area about 16 miles long, east to west, and 7 to 10 miles wide, north to south. The land at SNL/CA slopes gently to the northwest and north, with steep terrain in the southern portion of the site and along the banks of the Arroyo Seco. The site ranges in elevation from 615 feet above mean sea level at the northwest corner of the property to 849 feet at the southern end. Site topography is depicted in Figure 1-4.

SNL/CA is situated in a seismically active region, where the potential for significant seismic events is heightened by the presence of the San Andrea Fault System. The San Andreas Fault, a right-lateral strike-slip fault system trending northwest–southeast, extends from Point Arena on the coast in Mendocino County, California, to the Gulf of California. In this system, the faults closest to SNL/CA—the Hayward, Calaveras, Greenville, and Tesla faults. Among these, the Hayward Fault stands out as a particularly impactful geological feature due to its substantial risk to the SNL/CA site and the surrounding Livermore Valley.

The Hayward Fault is a right-lateral strike-slip fault that runs parallel to the San Andreas Fault, extending through densely populated areas. Its proximity to SNL/CA means that any seismic activity along this fault could have direct and immediate consequences for the site. While the San Andreas Fault is often highlighted due to its length and historical significance, the proximity of the Hayward Fault to SNL/CA should be considered. In fact, the Hayward Fault has a history of producing significant seismic events, and its last major rupture occurred in 1868, resulting in considerable destruction.

The Greenville Fault, which caused minor damage during a magnitude 5.8 earthquake in 1980, serves as a reminder of the seismic risks in the area. Additionally, the Las Positas Fault, which crosses through SNL/CA, is a transverse fault that could also contribute to the seismic risk profile, particularly in conjunction with the Hayward Fault's activity. The Verona Fault, while less connected to the regional faulting, still adds to the complexity of the seismic landscape. All of these faults are shown on Figure 1-5.

Surface soils and arroyo sediments cover the SNL/CA site. Soils at the site are formed primarily upon sediments deposited by local streams. Three soils cover most of SNL/CA: Rincon clay loam, Positas gravelly loam, and Livermore gravelly loam. There are no known mineral resources or fossils at the site.

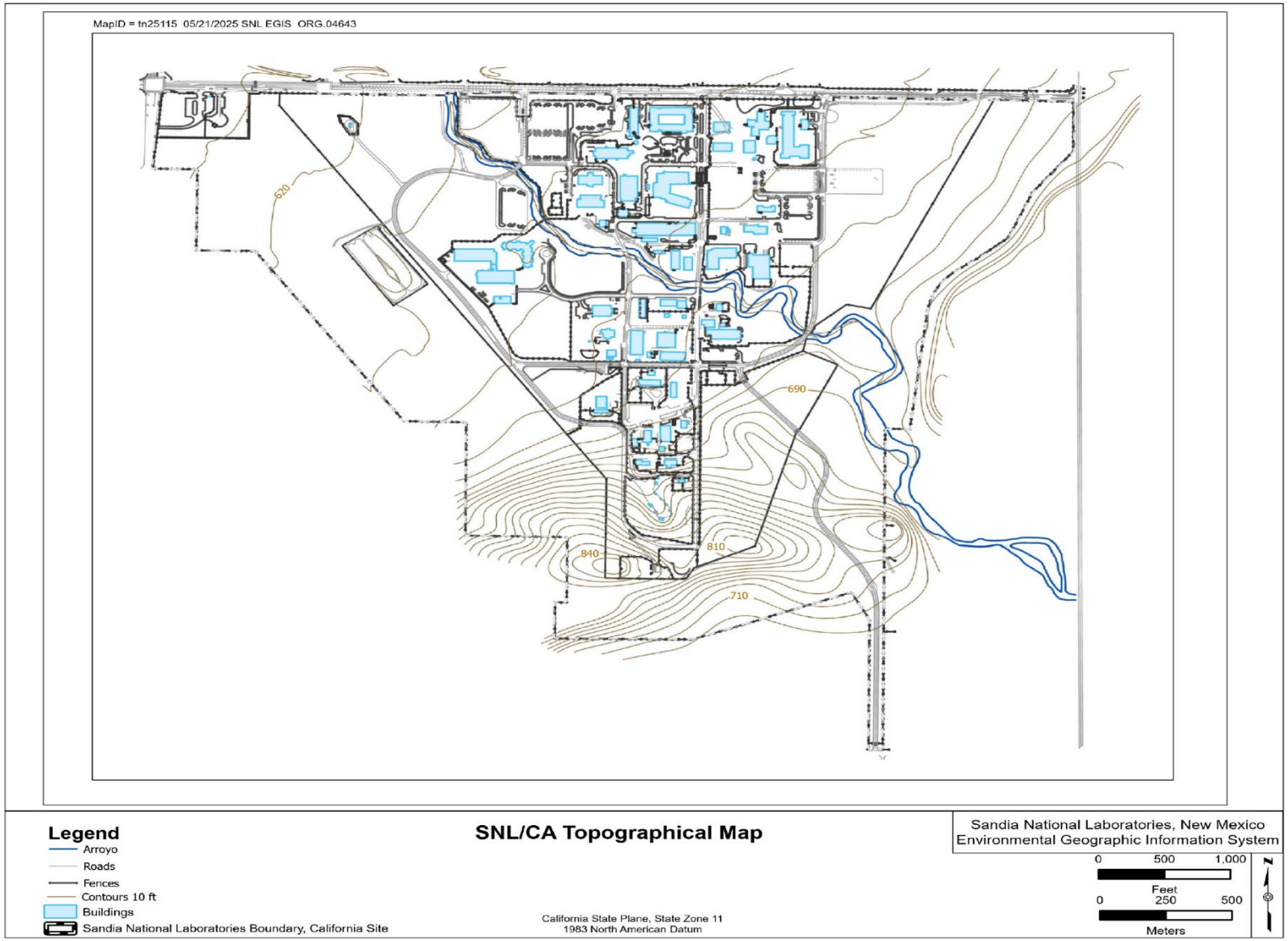


Figure 1-4. SNL/CA topography

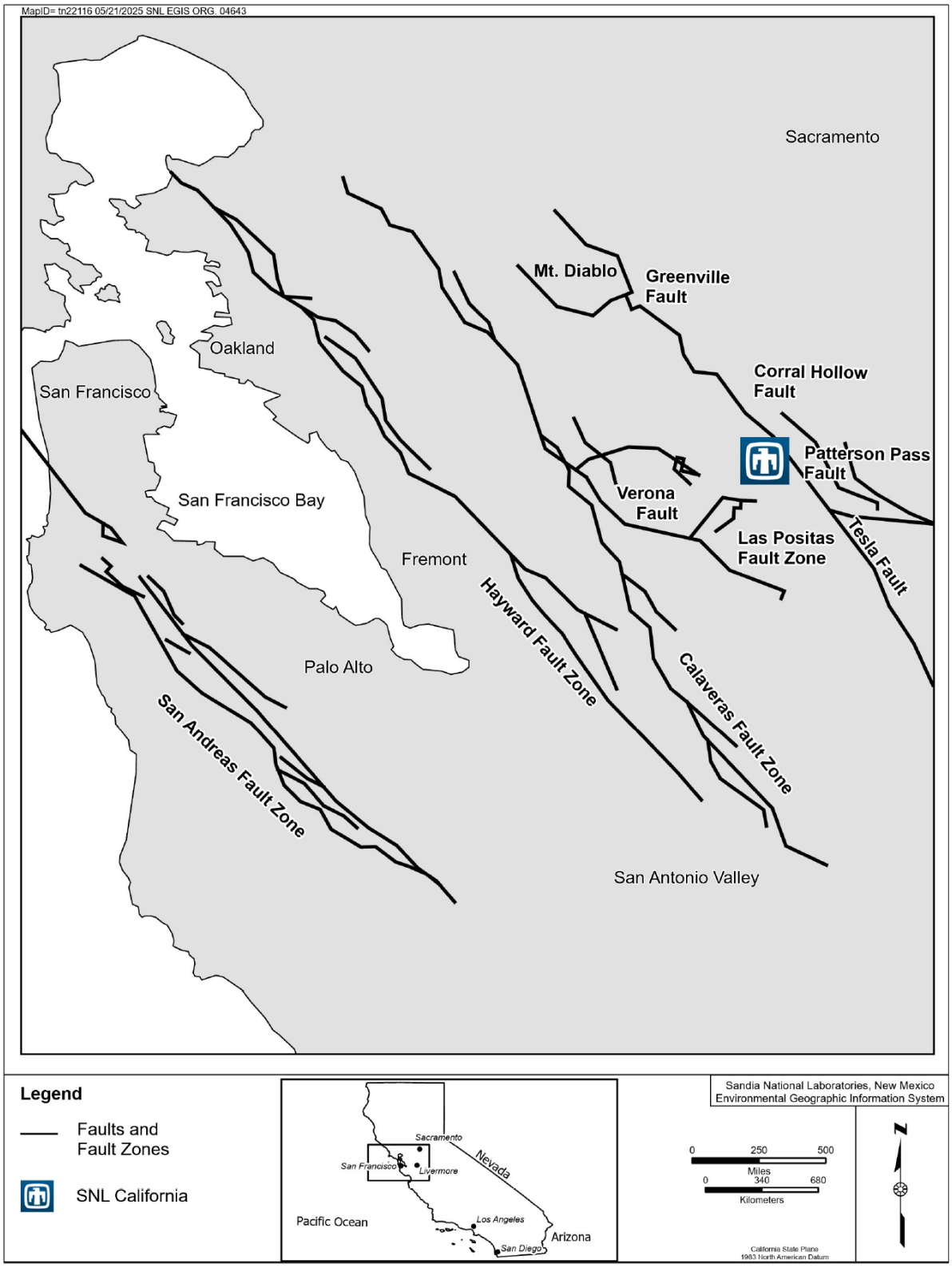


Figure 1-5. Regional earthquake faults

1.5.2 Water Resources

1.5.2.1 Arroyo Seco

There are no perennial streams or natural surface water bodies at SNL/CA. The Arroyo Seco, an intermittent stream, traverses the site diagonally from southeast to northwest. The arroyo typically flows only in very wet years and for short periods of time during heavy storms. There is a seasonal wetland in the streambed along the eastern part of the arroyo behind the wildlife gate (Figure 1-6). Stormwater at SNL/CA runs to the Arroyo Seco through a system of storm drains and channels that further discharges the runoff into Alameda Creek and eventually to the San Francisco Bay (Figure 1-7).

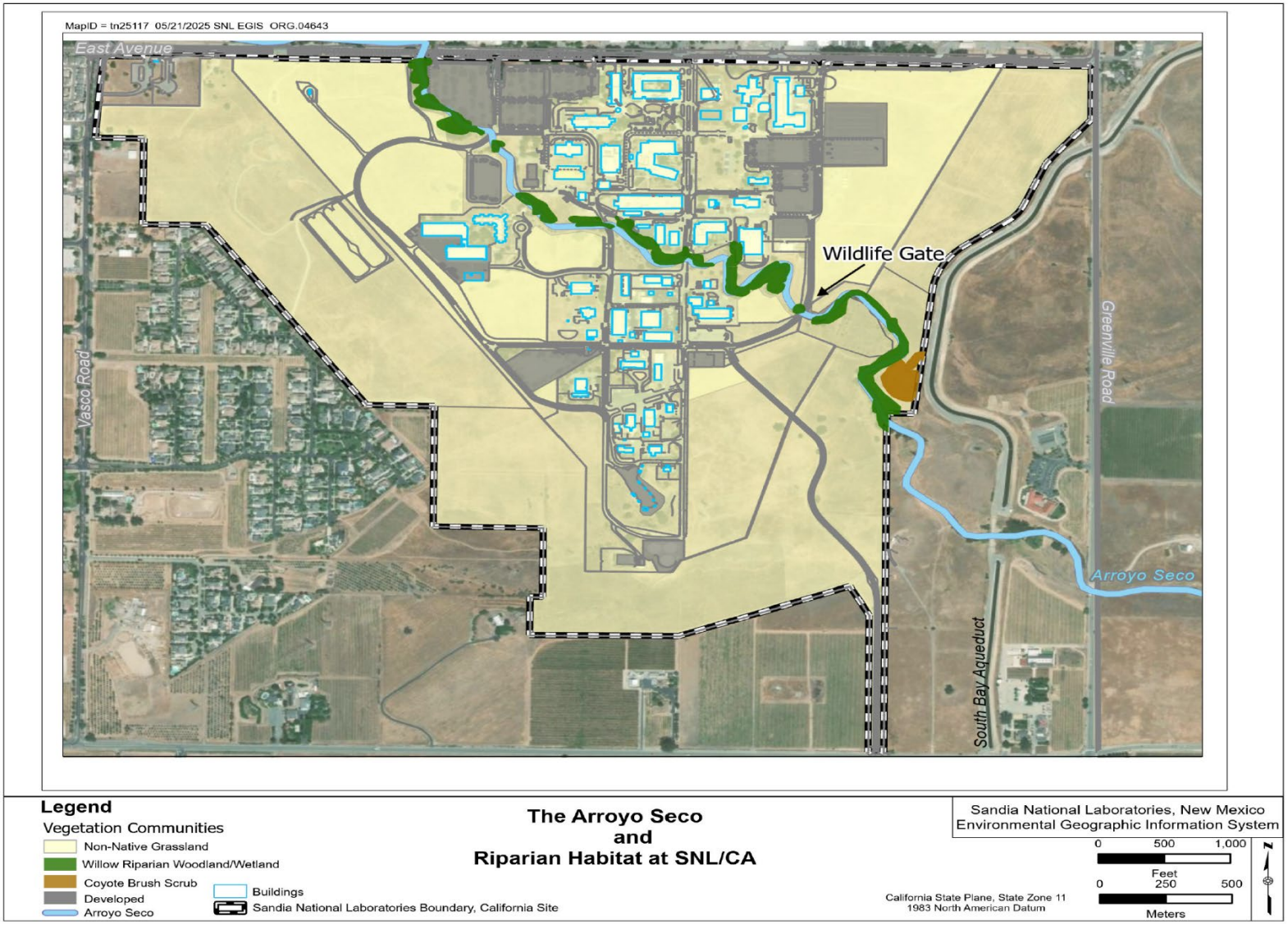


Figure 1-6. The Arroyo Seco and wetland habitat at SNL/CA

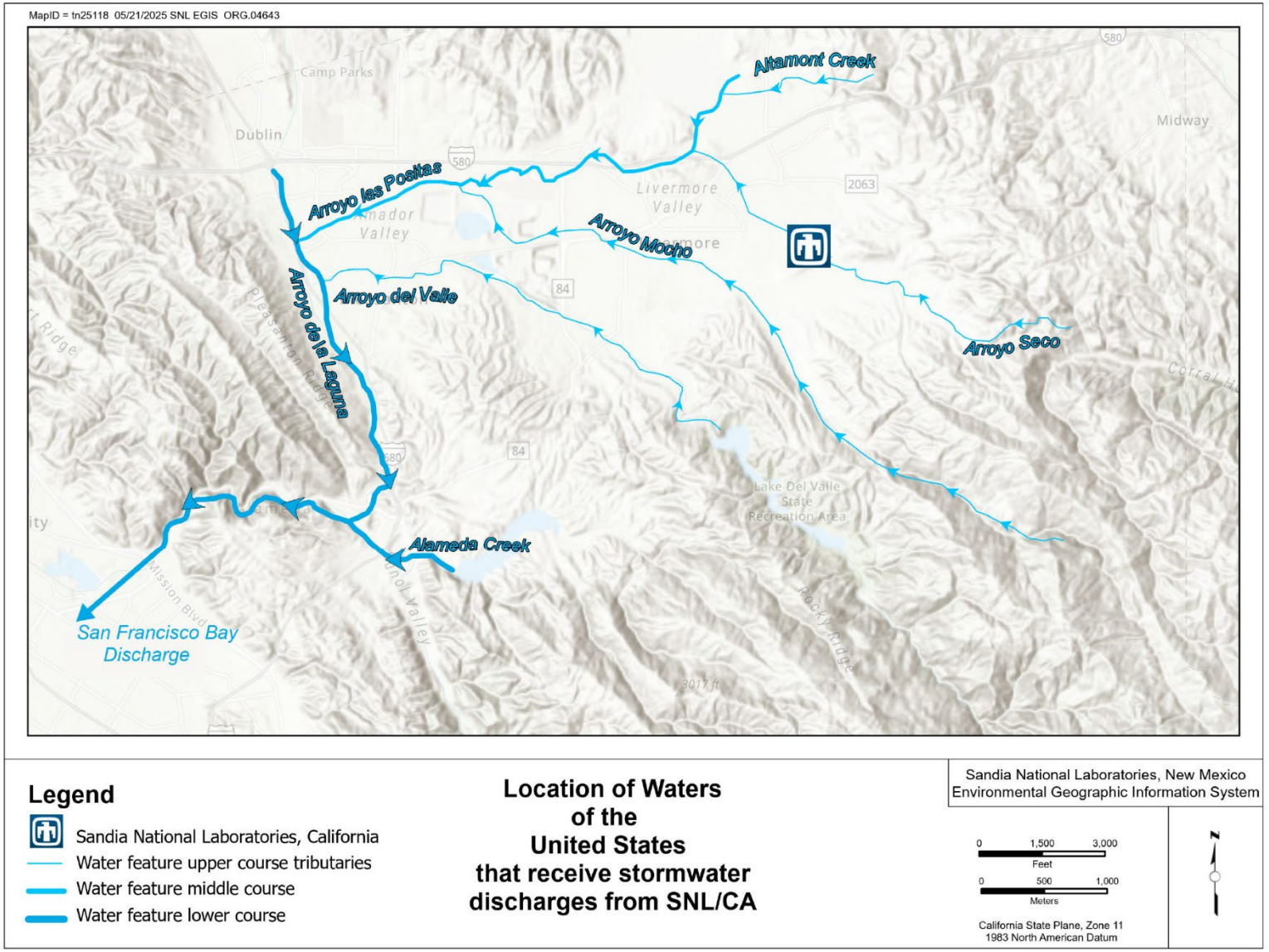


Figure 1-7. Location of stormwater drainages and waters of the United States that receive stormwater discharges from SNL/CA

1.5.2.2 Groundwater

Groundwater at SNL/CA occurs within saturated, unconsolidated geologic material. Depth to groundwater varies from less than 20 feet on the eastern portion of the site to approximately 126 feet on the west side of the site. Water-bearing units beneath the site are composed of shallow heterogeneous, unconsolidated alluvium and deep fluvial and lacustrine sediments. There is no active groundwater recharge on site.

1.5.2.3 Potable Water

The potable water used at SNL/CA is purchased from LLNL, which is supplied by the San Francisco Public Utilities Commission; this can be supplemented by water from the Alameda County Flood Control and Water Conservation District (known as Zone 7) as a backup source. The potable water is stored in the LLNL-owned tanks on the southern hills at SNL/CA. To ensure safe drinking water, the U.S. Environmental Protection Agency (EPA) and the California State Water Resources Control Board prescribe regulation limits on specific contaminants in potable water provided by public water systems. LLNL is designated as the water supplier and issues an annual consumer confidence report to SNL/CA.

1.5.3 Ecology

1.5.3.1 Land Use

The grasslands in Alameda County have been heavily influenced over the years by many factors. Records of human presence in the region date to at least 13,000 years ago (Erlandson et al. 2007); and, at the time of European arrival, the land was inhabited by people of the Chochenyo Ohlone/Costanoan language group. There were several distinct tribelets and smaller autonomous groups in the Livermore-Amador Valley area, including the Pelnen, Seunen, Ssaoan, and Ssouyen peoples. Beginning in the early-Holocene period with the first Indigenous peoples, the grasslands were used for hunting grounds, and many tribes used various fire management techniques to aid in hunting, gathering acorns and seeds, and spreading various seeds that needed ash or smoke to germinate. European colonization and the establishment of the mission system in California and in the eastern part of the Bay Area resulted in the decimation of Indigenous populations and loss of their fire management activities. However, the Spanish, and later the Mexicans, used fire to expand grazing lands (Keeley 2005; Roof 1971).

A forb is an herbaceous flowering plant other than a grass.

In the early 1700s, non-native grasses were slowly introduced to the grasslands, likely unintentionally from livestock and feed from early colonizers. By the late 1700s, the arrival of Franciscan missionaries and domestic livestock and the growth in the ranching industry spread non-native grasses and forbs in the area (Burcham, 1957). Wild oats and other plants that serve as livestock forage may have been introduced intentionally, while other plants such as red brome (*Bromus madritensis* subsp. *rubens*) and ripgut brome (*Bromus diandrus*) were likely accidentally introduced in weedy hay or packing material from arriving ships to San Francisco Bay (Barry S. *et al*, 2015). From the late 1700s to the mid-1800s, and with the establishment of Mission San José, the land was mostly used for grazing cattle and other

livestock (Durán 1827 in McCarthy 1958; Bowman 1947). The number of seeds from non-native plants found in the bricks used to construct the missions in California increased as more missions were built, indicating the vast majority of non-native species invaded and spread in the late 18th and 19th centuries (Hendry, 1931).

By the late 1800s, the land of Livermore Valley (then San Jose Valley) had transitioned to become a source of grain for Alameda County (Wood 1883:35). The era's total watershed impacts from grazing and grain production remain unknown. In the late 1800s and early 1900s, land use again shifted, this time to gravel quarries, orchards, row crops, and vineyards; there was also a rapid increase in population size in the early to mid-twentieth century, when SNL/CA was first established. Grasslands at SNL/CA have been excluded from grazing since the 1950s. Today, much of the Livermore Valley has been developed to accommodate people, and much of the nearby land formerly dedicated to gravel quarries, orchards, and row crops has switched to viticulture.

An *ecosystem* is a network of living organisms and nonliving components that interact with one another to comprise an overall environment.

The current ecosystem at SNL/CA includes the interactions among many living components—such as humans, animals, insects, plants, and fungi—within several habitat types. Nonliving components within the ecosystem include air, water, mineral soil, buildings, structures, roads, and paved surfaces. The habitats in the SNL/CA ecosystem include developed areas, non-native grassland (including ruderal, plants that are the first to colonize disturbed lands), Diablan sage scrub, Great Valley willow scrub, and Great Valley mixed riparian forest (Nomad 2022b). This ecosystem is a dynamic entity that is impacted by external and internal factors. External influences include climate, time, topography, and biota. Internal factors include the introduction of non-native species to the ecosystem and human disturbance and interactions (through development) within the various habitats.

1.5.3.2 Watershed Use

The SNL/CA campus hosts a portion of the Arroyo Seco, a watercourse with intermittent flowing water that is part of the Mocho Subbasin and Alameda Creek Watershed. Historically, the subbasin supported artesian springs but experienced heavy agricultural use in the early 1900s, leading to a decline of water levels to the point that artesian water sources ran dry.

Arroyo Seco means "dry creek" in Spanish.

Likewise, the extensive water use contributed to the drying of seasonal wetlands, marshes, seeps, and springs. Today, the groundwater basin has recovered, and the on-site Arroyo Seco experiences seasonal flowing water (Williams 1912; Dockweiler 1912b; Clark 1924; West 1937; Morris et al. 1960; Fisher et al. 1966; Figuers 1998; California Department of Transportation 1998).

1.5.3.3 Plant Species

The plant community at SNL/CA is typical of the surrounding region, consisting primarily of grassland. Localized areas of coyote brush scrub, willow riparian woodland, and wetland

habitat are also present. Sandia personnel manage several areas along the Arroyo Seco as active ecological restoration sites, focusing on increasing the riparian and floodplain habitat on site to support local endangered wildlife species. The vegetation on site is surveyed multiple times per year to monitor for any increases in invasive vegetation, the presence of listed species, and the success of restoration plantings. Areas developed and disturbed by Sandia operations constitute an additional habitat type, designated as altered habitat. Figure 1-6 depicts the vegetation and habitat types at SNL/CA. No threatened, endangered, proposed, or candidate plant species are present on site.

1.5.3.4 Wildlife Species

A variety of wildlife species live and forage at SNL/CA, and 88 different species were seen in 2024. Table 1-1 provides a list of all species of animals seen on site in 2024.

Table 1-1. Animals seen at SNL/CA, 2024

Common Name	Scientific Name	Common Name	Scientific Name
Birds (Avifauna)			
Acorn woodpecker	*Melanerpes formicivorous*	Hermit thrush	*Catharus guttatus*
American crow	*Corvus brachyrhynchos*	House finch	*Haemorhous mexicanus*
American goldfinch	*Spinus tristis*	House sparrow	*Passer domesticus*
American kestrel	*Falco sparverius*	House wren	*Troglodytes aedon*
American robin	*Turdus migratorius*	Killdeer	*Chardrius vociferus*
Anna's hummingbird	*Calypte anna*	Lesser goldfinch	*Spinus psaltria*
Ash-throated flycatcher	*Myiarchus cinerascens*	Lincoln's Sparrow	*Melospiza lincolnii*
Barn owl	*Tyto alba*	Mallard duck	*Anas platyrhynchos*
Barn swallow	*Hirundo rustica*	Mourning dove	*Zenaida macroura*
Bewick's wren	*Thyromanes bewickii*	Northern mockingbird	*Mimus polyglottos*
Black-Chinned Hummingbird	*Archilochus alexandris*	Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*
Black-Headed Grosbeak	*Pheuticus melanocephalus*	Nuttall's woodpecker	Picoides nuttallii
Black phoebe	*Sayornia nigricans*	Oak titmouse	Baeolophus inornatus
Brown creeper	*Certhia americana*	Orange-crowned warbler	*Leiothlypis celata*
Brown-Headed cowbird	*Molothrus ater*	Red-tailed hawk	*Buteo jamaicensis*
Bushtit	*Psaltriparus minimus*	Red-winged blackbird	*Agelaius phoeniceuss*
California quail	*Callipepla californica*	Rock pigeon	*Columba livia*
California scrub-jay	*Aphelocoma californica*	Ruby-crowned kinglet	*Corthylio calendula*
California towhee	*Pipilo crissalis*	Savannah sparrow	*Passerculus sandwichensis*
Canada goose	*Branta canadensis*	Say's Phoebe	*Sayornis saya*
Cassin's kingbird	*Tyrannus vociferans*	Song sparrow	*Melospiza melodia*
Cedar waxwing	*Bombycilla cedrorum*	Spotted towhee	*Pipilo maculatus*
Chestnut-backed chickadee	*Poecile rufescens*	Swainson's hawk	*Buteo swainsoni*
Cliff swallow	*Petrochelidon pyrrhonota*	Tree swallow	*Tachycineta bicolor*
Common raven	*Corvus corax*	Turkey vulture	*Cathartes aura*
Cooper's hawk	*Accipiter cooperii*	Western bluebird	*Sialia mexicana*
Dark-eyed junco	*Junco hyemalis*	Western kingbird	*Tyranmus verticalis*
Eurasian collared dove	*Streptopelia decaocto*	Western meadowlark	*Sturnella neglecta*

Common Name	Scientific Name	Common Name	Scientific Name
European starling	*Sturmus vulgaris*	Western Tanager	*Piranga ludoviciana*
Ferruginous hawk	*Buteo regalis*	White tailed kite	*Elanus leucurus*
Fox sparrow	*Passerella iliaca*	White-breasted nuthatch	*Sitta carolinensis*
Golden-crowned sparrow	*Zonotrichia atricapilla*	White-crowned sparrow	*Zonotrichia leucophrys*
Great blue heron	*Ardea herodias*	Wilson's warbler	*Cardellina pusilla*
Great horned owl	*Bubo virginianus*	Wrentit	*Chamaea fasciata*
Hairy Woodpecker	*Leuconotopicus villosus*	Yellow-rumped warbler	*Setophaga coronata*
Mammals			
Audubon's cottontail	*Sylvilagus audubonii*	Raccoon	*Procyon lotor*
Bobcat	*Lynx rufus*	Red Fox	*Vulpes vulpes*
California ground squirrel	*Otospermophilus beecheyii*	Fox Squirrel	*Sciurus niger*
Coyote	*Canis latrans*	Grey Fox	*Urocyon cinereoargenteus*
Black-Tailed Jackrabbit	*Lepus californicus*	California Myotis	*Myotis californicus*
Mexican Free-Tailed Bat	*Tadarida brasiliensis mexicana*	Silver-Haired Bat*	*Lasionycteris noctivagans*
Reptiles and Amphibians (Herpetofauna)			
Common California kingsnake	*Lampropeltis californiae*	California Red-Legged Frog*	*Rana draytonii*
Pacific treefrog	*Pseudacris regilla*	Western fence lizard	*Sceloporus occidentalis*
Pacific gopher snake	*Pituophis catenifer*	Western toad	*Anaxyrus boreas*

* Animals found on the California Natural Diversity Database Special Animals List
\+ Only on the Special Animals List in particular circumstances (i.e., nesting, wintering, etc.)

There is habitat (or potential habitat) at SNL/CA for one threatened avian species, the Swainson's hawk (*Buteo swainsoni)* which is a special status species for the state of California. The pair that has nested on site for several years in the recent past did not do so in 2024.

There is also habitat (or potential habitat) for two threatened wildlife species: the California red-legged frog (*Rana aurora draytonii*) and the California tiger salamander (*Ambystoma californiense*). The red-legged frog is listed as threatened under the federal Endangered Species Act and as a species of special concern under the California Endangered Species Act. The tiger salamander (in the Central California Distinct Population Segment) is listed as threatened under the federal Endangered Species Act and under the state Endangered Species Act.

Night survey efforts include auditory and eyeshine visual encounter surveys for California red-legged frog and American bullfrogs; with other species observed during the survey being documented as present on-site.

The most recent confirmed sighting of a tiger salamander at SNL/CA was on January 25, 2023, when an adult salamander was found in a manhole in the developed area of the site. The most recent sighting of a California red-legged frog at SNL/CA was on April 22, 2024, during a nighttime eyeshine survey conducted by subcontracted biologists and Sandia personnel, where one adult frog was found in shallow water in the southeastern portion of the Arroyo Seco. A dipnet survey was performed later in the year in which the biologists used a mesh net to gently scoop through the pool of water where the California red-legged

frog was found, in order to survey for any larval amphibians. The dipnet survey was conducted due to previous observations of California red-legged frog tadpoles in the same pool of water in 2022. Subcontracted biologists help monitor for the presence of the California red-legged frog and California tiger salamander annually and, when necessary, file reports to the California Natural Diversity Database (Nomad 2016–2024a; Nomad 2016–2024b). The on-site biologist files these reports for species occurrences and sightings of animals found on campus that are listed in the California Department of Fish and Wildlife California Natural Diversity Database Special Animals List. A species occurrence is an occurrence of a species at a certain location.

Game cameras and bat acoustical monitoring equipment are used to monitor wildlife. Figure 3-3 indicates equipment locations. Game camera monitoring is conducted every year between May and December, and bat acoustical monitoring is conducted every other year between March and August. Bat acoustical monitoring was performed in 2024. Results of the game camera monitoring in 2024 are in Table 3-4, and results of the bat acoustical monitoring are in Table 3-3.

SNL/CA is in the home range for mountain lions (*Puma concolor*), a specially protected mammal under the California Wildlife Protection Act of 1990 (Proposition 117). There were no reports of mountain lions at SNL/CA in 2024.

1.5.4 Climate and Meteorology

The climate at SNL/CA is typical of the Mediterranean conditions in the San Francisco Bay region where cool, wet winters and hot, dry summers are normal. In summer, inland valleys, such as the Livermore Valley, generally experience more sunshine and higher temperatures than the coastal areas. In winter, temperatures in the valley are usually cooler than at the coast.

Annual meteorological data for 2024 was obtained from a nearby meteorological tower located at LLNL (LLNL 2024). The total precipitation for 2024 was 15.96 inches. Temperatures in 2024 ranged from 27.4 to 109.8 °F. Average annual rainfall in the Livermore area over the last five years was 11.55 inches. The windiest months in the area occur in the spring and summer and are dominated by westerly sea breezes. The winds during the fall and winter are typically lighter and more varied in direction.

1.6 Overview of the Environmental Management System

Sandia personnel integrate environmental protection with their missions through the Environmental Management System (EMS), a set of interrelated elements used to establish policy and environmental objectives that enable personnel to reduce environmental impacts and increase operating efficiency through a continuing cycle of planning, implementing, evaluating, and improving processes. The scope of Sandia's EMS encompasses all activities, products, and services that have the potential to interact with the environment at all Sandia locations. For more information on the EMS, see Section 8.2.

1.7 Environmental Programs

The following chapters and sections detail the current environmental programs at SNL/CA:

- Cultural Resources Program (Chapter 2)
- Ecology Program (Chapter 3)
- Terrestrial Surveillance Program (Chapter 4)
- Air Quality Programs (Chapter 5)
  - Air Quality Program (Section 5.1)
  - National Emission Standards for Hazardous Air Pollutants (NESHAP) Program (Section 5.2)
- Water Quality Programs (Chapter 6)
  - Safe Drinking Water Protection Program (Section 6.1)
  - Stormwater Program (Section 6.2)
  - Wastewater Program (Section 6.3)
  - Groundwater and Remediation Program (Section 6.4)
- National Environmental Policy Act (Section 7.1)
- Chemical Management Program (Section 7.2)
- Oil Storage Program (Section 7.3)
- Pollution Prevention and Waste Minimization Program (Section 7.4)
- Waste Management Program (Section 7.5)

In addition, a summary of compliance efforts and a list of environmental-related permits held for SNL/CA are provided in Chapter 8. Chapter 9 details how quality assurance is implemented for environmental monitoring, including sampling, and identifies all subcontracted analytical laboratories and waste vendor facilities used in 2024 and their compliance status.

Chapter 2. Cultural Resources Program

976 Hydrogen Effects of Materials Lab, recommended as eligible for the National Register of Historic Places, 2022.

OVERVIEW ▪ Cultural Resources Program personnel coordinate cultural resource compliance, including enactment of archaeological precautions and review of historic buildings. Actions that could affect cultural resources adversely are analyzed using a NEPA checklist review. DOE/NNSA is responsible for ensuring that any assessed impacts on cultural resources are appropriately mitigated.

Cultural Resources Program personnel focus on long-term preservation and protection of cultural resources and cultural resource compliance to ensure that the heritage of Sandia operating areas and their landscapes are maintained.

Cultural resources are places and physical evidence of past human activity: a site, a structure, an object, or a natural feature of significance to a group of people traditionally associated with it.

This section introduces local history and the context in which the land became SNL/CA property, then examines the two main cultural resource categories, archaeological resources and historic buildings.

2.1 Cultural History

SNL/CA is situated in what was historically Chochenyo territory, which was inhabited by a group of Native Americans referred to by ethnographers as the Ohlone or Costanoan's

(Kroeber 1925; Hart 1978). They occupied the eastern shores of San Francisco Bay between Richmond and Mission San José, and the western portion of the Livermore Valley. The Ohlone lived in approximately 50 separate and politically autonomous nations or tribelets (a tribelet being a small tribe of Native Americans) that shared a language.

The Ohlone were hunter-gatherers moving from permanent villages to temporary camps in the area seasonally. In addition, they practiced controlled burns to ensure the abundance and regrowth of seed-bearing annuals and increased the forage areas of larger game. The Ohlone way of life gradually disappeared by 1810 due to various factors such as the introduction of new diseases from the Europeans and Mexicans, declining birth rates, and the impact of the Spanish missions in California. The Ohlone were forced to become agricultural laborers who lived at the missions and worked with former neighboring groups such as the Esselen, Yokuts, and Miwok (Levy 1978). Later, when Mexico secularized the missions in 1834, most of the aboriginal population moved to ranchos to work as manual laborers (Levy 1978).

Spanish explorers were the first Europeans to explore California in the 1760s and early 1770s. Gaspar de Portola y Rovira, a Spanish military officer and eventually the first governor of California, led the expeditions. In 1769, Gaspar de Portola, along with Father Junipero Serra and Father Juan Crespi, explored the coast from Monterey Bay to San Francisco Bay. Fernando Javier Rivera and Father Francisco Palou explored the San Francisco Peninsula in 1774, selecting the Palo Alto area for a mission site but continuing to San Francisco. In 1776, Colonel Juan Bautista de Anza and Father Pedro Font traveled from Monterey to San Francisco to select settlement sites (Busby et al. 1990). The initial period of historic exploration of the Livermore Valley region lasted from 1769 to 1810 (Busby et al. 1990).

In 1779, the Mission San José was established and would have the greatest impact on the aboriginal population as it served as a base for expeditions against hostile Native Americans as well as a place to convert them (Hart 1978). Between 1830 and 1840, several Native American groups had begun to resist the mission system. The Miwok and Yokut groups raided Hispanic territories in defiance to the mission system and to secure horses and cattle (Beck and Haase 1974). By 1828, horsemeat had replaced the acorn as the primary dietary staple (Busby et al. 1990).

Government policy during the Spanish Period (1769–1821) was directed at founding the presidios, missions, and pueblos with the land held by the Spanish Crown, while the later Mexican policy stressed individual ownership of the land (Findley 1980). After the Mexican government secularized the missions, an act that also liberated the Native American population from a system that demanded servitude and religious conversion, vast tracts of mission land were granted to individual citizens (Busby et al. 1990). The area where SNL/CA is located was used for livestock grazing and was situated mostly within ungranted lands, with the far northwest portion of SNL/CA situated in the southern portion of Rancho Las Positas (Dryer 1869; Thompson and West 1878; Beck and Haase 1974; Hendry and Bowman 1940). It may have been intersected by El Camino Viejo, the "Old Road," circa 1795, which connected San Pedro to the San Joaquin Valley, the Coast Range foothills, and Las Positas Valley (present-day Livermore), eventually continuing to Mission San José and its terminus at present-day San Francisco (Williams 1965; Dyer 1896a; Gudde 1969).

In the mid-nineteenth century, most of the rancho and pueblo lands in California were subdivided because of population growth, the American takeover, and the confirmation of property titles (Busby et al 1990). The initial explosion in population was associated with the California Gold Rush (1848 to 1855) and later followed by the completion of the Transcontinental Railroad in 1869. The town of Livermore was founded and named in honor of Robert Livermore in 1869 and is located on a portion of what was the Rancho El Valle de San Jose. Livermore was an English sailor who reportedly jumped ship in California in 1822 (Busby et al 1990) and was later one of the first settlers in the valley to fence off acreage for growing wheat, a major departure from the local tradition of open grazing (Baker 1914).

Alameda County was carved from parts of Santa Clara and Contra Costa counties in 1853 and grew rapidly after the completion of the Central Pacific Railroad terminus in Oakland in 1869 (Hart 1978). By 1874, Livermore was the second-most-populous town, after Stockton, along the overland route between San Francisco and Sacramento (Mosier 1978). Early residents in the area arrived gradually and concentrated on enterprises that demanded minimal capital, such as ranching (Busby et al 1981). Industrialization later took place south of Livermore in the Corral Hollow area where coal, manganese, and rich clay deposits were mined. Natural disasters like the 1906 earthquake; flooding in 1907, 1911 and 1912; and a bank failure hastened the demise of these various enterprises (Busby et al 1990; Busby et al 1981; Bowden 1951). In 1862, coal was discovered seven miles southeast of Livermore, but production proved uneconomical and ended by 1908.

2.2 Historical Context

In 1942, the United States government acquired 629 acres of land to the east of Livermore and established a naval air station on the property. The Livermore Naval Air Station served as a flight training facility for approximately 4,000 pilots during World War II. Late in 1944, training activities were curtailed, and the facility was converted to a stopover base for pilots operating from aircraft carriers. The station was deactivated in 1946.

In July 1952, the Atomic Energy Commission decided to create an additional design laboratory for nuclear weapons to pursue a thermonuclear weapons development program and provide direct competition to Los Alamos National Laboratory. What is now Lawrence Livermore National Laboratory was established in September 1952 on the site of the former Livermore Naval Air Station. Just over 600 acres of former naval air station land were transferred to the Atomic Energy Commission. The site was north of East Avenue (then County Road 1518), about three miles east of the center of Livermore and 40 miles east of San Francisco.

In 1955, the Atomic Energy Commission acknowledged the need for ordnance engineering support from Sandia for the new lab's design efforts. By January 1956, 14 Sandia employees were assigned to work in Lawrence Livermore National Laboratory facilities. On March 8, 1956, a permanent Sandia facility was established in Livermore. The Sandia facility was sited just across from Lawrence Livermore National Laboratory on the south side of East Avenue on land from the former Gunnery Range of the Livermore Naval Air Station.

The site initially consisted of a long narrow strip of 50 acres of land stretching south from East Avenue. Over time, the lab expanded by obtaining surrounding lands, primarily to provide an additional buffer between its activities and the rest of the community. The long strip of land evolved into a much larger 410-acre, bell-shaped parcel (with the top of the bell at the southernmost point of the site). The number of personnel grew steadily, with over 800 people working there by the end of 1959.

LIVERMORE, CALIFORNIA

1942	The U.S. government acquired 629 acres of land to the east of Livermore, California and established a naval air station.
1942-1944	The Livermore Naval Air Station served as a flight training facility for approximately 4,000 pilots.
1944	Livermore Naval Air Station training activities were curtailed; the facility became a stopover base for pilots operating from aircraft carriers.
1945	Los Alamos laboratory (part of the Manhattan Project) in New Mexico reorganized. Its ordnance engineering activities were gathered into Z Division, which moved to Sandia Base near Albuquerque.
1946	Livermore Naval Air Station was deactivated.
1948	Z Division was redesignated Sandia Laboratory, a branch of Los Alamos.
1949	Sandia Corporation, a subsidiary of Western Electric, took over management of Sandia Laboratory, which was separated from Los Alamos.
1952	The Atomic Energy Commission created an additional design laboratory for nuclear weapons to pursue a thermonuclear weapons development program and provide direct competition to Los Alamos National Laboratory. What is now Lawrence Livermore National Laboratory was established on just over 600 acres of Livermore Naval Air Station land transferred to the Atomic Energy Commission.
1955	The Atomic Energy Commission acknowledged the need for ordnance engineering support from Sandia for the new Livermore lab's design efforts.
1956	A permanent Sandia facility was established in Livermore just across East Avenue from Lawrence Livermore on land from the former Gunnery Range of the Livermore Naval Air Station. The labs' original mission was to design the non-nuclear components for nuclear weapons designed by Lawrence Livermore.
1956	Construction began on the first seven buildings for the new Sandia lab.
1959	Initial construction was complete, by which point over 800 people were working at the site.
1970s	Tritium research began; for nearly twenty years tritium study was a well-respected and fully developed research program at Sandia California.
1970s	Sandia California developed a significant capability in the area of solar power research.
1980	The Combustion Research Facility was built as a large user facility supporting combustion research and working with industry to advance the understanding of combustion.
1995	President Clinton announced and DOE deployed the Science-Based Stockpile Stewardship Program supported by the Advanced Simulation and Computing Initiative to provide stockpile maintenance, design, and testing without nuclear testing.
1990s	Building on existing counter-terrorism work, Sandia California moved into biological research.
2002	Construction of the Distributed Information Systems Laboratory (DISL) began with ASC funding. DISL provides distributed and distance computing capability for the DOE weapon design entities. DISL links the nuclear weapons complex together and offers a testbed for new advanced technologies.

Figure 2-1. SNL/CA Timeline

2.3 Archaeological Resources

No archaeological resources have been identified at SNL/CA, but SNL staff still take all relevant precautions to protect any which are yet to be discovered. Between 1977 and 2024, three archaeological surveys—covering more than 150 acres of land—were conducted at SNL/CA.

In July 2022, a pedestrian baseline survey was conducted for the entire SNL/CA property; the survey yielded no cultural sites (sites having cultural heritage value), and, as a result, no archaeological sites were recommended as eligible for inclusion in the National Register of Historic Places.

Sandia archaeological staff help Sandia personnel and NNSA maintain compliance with National Historic Preservation Act, Section 106, requirements. This ensures that (1) cultural resources and their historic and cultural heritage are preserved and protected and (2) data are available to make appropriate land use and environmental planning decisions at SNL/CA.

Archaeological staff review projects through the NEPA module that involves land disturbances and provides recommendations for monitoring field activities so archaeological resources are not impacted adversely. Sandia archaeological staff also make site eligibility recommendations for inclusion in the National Register of Historic Places.

Program Activities and Results 2024: Archaeological Resources

A pedestrian baseline survey was conducted in 2022, which resulted in a no findings report. Archaeological staff provided a consultation letter and associated documents to NNSA in 2023 for correspondence with the California State Historic Preservation Officer on the Section 110 results. Concurrence was received from the California State Historic Preservation Officer in November 2023. As a result, no further pedestrian surveys were required in 2024. In 2024, archaeological staff reviewed more than 17 outdoor projects through the NEPA module. Proposed projects included utility work, building modifications, and ongoing operational activities. No memos were written as a result of these reviews. Typically, memos provide guidance regarding cultural resource concerns and mitigative measures.

2.4 Historic Buildings

The Sandia historian surveys and assesses historic properties in support of the National Historic Preservation Act, Section 106, for all properties owned by NNSA and used by Sandia personnel at SNL/CA. This includes all elements of the built environment from the Historic Period but is primarily focused on properties built for and used by Sandia since 1956.

2.4.1 Methods

While a NEPA checklist is in subject matter expert review, the historian reviews the project details and, if a property's design, appearance, or operation will be affected, analyzes the documentary and photographic record of the property and any related facilities involved in the proposed work. Properties potentially affected by a proposed project are evaluated within the established post-World War II themes outlined in the 2024 Historic Context,

Building Survey, and Historic Building Assessment of the Sandia National Laboratories California Site (Sandia 2025).

Once the property is understood in context, the historian makes a recommendation as to whether the proposed work will have an adverse effect on any historic properties or districts, including the property where the work is occurring. If the proposed work will have an adverse effect on a historic property, a transmittal letter and appropriate enclosures are prepared to support a NNSA consultation with the California State Historic Preservation Officer. The historian's recommendation is captured in the NEPA checklist subject matter expert review.

2.4.2 Building Surveys, Assessments, and Determinations

Post-World War II U.S. nuclear arms research and development provide the primary historic context for Sandia's built environment. In 2001, the Sandia historian began a survey and assessment of the SNL/CA site. A historic context statement was prepared, a site visit was undertaken, and State of California Department of Parks and Recreation forms were prepared for the 45 buildings requiring detailed assessment. None of the properties at the site were recommended as eligible for the National Register of Historic Places at that time. Two final reports produced in 2003 provided NNSA with the historic context and the assessment, forms, and recommendations (Sandia 2003; Sandia 2002).

NNSA determined that no properties at SNL/CA were eligible for the National Register of Historic Places. The California State Historic Preservation Officer concurred in correspondence dated April 5, 2005. No historic building assessments or Section 106 consultations were conducted, until a new survey and assessment was launched in late 2022.

Program Activities and Results 2024: Historic Buildings

As a result of this new work, the SNL historian recommended in 2024 that 11 buildings at the site are eligible for the National Register of Historic Places. One historic district is proposed, consisting of the four buildings initially built as the Combustion Research Facility. These have a consistent architectural design, and the CRF has housed work of exceptional historical significance. The other seven buildings appear to be individually eligible for the National Register of Historic Places. In 2025, NNSA is expected to consult with the California State Historic Preservation Officer on the determination of which buildings are eligible at SNL/CA.

Chapter 3. Ecology Program

Barn Owl (*Tyto alba*)

OVERVIEW ▪ Ecology Program personnel support compliance with regulations and laws, land use decisions, and ecological and wildlife awareness campaigns to ensure safe work environments and sustainable decision-making strategies.

Ecology Program personnel, along with subcontractors, monitor and surveil vegetation and wildlife to support operations. Ecological compliance promotes conservation through the protection of native wildlife and their habitats. Conducting routine monitoring activities promotes an understanding of local population dynamics and shifts over time. This knowledge is important for making local land use decisions on a precise scale. Ecological monitoring activities are conducted on a calendar-year basis at SNL/CA as follows:

- Collect biological inventory data to support site activities and maintain regulatory compliance. Data collected include information on species diversity, abundance, and habitat. These data are used to support NEPA documentation, promote ecological and wildlife awareness campaigns, ensure safe work environments, and endorse sustainable decision-making strategies. The following data are collected on

vegetation, reptile, amphibian, mammal, and bird species that currently inhabit DOE-controlled land:

- Vegetation monitoring (Section 3.1)
- Herpetofauna monitoring (Section 3.2)
- Mammal monitoring (Section 3.3)
- Avian monitoring (Section 3.4)

- Collect data on plant and animal species to advance the understanding of on-site ecological processes.
- Educate the Sandia community regarding ecological conservation.
- Provide support when biological issues arise (e.g., injured wildlife, nesting birds, snake relocation, or other wildlife encounter concerns).

Ecological monitoring and surveillance are conducted throughout the year for routine and nonroutine activities.

Ecology activities are conducted in accordance with applicable regulations and permits as discussed in Section 8.1.1 and Section 8.7, respectively.

3.1 Vegetation Surveillance

Vegetation is a key ecosystem component, and monitoring it provides data to enhance an understanding of various ecosystems and allow correlations to be examined between transformations in a vegetation habitat and other ecosystem changes. Vegetation monitoring is valuable in upholding compliance with Executive Order (EO) 13751, *Safeguarding the Nation from the Impacts of Invasive Species* (EO 13751 2016), and EO 13112, *Invasive Species* (EO 13112 1999). Vegetation Monitoring also aids in the management of wildland fires.

An *ecosystem* is a network of living organisms and nonliving components that interact with one another to comprise an overall environment.

Vegetation types at SNL/CA currently consist of non-native grassland (including ruderal), Diablan sage scrub, Great Valley willow scrub, and Great Valley mixed riparian forest. (Nomad 2022b), as shown in Figure 3-1. Factors impacting these habitat and vegetation types are the introduction of non-native species, human disturbance, climate, time, topography, and biota.

Patches of ruderal vegetation (plants that are the first to colonize disturbed lands) within the non-native grassland matrix are dominated by non-native, invasive forbs. These ruderal areas are included in non-native grassland due to the size of the study area.

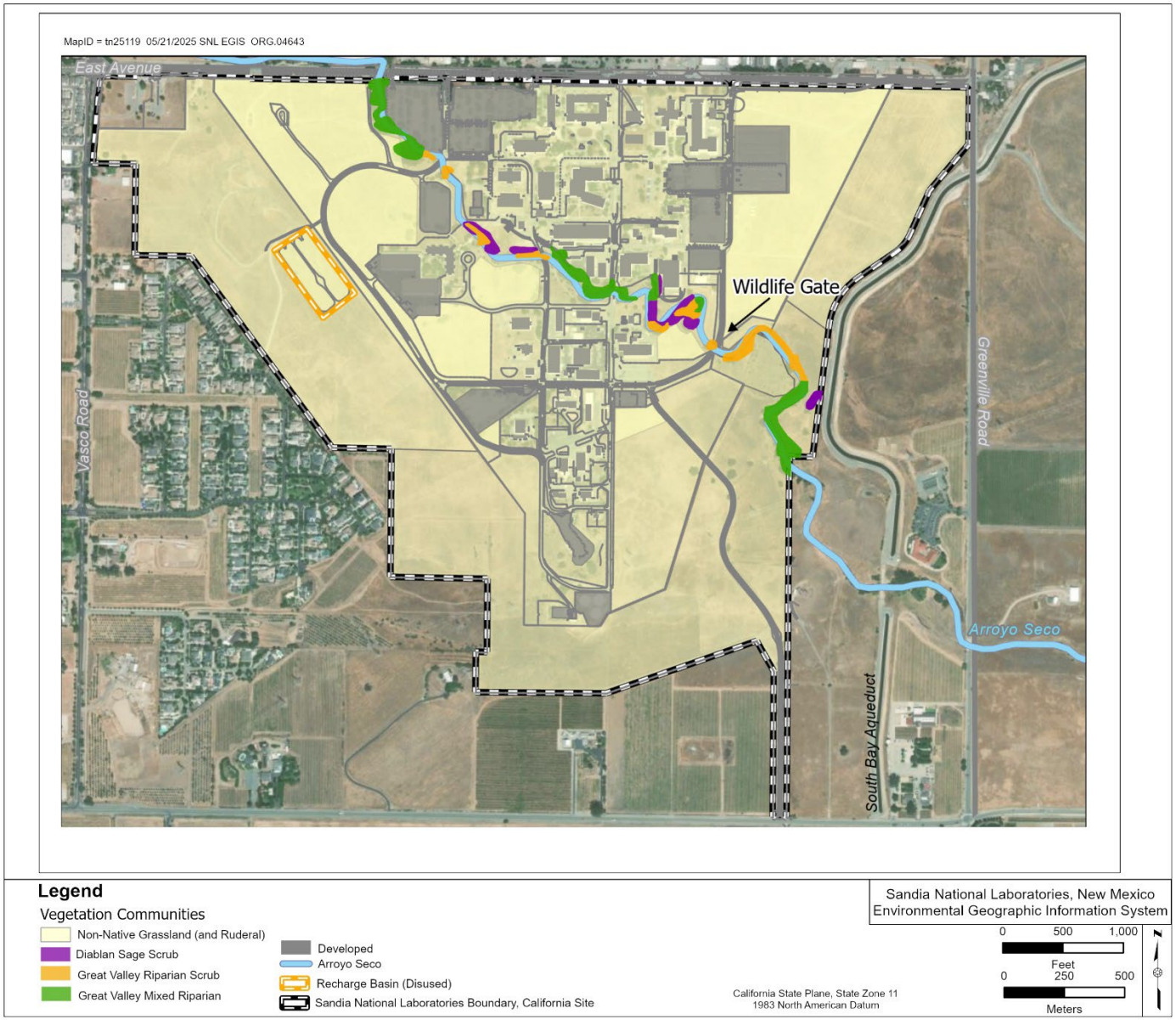


Figure 3-1. Vegetation communities and habitat types

It's important to monitor invasive plants at SNL/CA because they dominate native vegetation and reduce habitat for native wildlife. On site, there is documented presence of fennel, hoary mustard, Italian thistle, pampas grass, perennial pepperweed, purple starthistle, stinkwort, and yellow starthistle. These get treated as feasible as part of the ecological management plan for monitoring the restoration areas at SNL/CA. In this context, *feasible* treatment for invasive plants involves pulling weeds and spraying a dilute mixture of Roundup on individual plants that are not in protected Waters of the State or Waters of the United States.

Biota is the animal and plant life of a given region; *biotic* is relating to or resulting from living organisms.

Habitat is the environment that a plant or animal has adapted to and where it is normally found. The U.S. Fish and Wildlife Service determines areas of critical habitat for listed species, which are areas within a species' native range that are important to the conservation of the species and guide federal government cooperation. The SNL/CA campus does not have federally-designated critical habitat on site.

Even when there is no critical habitat designation, federal agencies are required to fulfill their conservation responsibilities by consulting with the U.S. Fish and Wildlife Service if their actions "may affect" listed species.

3.1.1 Vegetation Establishment and Ecological Restoration along the Arroyo Seco

The restoration sites at SNL/CA were established and continue to be monitored as a result of the Arroyo Seco Improvement Program that began in 2006. Several objectives to improve the on-site portions along the Arroyo Seco include the following:

- Correct existing channel stability problems associated with existing arroyo structures (i.e., bridges, security gates, utility crossings, and drain structures).
- Correct bank erosion and provide protection against future erosion.
- Reduce the risk of future flooding.
- Provide habitat improvement and create a mitigation credit for site development and management activities.

The Arroyo Seco Improvement Program was divided into 17 construction projects, 13 of which were constructed between 2006 and 2009, one in 2012, and two in 2013, with the final construction project conducted in 2015. Figure 3-2. indicates the restoration site locations.

Ecological restoration projects completed through 2024 are summarized in Table 3-1. The table also includes a description of the construction projects, the year construction was completed, restoration planting at the sites, and the number of years of monitoring completed as of 2024. After construction at each site, restoration sites were established to compensate for any habitat loss resulting from the erosion repairs and other various construction projects along the Arroyo Seco. Each restoration site must be monitored for a minimum of 10 years and meet certain success criteria to be considered complete. Table 3-2 describes the success criteria for restoration plantings. Some sites are monitored for more than 10 years if they have not met success criteria. Ecology Program personnel report on the

construction and restoration projects undertaken and monitoring results annually. A replanting project at Site 17 was completed in 2024.

Table 3-1. Ecological restoration projects completed through 2024.

Project Number	Description	Year of Construction Completion	Restoration Plantings at this Site	Years of Monitoring Completed as of 2024
1	Sewer crossings in Arroyo Seco at LLNL and SNL/CA.	2006	No	N/A[a]
3	Remove concrete and debris upstream of the East Avenue crossing. Activities in 2009 were limited to reseeding with native grass mix.	2006	No	N/A[a]
4	Install a grouted rock apron extending down the channel bank and along the stream bottom.	2013	Yes	Year 11
5	Stabilize the stream bank by removing a pine tree, regrade the north bank.	2012	Yes	Site completed in 2022[b]
6	Correct erosion upstream of the security gate.	2006	Yes	Site completed in 2018[b]
7	Repair erosion at pedestrian bridge.	2008	Yes	Site completed in 2018[b]
8	Repair a storm drain outlet between the C Street bridge and the Pedestrian Bridge.	2013	Yes	Site completed in 2023 [b]
9	Repair erosion at the C Street bridge.	2009	Yes	Site completed in 2020[B]
10	Remove concrete debris between A Street and C Street.	2009	No	N/A[a]
11	Repair the storm drain outlet between A Street and C Street.	2006	No	N/A[a]
12	Repair erosion at the A Street bridge. Activities in 2009 were limited to reseeding with native grass mix.	2008	Yes	Site completed in 2018[b]
13	Repair the storm drain outlet upstream of the A Street bridge.	2006	Yes	Site completed in 2016[b]
14A	Repair the storm drain outlet downstream of land bridge.	2009	Yes	Year 15[c]
14B	Create inset a floodplain downstream of the land bridge.	2009	Yes	Site completed in 2019[b]
15	Remove the land bridge.	2009	Yes	Site completed in 2019[B]
16	Repair erosion at the Thunderbird Lane bridge.	2009	Yes	Year 15[c]
17	Create a floodplain.	2015	Yes	Year 9

[a]Sites marked as N/A did not require restoration planting and therefore did not require monitoring.

[b]These sites were monitored for at least 10 years and met 10-year performance criteria; therefore, these sites are considered complete, and monitoring is no longer required.

[c]These sites did not meet performance criteria in 10 years so monitoring will continue until performance criteria are met.

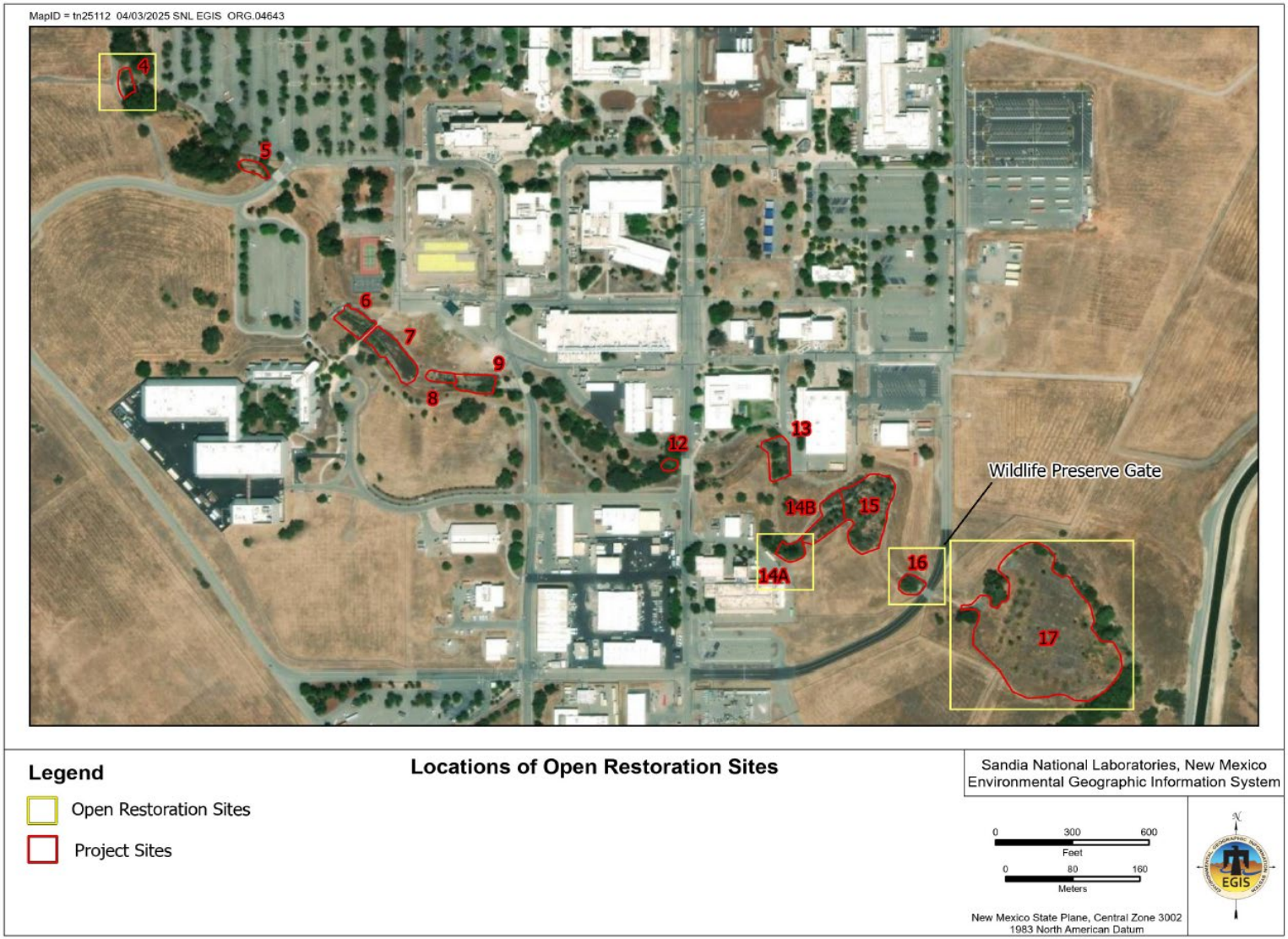


Figure 3-2. Restoration sites

Table 3-2. Success criteria for restoration plantings

Metric	Success Criteria (percent)	Monitoring
Survivorship of all trees planted	85	Monitoring will continue until criteria are met for five consecutive years: • Running count of trees planted • Annual count of number of trees surviving
Tree cover (at 2 years)	40	Sampling of random plots using densiometer[a]
Tree cover (at 5 years)	60	Sampling of random plots using densiometer[a]
Tree cover (at 10 years)	75	Sampling of random plots using densiometer[a]
Shrub cover (at 2 years)	20	Sampling of random plots using line intercept method
Shrub cover (at 5 years)	30	Sampling of random plots using line intercept method
Shrub cover (at 10 years)	45	Sampling of random plots using line intercept method
Riparian grass and ground cover (native)	75	Sampling of random plots using Daubenmire technique[b]

[a]Line intercept was used to measure cover as this is a more suitable method for small trees that have been planted. Line-intercept method is used to calculate shrub cover by using multiple line transects over an area where cover is calculated as the number of meters intercepted by each species along the transect.
[b]The Daubenmire technique is a relatively accurate method of determining the percent cover of tree canopy or grass cover over an area by splitting it into quadrants (usually 20 cm x 50 cm but area size and shape are also considered) and estimating percent cover inside of each quadrant.

3.1.2 Vegetation Monitoring Strategy and Summary

Each restoration site has native vegetation curated to both increase habitat for California red-legged frogs and California tiger salamanders and to give the plants the greatest chance of success. Sandia personnel, the U.S. Army Corps of Engineers, and the Regional Water Quality Control Board agree on the species of plants that are planted in each ecological restoration area.

The tree and shrub species included in the restoration areas include blue elderberry (*Sambucus mexicana*), California buckeye (*Aesculus californica*), California mugwort (*Artemisia douglasiana*), California rose (*Rosa californica*), California sagebrush (*Artemisia californica*), California sycamore (*Platanus racemosa*), coast live oaks (*Quercus agrifolia*), coyote brush (*Baccharis pilularis*), Fremont cottonwood (*Populus fremontii*), maples (*Acer* spp.), valley oak (*Quercus lobata*), and willows (*Salix* spp.). Additional plantings are performed when success criteria are not being met; the largest active restoration area was replanted in 2024 and met survivorship criteria. Survey methods and success criteria are outlined in Table 3-2. In 2024, monitoring surveys were performed in spring and fall on active restoration sites.

Program Activities and Results in 2024: Vegetation Monitoring

In 2024, spring surveys focused on sampling grass and shrub cover; observing invasive weed infestations, native plant recruitment, seed germination, site maintenance, and irrigation; and recording other plants and animals of note. Fall surveys focused on tree and shrub survival and cover. All plantings, except for willow pole cuttings, were located using as-built plans and recorded as surviving or dead. Surviving willow pole cuttings at each site were counted individually. Additionally, fall observations considered invasive weed infestations, native plant recruitment, site maintenance, irrigation, and the status of the study area. For 2024, weeds of concern were noted for all restoration sites; except one, site 17, which was seen to

have good stands of native grass. Of the remaining active restoration sites, one site was replanted in the late summer/early fall and therefore met tree survivorship criteria. This site is expected to continue to thrive and increase in cover. For the other active sites, a replanting strategy is in place, and the sites will continue to be monitored until success criteria have been met.

3.2 Reptile and Amphibian Surveillance

Every year, visual encounter surveys are conducted for the Arroyo Seco to monitor the presence of amphibians on site, specifically the American bullfrog (*Lithobates catesbeianus*), California red-legged frog, and California tiger salamander. American bullfrogs are an invasive species that has been recorded on site in the past; a plan is in place for invasive species management of bullfrogs if they are observed on site. California red-legged frogs and California tiger salamanders are both federally listed as threatened species that have been observed on site recently. A California red-legged frog adult was observed in April of 2024, and one California tiger salamander individual was observed on January 25, 2023.

Herpetology is the study of reptiles and amphibians. *Herpetofauna* are the reptiles and amphibians of a particular region, habitat, or geological period.

The Ecology Program biologist and a subcontracted biologist conducted multiple daytime and nighttime surveys between January and August. All wet areas along the Arroyo Seco were surveyed for all amphibian life history stages, including egg masses, larvae, juveniles, and adults. Adjacent upland refuge habitat was inspected as achievable. Nighttime survey efforts included nocturnal visual and auditory American bullfrog and California red-legged frog eyeshine surveys. The methods for these surveys included slowly walking the perimeter of the Arroyo Seco at night (dusk or later) while listening for American bullfrogs, California red-legged frogs, and other amphibians, and using handheld flashlights to detect movement and eyeshine. The species of all wildlife observed was recorded. Reptile species are recorded during amphibian surveys as "additional species seen." Additional data is captured about species seen on site in Eco Ticket data (Section 3.6).

Table 1-1 shows all species observed both during and outside regular surveys.

Program Activities and Results 2024: Reptile and Amphibian Monitoring

No American bullfrogs were observed on site for the fifth consecutive year, and no California tiger salamanders were observed in 2024.

There was one observation of a California red-legged frog on April 22, 2024, during a nighttime survey. One adult frog was observed at the bottom of a pool within the wildlife preserve. This pool is the only area where water remains year round and where California red-legged frog tadpoles were observed in 2022. Numerous Sierran treefrogs and western toads were observed throughout the year.

While there are currently no specific surveys targeting reptiles, observations are noted when they are identified during amphibian and bird surveys.

3.3 Mammal Surveillance

Mammals are surveyed every year using wildlife cameras posted in discreet locations on site to trap images of animals moving past the camera sensor. These cameras were active between May and December. There is a *detection* each time the camera is triggered and a species *occurrence* when an animal crosses the camera's field; photos with more than one individual were counted as more than one occurrence. Occurrence events were differentiated based on thirty-minute intervals, whereby multiple triggers of the same species within a thirty-minutes period were counted as a single occurrence. The 30-minute window was determined after image analysis to be a suitable interval for reducing the likelihood of recording multiple species occurrences of the same individual (e.g., deer foraging within the trigger window).

Bats are also surveyed with acoustical monitoring equipment every other year. The bat acoustical equipment was active between April and May. The bat acoustical equipment and the wildlife cameras are deployed to monitor and compare bat and wildlife use between restoration and control (non-restoration) areas. In both survey methods (camera traps and acoustical equipment), the equipment is placed strategically in locations where it is thought mammals may be more likely to forage, rest, and seek shelter. Figure 3-3 indicates the locations of the camera traps and the bat acoustical monitoring equipment at SNL/CA.

The two camera traps are spaced approximately 380 linear feet apart in the wildlife preserve. In Figure 3-3, the camera identified as C1 is located within the restoration area, and the camera identified as C2 is located outside the restoration area. Bat acoustical data are recorded every other year and were collected in 2024; the results from the data collection can be found in Table 3-3. The acoustical equipment identified as B1 provides restoration data, and acoustical equipment identified B2 provides non-restoration data. The Ecology Program biologist set and checked the cameras.

Table 3-3. Number of bat calls per species and catch per night effort in 2024

Common Name	Scientific Name	Restoration Site (9 Nights)		Control Site (9 Nights)	
		Total Calls	Catch per Night Effort	Total Calls	Catch per Night Effort
California myotis	*Myotis californicus*	46	5.11	8	0.89
Mexican free-tailed bat	*Tadarida brasiliensis mexicana*	3	0.33	37	4.11
Silver-haired bat	*Lasionycteris noctivagans*	0	0.00	11	1.22
Total		**49**	**N/A**	**56**	**N/A**

Species names and the total number of occurrences per species were documented for each camera trap site. A photo with more than one individual was counted as more than one species occurrence. Catch per night effort was also calculated for each camera trap site. Catch per night effort indicates the average number of species occurrences for a single night of camera trapping; a greater catch per night effort value indicates a higher frequency of species occurrences. This can be an indicator of a variety of factors, including a larger local population size, greater activity by a single individual, greater habitat quality or utility, or

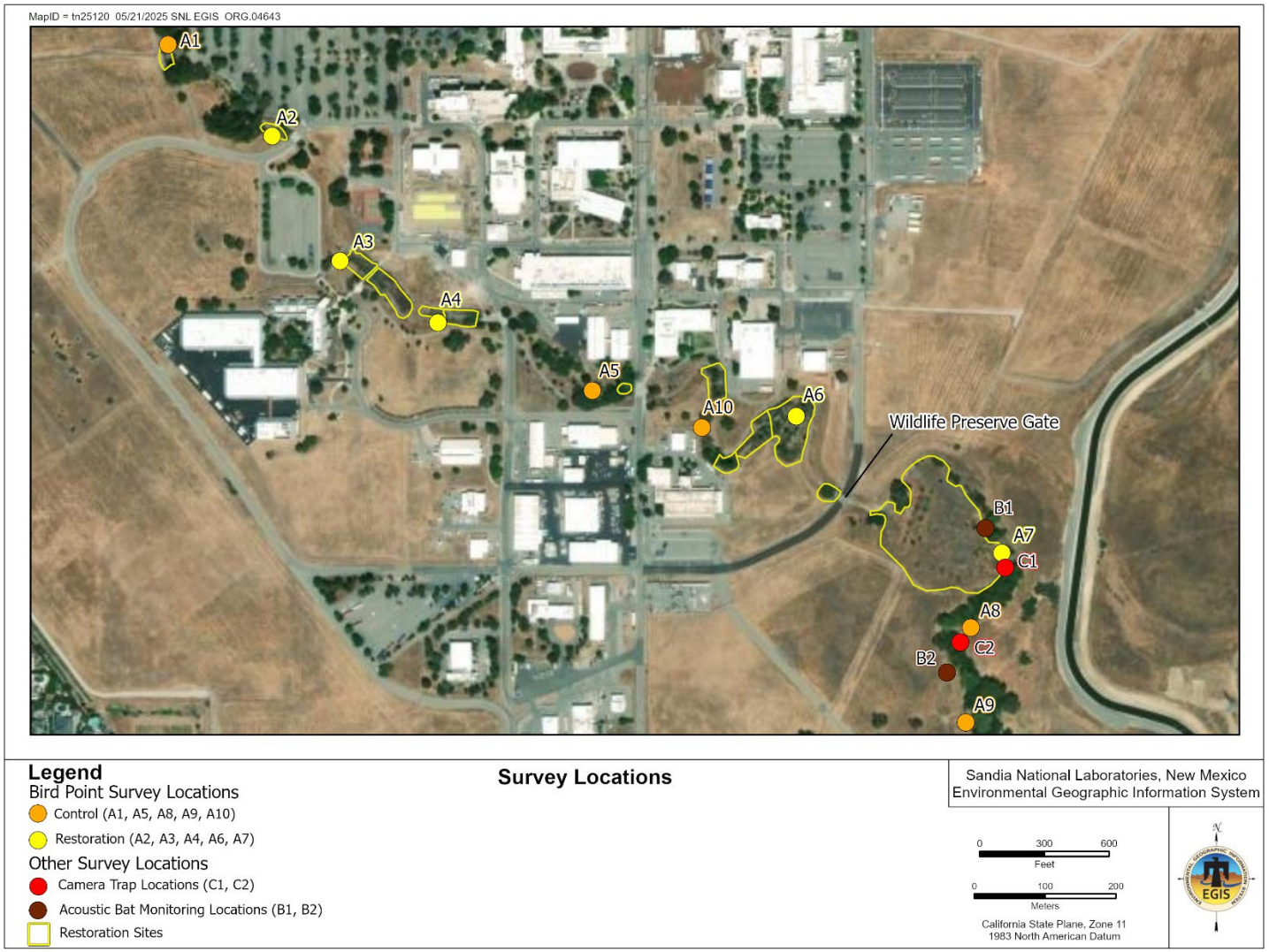


Figure 3-3. Wildlife Surveillance Locations

proximity to an unrelated attractant (e.g., trash bins). Due to the open nature and size of the study area, large-scale determinations of species density and richness could not be calculated.

The camera traps used were commercially available infrared camera traps triggered by a dual sensor (motion/temperature). When a subject crosses the viewing field, the camera senses the difference in temperatures between the subject and the background and captures an image. Smaller mammals and cold-blooded reptiles and amphibians are less likely to trigger the camera trap than larger mammals with greater mass and a larger temperature field. Wildlife occurrences documented by the cameras are biased toward larger mammals, though this is somewhat balanced by the difficulty in detecting these species during in-person surveys as they tend to be more sensitive to a human presence. The lack of smaller species in the camera trap data should not be taken to imply absence.

Representative wildlife camera images included those of a coyote (Figure 3-4), grey fox (Figure 3-5), two bobcats (Figure 3-6), and barn owl (Figure 3-7).

Figure 3-4. Coyote (Canis latrans) carrying a desert cottontail (Sylvilagus audubonii) in its mouth.

Figure 3-5. Grey Fox (Urocyon cinereoargenteus)

Figure 3-6. Two bobcats (Lynx rufus)

Figure 3-7. Barn owl (Tyto alba)

Program Activities and Results in 2024: Mammal Surveillance

Table 3-3 shows the number of bat calls per species and the catch per night effort in 2024. Acoustical recording equipment is set up first in the restoration area and then moved to a control area onsite. At both sites, the monitor was placed on the ground adjacent to the Arroyo Seco, with the microphone fixed to a long, extendable flagpole extending into likely bat flyways that were relatively clear of vegetation. Acoustic data went through two rounds of analysis to ensure an acceptable level of accuracy. More total calls and species were recorded at the control site versus the restoration site. However, it can't be extrapolated how many individual bats were recorded – a greater number of calls may be explained by a larger population of bats or a single bat repeatedly passing the acoustic recorder; therefore, it may not be indicative of a more productive foraging habitat. Furthermore, additional recordings were made that contained bat calls but lacked sufficient acoustic characteristics or clarity to be confidently classified to species.

Table 3-4 shows the wildlife species occurrences and catch per night effort in 2024.

Table 3-4. Wildlife camera trap species occurrences and catch per night effort in 2024.

Common Name	Scientific Name	Restoration Site Species Occurrences	Restoration Site Catch per Night (106 nights)	Control Site Species Occurrences	Control Site Catch per Night (96 nights)
Barn Owl	*Tyto alba*	0	0.00	9	0.09
Black Phoebe	*Sayorina nigricans*	1	0.01	3	0.03
Bobcat	*Lynx rufus*	42	0.40	2	0.02
California Quail	*Callipepla californica*	0	0.00	1	0.01
California Scrub-Jay	*Aphelocoma californica*	1	0.01	1	0.01
Cooper's Hawk	*Accipiter cooperii*	0	0.00	1	0.01
Coyote	*Canis latrans*	22	0.21	2	0.02
Desert Cottontail	*Sylvilagus audubonii*	2	0.02	0	0.00
Fox Squirrel	*Sciurus niger*	4	0.04	0	0.00
Great-Horned Owl	*Bubo virginianus*	0	0.00	2	0.02
Grey Fox	*Urocyon cinereoargenteus*	6	0.06	0	0.00
Raccoon	*Procyon lotor*	164	1.55	0	0.00
Turkey Vulture	*Cathartes aura*	0	0.00	1	0.01
Wild Turkey	*Meleagris gallopavo*	0	0.00	17	0.18
Wrentit	*Chamaea fasciata*	0	0.00	11	0.11
Unidentified Animal		14	0.13	20	0.21
Unidentified Bat		1	0.01	0	0.00
Unidentified Bird		3	0.03	12	0.13
Unidentified Insect		1	0.01	0	0.00
Total		**262**	**2.47**	**82**	**0.85**

Six mammal species and at least six bird species were caught in camera trap images. Coyote, California scrub-jay, bobcat, and black phoebe were the only species observed in both the restoration and control sites. Desert cottontail, fox squirrel, grey fox, and raccoon were only observed in the restoration site. Barn owl, California quail, Cooper's hawk, great-horned owl, turkey vulture, wild turkey, and wrentit were observed only in the control site. Although mammals are the focus for the camera traps, the cameras recorded several bird species, including barn owl, black phoebe, California quail, California scrub jay, great horned owl, turkey vulture, wild turkey, and an additional 15 captures that could not be identified (i.e., due to poor lighting, distance from the camera, or poor quality due to the birds being in flight). There were 34 additional captures that could not be attributed to a specific animal due to vegetation obscuring the subject, poor lighting, or poor quality due to the animals moving too quickly.

Catch per night effort (CPNE) was also calculated for each camera trap site. Raccoon had the highest CPNE at the restoration site (1.55), while wild turkey had the highest CPNE of the identifiable species at the control site (0.18). Due to the small size and interspersed locations of the restoration sites, mammals using the riparian corridor are expected to pass through both restored and non-restored (control) areas. Therefore, diversity and population sizes are reported for each site, but further analysis of mammal use in the restored versus

control areas is not possible. The data presented here are intended to provide an idea of the utilization of the sites by large mammals, as the camera trap triggers are biased toward these species.

3.4 Bird Surveillance

Long-term monitoring of breeding birds can reveal population trends and dynamics. Collecting data aids land use decisions and provides documentation regarding bird population trends regionally and continentally. The main monitoring method used at SNL/CA is bird surveys, which is the process of counting birds visually and audibly. The Ecology Program biologist and a subcontracted biologist conducted point counts for a standardized period of 25 minutes at 10 survey locations to document avian species use and species richness at restoration and non-restoration (control) sites. Figure 3-3 indicates the avian survey locations. The standardized duration of 25 minutes was set to maximize species observation and reduce observation bias caused by disturbance. Nesting behavior was noted if observed incidentally during the point count surveys. Point count data were used to compare the number of species and individual bird counts between restoration and control sites to infer potential impacts of restoration on avian abundance and diversity.

Program Activities and Results 2024: Bird Surveillance

In 2024, 53 species were observed in restoration areas, and 47 species were observed in control areas, with a total of 62 different species observed. The species and the number of times each was detected are listed in Table 3-5 and Table 3-6, respectively. At restoration sites, 439 individual birds were detected; and 331 individual birds were detected at control sites. Fifteen species were exclusive to restoration sites: American crow, American kestrel, barn swallow, dark-eyed junco, Eurasian collared dove, hairy woodpecker, house wren, northern mockingbird, northern rough-winged swallow, orange-crowned warbler, Say's phoebe, spotted towhee, western bluebird, western kingbird, and western meadowlark. Nine species were exclusive to control sites: Cooper's hawk, Cassin's kingbird, chestnut-backed chickadee, great-blue heron, great-horned owl, hermit thrush, ruby-crowned kinglet, red-winged blackbird, and violet-green swallow. During the surveys, four species exhibited nesting behavior: European starling, Cassin's kingbird, California scrub-jay, and violet-green swallow. Nests that were documented on the SNL/CA campus in 2024 included: one red-tailed hawk nest, two barn owl nests, one American kestrel nest, and two American crow nests. Species observed during bird surveys on the Sandia property in 2024 that were not observed in 2023 include: acorn woodpecker, American kestrel, black-headed grosbeak, downy woodpecker, great-horned owl, hairy woodpecker, Lincoln's sparrow, northern rough-winged swallow, Say's phoebe, violet-green swallow, and western tanager. Table 3-7 shows the increase in the number of species observed on the SNL/CA campus since 2016. This increase in the number of species observed is a good indication that the restoration of the Arroyo Seco is having a positive impact on avian activity and diversity. Lincoln's sparrow and western tanager were observed for the first time during the 2024 surveys and have not been observed in the previous years of surveys. It should be noted that the Swainson's hawk (which is listed as state threatened) pair that nested on the north side of SNL/CA in 2021 and 2022 did not nest on site in 2023 or 2024.

Table 1-1 shows a complete list of all species seen at SNL/CA both during and separate from surveys in 2024.

Table 3-5. Species detected during the breeding bird survey, 2024

Common Name	Scientific Name	Restoration	Control	All
Acorn Woodpecker	*Melanerpes formicivorus*	5	1	6
American Crow	*Corvus brachyrhynchos*	11	0	11
American Goldfinch	*Spinus tristis*	8	6	14
American Kestrel	*Falco sparverius*	1	0	1
American Robin	*Turdus migratorius*	2	4	6
Anna's Hummingbird	*Calypte anna*	32	11	43
Ash-Throated Flycatcher	*Myiarchus cinerascens*	3	5	8
Barn Swallow	*Hirundo rustica*	3	0	3
Bewick's Wren	*Thryomanes bewickii*	12	11	23
Black-Headed Grosbeak	*Pheuticus melanocephalus*	3	1	4
Black Phoebe	*Sayorina nigricans*	14	4	18
Bushtit	*Psaltriparus minimus*	13	9	22
California Quail	*Callipepla californica*	1	4	5
California Scrub-Jay	*Aphelocoma californica*	13	15	28
California Towhee	*Melozone crissalis*	9	5	14
Canada Goose	*Branta canadensis*	11	1	12
Cassin's Kingbird	*Tyrannus vociferans*	0	3	3
Cedar Waxwing	*Bombycilla cedrorum*	4	4	8
Chestnut-Backed Chickadee	*Poecile rufescens*	0	3	3
Common Raven	*Corvus corax*	5	6	11
Cooper's Hawk	*Accipiter cooperii*	0	1	1
Dark-Eyed Junco	*Junco hyemalis*	1	0	1
Downy Woodpecker	*Picoides pubescens*	1	1	2
Eurasian Collared Dove	*Streptopelia decaocto*	2	0	2
European Starling	*Sturnus vulgaris*	4	29	33
Golden-Crowned Sparrow	*Zonotrichia atricapilla*	3	1	4
Great Blue Heron	*Ardea herodias*	0	1	1
Great-Horned Owl	*Bubo virginianus*	0	1	1
Hairy Woodpecker	*Leuconotopicus villosus*	1	0	1
Hermit Thrush	*Catharus guttatus*	0	3	3
House Finch	*Haemorhous mexicanus*	47	48	95
House Sparrow	*Passer domesticus*	2	2	4
House Wren	*Troglodytes aedon*	3	0	3
Killdeer	*Chardrius vociferus*	3	4	7
Lesser Goldfinch	*Spinus psaltria*	24	16	40
Lincoln’s Sparrow	*Melospiza lincolnii*	1	1	2
Mallard Duck	*Anas platyrhynchos*	4	3	7
Mourning Dove	*Zenaida macroura*	21	3	24
Northern Flicker	*Colaptes auratus*	1	1	2
Northern Mockingbird	*Mimus polyglottos*	5	0	5
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*	4	0	4
Nuttall's Woodpecker	*Picoides nuttallii*	8	4	12

Common Name	Scientific Name	Restoration	Control	All
Oak Titmouse	*Baeolophus inornatus*	7	3	10
Orange-Crowned Warbler	*Leiothlypis celata*	6	0	6
Red-Tailed Hawk	*Buteo jamaicensis*	2	9	11
Red-Winged Blackbird	*Agelaius phoeniceuss*	0	1	1
Rock Pigeon	*Columba livia*	33	4	37
Ruby-Crowned Kinglet	*Corthylio calendula*	0	2	2
Say's Phoebe	*Sayornis saya*	1	0	1
Song Sparrow	*Melospiza melodia*	12	6	18
Spotted Towhee	*Pipilo maculatus*	3	0	3
Tree Swallow	*Tachycineta bicolor*	4	1	5
Turkey Vulture	*Cathartes aura*	29	33	62
Violet-Green Swallow	*Tachycineta bicolor*	0	10	10
Western Bluebird	*Sialia mexicana*	4	0	4
Western Kingbird	*Tyranmus verticalis*	2	0	2
Western Meadowlark	*Sturnella neglecta*	1	0	1
Western Tanager	*Piranga ludoviciana*	2	1	3
White-Breasted Nuthatch	*Sitta carolinensis*	4	1	5
White-Crowned Sparrow	*Sitta carolinensis*	19	6	25
Wilson's Warbler	*Cardellina pusilla*	2	3	5
Yellow-Rumped Warbler	*Setophaga coronata*	22	35	57
Total		**439**	**331**	**770**

Table 3-6. Number of bird species observed at restoration and control sites by date

Survey Date	Restoration (Five Sites)	Control (Five Sites)	Total Number of Different Species
March 28, 2024	39	35	45
May 9, 2024	40	32	51
July 9, 2024	25	13	26
Total number of different species	**53**	**47**	**61**

Table 3-7. Number of bird species observed during each monitoring year.

Survey Year	Restoration (Five Sites)	Control (Five Sites)	Total Number of Different Species
2016	28	27	32
2017	34	38	43
2018	34	37	43
2019	36	41	48
2020	39	38	46
2021	38	40	49
2022	38	42	50
2023	40	49	54
2024	53	47	61

3.5 Federally Listed and State-Listed Endangered, Threatened, and Other Species of Concern

As stated in Section 8.1.1, the Endangered Species Act is intended to protect all animal and plant species that are federally listed as endangered or threatened. Several surveys are performed annually to monitor the site for the presence of California red-legged frogs and California tiger salamanders either breeding or dispersing across the site. Currently, no known federally-listed species breed on Sandia-controlled premises at SNL/CA; but several individual California red-legged frogs were seen in a restoration site at SNL/CA in 2022, and one adult was seen in 2024 during the target surveys. A California tiger salamander was observed on-site in January 2023.

SNL notified the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife of all these findings because both agencies list the California red-legged frog and the California tiger salamander as threatened ("federally threatened, state species of special concern" and "federally endangered, state threatened," respectively). Sandia personnel coordinated with the agencies on measures to prevent harm to these species, including working only during the dry season, having a biologist monitor all work near the Arroyo Seco, and approving an emergency relocation plan for a California tiger salamander to move it from an active construction site to the wildlife preserve. California red-legged frogs, California tiger salamanders, Western spadefoot toads, Northwestern pond turtles, and American badgers are federally listed or proposed listed species that have been encountered on site in the past.

One bird species, the Swainson's hawk (*Buteo swainsoni*, protected by the state of California), is well known as a breeding bird at SNL/CA and is listed under the California Endangered Species Act (California Department of Fish and Wildlife, California Natural Diversity Database, January 2024, *State and Federally Listed Endangered and Threatened Animals of California*) as threatened. A pair nested on site in 2021 and 2022. In 2023 and 2024, the pair was seen carrying nest-building material to their prior site, but in these years a pair of red-tailed hawks overtook this nesting site.

3.6 Eco Ticket Request System

Sandia personnel use Eco Ticket, a web-based ticketing system, for reporting wildlife issues or concerns. Using Eco Ticket, individuals can easily place a request that is sent to all Ecology Program personnel instantaneously. Requests are prioritized in a queue and then responded to accordingly. Once an action is completed, a biologist will close out the ticket, moving the request and associated data from the queue to a searchable database. The request is used to track wildlife encounters and ultimately to inform decisions and practices aimed at managing human-wildlife interactions effectively.

For Eco Tickets pertaining to a wildlife issue, Ecology Program personnel call the individual who placed the ticket to gather information. Requested information may include the type of animal, the location, the time last seen, and any pertinent safety information. For nonvenomous wildlife outside buildings, Ecology Program personnel typically leave the animal alone unless it is trapped, sick, or injured. Venomous snakes are always relocated due to the risk they pose to personnel. If an animal is injured, it is taken to a wildlife rescue

site. Wildlife trapped inside a building are captured and then released in an appropriate habitat.

Program Activities and Results 2024: EcoTicket

In 2024, 46 wildlife issues or requests were received through Eco Ticket. The "Trapped Wildlife" category was requested most often with 11 tickets. Figure 3-8 shows all Eco Tickets received by type of call. Several notable wildlife species were seen throughout the year, including an injured black-tailed jackrabbit (*Lepus californicus*) that was immediately taken to the Lindsay Wildlife Hospital for care and several calls for raccoons stuck in trash bins. Since wildlife-proof trash bins and dumpsters are already in place, Ecology Program personnel campaigned to increase awareness that staff should close dumpster and trash bin lids to prevent raccoons from crawling inside.

There were nine snake removal tickets in 2024. Occasionally, Ecology Program personnel are unable to locate the snake when they arrive at the location to remove it. This was the case for three snake removal tickets in 2024. Of the six remaining tickets, none were for venomous snakes. Pacific gopher snakes (*Pituophis catenifer catenifer*) continue to be the most common snakes encountered, followed by common California kingsnakes (*Lampropeltis californiae*).

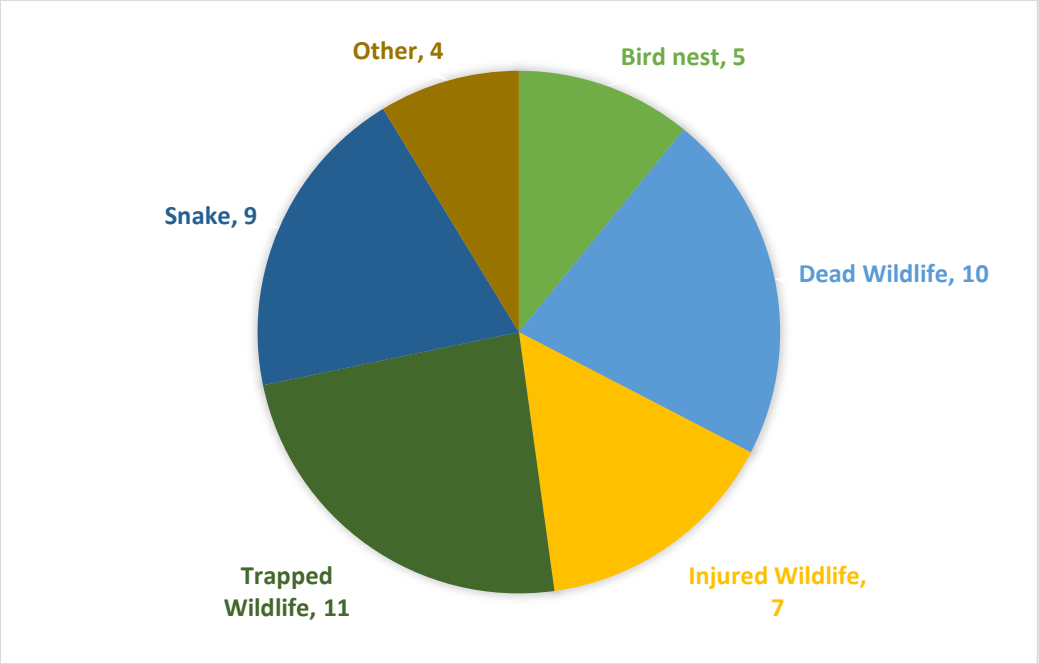


Figure 3-8. EcoTickets by type of call, 2024

Chapter 4. Terrestrial Surveillance Program

American Sweetgum (*Liquidambar syraciflua*)

OVERVIEW ▪ Terrestrial Surveillance Program personnel measure ambient external gamma radiation levels using environmental dosimeters.

Ambient external gamma radiation levels are measured using environmental dosimeters. On-site sources that could contribute to gamma radiation include small, unsealed radioactive isotopes; sealed sources; and several radiation-generating devices. Dosimeters are used to measure the cumulative ambient external radiation dose and to approximate the dose potentially received from natural and nonnatural sources.

Currently there are no operations on site that require Sandia personnel at SNL/CA to collect environmental media (soil, sediment, surface water, groundwater, and vegetation) radiological samples.

4.1 Regulatory Criteria

The Terrestrial Surveillance Program is designed to address DOE O 458.1, Change 4 (LtdChg), *Radiation Protection of the Public and the Environment* (DOE O 458.1, Change 4 (LtdChg 2020), which establishes standards and requirements to protect the public and the environment from undue risk from radiation associated with radiological activities under NNSA control.

Applicable DOE orders are listed in Section 8.1.1.

4.2 Sample Locations

The environmental dosimeters that measure ambient external gamma radiation levels are positioned at 1 central on-site monitoring station, 10 site perimeter locations, and 2 off-site background locations east and west of SNL/CA. The eastern off-site dosimeters (E7013) for quarter 3 and quarter 4 in 2024 were lost and are not included in this report due to incomplete data. The value of the western off-site dosimeter (E7012) is utilized as the sole reference for comparative analysis of the annual dose in this region for the purposes of this report. The stations are equipped with optically stimulated luminescence dosimeters and are collected and evaluated quarterly. The dosimeter locations are identified in Figure 4-1.

Background radiation refers to naturally occurring radiation levels.

Program Activities and Results 2024: Terrestrial Surveillance

The annual average background radiation dose in 2024 was measured at 27.9 mrem (0.279 mSv). The average annual perimeter dose was measured at 39.7 mrem (0.397 mSv) and was from the natural background dose in the area. The reported perimeter dose is the actual measurement; the background radiation dose is not deducted. The average annual dose for the San Francisco Bay Area is estimated to be 43.8 mrem (Mauro and Briggs 2005). Monitoring stations and annual data are listed in Table 4-1.

Table 4-1. Environmental radiation monitoring data, 2024

Location Classification	Number of Observations	Average (mrem/year)	Median (mrem/year)	Standard Deviation (mrem/year)	Minimum (mrem/year)	Maximum (mrem/year)
On-site	1	21.7	N/A	N/A	N/A	N/A
Perimeter	10	39.7	39.6	6.3	30.2	49.1
Off-site	1	27.9	N/A	N/A	N/A	N/A

N/A = not applicable

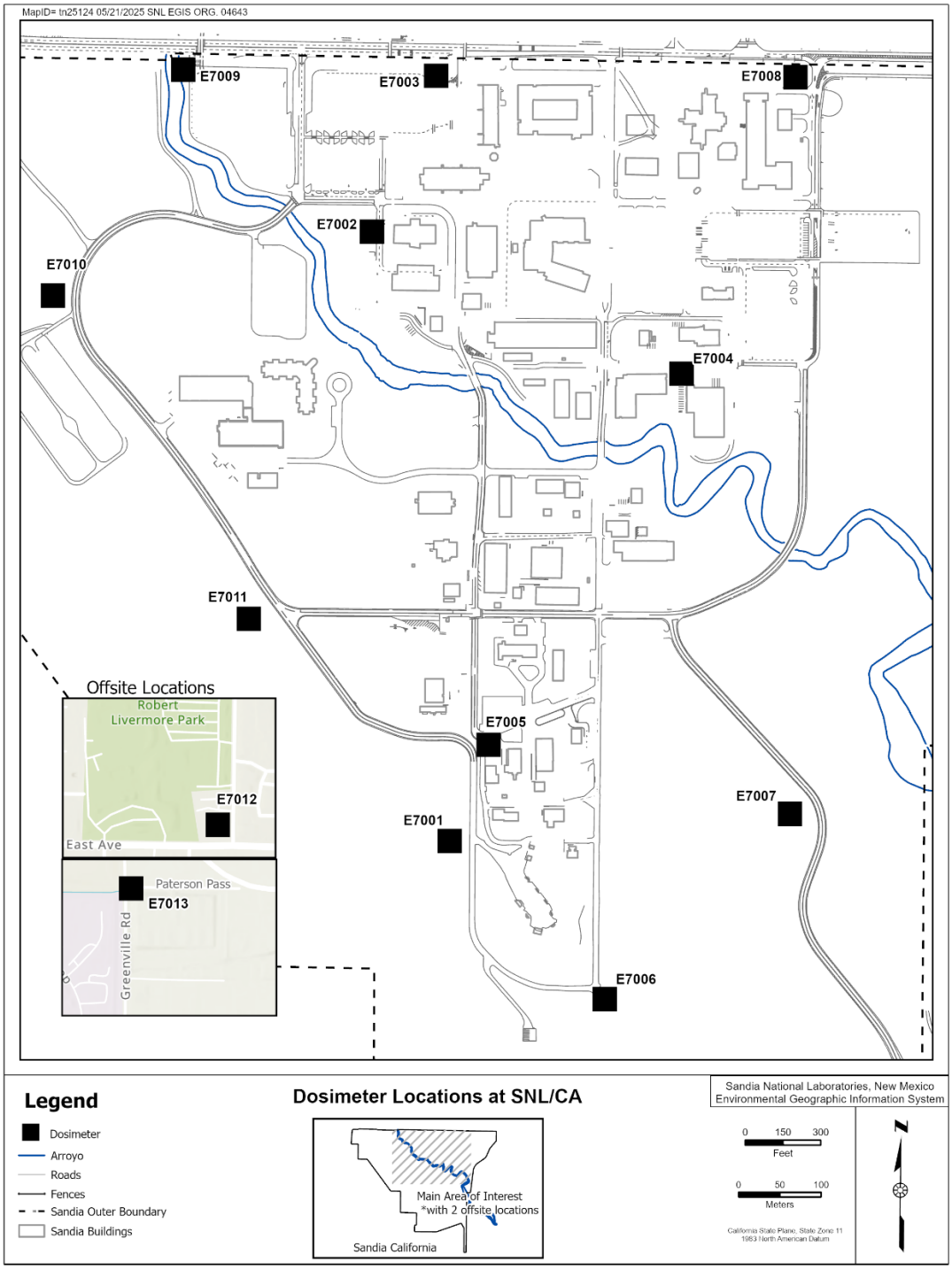


Figure 4-1. Dosimeter locations at SNL/CA and off site

Chapter 5. Air Quality Programs

Sandia National Laboratories Fueling Station Annual Vapor Recovery Testing

OVERVIEW ▪ Air quality personnel help Sandia operations maintain compliance with applicable air quality regulations and policies.

Air quality and surveillance activities are conducted through the following programs:

- Air Quality Compliance Program (Section 5.1)
- National Emission Standards for Hazardous Air Pollutants (NESHAP) Program (Section 5.2)

5.1 Air Quality Program

The Bay Area Air Quality Management District (BAAQMD) is the regulating authority for controlling air pollution from stationary sources at SNL/CA. The California Air Resources Board (CARB) is responsible for ensuring that federal and state standards are met for mobile and area sources of air pollution.

Various permitted and registered emission sources are operated at SNL/CA, including a non-retail gasoline-dispensing facility, site-wide wipe cleaning, adhesive usage for maintenance activities, emergency generators, boilers, and paint spray booths for research activities. The CARB regulates diesel off-road equipment and on-road heavy-duty diesel vehicles. Under Assembly Bill 32, the CARB adopted various greenhouse gas-reducing regulations that apply to SNL/CA. These include greenhouse gas emissions from gas-insulated equipment, sulfur hexafluoride (SF6) emissions from research operations, and greenhouse gas emissions from refrigeration systems under the Refrigerant Management Program. SNL/CA is not a Title V Facility or a major source. No fugitive dust control permits are required at SNL/CA.

5.1.1 Stationary Sources

BAAQMD is the regional agency that regulates air quality from stationary industrial sources in the Bay Area. By federal law, the state must adopt air quality standards and rules and regulations that are at least as strict as the federal mandates. California has chosen to adopt state ambient air quality standards that are more stringent than the federal standards in many areas. BAAQMD is responsible for issuing air quality permits for stationary equipment in the Bay Area. Almost all stationary equipment that emits to the atmosphere requires a permit from BAAQMD. Air quality permits for SNL/CA stationary sources are presented in Table 8-8.

Program Activities and Results 2024: Criteria Pollutant and Hazardous Air Pollutant Emissions from Permitted Stationary Sources

In 2024, five diesel-fueled emergency standby generators were operated at SNL/CA. BAAQMD also administered a boiler registration program for natural gas-fueled boilers with rated heat input capacities greater than 2 million BTU/hr and less than 10 million BTU/hr. Nine boilers that are in this registration program were operated at SNL/CA in 2024.

The Gasoline Dispensing Facility requires annual vapor recovery testing. In 2024, this routine test was performed on the Gasoline Dispensing Facility in January and then again in December. All results were within regulatory limits.

A Wipe Cleaning Permit (S-95) for SNL/CA allows wipe cleaning activities at multiple locations sitewide. The Maintenance Adhesive Usage Permit (S-93) covers adhesive and sealant usage for maintenance activities for most of the site-wide volatile organic compounds emissions. In 2024, both the sources were within permitted limits.

Air Quality Program Emissions data for criteria pollutants from the permitted and registered sources and the total Toxic Air Pollutant Emissions are provided in Table 5-1. All emissions were within permitted limits.

Table 5-1. Permitted and registered stationary source emission data, 2024

Carbon Monoxide	Hazardous Air Pollutant	Nitrogen Oxide	Particulate Matter with a Diameter ≤ 10 µm	Sulfur Dioxide	Volatile Organic Compound
1.44[1]	0.59	2.4	0.5	0.04	1.48

Notes:
All units are in tons per year.
Annual emissions were calculated by multiplying the daily emissions reported in the BAAQMD Permit to Operate by 365.
Emissions for 2024 are based on 2023 data.
[1]Annual emissions for Carbon Monoxide were calculated based on actual emissions from the boilers.

Program Activities and Results 2024: Greenhouse Gas Emissions

Under the authority of Assembly Bill 32, California adopted several regulations to reduce greenhouse gas emissions. CARB regulations aim to reduce greenhouse gas emissions from gas-insulated equipment such as SF6. Sandia personnel are required to record and report SF6 (and other greenhouse gasses) inventory and emissions from gas-insulated equipment on an annual basis. There were no greenhouse gas emissions from gas-insulated equipment in 2024. In addition, an annual report must be submitted to the CARB describing SF6 research uses, SF6 purchases, and measures taken to control SF6 emissions from research activities.

In 2024, annual greenhouse gas emissions from natural gas combustion at SNL/CA were 2,559 $MTCO^2e$, which is lower than the annual reporting threshold of 10,000 $MTCO^2e$. Therefore, operations at SNL/CA are not subject to California Regulation for Mandatory Reporting of Greenhouse Gas Emissions or the EPA Final Rule for Mandatory Reporting of Greenhouse Gases.

The American Innovation and Manufacturing Act of 2020 seeks to reduce hydrofluorocarbon (HFC) greenhouse gas consumption and production to 15 percent of a 2011 to 2013 baseline by 2036. The American Innovation and Manufacturing Act authorizes EPA to establish production and consumption allowances, sector-specific controls, refrigerant management practices, and penalties for circumventing American Innovation and Manufacturing Act rules. At SNL/CA, an annual refrigerant-inventory reconciliation was instituted, which helps to maintain control over the refrigerant supply and storage. Also, Sandia personnel participate on the DOE HFC Task Team, which identifies options for eliminating the use of HFC and HFC emissions wherever feasible.

California Global Warming Solutions Act of 2016 requires a 40 percent reduction in greenhouse gas emissions below 1990 levels by 2030. The California Global Warming Solutions Act of 2006 was amended by Senate Bill 1383 in 2016 to address Short-Lived Climate Pollutants and requires a 40 percent reduction of HFC emissions below 2013 levels by 2030. In 2018, the California Air Resources Board adopted a new HFC regulation that was again amended in 2020 for new refrigeration and air-conditioning equipment. The California Air Resources Board HFC regulation requires end users to shift away from HFC refrigerants and transition to alternative technologies. At SNL/CA, personnel are encouraged to consider the alternative technologies during the design phases of heating, ventilation, and air-conditioning equipment replacement projects.

At SNL/CA, HFC uses include but are not limited to refrigeration equipment, fire suppression systems, and research and development operations, along with a minute use in products such as lubricants, aerosol dusters, and contact cleaners.

Greenhouse gas emissions are calculated on a fiscal year basis. During fiscal year 2024 (October 1, 2023, through September 30, 2024), Sandia operations directly emitted 181 $MTCO^2e$ (refrigerant and fugitive emissions).

Sandia's annual site sustainability plan documents greenhouse gas reductions, projected performance, and status (see Section 8.2).

5.1.2 Stratospheric Ozone Protection

Title VI of the Clean Air Act Amendments of 1990 required EPA to establish regulations to phase out the production and consumption of ozone-depleting substances. Ozone-depleting substances are defined as chlorofluorocarbons, hydrochlorofluorocarbons, and other halogenated chemicals that have been found to contribute to the depletion of the stratospheric ozone layer. EPA has established regulations in 40 Code of Federal Regulations (CFR) 82, *Protection of Stratospheric Ozone*, which require the following: recycle ozone-depleting substances and other refrigerants when servicing equipment, establish requirements for recycling and recovering equipment, repair substantial leaks in refrigeration equipment containing more than 50 pounds of refrigerant, and establish safe disposal standards.

At SNL/CA, ozone-depleting substances are used in refrigeration equipment and in some limited research and development applications. Halon, which contains the ozone-depleting substance bromine, is contained in some fire-suppression systems and fire extinguishers.

5.1.3 Vehicle Fleet Management

Various on-road and off-road vehicles provided by DOE and the U.S. General Service Administration are operated at SNL/CA. The CARB regulates mobile source emissions from the fleet.

Program Activities and Results 2024: Vehicle Fleet Management

In 2024, Sandia personnel maintained registrations with the CARB for 15 in-use off-road diesel vehicles, 4 on-road heavy-duty diesel vehicles, 8 large spark-ignition engine vehicles, and 11 electric vehicles. New in 2024, 15 on-road medium duty fleet vehicles (trucks and vans) were registered as required. In 2024, no portable generators were registered with the California Air Resources Board or permitted with the BAAQMD.

5.2 Radionuclide National Emission Standards for Hazardous Air Pollutants Program

EPA regulates radionuclide air emissions in accordance with 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities," and has established an effective dose equivalent limit of 10 mrem/year for any member of the public resulting from all radionuclide air emissions from a DOE facility.

There are no radionuclide emission sources at SNL/CA that are subject to 40 CFR 61 monitoring requirements. To comply with national emission standards, individual projects with the potential to release radionuclide emissions are evaluated to determine the worst-case dose to the public. Additionally, dose calculations are compared to the standards to determine the need for annual monitoring.

Program Activities and Results 2024: Air Quality NESHAP Program

In 2024, no projects at SNL/CA emitted any radionuclides into the ambient air; consequently, no annual effluent monitoring and no National Emission Standards for Hazardous Air Pollutants evaluations were completed.

Chapter 6. Water Quality Programs

Arroyo Seco

OVERVIEW – The SNL/CA Stormwater Program, Wastewater Program, and Groundwater and Remediation Program collectively ensure compliance with requirements established by federal, state, and local agencies.

Environmental Management personnel monitor water quality through numerous programs. Operations comply with water quality requirements established by federal, state, and local agencies. Water quality programs discussed in this chapter include the following:

- Safe Drinking Water Protection Program (Section 6.1)
- Stormwater Program (Section 6.2)
- Wastewater Program (Section 6.3)
- Groundwater and Remediation Program (Section 6.4)

6.1 Safe Drinking Water Protection Program

The potable water used at SNL/CA is purchased from LLNL, which is supplied by the San Francisco Public Utilities Commission (SFPUC) but can be supplemented by water from

the Alameda County Flood Control and Water Conservation District (known as Zone 7) as a backup source. The SFPUC and Zone 7 are responsible for monitoring the quality of the incoming water, which is stored in LLNL-owned water tanks located on the south hills at SNL/CA. From there, LLNL becomes the water system provider and maintains the primary drinking water distribution system that feeds to SNL/CA and screens for water quality. To demonstrate compliance with EPA and California State Water Resources Control Board (SWRCB) prescribed regulation limits, LLNL develops and delivers a consumer confidence report on the drinking water quality to Sandia personnel. The most recent consumer confidence report was received on June 17, 2024, and it presented no known concerns with the drinking water at SNL/CA.

6.2 Stormwater Program

Environmental Management personnel maintain regulatory compliance with federal and state stormwater requirements via the California SWRCB General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) and General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit); see Table 8-8. Stormwater Program activities include preparing stormwater pollution prevention plans and stormwater management plans, conducting routine inspections, monitoring stormwater quality, and providing training on stormwater pollution prevention practices. Compliance with these permits reduces the impact of construction, industrial, and municipal activities on the environment. The California SWRCB and the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) implement and enforce the Industrial General Permit and the Construction General Permit. In addition, Sandia personnel comply with Energy Independence and Security Act § 438 where applicable.

6.2.1 Stormwater Discharges

SNL/CA is in the San Francisco Bay watershed. All industrial stormwater runoff at SNL/CA is conveyed to the Arroyo Seco, which merges into the Arroyo Las Positas and Arroyo de la Laguna before discharging into Alameda Creek and eventually to the San Francisco Bay (Figure 1-7).

6.2.2 Industrial Stormwater Discharges

To minimize pollution in stormwater runoff, Sandia personnel deploy several best management practices, including good housekeeping, spill prevention and response, preventive maintenance, material handling and waste management, and erosion and sediment control. Sandia personnel also inspect and clean debris from the stormwater drainage system at least once per year before the rainy season begins, and street sweeping is implemented routinely. Additional best management practices include developing stormwater basins that capture runoff and allowing it to infiltrate through the soil. These strategies are detailed in the Industrial General Permit stormwater pollution prevention plan.

A *discharge* is any liquid or solid that flows or is placed onto any land or into any water. This includes precipitation discharges to storm drains, accidental or intentional spilling, and leaking, pumping, pouring, emitting, emptying, or dumping any material or substance onto any land or into any water.

Per the Industrial General Permit, Environmental Management personnel are required to sample four qualifying storm events during the reporting year (July 1 through June 30) at each designated representative location, twice from July through December and twice from January through June. However, a storm event may not meet the permit's definition of a qualifying storm event or may not produce enough runoff to collect samples at either or both sampling locations. If fewer samples are collected than are required, justification (such as a lack of qualifying storm events) is provided in an annual report.

To assess the impact of site operations on stormwater discharges, two sampling locations (ST-11 and ST 13-2) and 20 outfall locations were identified that provide the best representation of drainage areas and activities on site. Designated sampling locations are based on upstream areas that have exposed industrial activities with the potential to impact the stormwater runoff. At location ST-11, samples capture runoff from a drainage area that encompasses a vehicle repair area, a vehicle fueling station, a machine shop, and a hazardous waste facility. Stormwater is monitored at these areas even though work is performed under sheltered areas or in buildings. At location ST-13-2, samples capture runoff from the site's scrapyard. These stormwater sampling locations are shown in Figure 6-1.

Field quality control samples for stormwater sampling included duplicate, field blank, and trip blank samples. A sampling event and the samples are evaluated if a constituent is observed to be in the sample blanks or when a duplicate sample differs significantly from the original sample. Stormwater sampling and documentation comply with Industrial General Permit requirements.

6.2.3 Construction Activities Stormwater Discharges

Construction activities that are subject to the Construction General Permit comply with the permit's requirements and the related Stormwater Pollution Prevention Plan (SWPPP). All construction activities on site that do not fall under the Construction General Permit comply with the Industrial General Permit requirements and the related SWPP. Stormwater runoff from these activities is contained on site and/or managed through best management practices.

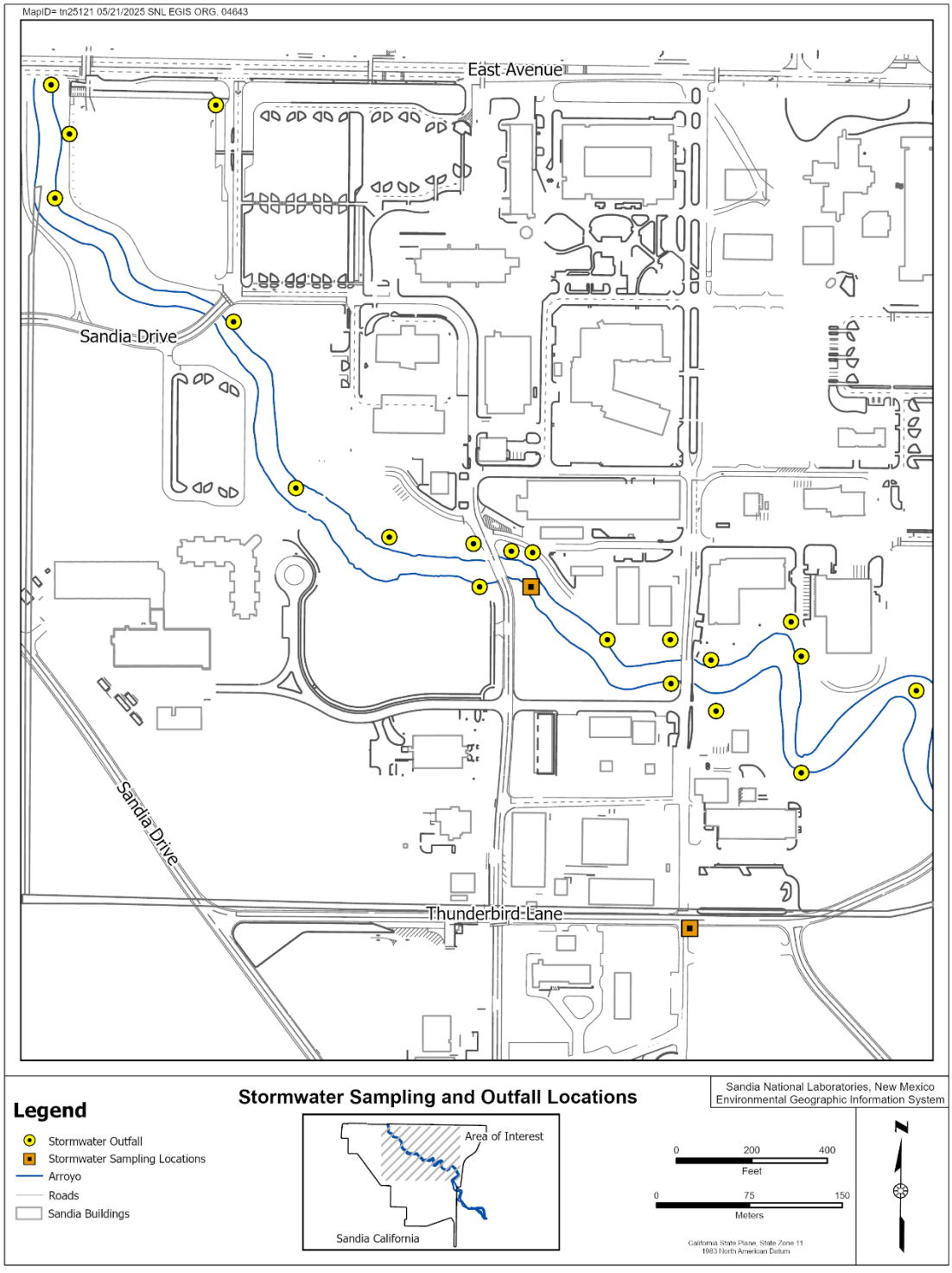


Figure 6-1. Stormwater sampling locations

Program Activities and Results 2024: Stormwater

The reporting year under the Industrial General Permit (Order 2014-0057-DWQ) occurs from July 1 through June 30. The data in Table 6-1 represents the 2023–2024 reporting year, which started on July 1, 2023, and ended on June 30, 2024. For reporting year 2023–2024, Numeric Action Levels (NALs) were exceeded for iron and aluminum. The NAL for the parameter pH was met during this reporting year and obtained a baseline status. Exceedances of the NALs are not a violation of the Industrial General Permit but instead require an Exceedance Response Action (ERA) Report that outlines the elevated parameters and the actions to be taken to attempt to lower the observed levels. Sandia operations comply with the Industrial General Permit, and ERA Reports have been submitted to the California SWRCB.

Table 6-1. Analytical results for stormwater, July 1, 2023, to June 30, 2024

Parameter	Number of Samples Analyzed	Number of Samples Found Below the Detection Limit	Method Detection Limit (mg/L)[a]	Reporting Limit (mg/L)[a]	Numeric Action Level (mg/L)	Results Annual Average Concentration (mg/L)[a]
Aluminum	6	0	0.02	0.05	0.75	1.54
Chemical oxygen demand	6	1	20	50	120	28 [b,c]
Iron	6	0	0.05	0.1	1	1.39
Lead	6	0	0.0024	0.005	0.262	0.0015 [b]
Nitrate + nitrite nitrogen	6	2	0.04	0.2	0.68	0.60 [b,c]
Oil and grease	6	4	1.4	5	15	1.0 [b,c]
pH	6	N/A	N/A	N/A	< 6.0 or > 9.0	6.00 to 6.58 [d]
Total phosphorus	6	2	0.02	0.04	2	1.12 [c]
Total suspended solids	6	0	1	1	100	19
Zinc	6	0	0.008	0.05	0.26	0.07 [b]

[a] Does not include the measurement for pH.
[b] One or more results are below the reporting limit but above the detection limit.
[c] Data included results below the detection limit and were calculated as zero.
[d] pH results are monitored by instantaneous numeric action levels, not by annual averages. Thus, the observed range is displayed.
N/A = not applicable

6.3 Wastewater Program

Wastewater effluent generated at SNL/CA consists of sanitary and laboratory discharges. Sanitary effluent is discharged directly to the sewer system. Sewer discharges exit the site through a sewer outfall located at the northern boundary and join with the LLNL sewer system. Laboratory discharges are generated from general research activities and from operations that qualify as categorical processes subject to federal pretreatment standards. Laboratory effluent from most laboratory areas is diverted to liquid effluent containment system holding tanks prior to discharge to the sanitary sewer. Environmental Management personnel monitor wastewater at the sewer outfall, the liquid effluent containment system tanks, and categorical process point sources.

Wastewater is the spent or used water from a home, community, farm, or industry. Wastewater effluent generated at SNL/CA consists of sanitary discharges (drained from kitchen and bathroom plumbing fixtures) and laboratory discharges (generated from general research activities).

6.3.1 Wastewater Discharge Permit

Wastewater generated at SNL/CA is discharged to the Livermore Water Reclamation Plant, a publicly-owned treatment works. The Livermore plant maintains a National Pollutant Discharge Elimination System (NPDES) permit and regulates industry discharges into its sewer system. A wastewater discharge permit issued by the City of Livermore's Water Resources Division regulates wastewater discharges at SNL/CA (Table 8-8). The permit is updated every five years and includes discharge limits for sanitary sewer outfall and processes subject to EPA pretreatment standards (40 CFR 403, *General Pretreatment Regulations for Existing and New Sources of Pollution*). Sandia personnel are responsible for monitoring, sampling, and reporting the wastewater generated to ensure permit compliance.

6.3.2 Sewer Outfall

A sewer outfall and monitoring station is operated at the northern SNL/CA boundary to monitor wastewater continuously for flow and pH. Environmental Management personnel also collect samples at the outfall to monitor compliance with wastewater discharge limits established in the wastewater discharge permit discussed in Section 8.7. Table 6-2 details the outfall sampling schedule and analytical parameters that were followed in 2024. Consistent with permit requirements, wastewater samples collected at the sewer outfall are not monitored for radioactive constituents. Figure 6-2 displays the main sewer lines, the liquid effluent containment systems, and sewer outfall monitoring station at SNL/CA.

As required in the wastewater discharge permit, 24-hour daily composite samples for metals are submitted for analysis and reported to the City of Livermore's Water Resources Division when a constituent is observed above half the permit's discharge limit. Monthly wastewater monitoring reports are sent to the City of Livermore's Water Resources Division.

The City of Livermore's Water Resources Division conducts inspections and compliance sampling. Environmental Management personnel perform concurrent samples during compliance sampling events.

Table 6-2. Sewer outfall sampling schedule, 2024

Frequency	Sample Type	Analytical Parameter
Daily	24 hour – composite	• Archive sample is analyzed only when a weekly composite sample shows a concentration greater than or equal to 50 percent of the discharge limit for metals
Weekly	Weekly – composite	• Metals
Monthly	24 hour – composite	• Biochemical oxygen demand • Chemical oxygen demand[a] • Oil and grease • Total dissolved solids • Total suspended solids
Monthly	Grab	• Cyanide • EPA priority organic pollutants

[a] Chemical oxygen demand analyses are not required by the wastewater discharge permit.

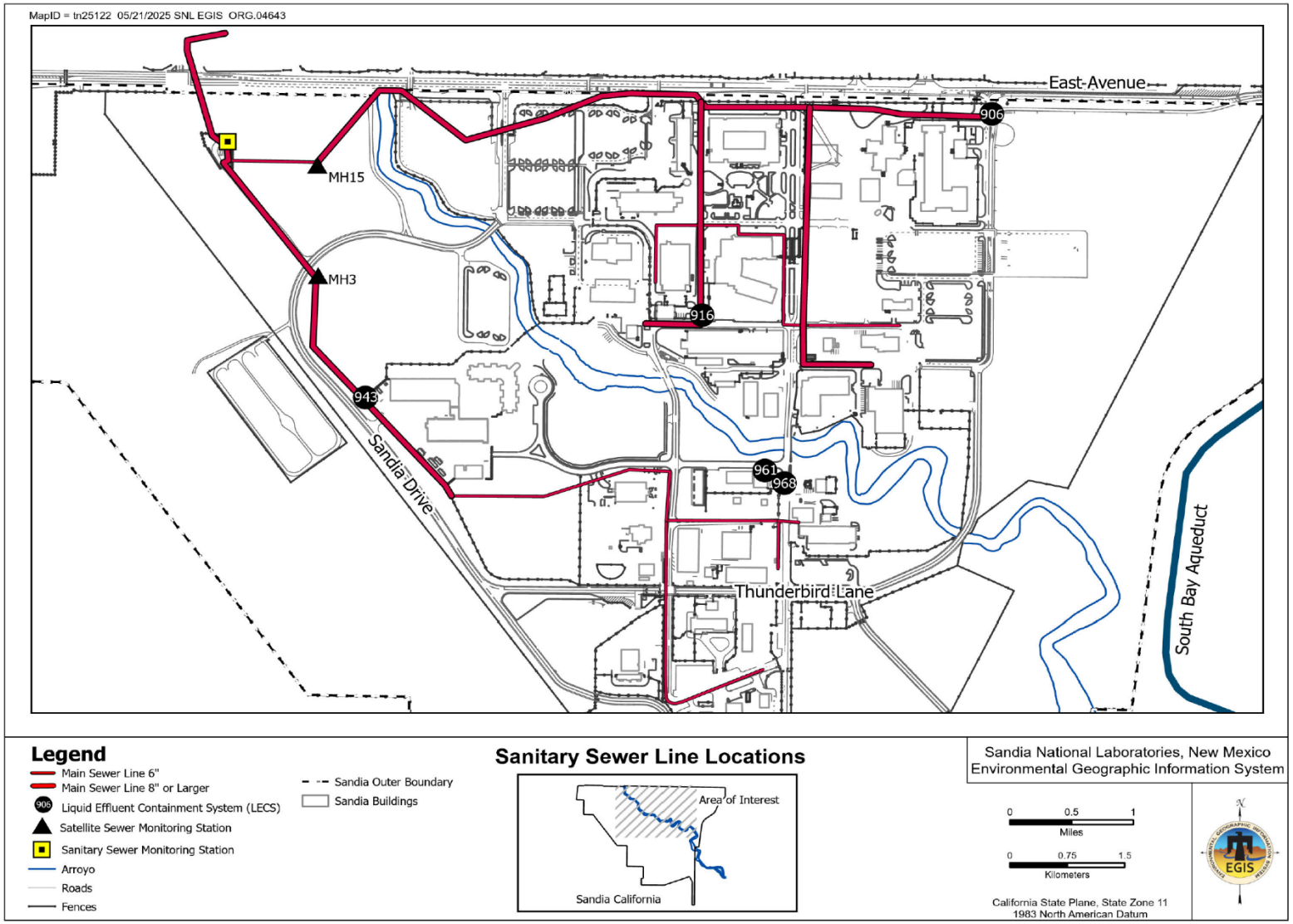


Figure 6-2. Sewer system at SNL/CA

Program Activities and Results 2024: Wastewater—Sewer Outfall

Table 6-3 summarizes analytical results for physical parameters, metals, and total toxic organics from the sanitary sewer outfall at SNL/CA. Total toxic organics are analyzed and reported in micrograms per liter (µg/L) but displayed in milligrams per liter (mg/L) in the table for consistency. For the parameter pH, recorded pH charts are included in the monthly reports to the City of Livermore's Water Resource Division. In 2024, all liquid effluent from the outfall complied with the site outfall discharge limits for all parameters. Detailed sewer analysis results are provided in Appendix A.

Table 6-3. Composite sewer outfall monitoring results for physical parameters and metals, 2024

Parameter	Number of Samples Analyzed	Quantity of Samples Found Below Detection Limit	Lowest Detection Limit (mg/L)	Sewer Discharge Limit (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Arsenic	52	34	0.0016	0.06	0.00052	0.0016
Biochemical Oxygen Demand	12	1	2.0	NL	99	330
Cadmium	52	49	0.00024	0.14	0.00025	0.0003
Chemical Oxygen Demand[a]	12	0	10	NL	66	600
Chromium	52	36	0.0016	0.62	0.0016	0.043
Copper	52	0	0.0015	1.00	0.048	0.32
Cyanide	12	0	0.002	0.04	0.0026	0.011
Lead	52	0	0.00024	0.20	0.00061	0.0096
Mercury	52	44	0.00005	0.01	0.00005	0.00014
Nickel	52	0	0.0005	0.61	0.0011	0.035
Oil and Grease (Animal and Vegetable)	12	0	1.4	300	3	21
Oil and Grease (Mineral)	12	11	1.4	100	5.5	5.5
Silver	52	51	0.0004	0.2	0.0038	0.0038
Total Dissolved Solids	12	0	10	NL	38	580
Total Suspended Solids	12	0	1.0	NL	34.8	426
Total Toxic Organics[b]	12	0	Varies	1.00	6.0E-05	0.044
Zinc	52	1	0.008	3.00	0.041	0.38

[a] Chemical oxygen demand analyses are not required by the wastewater discharge permit.
[b] Total toxic organics have multiple compounds analyzed per month.
NL= There are no numeric limits in the permit for this parameter. Data is submitted for information only.

6.3.3 Liquid Effluent Containment System

Effluent from major laboratory facilities is diverted to liquid effluent containment system holding tanks where wastewater can be sampled and analyzed prior to release to the sewer system. Wastewater from the tanks is, at a minimum, analyzed for metals. Other parameters associated with the process that generates the wastewater are typically analyzed as well. Four of the five liquid effluent containment system tanks are also monitored continuously for pH.

One tank, located at the Radioactive Waste Management Facility, is used infrequently and only monitored prior to discharge for tritium and uranium.

Wastewater captured in liquid effluent containment system tanks that does not meet wastewater discharge permit limits at the sewer outfall is evaluated on a case-by-case basis to ensure that appropriate disposal requirements are met. Depending on the concentration of the wastewater's constituents, it may be released to the sanitary sewer (the standard process) or disposed of off-site as either nonhazardous waste or hazardous waste.

There are no reporting requirements for the liquid effluent containment systems used at SNL/CA; however, these systems are monitored as a best management practice. Environmental Management personnel monitor and track the analytical results from these systems.

Program Activities and Results 2024: Wastewater—Liquid Effluent Containment System

In 2024, there were three incidents in which the contents of a liquid effluent containment system holding tank needed to be disposed of off-site as nonhazardous waste. In these cases, elevated constituents in a holding tank had the potential to compromise the final effluent at the sewer outfall.

6.3.4 Categorical Processes

Three research operations at SNL/CA are defined as federal categorical processes subject to the EPA pretreatment standards for point sources (40 CFR 403, *General Pretreatment Regulations for Existing and New Sources of Pollution*; 40 CFR 433, *Metal Finishing Point Source Category*). These categorical processes include one metal finishing operation, a semiconductor manufacturing operation, and a spray paint booth. Wastewater from the semiconductor manufacturing operation is processed through a pretreatment system and is sampled semiannually. The metal finishing operation and the spray paint booth are closed-loop systems that do not discharge effluent to the sanitary sewer, so wastewater monitoring is not required. An additional laboratory infrequently uses metal cyanide complexes for electroplating, but this is done on a very small scale (less than 50 mL), and all liquid waste is collected and handled as hazardous waste. There is no discharge to the sanitary sewer system from this process.

Samples collected semiannually from the semiconductor manufacturing operation are analyzed for arsenic, pH, and toxic organic pollutants. The lab owner records daily flows in a logbook and delivers the information to Environmental Management personnel monthly.

The City of Livermore conducts inspections and compliance sampling routinely. Environmental Management personnel perform concurrent samples during compliance sampling events.

Program Activities and Results 2024: Wastewater—Categorical Processes

Table 6-4 summarizes semiannual monitoring results for the semiconductor manufacturing operation. In 2024, all wastewater from this operation met the pretreatment standards.

Table 6-4. Monitoring for semiconductor manufacturing categorical processes, 2024

Parameter	Number of Samples Analyzed	Quantity of Samples Found Below Detection Limit	Lowest Detection Limit (mg/L)	Sewer Discharge Limit (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Arsenic	2	0	0.000071	0.06	0.00045[a]	0.0015[a]
pH	2	N/A	N/A	5 to 10	7.04	7.22
Total Toxic Organics	2	0[b]	Varies	1.00	0.00008[a]	0.00013[a]

[a] Sample was found above the detection limit, but below the reporting limit.
[b] Three parameters were found to be above the detection limit, but below reporting limits.
N/A = not applicable

6.3.5 Wastewater Discharge Requests

Wastewater discharges resulting from ongoing chemical, manufacturing, and industrial processes conducted at Sandia facilities are tracked through the Wastewater Discharge Approval System before being discharged to the sanitary system. Facility processes are reviewed for contaminants, concentrations, and discharge frequencies to determine whether the effluent will meet regulatory criteria. Once approved, a facility is issued an internal permit that is valid for one year. The internal permit can be renewed annually after review and approval from Environmental Management personnel. Generally, processes are well characterized, and any constituents detected as being above the permit-specific limits at a wastewater monitoring station can be tracked back to the source facility. Corrective actions to mitigate further releases are implemented as necessary. One-time releases are approved on a case-by-case basis.

Program Activities and Results 2024: Wastewater—Wastewater Discharge Requests

In 2024, 29 wastewater discharge requests were approved. Wastewater discharge approvals are not required for buildings that only produce domestic sewage from restrooms, showers, sinks, and drinking fountains.

6.4 Groundwater and Remediation Program

There are seven groundwater monitoring wells at SNL/CA. Environmental Management personnel monitor groundwater at two former restoration areas and along the Arroyo Seco (Figure 6-3). Three groundwater monitoring wells are used to monitor residual contamination at former restoration areas under a 1989 site cleanup order issued by the SFBRWQCB. Two of these wells are located at the Fuel Oil Spill site (FM-1R and FM-7R), and one is at the Navy Landfill (NLF-6). The other four monitoring wells (AS-3A, AS-3B, AS-3C, and AS-4) are located along the Arroyo Seco to monitor the effect of site operations on groundwater quality. Well AS-4 is located up gradient of the developed area of the site and provides background data about local groundwater quality. Table 6-5 provides the sampling schedule for each well location.

Groundwater is the water found beneath the earth's surface in pore spaces and in fractures of rock formations.

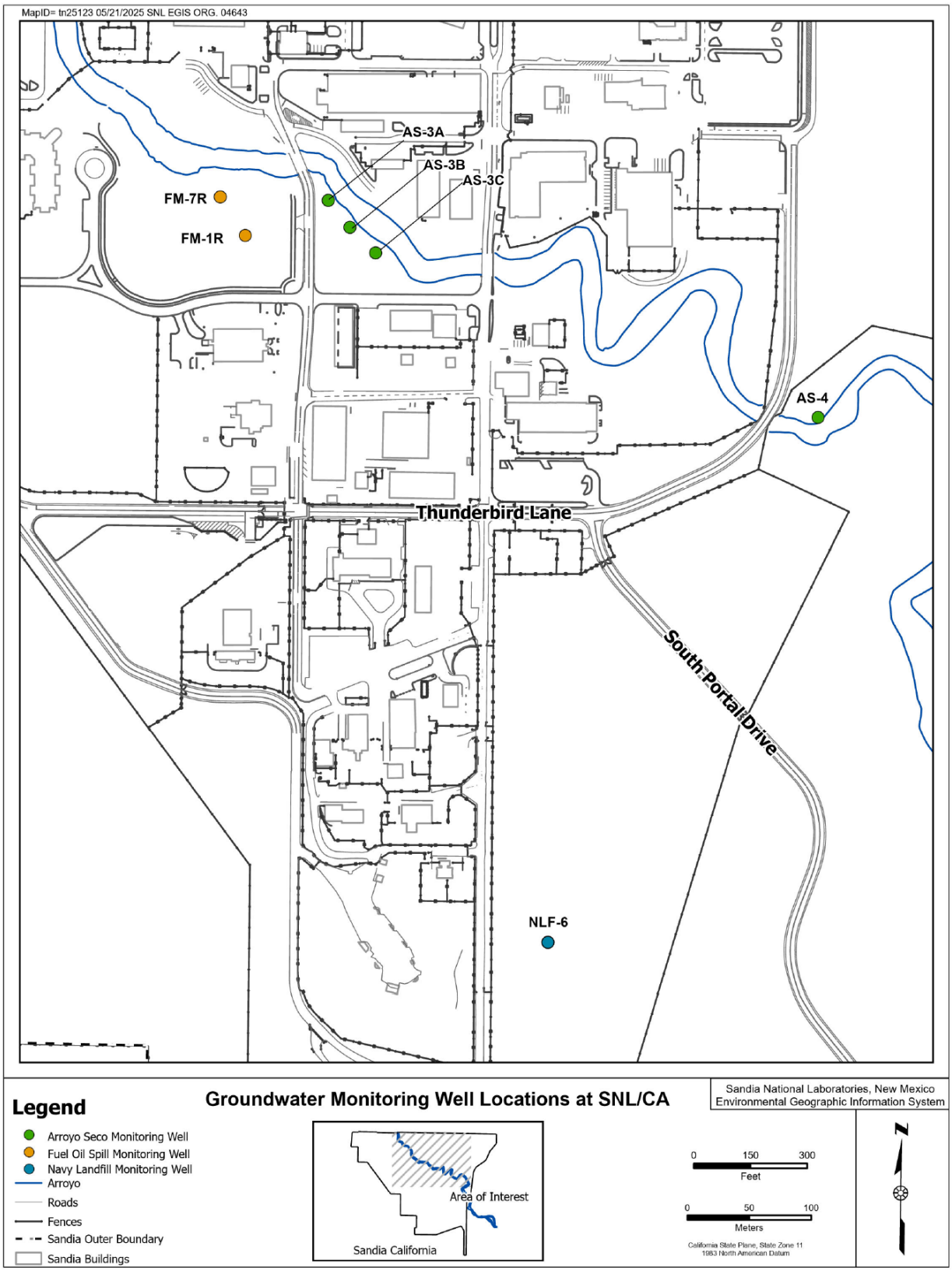


Figure 6-3. Groundwater monitoring well locations at SNL/CA

Sample results for diesel in groundwater at the Fuel Oil Spill site from 2014 to 2024 are presented in Figure 6-4, and sample results for carbon tetrachloride at the Navy Landfill from 2015 to 2024 are presented in Figure 6-5.

Samples taken for groundwater monitoring are performed in duplicate and are accompanied by field blanks. Samples are evaluated if a constituent in the original sample is observed to differ significantly in the duplicate sample or if there is detection in the blank samples.

Table 6-5. Groundwater sampling schedule

Well Location	Sampling Frequency	Analytical Parameter
Arroyo Seco (Wells AS-3A, AS-3B, AS-3C, and AS-4)	Annually	Metals, total petroleum hydrocarbons-diesel, volatile halogenated organics, and water elevation
Arroyo Seco (Wells AS-3A, AS-3B, AS-3C, and AS-4)	Every two years	General minerals
Fuel Oil Spill site (Wells FM-1R, FM-7R)	Semiannually	Benzene, ethylbenzene, naphthalene, total petroleum hydrocarbons diesel-methane, toluene, water elevation, and xylenes
Navy Landfill (Well NLF-6)	Annually	Volatile halogenated organics and water elevation

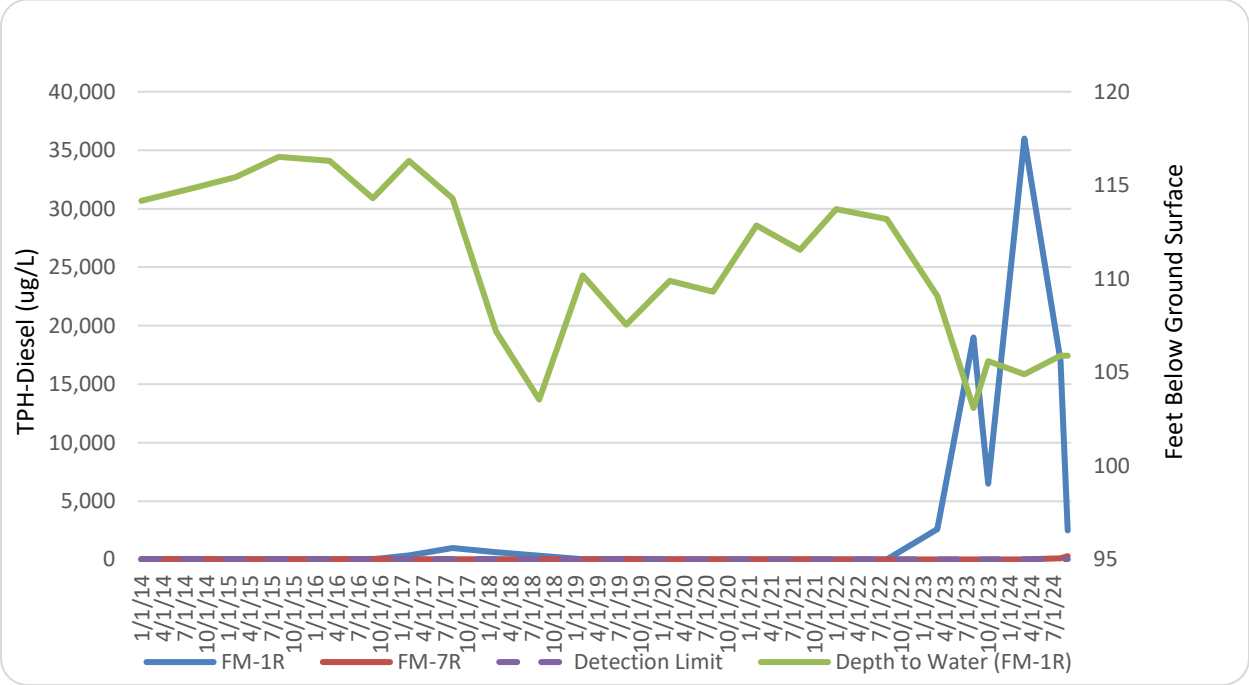


Figure 6-4. Sample results for diesel in groundwater at the Fuel Oil Spill site, 2014 to 2024.

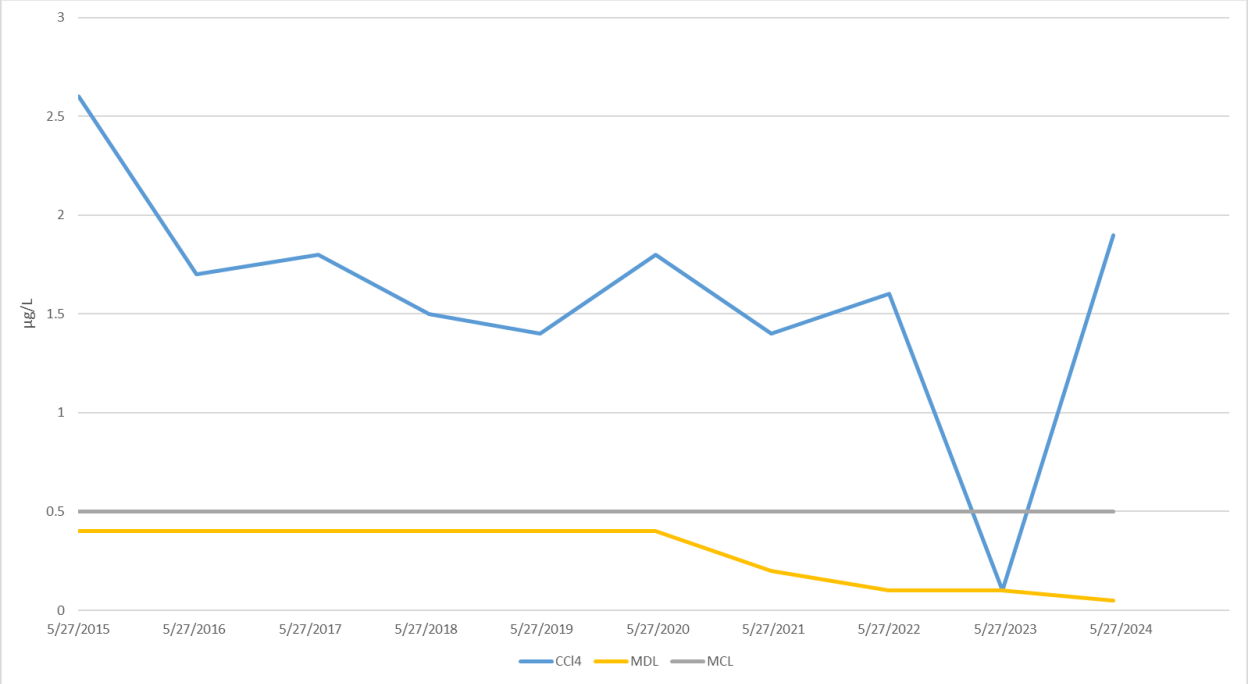


Figure 6-5. Sample results for carbon tetrachloride at the Navy Landfill, 2015 to 2024

Program Activities and Results 2024: Groundwater and Remediation

Table 6-6 summarizes groundwater analytical results comparative to the maximum contaminant limit (MCL) and method detection limit (MDL) for organics at the Navy Landfill in 2024. In 2024, all required parameters were sampled in compliance with the San Francisco Regional Water Quality Control Board. Detailed groundwater analysis results are provided in Appendix A.

Table 6-6. Groundwater analyses for the Navy Landfill, 2024

Parameter	Sample Date	NFL-6 Result (µg/L)	Method Detection Limit (µg/L)
1,2-Dichloroethane (1,2-DCA)	5/2/2024	0.011[a]	0.00930
Carbon tetrachloride	5/2/2024	1.9	0.05
Toluene	5/2/2024	0.15[a]	0.100
Trihalomethane (chloroform)	5/2/2024	0.68	0.10

Note: All other parameters were not detected.
[a] Sample was found above the detection limit, but below the reporting limit.
N/A = not applicable
ND = not detected

Table 6-7 summarizes groundwater analytical results for organics at the Fuel Oil Spill site in 2024. In August 2024, there was a notable concentration in total petroleum hydrocarbons diesel-methane for FM-1R. This is likely attributed to a strong wet year after several years of drought, allowing for a thorough flushing of the soil. Although not required, additional confirmation sampling at FM-1R was performed in September 2024. The results indicated a decrease in total petroleum hydrocarbons diesel-methane for FM-1R. This will continue to be closely monitored.

In 2024, all required parameters were sampled in compliance with the SFBRWQCB. Detailed groundwater analysis results are provided in Appendix A.

Table 6-7. Groundwater analyses for the Fuel Oil Spill site, 2024

Parameter	Sample Date	Well ID FM-1R (µg/L)	Well ID FM-7R (µg/L)	Method Detection Limit (µg/L)
Benzene	3/19/2024	0.073	0.47	0.0350
	8/14/2024	ND	ND	
	9/12/2024	ND	ND	
TPH-Diesel	3/19/2024	2600	2800	71
	8/14/2024	19000	300	
	9/12/2024	6500	ND	

Note: All other parameters were not detected.

Table 6-8 and Table 6-9 summarize groundwater analytical results for metals and organics, respectively, for the Arroyo Seco wells. In 2024, all required parameters were sampled in compliance with the SFBRWQCB. Detailed groundwater analysis results are provided in Appendix A.

Table 6-8. Groundwater monitoring analytical results for metals at the Arroyo Seco wells, 2024

Parameter	Sample Date	Well ID AS-3A (µg/L)	Well ID AS-3B (µg/L)	Well ID AS-3C (µg/L)	Well ID AS-4 (µg/L)	Method Detection Limit (µg/L)
Antimony	5/2/2024	0.17 [a]	0.25 [a]	12	0.16 [a]	0.084
Arsenic	5/2/2024	1.1	0.68	0.28 [a]	2.4	0.071
Barium	5/2/2024	110	110	130	76	0.52
Beryllium	5/2/2024	ND	ND	ND	ND	0.060
Cadmium	5/2/2024	ND	ND	ND	ND	0.050
Chromium	5/2/2024	7.8	6.8	6.1	3.0	0.78
Cobalt	5/2/2024	0.37 [a]	0.24 [a]	0.44 [a]	1.2	0.051
Copper	5/2/2024	1.3 [a]	1.0 [a]	ND	4.5	0.63
Lead	5/2/2024	0.63	0.98	ND	0.70	0.19
Mercury	5/2/2024	ND	ND	ND	0.11	0.031
Molybdenum	5/2/2024	2.2	2.2	4.6	1.4	0.19
Nickel	5/2/2024	1.2	0.74	ND	4.3	0.33
Selenium	5/2/2024	0.88	0.43	1.0	0.28 [a]	0.18
Silver	5/2/2024	ND	ND	ND	ND	0.051
Thallium	5/2/2024	ND	ND	ND	ND	0.067
Vanadium	5/2/2024	2.6	2.5	0.37 [a]	5.7	0.19
Zinc	5/2/2024	ND	ND	ND	ND	11

[a] Sample was found above the detection limit, but below the reporting limit
N/A = not applicable
ND = not detected

Table 6-9. Groundwater monitoring analytical results for organics at the Arroyo Seco wells, 2024

Parameter (µg/L)	Sample Date	Well ID AS-3A	Well ID AS-3B	Well ID AS-3C	Well ID AS-4	Method Detection Limit (µg/L)
Chloroform	5/2/2024	ND	0.820.27	ND	ND	0.06
TPH-Diesel	5/2/2024	ND	ND	ND	ND	20
Vinyl Chloride	5/2/2024	ND	ND	0.084	ND	0.00440

Note: All other parameters were not detected.
ND = not detected

6.5 Pollutants Released to the Ground or Groundwater

Environmental Management personnel track pollutants released to the ground surface that occur throughout the year.

Program Activities and Results 2024: Pollutants Released to the Ground or Groundwater

Environmental Management personnel are required to report sanitary sewer overflows to the California State Water Resources Control Board. In 2024, there was one sanitary sewer overflow at SNL/CA.

6.6 Emerging Contaminants

Per- and polyfluoroalkyl substances (collectively known as PFAS) are a group of human-made fluorinated chemicals that include perfluorooctanoic acid, perfluorooctane sulfonic acid, GenX, and other related chemicals. PFAS have been widely produced and used in the United States since the 1940s for many applications such as product surface coating and fire-fighting foam. Both the EPA and the California SWRCB are investigating PFAS as a constituent of emerging concern. These investigations are focusing on drinking water suppliers and active facilities that may have PFAS groundwater contamination properties, such as airports, landfills, chrome-plating facilities, and publicly-owned treatment works. As none of these are ongoing activities at SNL/CA, the SFBRWQCB has not made any indication or determination that PFAS investigations, testing, or monitoring are required to be conducted at SNL/CA. Current internal discussions are focusing on incorporating PFAS monitoring in the future, and Sandia personnel will continue to look to the SFBRWQCB evaluation and decision to implement appropriate regulatory actions.

Chapter 7. Other Environmental Programs

Willow Tree (*Salix spp.)*

OVERVIEW ▪ Sandia personnel take the responsibility of protecting the environment seriously. Numerous program teams monitor the air, water, and soil to help prevent pollution and conserve natural resources.

7.1 National Environmental Policy Act Program

NEPA Program personnel provide technical assistance to ensure that Sandia operations and activities are reviewed for compliance with NEPA at all Sandia locations, including Sandia National Laboratories, New Mexico (SNL/NM); SNL/CA; Kauai Test Facility, Hawaii; Tonopah Test Range, Nevada; and other remote locations. For all federally proposed projects and activities, project owners must complete an online NEPA checklist using an internal NEPA Module application. A NEPA checklist is an internal form used by Sandia NEPA personnel to review projects and proposed activities for compliance with NEPA.

As part of a NEPA checklist review, NEPA Program personnel verify whether federally proposed projects and activities and their associated environmental impacts have been evaluated in existing NEPA documentation (e.g., a site-wide environmental impact statement, a site-wide environmental assessment, or an environmental assessment). Other relevant environmental program subject matter experts also review proposed projects and

activities to determine and communicate any applicable environmental permitting or other requirements for the proposed activity to project managers. Project managers are required to ensure that all environmental requirements are met.

A NEPA checklist is forwarded to NNSA NEPA Compliance Officer (NCO) for review and determination when a federally proposed project or activity reflects any of the following:

- The proposed project or activity is not covered by existing NEPA documentation.
- The proposed project or activity is outside the scope of an existing land-use permit.
- The proposed project or activity is at a location that is not owned by DOE or permitted to Sandia.

The NNSA NCO determines whether a proposed federal action has been assessed as required by the NEPA. Projects or activities that have not been reviewed in existing NEPA documents or do not qualify for a categorical exclusion, per 10 CFR 1021, *National Environmental Policy Act Implementing Procedures*, would require new or additional NEPA analyses, which may result in the need for a new environmental assessment, a new environmental impact statement, or documentation to supplement an existing environmental impact statement or environmental assessment.

The *Final Site-Wide Environmental Assessment for Sandia National Laboratories/California* (DOE 2003) evaluated ongoing and proposed activities at SNL/CA. In 2012, a screening analysis was performed for each resource area evaluated in the 2003 site-wide environmental analysis. The screening analysis evaluated new and modified projects or proposals, changed circumstances, and new regulations to determine whether impacts from activities at SNL/CA remain within the envelope of consequences established in the 2003 site-wide environmental analysis. Following the screening analysis, a determination was published in a supplement analysis document, which indicated that the environmental impacts of current (circa 2012) and projected operations were within the envelope of consequences established in the 2003 site-wide environmental analysis. In 2024, SNL/CA staff continued working on a new screening analysis comparing current and planned operations to the 2003 site-wide environmental analysis and 2012 screening analysis.

Applicable regulations for NEPA compliance are listed in Section 8.1.1.

Program Activities and Results 2024: National Environmental Policy Act

NEPA Program personnel continued to participate in process improvement activities with the NNSA Sandia Field Office in 2024, resulting in alignment on terminology, roles and responsibilities, and both short- and long-term process improvements.

In 2024, NEPA Program personnel reviewed 60 NEPA checklists for activities at SNL/CA. Of these, 59 checklists were determined to describe activities and operations that had been analyzed in previously published NEPA documents (Table 7-1). The remaining checklist described activities and operations that had not been analyzed previously in existing NEPA documents and was sent to the NNSA Sandia Field Office NEPA Compliance Officer for review and determination. The NEPA Compliance Officer cited a single categorical exclusion in the determination, which declares that operations would not significantly impact the environment (Table 7-2).

In addition to reviewing checklists, Sandia NEPA program personnel continued working on the 2023 Corrective Action Plan that was developed to create efficiencies and ensure deliverables are comprehensive, actionable, and adherent to statutory and regulatory requirements. The goal of the Corrective Action Plan is to better facilitate NNSA decision making to effect efficient mission execution at Sandia. In calendar year 2024, the NEPA program completed 85% of the objectives outlined in the 2023 Corrective Action Plan. NEPA Program personnel continued to provide ongoing support for NEPA and related environmental documentation requirements for various construction projects that are in the design phase.

Table 7-1. NEPA documents cited in Sandia determinations for activities at SNL/CA, 2024

Cited Documents in Sandia Determinations	NEPA Document	Number of Citations
SWEA DOE/SWEA-1422	Final Site-Wide Environmental Assessment for Sandia California (2003)	59
Various	Quality assurance review of previously determined activities	13

SWEA = site-wide environmental analysis

Table 7-2. Categorical exclusion cited by Sandia Field Office NEPA Compliance Officer in determinations for activities at SNL/CA, 2024

Categorical Exclusions Cited	Number of Citations
B1.23 Demolition/disposal of buildings	1

Each year, NEPA Program personnel compare actual site operations to the maximum operations scenarios presented in the 2003 NNSA site-wide environmental assessment and a supplement analysis completed in 2012 to determine whether operations at SNL/CA remain within the envelope of the environmental impact analysis. Table 7-3 summarizes the 2024 comparison and an evaluation of results.

Table 7-3. Comparison of operations with site-wide environmental assessment and supplemental analysis envelope, 2024

Activity or Unit	Maximum Operations in SWEA and Supplemental Analysis Envelope	2024	Site Operations Remain within SWEA and Supplemental Analysis Envelope
Arroyo Seco improvements	20 tasks	20 tasks; improvements completed	Yes
Demolition, real property	100,000 square feet	76,573 square feet as of December 31, 2024	Yes
Increased operations	Increase to 2 shifts	1 shift	Yes

Activity or Unit	Maximum Operations in SWEA and Supplemental Analysis Envelope	2024	Site Operations Remain within SWEA and Supplemental Analysis Envelope

New facility construction	• 105,000 gross square feet of new building space
	  • 5,000-square-foot badge office
	  • new 16,000-square-foot laboratory
	  • 84,000-square-foot laboratory replacement for Building 916
		• 82,050 gross square feet of new building space
		  • Includes Limited Area Multi-Program Secure Offices (26,777 gsf) and High Bay (17,000 gsf), and Modular Office Park for High-Security Programs (7,000 gsf)
			Yes

Site mission work	Supports DOE /NNSA and U.S. Department of Homeland Security	No change	Yes
Land Use			
Area designated for new construction	93 acres	95 acres	Yes, change was evaluated in subsequent NEPA documents
Wildlife reserve	30 acres minimum	106 acres	Yes
Geology and Soil			
Backfill material brought on-site	6,000 cubic yards per year	< 500 cubic yards[b] per year	Yes
Soil managed on-site	5,000 cubic yards per year	< 5,000 cubic yards[b] per year	Yes
Soil removed	5,000 cubic yards per year	< 500 cubic yards per year	Yes
Solid waste management units	23 units total	22 units[a]	Yes
Infrastructure			
Electricity use	48,800 megawatt hours per year	37,470 megawatt hours per year	Yes
Natural gas use	94 million cubic feet per year	48.9 million cubic feet per year	Yes
Sanitary sewer discharge	29.1 million gallons per year	8.1 million gallons per year	Yes
Water use	91.8 million gallons per year	30.8 million gallons per year	Yes
Impervious surface area	140 acres	Approximately 101 acres	Yes
Biological and Ecological Resources			
Flood plain construction along the Arroyo Seco	1,800 linear feet	162 linear feet as of December 31, 2018	Yes
Riparian habitat creation	0.2 acres	5.414 acres as of December 31, 2024[c]	No, Positive impact
Ground disturbance in or along the Arroyo Seco	10 acres	< 6 acres as of December 31, 2018	Yes
Cultural Resources			
None known on-site		No change	Yes
Waste Generation			
Hazardous waste	133,820 kg per year	31,639 kg per year	Yes
Radioactive waste	8,811 kg per year	0 kg per year	Yes
Solid waste (nonhazardous, excludes construction debris)	378.7 metric tons per year	113 metric tons per year[d]	Yes

Activity or Unit	Maximum Operations in SWEA and Supplemental Analysis Envelope	2024	Site Operations Remain within SWEA and Supplemental Analysis Envelope
Transportation			
Hazardous or radioactive waste shipments	116 shipments per year	63 shipments per year	Yes
Nonhazardous solid waste shipments to landfill	80 shipments per year	93 shipments per year	No
Air Emissions			
Permits	57 permits annually	10 permits annually[f]	Yes
Radioactive emissions	0 emissions annually	0 emissions annually	Yes
Total air toxins	2,880.16 kg per year	535 kg per year[e]	Yes
Total criteria pollutants	8,212 kg per year	5,316 kg per year[e]	Yes
Human Health			
Lost work day cases	19 cases annually[g]	5 cases annually	Yes
Recordable accidents and injuries	78 accidents and injuries annually	36 accidents and injuries annually	Yes
Socioeconomics			
Employment	Up to 1,931 persons annually	2,094 persons annually[h]	No

[a] One solid waste management unit was removed from the site.
[b] No data was available for 2024.
[c] An increase in riparian acreage was in response to the Arroyo Seco Improvement Program.
[d] Routine waste was sent to the landfill.
[e] Annual emissions were calculated by multiplying the daily emissions reported in the BAAQMD Permit to Operate by 365. Emissions for 2024 are based on 2023 data.
[f] Data are provided for the July 1, 2023, to June 30, 2024 (nine permitted sources) and July 1, 2024, to June 30, 2025 (10 permitted sources) permit periods. See Table 8-8 for more information.
[g] Extrapolated from historical average.
[h] SNL/CA employees and on-site subcontractors. Data from December 2024.
SWEA = site-wide environmental assessment

7.2 Chemical Management Program

Chemical Management Program personnel support all projects and activities involving the handling or use of chemicals at SNL/CA. The SNL/CA Chemical Management Program is part of the Sandia corporate chemical management program.

Sandia's Chemical Information System is a comprehensive chemical information tool used to track workplace chemical and biological containers by location. The primary drivers for the Chemical Information System are state and federal regulations, including the Emergency Planning and Community Right-to-Know Act (EPCRA). These are listed in Section 8.1.1. The Chemical Information System compiles information concerning chemical hazards and appropriate protective measures for Emergency Management operations, other Environment, Safety, and Health (ES&H) programs, and the workforce.

The information system provides the chemical or product name, its location and quantity, and information about who is responsible for the chemical. Chemical hazards are reported on safety data sheets, and the Chemical Information System currently contains more than 130,000 safety data sheets in its library for use by any Sandia site. This electronic inventory helps chemical users and their managers assess and manage workplace hazards. Easy access

to this inventory facilitates more efficient chemical availability searches. It also improves the ability to share chemicals and thus help reduce sources, which helps to minimize chemical purchases and waste disposal expenses.

Chemical Management Program personnel count and verify the number of hazardous materials containers in inventory at SNL/CA annually. Inventory results are used to encourage chemical owners to right-size inventories and minimize the use of higher-toxicity materials through chemical exchange or reduction.

A pre-procurement module, ChemPro, is used to request permission for new chemical purchases. The system runs a series of queries, comparing the requested purchasing information to regulatory limits, and determines whether the requested chemical and volume is approved for use and storage in the specified location. If approved, the requestor is given a chemical approval number, which must be provided to the chemical vendor as part of the purchasing process. ChemPro allows for proactive environmental and safety planning.

The Chemical Exchange Program was developed as a hazardous waste minimization management program. The Chemical Exchange Program's goal is to reduce the amount of usable chemicals disposed of as waste and instead make them available for reuse, thereby lowering the cost for both new acquisitions and disposal. The Chemical Exchange Program is a module within the Chemical Information System.

Program Activities and Results 2024: Chemical Management

In 2024, chemical containers were tracked along with information about any related chemical hazards listed in the Chemical Information System. Sandia personnel continued to use ChemPro to request permission for new chemical purchases in 2024. The Chemical Exchange Program was not utilized in 2024 largely due to lack of a central storage location for chemicals donated for reuse. However, the overall trend for chemical container count was down. There were approximately 1000 more chemicals disposed of than new chemicals purchased in 2024.

7.3 Oil Storage Program

Oil Storage Program activities support regulatory compliance associated with the management, operation, and maintenance of oil storage containers and equipment. As required by both 40 CFR 112, *Oil Pollution Prevention*, and California Health and Safety Code Division 20, Chapter 6.67 § 25270–25270.13, *Aboveground Storage of Petroleum Act*, Oil Storage Program personnel maintain and implement the *Sandia National Laboratories, CA Spill Prevention, Control, and Countermeasure Plan*, which describes the oil storage facilities at SNL/CA and the mitigation controls in place to prevent inadvertent discharges of oil. Applicable regulations for the management, operation, and maintenance of oil storage containers and equipment are listed in Section 8.1.1.

The oil storage capacity at SNL/CA is approximately 17,404 gallons. The inventory of oil storage containers at SNL/CA operating under the *Sandia National Laboratories, CA Spill Prevention, Control, and Countermeasure Plan* includes bulk storage containers and oil-filled operation equipment containers. Bulk storage containers include fixed, portable, and mobile containers. Oil-filled operational equipment containers are associated with electrical,

hydraulic, and metal machining equipment. These oil storage container capacities range from 55 gallons to 2,400 gallons. No underground oil storage tanks are present at SNL/CA.

All oil storage locations with regulated containers are equipped with passive and/or active secondary containment. Passive secondary containment structures include concrete-lined basins, containment reservoirs, double-wall tanks, sloped pads, trenches, and containment pallets. Active secondary containment measures include sorbent materials, spill kits, and drain covers.

Program Activities and Results 2024: Oil Storage

In 2024, Oil Storage Program personnel conducted an annual inspection of all stationary fixed bulk storage containers in accordance with the Steel Tank Institute/Steel Plate Fabricators Association standard SP001, "Standard for the Inspection of Aboveground Storage Tanks" (STI/SPFA 2001). The annual inspections found all stationary fixed bulk storage containers in compliance.

Oil Storage Program personnel also conducted annual training for oil-handling personnel as required by both 40 CFR 112, *Oil Pollution Prevention*, and California Health and Safety Code Division 20, Chapter 6.67 § 25270–25270.13, *Aboveground Storage of Petroleum Act*.

7.4 Pollution Prevention and Waste Minimization Program

The Pollution Prevention and Waste Minimization Program is a central element in the Environmental Management System and applies to all activities that involve procuring and using resources and generating waste. Program personnel provide guidance and specify strategies and methods for reducing the quantity and toxicity of waste and pollutants, conserving energy and resources, and purchasing environmentally preferable products. Program personnel also work closely with other organizations at SNL/CA to establish routine and project-specific recycling programs. The Pollution Prevention and Waste Minimization Program focus areas include waste minimization, sustainable acquisitions, electronics stewardship, recycling, and awareness and outreach. Pollution prevention and waste minimization activities are conducted in accordance with applicable regulations and permits as discussed in Section 8.1.1 and Section 8.7, respectively.

7.4.1 Sustainable Acquisition

Sustainable acquisitions include integrating products with reduced environmental impact into purchase agreements and ongoing operations and maintenance. Products containing recycled and biobased content, those designed with identified environmentally preferable attributes, and those with third-party certified green labels are preferred.

The Sustainable Facilities Tool (SFTool+), previously known as Ecomedes, allows Sandia-delegated representatives and subcontractors to search for sustainable products as well as report the use of applicable products outlined in the 350APR clause of their contract. The 350APR clause is the "green language" clause in subcontractor contracts that includes the verbiage to provide services to promote the expanded use of green products, reduce greenhouse gas emissions, and protect the health and well-being of occupants, service providers, and visitors in an NTESS-controlled facility. Sandia-delegated representatives and subcontractors continued to use SFTool+ in 2024 to maintain regulatory compliance.

Program Activities and Results 2024: Pollution Prevention and Waste Minimization—Sustainable Acquisition

In 2024, additional training on using SFTool+ was provided to Sandia-delegated representatives and construction subcontractors. Emails were also sent quarterly to remind users to report sustainable product purchasing in SFTool+, which increased the use of SFTool+.

7.4.2 Electronic Stewardship

Sandia procurement personnel are committed to purchasing electronic equipment that is registered in the Electronic Product Evaluation Assessment Tool. Products registered in this tool are considered to be green electronics. Registered equipment has been designed with the environment in mind. Green electronics are defined as equipment whose manufacture, operation, and end-of-life disposition have lower environmental impacts than electronics not registered in the Electronic Product Evaluation Assessment Tool registry.

Program Activities and Results 2024: Pollution Prevention and Waste Minimization—Electronic Stewardship

In 2024, percentages for Electronic Product Evaluation Assessment Tool electronics purchases at SNL/CA were as follows:

- Imaging equipment: 100 percent
- Mobile phones: 100 percent
- Computers and displays: 96.2 percent
- Televisions: 100 percent
- Servers: 96.2 percent

7.4.3 Solid Waste Disposal and Recycling

Municipal solid waste and construction and demolition debris suitable for reuse or recycling are diverted from landfills, thereby minimizing the economic and environmental impacts of waste disposal. Alameda County Municipal Code, Title 6, Chapter 6.40, *Solid Waste Collection and Organic Waste Reduction*, and Alameda County Recycling Ordinance 2021-02, *Organics Reduction and Recycling Ordinance,* both have targets for businesses such as Sandia to reduce the amount of organic and recyclable materials deposited in a landfill by 75 percent by 2025. Sandia's corporate goal is to divert 90 percent of waste from going to a landfill by 2025.

Municipal solid waste and construction and demolition waste landfilled are summarized in Table 7-4 and recycled are summarized in Table 7-5.

Table 7-4. Municipal solid waste and construction and demolition waste landfilled in 2024.

Waste Type	Waste Landfilled (pounds)
Municipal solid waste	249,160
Construction and demolition waste	63,288
Total	**312,448**

Table 7-5. Municipal solid waste and construction and demolition waste recycled in 2024.

Waste Type	Waste Recycled (pounds)
Municipal solid waste	543,430
Construction and demolition waste	163,112
Total	**706,542**

In 2024, the municipal solid waste recycled at SNL/CA included the following waste streams:

- 3D printer cartridges
- Compost (food and green waste)
- Equipment (donated/auction or trade-in)
- Food grease
- Mixed recyclables (includes cardboard, plastic, beverage containers)
- Paper
- Scrap metal
- Wood (nontreated)

In 2024, the construction and demolition waste recycled at SNL/CA included the following waste streams:

- Asphalt
- Cardboard
- Concrete
- Green waste
- Mixed recyclables
- Plastic
- Scrap metal
- Sheetrock and wallboard
- Wood (nontreated)

Program Activities and Results 2024: Pollution Prevention and Waste Minimization—Solid Waste Disposal and Recycling

During fiscal year 2024, (October 1, 2023, through September 30, 2024, the most recent period for which data is available), the total diverted waste that includes both municipal solid waste and construction and demolition waste increased from 80 percent in fiscal year 2023 to 86 percent in fiscal year 2024. The municipal solid waste diversion that excludes construction and demolition waste decreased from 74 percent in fiscal year 2023 to 71 percent in fiscal year 2024.

There were 93 shipments of nonhazardous waste that included both municipal solid waste and construction and demolition waste from SNL/CA in calendar year 2024. This exceeded the maximum operation number of shipments (80) identified in the site-wide environmental

assessment (DOE/SWEA-1422) (Table 7-3), but the 113.0 metric tons (249,160 pounds) of municipal solid waste sent to a landfill was below the annual weight (378.7 metric tons) identified in the site-wide environmental assessment. In addition, the number of shipments increased by 4 from 89 shipments in calendar year 2023 to 93 shipments in 2024. The increase in shipments in calendar year 2024 was due to extra municipal solid waste routine pickups.

7.4.4 Awareness and Outreach

Pollution Prevention and Waste Minimization Program personnel promote the use of available resources to decrease the environmental impact of existing operations. Various communication tools are used to increase awareness about and bolster participation in recycling, composting, and acquiring sustainable products. Major outreach efforts included an awareness campaign to all employees about the installation of new outdoor bins and guidance describing the types of materials that should be placed in each bin. The bins included individual bins for recycling, compost, and solid waste (garbage). An Earth Day event was hosted at the SNL/CA site on April 24, 2024. The Earth Day event was a collaboration with LLNL and external agencies to promote innovative technologies and sustainable materials.

7.5 Waste Management Program

Personnel at SNL/CA follow the waste management hierarchy dictated in the Pollution Prevention Act of 1990 and reinforced in RCRA amendments. The objective is to reduce, reuse, or recycle waste (in that order), as appropriate, before any treatment or disposal. Waste management activities are conducted in accordance with applicable regulations and permits as discussed in Section 8.1.1 and Section 8.7, respectively.

Waste Management Program personnel are responsible for managing hazardous, radioactive low-level, and mixed (combination of radioactive low level and RCRA and/or non-RCRA hazardous) wastes generated on site. Program personnel collect waste from the point of generation and transfer it to on-site waste storage facilities for storage, consolidation, commingling, and packaging. Program personnel also establish and maintain contracts for off-site recycling, treatment, and disposal of wastes. A list of the contracted offsite commercial waste vendor facilities that were used by SNL/CA in 2024 are listed in Section 9.3, along with any associated audit information for those facilities.

In addition, Waste Management Program personnel provide regulatory oversight in accordance with federal, state, and local regulations; manage the RCRA and tiered permit process; and implement RCRA and tiered permit conditions. Program personnel conduct process knowledge evaluations to characterize waste types generated from specific operations and provide waste generator training to the workforce at SNL/CA.

Waste Management Program personnel are also responsible for managing medical wastes generated by SNL/CA operations and for establishing and maintaining contracts for off-site disposal of medical wastes.

7.5.1 Types and Amounts of Waste Managed and Shipped

Wastes are generated during daily activities that include research and development, maintenance, and support operations (e.g., construction, renovation, decommissioning and demolition, and waste management activities). Wastes include the following:

- Construction and demolition waste
- Hazardous waste
- Medical waste
- Mixed waste (combination of radioactive low-level and RCRA and non-RCRA hazardous)
- Municipal solid waste
- Radioactive waste (including low-level radioactive waste and transuranic waste)
- Toxic Substances Control Act waste (includes asbestos and PCBs)

Types of regulated waste managed at and shipped from SNL/CA in 2024 are summarized in Table 7-6. Hazardous wastes recycled in 2024 are summarized in Table 7-7.

Table 7-6. Waste shipped by waste category, 2024

Waste Category	Waste Shipped (pounds)
Radioactive waste	
Low-level radioactive waste	0
Transuranic waste	N/A
Mixed radioactive and hazardous waste	
Mixed low-level radioactive waste	0
Mixed transuranic waste	N/A
Total radioactive and mixed waste	**0**
RCRA waste	
Hazardous waste	33,304
Non-RCRA waste	
Hazardous waste	35,004
Toxic Substances Control Act waste	
Asbestos and PCBs	1,444
Total hazardous waste	**69,752**
Medical waste	
Medical waste	121
Total medical waste	**121**

Note: All wastes were shipped off-site for treatment and/or disposal. Wastes that were treated on-site and shipped off-site are included in the quantities of wastes shipped off-site.
N/A = not applicable

Table 7-7. Hazardous waste recycled, 2024

Hazardous Waste	Waste Recycled (pounds)
Batteries (e.g., alkaline, lead or acid)	8,697
Computers and electronics	38,791
Lead	14

Hazardous Waste	Waste Recycled (pounds)
Light tubes	2,081
Toner and ink cartridges	1,301
Shredded plastic	474
Total hazardous waste recycled	**51,358**

7.5.2 Waste Management Locations

A waste treatment and storage facility is operated at SNL/CA for hazardous, radioactive low-level, and mixed low-level (combination of radioactive low-level and RCRA and/or non-RCRA hazardous) wastes generated on site. The facility consists of Building 9611 and Building 961.

Building 9611 is used to treat and store hazardous waste generated from site operations, including research and development, maintenance, and support operations (e.g., construction, renovation, decommissioning and demolition, and waste management activities).

Building 961 is used to store low-level radioactive and mixed wastes generated from site operations. Low-level radioactive and mixed wastes generally consist of laboratory waste, debris from maintenance activities, debris from decontamination and demolition activities, and personal protective equipment. Low-level radioactive waste is contaminated primarily with tritium and/or depleted uranium.

Hazardous, radioactive, and mixed waste is generated at multiple locations sitewide. Medical waste is generated at Building 925 and Building 968. Waste is always managed to protect human health and the environment. Wastes are not disposed of at SNL/CA.

7.5.3 Hazardous and Mixed Waste Permit

The waste management facility (Building 9611 and Building 961) is managed and operated under an RCRA hazardous waste facility permit issued by the California Department of Toxic Substances Control on October 25, 2018. The permit is effective for 10 years, through October 2028, and allows for storing, consolidating, commingling, and packaging hazardous waste.

Program Activities and Results 2024: Waste Management—Hazardous and Mixed Waste Permit

In 2024, there were no modifications to the hazardous waste facility permit.

7.5.4 Hazardous Waste

Hazardous waste generated at SNL/CA includes a wide variety of wastes from research and development, together with larger quantities of wastes from decontamination and demolition, maintenance, and support operations, including waste management activities. Hazardous wastes that cannot be recycled or treated on site are sent to off-site facilities for treatment, as needed, before disposal at permitted off-site facilities. Applicable regulations for managing hazardous waste are listed in Section 8.1.1. The amounts and types of hazardous waste managed and shipped in 2024 are reported in Table 7-6.

Explosives waste is generated and managed at the point of generation until it is shipped to an off-site facility for treatment in accordance with regulatory requirements.

In accordance with the RCRA hazardous waste facility permit, NNSA and Sandia personnel annually certify that there is a "program in place to reduce the volume and toxicity of hazardous waste generated by the facility's operation to the degree determined by the Permittee to be economically practicable" at SNL/CA. Sandia personnel investigate and implement waste minimization efforts.

Many types of hazardous waste are recycled where feasible. Recycled hazardous waste includes various batteries, shredded plastic, electronic devices, lamps, and toxic metals such as lead. The amounts and types of hazardous waste recycled in 2024 are reported in Table 7-7.

Program Activities and Results 2024: Waste Management—Hazardous Waste

During 2024, Waste Management Program personnel prepared required regulatory reports, and managed and shipped 121,110 pounds of hazardous waste for recycling or disposal as appropriate.

7.5.5 Medical Waste

Medical waste is generated in two facilities at SNL/CA. One facility is permitted as a small-quantity generator without on-site treatment, and the other facility is a large-quantity generator with on-site treatment. Medical wastes that cannot be treated on-site are sent for disposal at permitted off-site facilities. Applicable regulations for managing medical waste are listed in Section 8.1.1. The amount of medical waste managed and shipped in 2024 is reported in Table 7-6.

Program Activities and Results 2024: Waste Management—Medical Waste

During 2024, Waste Management Program personnel prepared required regulatory reports and managed and shipped 121 pounds of medical waste for disposal.

7.5.6 Radioactive and Mixed Waste

NNSA and Sandia personnel manage low-level radioactive waste and low-level mixed (combination of radioactive low level and RCRA and/or non-RCRA hazardous) waste that is generated through a variety of processes, including research, decontamination and demolition, and waste management activities. Neither high-level radioactive waste nor transuranic waste is generated at SNL/CA. Applicable regulations for managing low-level radioactive waste and low-level mixed waste are listed in Section 8.1.1. The amounts and types of low-level radioactive waste and low-level mixed waste handled and shipped in 2024 are reported in Table 7-6.

All radioactive waste and mixed waste generators are required to contact Radioactive Waste Program personnel at SNL/NM to obtain approval before generating waste. This promotes waste minimization and ensures that a waste treatment and disposal plan is in place before the waste is generated.

Waste Management Program personnel at SNL/NM oversee the management of low-level radioactive waste generated at SNL/CA. Radioactive wastes typically are shipped to off-site facilities within one year but may remain on site longer than one year if necessary to complete the process for acceptance at an off-site facility and/or to achieve full utilization of transport vehicles.

Mixed wastes are managed under federal (RCRA) and state (22 CCR, Social Security, Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste") waste regulations and are well below the total effective dose of 100 mrem. The waste is shipped off site for treatment and disposal at commercial disposal facilities.

Program Activities and Results 2024: Waste Management—Radioactive Waste and Mixed Waste

During 2024, there was no low-level radioactive waste or low-level mixed waste shipped.

7.5.7 Pollutants Released to the Ground or Groundwater

Waste Management Program personnel track chemical spills to the ground surface that are observed or reported throughout the year. Typical materials spilled include motor oil, hydraulic oil, and coolants. The spill response team cleans up small releases to the ground surface within a few hours.

Program Activities and Results 2024: Waste Management—Pollutants Released to the Ground or Groundwater

Five releases to the ground surface resulted in an estimated total of 152 gallons released in 2024. Information on these releases is presented in Table 7-8. The spills did not reach groundwater or a storm drain and were promptly cleaned up by Sandia personnel.

Table 7-8. Chemical spills to ground surface

Date	Location	Amount Spilled	Description
1/24/24	968/120	150 gallons	Water with low level beta radiation
4/8/24	Post 10	½ gallon	Hydraulic Oil
6/17/24	906/102	1 liter	Methanol and Laser Dye
11/5/24	972/Outside	1 liter	Sulfuric Acid 30%
12/6/24	968/120	1 gallon	Water with low level beta radiation

7.6 Fire Protection and Management

Wildland Fire Management at SNL/CA is managed by a cross disciplinary team that includes Safety, Environmental, Fire Protection and Facilities organizations within Sandia.

Grass fires are a significant fire risk at SNL/CA due to the presence of tall dry vegetation in the grassland areas of the campus and the proximity of these grassland areas to campus buildings and abutting nearby housing developments, wineries and cattle grazing spaces. Given this risk, SNL/CA provides extra emphasis on preventing a wildland fire that starts on SNL/CA property. This is done by controlling access to and activities within the outer perimeter area and undeveloped areas in accordance with the fire hazard present at the time.

This is accomplished through implementation of a permit process for off road driving and construction activities in the outer perimeter area as described in an SNL/CA operating procedure. This procedure, which applies to all site personnel with an official need for pedestrian, vehicular, or construction-related access to the outer perimeter area or undeveloped area, requires an assessment of the work area for potential fire hazard. The assessment of the relative fire hazard of the activity determines which preventive measures are required. This assessment is performed by an interdisciplinary team including but not limited to, ecology, environmental monitoring and fire protection programs.

Prior to the start of the wildland fire season (typically in May/June), the entire outer perimeter area is mowed to control vegetation growth and reduce the fuel load available for a fire. Mowing lowers the intensity of any grass fires that do start and decreases the likelihood of a fire starting when activities require vehicular off-road access. In the event of a fire, Alameda County Fire Department (ACFD) Station 20, located on the Lawrence Livermore Laboratory property adjacent to SNL/CA, provides the primary response with other stations available for support as needed. In the case where ACFD needs assistance in addressing one or multiple events, letters of agreement have been established for additional support. ACFD has agreements with the following jurisdictions:

- Automatic Aid Agreement with the Livermore-Pleasanton Fire Department
- Alameda County Mutual Aid Agreement
- Mutual Threat Zone MOU with California Division of Forestry
- Mutual Fire Protection Resources Agreement with City of Livermore

Program Activities and Results 2024: Fire Management

In 2024, 30 Off Road Access permits were processed. One fire was recorded in 2024. A golf cart battery caught fire. Personnel at the scene used an ABC fire extinguisher to put out the fire. Livermore/Pleasanton Fire Department responded and deemed the scene safe.

Chapter 8. Compliance Summary

Bobcat (*Lynx rufus*)

OVERVIEW ▪ Sandia operations are required to comply with federal, state, and local environmental statutes, regulations, executive orders, and DOE directives. Audits, appraisals, and inspections are conducted to ensure Sandia operations comply with them and to identify areas for improvement as well as noteworthy practices.

Operations at SNL/CA are required to comply with federal, state, and local environmental requirements, including DOE directives and presidential executive orders. As part of this compliance, personnel adhere to reporting and permitting requirements. Permits and registrations in effect in 2024 are listed in Section 8.7.

All operations and activities at SNL/CA, including those that are part of environmental programs, are performed under Sandia's ES&H policy, which includes the following statement:

Sandia integrates environment, safety, and health throughout the lifecycle of its operations to ensure the:

- Protection of Members of the Workforce by providing a safe and healthful workplace.
- Protection of the environment by preventing or minimizing pollution and waste, pursuing sustainable resource use, and protecting biodiversity and ecosystems.
- Protection of the public through the prevention or minimization of releases of hazardous materials.
- Compliance with applicable ES&H requirements, including contractual requirements.
- Establishment, measurement, and monitoring of ES&H objectives to enhance performance and drive continual improvement.

An integrated safety management system is used to incorporate safety into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment. Thus, management of safety functions becomes an integral part of mission accomplishment and meets requirements outlined by NNSA. Five core functions guide the integration of safety into all work practices: define the scope of work, analyze the hazards, develop and implement hazard controls, perform work within controls, and provide feedback for continuous improvement.

8.1 Environmental Compliance

The management and operating contract, also referred to as the Prime Contract, for Sandia serves as the overarching agreement between the NNSA and NTESS. The Prime Contract requires NTESS to comply with specific DOE directives as well as applicable federal, state, and local requirements for the management and operation of Sandia.

8.1.1 Sustainability

Energy Independence and Security Act

The Energy Independence and Security Act, enacted in 2007, requires Federal agencies to submit an annual government efficiency status report on compliance with the implementation of initiatives to improve energy efficiency, reduce energy costs, lower greenhouse gas emissions, and savings to U.S. taxpayers resulting from mandated improvements. DOE SPO uses data from the annual Site Sustainability Plan to produce the DOE's Annual Energy Management Report.

Disaster Resiliency Planning Act

The Disaster Resiliency Planning Act, enacted in 2022 (31 USC § 501 2022) requires, each agency head to incorporate natural resilience into real property asset management and investment decisions made by the agency. A Vulnerability Assessment and Resilience Plan is prepared to meet this requirement.

8.1.2 Cultural Resources

American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978, as amended in 1994 (PL 103-344 1994), a federal law and joint resolution of Congress, protects and preserves the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and native Hawai'ians.

Compliance activities include the following:

- Conduct cultural resource surveys and monitor construction activities.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.
- Support consultation with American Indian tribes.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act of 1979 (PL 96-95 1979) secures, for the present and future benefit of the American people, the protection of archaeological resources and sites that are on public lands and Indian lands, and fosters increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals. Section 4 of the statute and sections 16.5 to 16.12 of the regulations describe the requirements that must be met before federal authorities can issue a permit to excavate or remove any archaeological resource on federal or Indian lands. The curation requirements of artifacts, other materials excavated or removed, and the records related to the artifacts and materials are described in Section 5 of the act. These regulations affect all federally owned or administered archaeological collections.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys and monitor construction activities.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.

DOE O 144.1, Department of Energy American Indian Tribal Government Interactions and Policy

DOE O 144.1, *Department of Energy American Indian Tribal Government Interactions and Policy* (DOE O 144.1 2009), sets forth the principles to be followed by DOE to ensure effective implementation of government-to-government relationships with American Indian and Alaska Native tribal governments. This order provides direction to all DOE officials, staff, and contractors regarding fulfillment of trust obligations and other responsibilities arising from DOE actions that may potentially impact American Indian and Alaska Native traditional, cultural, and religious values and practices; natural resources; and treaty and other federally recognized and reserved rights.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys and monitor construction activities.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.
- Support consultation with American Indian Tribes.

DOE O 430.1C, Real Property Asset Management

DOE O 430.1C, *Real Property Asset Management* (DOE O 430.1C 2019), establishes an integrated corporate-level, performance-based approach to the life-cycle management of real property assets. It links real property asset planning, programming, budgeting, and evaluation to the multifaceted DOE missions. Successful implementation of this order will enable DOE to carry out stewardship responsibilities and will ensure that facilities and infrastructure are sized properly and in a condition to meet mission requirements today and in the future.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys and monitor construction activities.
- Survey property to determine eligibility for inclusion in the National Register of Historic Places.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.

DOE P 141.1, Management of Cultural Resources

The purpose of DOE P 141.1, *Management of Cultural Resources* (DOE P 141.1 2011), is two-fold: (1) to ensure that all DOE programs and field elements integrate cultural resources management into their missions and activities and (2) to raise the level of awareness and accountability among DOE contractors concerning the importance of DOE cultural resource-related legal and trust responsibilities.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys and monitor construction activities.
- Survey property to determine eligibility for inclusion in the National Register of Historic Places.
- Prepare documentation to support planning activities and decisions.

National Historic Preservation Act, Section 106

The National Historic Preservation Act of 1966 (PL 89-665 1966), as amended and codified in 16 U.S.C., Conservation (16 U.S.C. 2016), is intended to preserve historical and archaeological sites in the United States. The act sets federal policy for preserving our

nation's heritage by establishing a federal government and tribal government partnership, establishing the National Register of Historic Places and National Historic Landmarks Programs, mandating the selection of qualified State Historic Preservation Officers, establishing the Advisory Council on Historic Preservation, charging federal agencies with responsible stewardship, and establishing the role of certified local governments within the states.

The National Register of Historic Places (36 CFR 60 2012) is authorized by the National Historic Preservation Act of 1966. It is the federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation for their historical significance at the national level.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys to determine eligibility for inclusion in the National Register of Historic Places.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.
- Conduct cultural resource surveys and monitor construction activities.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (PL 101-601 1990) developed a systematic process for determining the rights of Indian tribe and Native Hawai'ian lineal descendants and their representative organizations to protect certain Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony with which they are affiliated.

Compliance activities include the following:

- Develop internal management plans.
- Conduct cultural resource surveys and monitor construction activities.
- Prepare documentation to support planning activities and decisions.
- Review NEPA checklists to identify impacts on cultural resources.

Chapter 2 provides information on the Cultural Resources Program at SNL/CA.

8.1.3 Natural Resources

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act, enacted in 1940 (16 USC § 668-668d 1940), prohibits the taking or possession of and commerce in bald and golden eagles, or parts thereof with limited exceptions.

Compliance activities include the following:

- Conduct biological evaluations and inventory surveys.
- Consult with the U.S. Fish and Wildlife Service as appropriate.

Section 3.4 provides information on the avian surveillance element of the Ecology Program.

Endangered Species Act

The Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq. 1973), amended in 1982, provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found.

The U.S. Fish and Wildlife Service and the National Marine Fisheries Service are the lead federal agencies for implementing the act. The U.S. Fish and Wildlife Service maintains a worldwide list of endangered species; species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees.

Compliance activities include the following:

- Collect ecological data.
- Provide ecological surveillance for maintenance of regulatory compliance.
- Consult with the U.S. Fish and Wildlife Service as appropriate.

Section 3.5 provides more information on threatened and endangered species that may occur at SNL/CA.

Fish and Wildlife Conservation Act and Lacey Act

The Fish and Wildlife Conservation Act, (16 U.S.C. § 49 1980) enacted in 1980, and the Lacey Act Amendments of 1981 (16 U.S.C. 3371-3378 1981), were established so that wildlife will receive equal consideration with other natural resources regarding maintenance of the ecosystem.

Relevancy to an ecological program is stated in 16 U.S.C. 661, Conservancy, which states that the purpose is as follows: "(1) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species… (2) to make surveys and investigations of the wildlife of the public domain."

Compliance activities include the following:

- Consider Fish and Wildlife Conservation Act compliance when evaluating NEPA checklists.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 USC § 703 et seq. 1918) implemented the 1916 convention for the protection of migratory birds. The original statute implemented the agreement between the United States and Great Britain (for Canada), and later amendments implemented treaties between the United States and Mexico, the United States and Japan, and the United States and Russia. The act prevents the taking, possession, killing, transportation, and importation of migratory birds or their eggs, parts, and nests. To avoid harming birds, nests, or eggs, activities at SNL/CA are delayed or are monitored and modified to avoid disturbing a nest before the young have fledged or until surveys determine that the nest is abandoned.

Compliance activities include the following:

- Collect ecological data.
- Provide ecological surveillance for maintenance of regulatory compliance.
- Consult with the U.S. Fish and Wildlife Service as appropriate.

Section 3.4 provides information on the avian surveillance element of the Ecology Program.

Interim Protections for California Red-Legged Frogs

In October 2006, interim restrictions on pesticide use went into effect to protect the California red-legged frog. The restrictions are the result of a settlement agreement between the EPA and the Center for Biological Diversity outlined in a stipulated injunction and order (U.S. District Court 2006). The injunction restricts use of pesticides in critical habitat of the California red-legged frog as designated by the U.S. Fish and Wildlife Service and in specified non-critical habitat sections that are determined by the EPA. SNL/CA falls within one of these non-critical habitat sections as determined by the EPA.

Compliance activity includes the following:

- Review and approve all new pesticides prior to use in and along the Arroyo Seco at SNL/CA.

Section 3.5 provides more information on threatened and endangered species that may occur at SNL/CA.

California Fish and Game Code (CFGC)

The California Fish and Game Code is written in 13 Divisions, which establish the basis of fish, wildlife, and native plant protections and management in the state. Some of the more notable divisions of the code include the establishment of the California Department of Fish and Wildlife (CDFW, who oversees and enforces the policies in the code), hunting and fishing regulations, wildlife refuges and wilderness areas, and the California Endangered Species Act (CESA). Some important sections in the Fish and Game Code that concern wildlife are sections 1801 and 1802 which establish the CDFW and state policy of conservation of native species and gives CDFW the authority to review all "projects" under the California Environmental Quality Act (CEQA), which is the main driver for protection of native species and habitat. Other important sections include Section 1602 that outlines the protections and permits for Lake and Streambed alteration; Sections 83511, 4700, 5050, and 5515 which designate 37 species as Fully Protected in California. The classification of Fully Protected provides additional protection to those animals that are rare or face possible extinction. Most Fully Protected Species have also been listed as threatened or endangered species under CESA. Finally, Sections 3503, 3503.5, and 3513 protect native birds. Mitigation for avoidance of impacts to nesting birds are typically necessary to comply with these sections of the Fish and Game Code in CEQA and other permitting documents.

Compliance activities include the following:

- Annual surveys to monitor for the presence and health of native species on-site.
- Consideration of this code when evaluating NEPA checklists
- Enforcing mitigation strategies to minimize and avoid impacts to native species.

California Endangered Species Act

The California Endangered Species Act (California Fish and Game Code, Chapter 1.5, sections 2050 to 2115.5 1970) conserves and protects plant and animal species at risk of extinction. It was originally enacted in 1970, then repealed and replaced by an updated version in 1984 and amended in 1997.

The California Department of Fish and Wildlife is the agency for implementing the act.

Compliance activities include the following:

- Collect ecological data.
- Provide ecological surveillance for maintenance of regulatory compliance.
- Consult with the California Department of Fish and Wildlife as appropriate.

Section 3.5 provides more information on threatened and endangered species that may occur at SNL/CA.

Native Plant Protection Act

The California NPAA was enacted in 1977 and allows the Fish and Game Commission to designate plants as rare or endangered. There are 64 species, subspecies, and varieties of plants that are protected as rare under the NPPA. The NPPA prohibits take of endangered or rare native plants but includes exceptions for agricultural and nursery operations; emergencies; and (after properly notifying CDFW) for vegetation removal from canals, roads, and other sites, changes in land use, and in certain other situations.

EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

Requires federal agencies to recognize the critical importance of the protections for migratory birds and go above and beyond the protections that are provided in the Migratory Bird Treaty Act.

Compliance Activities include the following:

- Nest monitoring to ensure no disturbance events to migratory birds when construction work must be conducted within the vicinity of a nest
- Consulting with the USFWS as appropriate if a nest must be removed.

EO 11988, Floodplain Management

EO 11988, *Floodplain Management* (EO 11988 1977), requires federal agencies to consider impacts associated with the occupancy and modification of floodplains; reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains.

Compliance activities include the following:

- Review NEPA checklists to identify impacts on floodplains.

- Preserve and protect ecological resources.

Section 3.1 provides more information on the vegetation surveillance element of the Ecology Program.

EO 11990, Protection of Wetlands

EO 11990, *Protection of Wetlands* (EO 11990 1977), requires federal agencies to minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands.

Compliance activities include the following:

- Review NEPA checklists to identify impacts on floodplains.
- Preserve and protect ecological resources.

Section 3.1 provides information on the vegetation surveillance element of the Ecology Program.

EO 13112, Invasive Species

EO 13112, *Invasive Species* (EO 11990 1977), called upon executive departments and agencies to take steps to prevent the introduction and spread of invasive species and to support efforts to eradicate and control invasive species that are established. It also created a coordinating body—the Invasive Species Council, also referred to as the National Invasive Species Council—to oversee implementation of the order, encourage proactive planning and action, develop recommendations for international cooperation, and take other steps to improve the federal response to invasive species.

Compliance activities include the following:

- Monitor biota.
- Collect ecological data.
- Produce mitigation strategies as necessary.

EO 13751, Safeguarding the Nation from the Impacts of Invasive Species

EO 13751, *Safeguarding the Nation from the Impacts of Invasive Species* (EO 13751 2016), amended Executive Order 13112 and directs actions to continue coordinated federal prevention and control efforts related to invasive species. Sandia personnel at SNL/CA collect data on the presence of invasive species on site and mitigate them as necessary.

Compliance activities include the following:

- Monitor biota.
- Collect ecological data.
- Produce mitigation strategies as necessary.

Chapter 3 provides information on the Ecology Program at SNL/CA.

8.1.4 Air Quality

Clean Air Act

The Clean Air Act of 1970 (42 USC § 7401 1970) as amended establishes national ambient air quality standards for criteria pollutants and governs the management of regulated emissions through adherence to the conditions of permits and applicable regulations. The state of California has authority from EPA to implement the Clean Air Act. California's state implementation plan describes how national ambient air quality standards will be attained in each air district, which is responsible for regional air quality planning, monitoring, and stationary source and facility permitting. Air pollution regulations are established and enforced for each air district to attain and maintain state and federal ambient air quality standards. The BAAQMD is the regulating authority for controlling air pollution from stationary sources at SNL/CA. The California Air Resources Board is responsible for ensuring that federal and state standards are met for mobile and area sources of air pollution.

No major sources of air pollutants (as defined in 40 CFR 70.2) are present at SNL/CA. There are nine permitted sources and nine registered sources (boilers). Permit data applies to more than one permitting period in 2024 (July 2023 to June 2024 and July 2024 to June 2025). Table 8-8 provides a list of the permitted and registered sources.

BAAQMD regulates air emissions from stationary industrial air pollutant sources and develops air resource strategies that are implemented through rules and regulations to comply with the Federal Clean Air Act and protect public health and welfare.

The California Air Resources Board adopted several regulations to reduce greenhouse gases required by Assembly Bill 32. Several California Air Resources Board regulations are applicable at SNL/CA, including mobile source regulations, greenhouse emissions from gas-insulating equipment, and Refrigerant Management Program regulations.

SNL/CA is subject to one federal regulation for the protection of stratospheric ozone under EPA regulations in 40 CFR 82 and the Phasedown of Hydrofluorocarbons (AIM ACT) under EPA Regulations outlined in 40 CFR 84.

Compliance activities include the following:

- Confirm that planned stationary sources of air pollutants (e.g., equipment) and potential emissions from operations meet applicable local, state, and federal requirements.
- Maintain documentation to ensure that sources comply with regulations and permitted operating conditions.
- Submit monitoring reports, annual emissions inventories, dose assessments, and other compliance assurance documentation to regulatory agencies.

Section 5.1 provides information on air quality compliance activities in 2024.

Radionuclide Emissions

NESHAP, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (40 CFR 61), establishes radiation

protection standards, monitoring requirements, and annual reporting requirements for radionuclide air emissions.

There are no radionuclide emission sources at SNL/CA that are subject to 40 CFR 61 monitoring requirements.

Section 5.2 provides information on NESHAP activities in 2024.

8.1.5 Water Quality

Clean Water Act

The Clean Water Act of 1972 (33 U.S.C. § 1251 1972) and amendments establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. A discharge of any pollutant from a point source into navigable waters requires a permit issued under the National Pollutant Discharge Elimination System. In California, the State Water Resources Control Board has authority from EPA to implement the Clean Water Act. Federal permitting requirements are included in waste discharge requirements issued by regional water quality control boards.

The City of Livermore Water Resources Division regulates sanitary sewer discharges. Wastewater generated at SNL/CA is discharged to the Livermore Water Reclamation Plant, a publicly-owned treatment works. The Livermore plant maintains a National Pollutant Discharge Elimination System permit and regulates industry discharges into its sewer system. A wastewater discharge permit issued by the City of Livermore Water Resources Division includes discharge limits for sanitary sewer outfall and processes subject to EPA pretreatment standards (40 CFR 403, *General Pretreatment Regulations for Existing and New Sources of Pollution*).

The California State Water Resources Control Board and the San Francisco Regional Water Quality Control Board regulate stormwater discharges and enforce the Industrial General Permit. In addition to the Industrial General Permit, the California State Water Resources Control Board issues the Construction General Permit.

Compliance activities include the following:

- Monitor all wastewater discharges.
- Monitor sanitary sewer discharge at site sewer outfall.
- Develop and update stormwater pollution prevention plans, including control measures, site inspections, and annual reporting.

Chapter 6 provides information on compliance with water quality regulations.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Control Act (California Water Code, Division 7 Water Quality § 13000–16104) is the principal law governing water quality in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. Unlike the Clean Water Act, the Porter-Cologne Water Control Act applies to both surface water and groundwater.

Chapter 6 provides information on compliance with water quality regulations.

Energy Independence and Security Act, Section 438

The Energy Independence and Security Act of 2007 (42 U.S.C. § 17001 2007), Section 438, requires federal agencies to manage stormwater runoff from federal development projects for the protection of water resources.

Sandia projects undergo review to help identify the need for implementing measures to manage stormwater runoff in accordance with Energy Independence and Security Act § 438 requirements as well as the Industrial General Permit and Construction General Permit requirements. Site planning, design, construction, and maintenance strategies are applied to maintain or restore predevelopment site hydrology and applies to projects greater than 5,000 square feet.

Compliance activities include the following:

- Develop stormwater pollution prevention plans that include Energy Independence and Security Act § 438 requirements and describe compliance measures.

Section 6.2 provides information on the Stormwater Program.

Safe Drinking Water Act

The Safe Drinking Water Act of 1974, as amended (42 U.S.C. § 300f 1974), was established to protect the quality of drinking water in the United States, focusing on all waters actually or potentially designed for drinking use, whether from aboveground or underground sources.

Sandia has no ownership of any public water systems and has no environmental restoration activities for which Safe Drinking Water Act standards are being applied at SNL/CA. LLNL maintains the nonpublic primary drinking water distribution system that feeds SNL/CA.

Section 6.1 provides information on safe drinking water.

America's Water Infrastructure Act

America's Water Infrastructure Act of 2018 (33 U.S.C. § 2201 2018) is intended to improve drinking water and water quality, deepens infrastructure investments, enhances public health and quality of life, increases jobs, and bolsters the economy. This act's provisions represent changes to the Safe Drinking Water Act.

LLNL personnel maintain the nonpublic primary drinking water distribution system that feeds SNL/CA and screen for water quality. LLNL is also obligated to develop and send a consumer confidence report of the drinking water quality to Sandia personnel, displaying compliance with the EPA and California State Water Resources Control Board prescribed regulations limits.

Section 6.1 provides information on safe drinking water.

8.1.6 Environmental Restoration

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. § 9601 1980), and amended in 1986, establishes liability compensation, cleanup, and emergency response requirements for inactive hazardous waste sites.

Between 1984 and 1986, NNSA investigated SNL/CA under its Comprehensive Environmental Assessment and Response Program to identify and assess potential environmental problems (DOE 1986). During the Comprehensive Environmental Assessment and Response Program investigation, two potential CERCLA sites were identified at SNL/CA: the Fuel Oil Spill site and the Navy Landfill. A Hazard Ranking System study was performed for each site to determine whether either one qualified for listing on the EPA National Priorities List as a site that warrants further investigation for releases of hazardous substances, pollutants, or contaminants. Hazard Ranking System scores for both sites fell below 28.5, the qualifying score for being listed. Since completion of the Comprehensive Environmental Assessment and Response Program investigation, no hazardous substance releases or contaminated sites have been found at SNL/CA that warranted CERCLA investigation or a Hazard Ranking System analysis.

In addition, CERCLA requires federal facilities to report hazardous substance spills to the National Response Center and perform any necessary response action. CERCLA reporting requirements for spill prevention and spill control activities are incorporated into applicable technical work documents.

In 2024, no releases of hazardous substances on site required notification under CERCLA.

The Superfund Amendments and Reauthorization Act (SARA) Title III of 1986 (42 U.S.C. § 9601 1986) establishes additional reporting requirements that are addressed under "Chemical Management."

8.1.7 National Environmental Policy Act

National Environmental Policy Act

The National Environmental Policy Act of 1969 (42 USC § 4321 et seq. 1969) requires federal agencies to assess the impacts of proposed actions on the human and natural environment, including the physical, socioeconomic, and cultural environments, prior to making operational decisions.

Sandia personnel use an online NEPA tool that generates a checklist intended to assess proposed actions and activities and assess for potential environmental consequences and impacts. When projects or activities appear to be outside the scope of existing NEPA documentation, a new NEPA checklist is prepared and forwarded to NNSA for review and determination.

Compliance activities include the following:

- Ensure that potential environmental impacts have been assessed adequately.
- Coordinate NEPA assessments with NNSA personnel.

- Inform project owners of environmental requirements.

Section 7.1 provides information on NEPA activities.

8.1.8 Chemical Management

Emergency Planning and Community Right to Know Act (EPCRA)

EPCRA, also known as the Superfund Amendments and Reauthorization Act Title III of 1986 (42 USC § 11001, et seq. 1986), incorporates requirements for reporting hazardous materials, toxic chemical usage, and related releases to the environment.

To meet EPCRA requirements applicable to SNL/CA, an annual report is submitted online to the Livermore-Pleasanton Fire Department through the California Environmental Reporting System. This submittal satisfies EPCRA 302–303 and 311–312 federal, state, and local reporting requirements. To meet Section 313 of EPCRA, an annual report is submitted to EPA, and, if required, a Section 304 report is also submitted.

Table 8-1. EPCRA reporting, 2024

	Description of Reporting	Required in 2024
302–303[a]	Planning notification	Yes (sulfuric acid only)
304	Extremely hazardous substances release notification	No
311–312[a]	Safety data sheet and chemical inventory	Yes
313	Toxic Release Inventory reporting	No

[a] Reporting accomplished through an annual hazardous materials business plan submitted via the California Environmental Reporting System, a California requirement (see "Minimum Standards for Business Plans")

Compliance activities include the following:

- Maintain and report a chemical inventory.
- Report qualifying chemical releases.

The Hazardous Materials Release Response Plans and Inventory

California Health and Safety Code, Division 20, Chapter 6.95 § 25500–25547.8, "Hazardous Materials Release Response Plans and Inventory," requires a business to prepare, implement, and submit a business plan including a hazardous chemical inventory for purposes of emergency response in the case of a release or threatened release of a hazardous material.

Compliance activities include the following:

- Maintain and submit a business plan.

Minimum Standards for Business Plans

California Code of Regulations, Title 19, Division 2, Chapter 4, Article 4, § 2650–2660, "Minimum Standards for Business Plans," provides a business the minimum standards required for a business plan. The plan is to include a hazardous material inventory; emergency response plans and procedures; and training program information.

Sandia personnel at SNL/CA submit a hazardous material business plan annually, with related monthly inventory updates as required, to the Certified Unified Program Agencies

via the California Environmental Reporting System. The Livermore-Pleasanton Fire Department, Fire Prevention Division is the Certified Unified Program Agencies regulator for SNL/CA.

Chemical Management Program personnel inventory hazardous materials containers annually and monitor ongoing procurements.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act, enacted in 1910 and amended in 1972 (7 USC § 136 1910), regulates the sale, use, and disposal of pesticides (including herbicides, insecticides, fungicides, and rodenticides).

At SNL/CA, a licensed commercial pesticide applicator conducts this activity under a service contract. Contract requirements include a site-specific environmental specification. The service subcontractor manages all empty pesticide containers and removes them from the site.

Compliance activities include the following:

- Have state-licensed subcontractors supply, handle, and apply the products.

Toxic Substance Control Act

The Toxic Substances Control Act enacted in 1976 and later amended (15 USC § 2601 et seq. 1976) regulates the manufacture, distribution, use, disposal, import, or export of specific chemical substances and mixtures. At SNL/CA, the only Toxic Substances Control Act-regulated chemicals imported to or exported from the site are for research and development purposes and thus are exempt from general reporting requirements. However, Sandia personnel prepare a notice of export for chemical substances when a regulated chemical is exported out of the customs territory of the United States. In 2024, no Toxic Substances Control Act Notice of Export forms were prepared for operations at SNL/CA.

Sandia personnel also track disposal of Toxic Substances Control Act materials generated at SNL/CA that are not otherwise captured under RCRA (42 USC § 6901 et seq.) or the California Health and Safety Code, Division 20, Chapter 6.5 § 25100 et seq. These materials include asbestos and PCBs. The majority of Toxic Substances Control Act waste generated at SNL/CA is asbestos that is abated during construction activities. Only small quantities of PCB wastes are generated at SNL/CA, and these consist of light ballasts that are not specifically marked as PCB-free.

Compliance activities include the following:

- Conduct asbestos abatement in accordance with applicable regulatory requirements.
- Evaluate electrical equipment for PCBs when they are taken out of service.

Section 7.2 provides information on the Chemical Management Program at SNL/CA.

8.1.9 Oil Storage

Oil Pollution Act

The Oil Pollution Act of 1990 (33 U.S.C. 40 § 2701 1990) establishes requirements for the prevention of, preparedness for, and response to oil discharges at specific non-transportation-related facilities. Implementing regulations are found in 40 CFR 112, *Oil Pollution Prevention* (40 CFR 112).

Compliance activities include the following:

- Implement and maintain a site-wide spill prevention, control, and countermeasure plan for all applicable oil storage containers.
- Inspect bulk oil storage containers routinely.
- Train oil-handling personnel routinely.
- Maintain an oil storage container inventory.
- Incorporate oil spill prevention requirements and practices into processes, procedures, and new container installations.

Aboveground Storage Petroleum Act

The Aboveground Storage of Petroleum Act (California Health and Safety Code Division 20, Chapter 6.67 § 25270–25270.13) regulates petroleum storage, including containers with the capacity to store 55 gallons or more of petroleum. The California code requires owners and operators of an aggregate aboveground petroleum storage capacity greater than 1,320 gallons to prepare a spill prevention, control, and countermeasure plan to define guidelines, practices, and procedures for storing and handling petroleum; ensure safe, efficient, and timely response in the event of a petroleum spill or discharge; and conduct periodic inspections. An ongoing spill prevention, control, and countermeasure plan is reviewed every five years and is updated when a change occurs in the petroleum storage inventory on-site.

The Certified Unified Program Agencies regulator, specifically the Livermore-Pleasanton Fire Department, is the regulating authority for aboveground storage tanks at SNL/CA.

Compliance activities include the following:

- Manage and operate approximately 60 oil storage containers including petroleum containers, ranging from 55 to 2,400 gallons. Each year, declare the containers through the hazardous material business plan as described in Section 7.2.
- Review the *Sandia National Laboratories, CA Spill Prevention, Control, and Countermeasure Plan* every five years and update the plan when the on-site oil storage inventory, including petroleum, changes.
- See "Oil Pollution Act" for additional compliance activities.

Section 7.3 provides information on the Oil Storage Program at SNL/CA.

8.1.10 Pollution Prevention

Pollution Prevention Act

The Pollution Prevention Act of 1990 (42 USC § 13101 et seq.1990) declares, as national policy, that pollution should be prevented or reduced at the source whenever feasible.

A toxic chemical source reduction and recycling report is required for facilities that meet the reporting requirements under EPCRA, Section 313. See Table 8-1 for applicable EPCRA reporting requirements.

Compliance activities include the following:

- Conduct database queries for chemical purchases annually.
- Compare environmental releases with EPCRA reporting thresholds.
- Prepare annual reports and submit them to federal, state, and local regulatory agencies.
- Follow green purchasing practices.

Hazardous Waste Source Reduction and Management Review Act

The California Hazardous Waste Source Reduction and Management Review Act of 1989 (Senate Bill 14) requires hazardous waste generators to consider source reduction as the preferred method of managing hazardous waste. Under this act, facilities that generate more than 12,000 kg of hazardous waste or 12 kg of extremely hazardous waste annually are required to conduct source reduction planning.

Under an agreement between DOE and the California Department of Toxic Substances Control, all DOE California sites are considered as one waste generator rather than as individual DOE facilities. Every four years, Sandia personnel complete a source reduction and evaluation review and plan in cooperation with the other three DOE sites in California: LLNL, Lawrence Berkeley National Laboratory, and Stanford Linear Accelerator Center. As of 2015, the California Department of Toxic Substances Control no longer requires the plan to be submitted; however, each site is to retain a copy on file that will be reviewed during routine annual audits.

The most recent plan was completed on September 1, 2023, and it provides information for calendar year 2022. The plan also identifies waste reduction opportunities for any waste stream that is over 5 percent of a site's total routine regulated waste. The next plan, which will include information from calendar year 2026, will be prepared in 2027.

Compliance activities include the following:

- Prepare a source reduction and evaluation review and plan every four years.

Alameda County Code

Alameda County Municipal Code, Title 6, Chapter 6.40, "Solid Waste Collection and Organic Waste Reduction," and Alameda County Waste Management Authority Mandatory Recycling Ordinance 2021-02 targets are to divert 75 percent of organic and recyclable material from going to a landfill by 2025.

The Sandia corporate goal is to divert 90 percent of solid waste from going to a landfill by 2025.

Section 7.4 provides information on the Pollution Prevention and Waste Minimization Program at SNL/CA.

8.1.11 Waste Management

Federal Facility Compliance Act

The Federal Facility Compliance Act of 1992 (42 U.S.C. § 6961 1992) requires federal facilities to comply with all federal, state, and local requirements for hazardous and solid waste including full compliance with the restrictions and prohibitions on extended storage of wastes that do not meet the applicable hazardous waste treatment standards. The act gives EPA and authorized states authority to conduct annual inspections of federal facilities and establishes requirements for managing hazardous waste and mixed waste.

Activities at SNL/CA are not subject to a site-specific federal facility compliance agreement for mixed waste as no possession or storage of legacy mixed waste occurs at the site. *Legacy waste is waste that was generated during the development, production, and testing of nuclear weapons for the Manhattan Project and the Cold War.*

Resource Conservation and Recovery Act

RCRA, enacted in 1976, as amended (42 U.S.C. § 6901 et seq. 1976), sets forth the framework for managing hazardous solid waste, including the hazardous waste component of mixed waste and nonhazardous solid waste. The state of California has authority from EPA to implement RCRA. The California Department of Toxic Substances Control administers most aspects of RCRA in the state and is the regulating authority for hazardous waste operations at SNL/CA, including the hazardous component of radioactive mixed waste.

Compliance activities include the following:

- Operate hazardous waste treatment and storage facilities in compliance with the RCRA permit issued by the California Department of Toxic Substances Control.
- Collect RCRA waste from the point of generation and transfer waste to on-site waste storage facilities for storage, consolidation, commingling, packaging, and shipment to off-site facilities for recycling, treatment, or disposal.
- Conduct process knowledge evaluations to characterize RCRA waste types generated from specific operations.
- Provide hazardous waste generator training.
- Prepare RCRA regulatory reports.

California Hazardous Waste Control Law

The Hazardous Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5 § 25100 et seq.) provides a regulatory framework for hazardous waste management in California. The state law incorporates all RCRA requirements and imposes additional requirements that are broader and more comprehensive than the federal system. Under the California law, additional waste materials (e.g., oils, metals, and asbestos) or

activities (e.g., treatment) are regulated as hazardous. All state standards are incorporated into Waste Management Program operations at SNL/CA. The California Department of Toxic Substances Control conducts an annual audit.

Compliance activities include the following:

- Collect non-RCRA waste from the point of generation and transfer waste to on-site waste storage facilities for storage, consolidation, commingling, packaging, and shipment to off-site facilities for recycling, treatment, or disposal.
- Conduct process knowledge evaluations to characterize non-RCRA waste types generated from specific operations.
- Prepare state regulatory reports.

California Environmental Health Standards for Management of Hazardous Waste

The California Environmental Health Standards for Management of Hazardous Waste (Title 22 California Code of Regulations, Division 4.5) requires the management of hazardous waste generated at the generator site. The Certified Unified Program Agencies regulator, specifically the Livermore-Pleasanton Fire Department, is the regulating authority for the hazardous waste generators at SNL/CA. The Certified Unified Program Agencies regulator conducts a comprehensive inspection annually.

Compliance activities include the following:

- Ensure that RCRA and non-RCRA hazardous waste generated at the generator site is managed in accordance with federal and state regulatory requirements.
- Provide hazardous waste generator training including RCRA and non-RCRA waste.

California Medical Waste Management Act

The California Medical Waste Management Act (California Health and Safety Code, Division 104, Part 14 § 117600–118360) regulates medical waste generators, transporters, and treatment facilities. The Alameda County Department of Environmental Health is the regulating authority for medical waste generated at SNL/CA. The Alameda County Department of Environmental Health conducts an annual audit.

Compliance activities include the following:

- Ensure that medical waste generated at the generator site is managed in accordance with state regulatory requirements.
- Provide medical waste generator training.

Section 7.5 provides information on the Waste Management Program.

8.1.12 Wildland Fire Management

DOE O 420.1C Chg3 (LtdChg), Facility Safety

DOE O 420.1C, *Facility Safety* (DOE O 420.1C Change 3, (LtdChg 2019), outlines requirements for DOE for fire protection and wildland fire management. The order requires the development of an integrated site-wide wildland fire management plan, consistent with Federal Wildland Fire Management Policy. The plan must be submitted to the DOE Head

of Field Element for approval and executed in accordance with the applicable sections of the NFPA 1143, Standard for Wildland Fire Management. Creation of the site-wide wildland fire management plan is still pending.

Section 7.6 provides information on Wildland Fire Management at SNL/CA.

EO 13728, Wildland-Urban Interface Federal Risk Mitigation

EO 13728, *Wildland-Urban Interface Federal Risk Mitigation* (EO 13728 2016), outlines requirements for federal agencies concerning wildfire risk management for existing buildings over 5,000 gross square feet located in wildland-urban interface areas with moderate or greater fire hazard severity. Agencies are encouraged to comply with the International Wildland-Urban Interface Code or an equivalent code. The International Wildland-Urban Interface Code provides additional guidance on the necessary distance for defensible space around buildings in wildland-urban interface areas.

Compliance activities include the following:

- Ensuring wildfire resilience in the design and construction of new buildings that are Federally-owned or regulated, existing Federally-owned buildings that are altered, or new buildings that are leased for Federal occupancy.
- Maintain defensible space to mitigate fire risks. Creating defensible space involves clearing combustible materials and vegetation to protect life and property from wildfires.

Section 7.6 provides information on Wildland Fire Management at SNL/CA.

8.1.13 Radioactive Protection

Atomic Energy Act of 1954

The Atomic Energy Act of 1954 (42 U.S.C. § 2011 et seq.) specifies proper management of source, special nuclear, and by-product material. DOE has the authority to manage operations based on applicable statutes, federal regulations, and DOE directives.

Sandia personnel achieve compliance through adherence to these directives and applicable regulations in 10 CFR 830, *Nuclear Safety Management* (10 CFR 830, and 10 CFR 835, *Occupational Radiation Protection* (10 CFR 835 2021). The regulations include radiation protection standards, limits, and program requirements for protecting individuals from radiation exposure as a result of DOE activities.

Operations at SNL/CA are subject to the requirements established in DOE O 435.1, *Radioactive Waste Management*, and DOE O 458.1, *Radiation Protection of the Public and the Environment*.

Compliance activities include the following:

- Manage materials and facilities in accordance with DOE requirements and oversight, including appropriate documentation.
- Ensure that training requirements are met.

Chapter 4 provides information on protection of the public and environment.

DOE O 435.1, Radioactive Waste Management

DOE O 435.1, Change 1, *Radioactive Waste Management* (DOE O 435.1), establishes requirements for managing all DOE radioactive waste in a manner that is protective of worker and public health and safety, and of the environment. Under this order, DOE contractor-operated facilities are required to plan, document, execute, and evaluate the management of radioactive waste.

NNSA authorization is requested before generating radioactive waste streams with no identified disposal path. Information about the characteristics of each waste is used to manage the waste in a manner that is consistent with applicable requirements.

Compliance activities include the following:

- Certify and characterize waste.
- Support inspections and audits.
- Ensure that training requirements are met.
- Maintain operating procedures for handling, storing, packaging, shipping, and off-site disposal of radioactive waste.

Section 7.5.6 provides information on the radioactive waste management element of the Waste Management Program.

DOE O 458.1 Chg 4 (LtdChg), Radiation Protection of the Public and the Environment

DOE O 458.1, *Radiation Protection of the Public and the Environment* (DOE O 458.1, Change 4 (LtdChg 2020)), establishes requirements to protect the public from undue radiation exposure, demonstrate compliance with public dose limits from air pathways, control releases of radioactive discharges, control radioactive waste, protect drinking water and groundwater, protect biota, control the release of property with residual radioactivity, and manage radiation-related records.

DOE issued a moratorium in January 2000 that prohibited the clearance of volume-contaminated metals, and subsequently in July 2000 suspended the clearance of metals from DOE radiological areas for recycling purposes.

Chapter 4 provides information on protection of the public and environment. Section 7.5.6 provides information on the management of radioactive waste.

8.1.14 Reporting

DOE O 231.1B Admin Change 1, Environment, Safety and Health Reporting

DOE O 231.1B, *Environment, Safety and Health Reporting*, (DOE O 231.1B, Admin Change 1), ensures that DOE receives information about events that have affected or could adversely affect the health, safety, and security of the public or workers, the environment, the operation of DOE facilities, or DOE credibility. It enhances mission safety and promotes the sharing of effective practices to support continuous improvement and adaptation to change.

Environmental program personnel report on environmental program activities, monitoring results, accidental releases, and waste management operations.

Compliance activities include the following:

- Produce ASER

DOE O 232.2A, Chg1 (MinChg), Occurrence Reporting and Processing of Operations Information

DOE O 232.2A, Chg 1 (MinChg), *Occurrence Reporting and Processing of Operations Information* (DOE O 232.2A, Chg 1 (MinChg 2017)), requires timely notification to DOE about events that could adversely affect the health and safety of the public or workers, the environment, DOE missions, or DOE credibility.

Sandia personnel promote organizational learning through investigation and analysis of reported events and conditions that adversely affect or may adversely affect personnel, the public, property, the environment, or the DOE mission.

Compliance activities include the following:

- Track all environmental events.

Section 8.6 provides information on occurrence reporting.

8.1.15 Quality Assurance

DOE O 414.1E, Quality Assurance

DOE O 414.1E, *Quality Assurance* (DOE O 414.1E), is intended to achieve quality in all work and ensure that products and services meet or exceed customer requirements and expectations.

Environmental sampling and analyses at SNL/CA conform to applicable quality assurance plans, sampling plans, and field operations.

Compliance activities include the following:

- Develop quality assurance plans, operating plans, and sampling plans.
- Provide a statement of work for subcontract laboratories.
- Participate in quality assurance audits of subcontract laboratories.

Chapter 9 provides information on quality assurance.

8.2 Environmental Management System

The Environmental Management System is a continuing cycle of planning, implementing, evaluating, and improving processes to achieve environmental goals. This system facilitates identification of the environmental aspects and impacts of Sandia's activities, products, and services; identification of risks and opportunities that could impact the environment; evaluation of applicable compliance obligations; establishment of environmental objectives; and creation of plans to achieve those objectives and monitor their progress for continual system improvement.

Sandia's EMS is implemented through an ISO 14001-certified Environmental Management System. Initial ISO 14001:2004 certification for SNL/CA was received in September 2006. In 2015, the site-specific certifications for primary operating locations in New Mexico and California were integrated into a multisite ISO 14001:2004 certification. In 2018, the Environmental Management System was recertified under the new ISO 14001:2015, and in 2021, the system was again recertified to ISO 14001:2015. To maintain this certification, audits by a third-party registrar are required annually to ensure continued conformance with the standard. The Environmental Management System was audited in October 2024. Additional information can be found at Sandia Environmental Management.

The Environmental Management System provides the following benefits:

- Improved environmental performance.
- Enhanced compliance with environmental regulations
- Strengthened pollution prevention efforts.
- Improved resource conservation
- Increased environmental efficiencies and reduced costs.
- Enhanced image with the public, regulators, and potential new hires
- Heightened awareness of environmental issues and responsibilities

For fiscal year 2024, the significant aspects for operations at SNL/CA were: 1) Air Emissions (greenhouse gases); 2) Energy Use (Electricity Consumption); 3) Energy Emitted (Wildfire Potential); and 4) Hazardous Waste. When significant aspects and negative impacts have been identified, environmental objectives are typically established to guide efforts toward minimizing those aspects and impacts.

Table 8-2. Significant aspects, objectives, and status of objectives for 2024.

Significant Aspects	Objectives	Status
Hazardous Waste	Develop and implement a new chemical inventory tracking tool to replace the chemical inventory system (CIS).	In Progress – new system will be implemented in FY25
Hazardous waste	Develop and implement a workshop training to educate waste generators and improve efficiency and compliance with the waste description and disposition request (WDDR) process.	Completed
Air Quality	Corporate: Implement resilience measures, per current Site Sustainability Plan (SSP) guidance.	On Track

8.2.1 Site Sustainability Plan

A site sustainability plan is prepared annually and identifies contributions toward meeting DOE sustainability goals. The most recent plan, *Fiscal Year 2025 Site Sustainability Plan*, describes the performance status for fiscal year 2024.

Table 8-3. Performance status for selected key areas at SNL/CA, 2024

DOE Goal/Sandia Objective	Sandia Performance Status in Fiscal Year 2024
Electronic Stewardship	
Manage electronics stewardship from acquisition, to operations, to end of life.	Managed electronics stewardship, with 96.5 percent of acquisitions meeting environmentally sustainable electronics standards, 100 percent of operations using power management features during computer and monitor use, and 100 percent of end-of-life equipment being disposed of through government programs or certified recyclers.
Resilience	
Implement resilience measures	Updated the implementation status of the vulnerability assessment and resilience plan resiliency solutions.
Waste Management	
Reduce nonhazardous solid waste sent to treatment and disposal facilities. Reduce construction and demolition materials and debris sent to treatment and disposal facilities.	Diverted 70.5 percent of nonhazardous solid waste from treatment and disposal facilities. Diverted 95 percent of construction and demolition waste from treatment and disposal facilities.
Acquisition and Procurement	
Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring that all sustainability clauses are included as appropriate.	Led an interdepartmental working group to focus on SFTool+ outreach and education. 350APR "green language" clause continued to be populated in applicable contract categories valued over $250,000.
Sustainable Buildings	
Increase the number of owned buildings that are compliant with the *Guiding Principles for Sustainable Federal Buildings* (Council on Environmental Quality 2020).	None of the eleven buildings to which Guiding Principles is applicable are certified.
Energy Management	
Reduce energy use intensity (Btu per gross square foot) in goal-subject buildings.	Reduced energy intensity by 2.1 percent relative to fiscal year 2023.
Water Management	
Reduce potable water use intensity (gallons per gross square foot).	Reduced potable water intensity by 63.3 percent relative to a fiscal year 2021 baseline and decreased it by 10.2 percent relative to fiscal year 2023.

Guiding Principles = *Guiding Principles for Sustainable Federal Buildings*

8.2.2 Sustainability Awards

The DOE Sustainability Performance Division sponsors the DOE Sustainability Awards, which recognize outstanding sustainability contributions by individuals and teams at DOE facilities across the country. The awards celebrate excellence in energy, water, waste, fleet, sustainable acquisition, and resilience, as well as achievements in projects representing exemplary sustainability practices. Each year, Environmental Management System personnel select nominees from that year's Environmental Excellence Awards winners. In 2024, Sandia personnel at SNL/CA did not submit any nominations for the internal Environmental Excellence Awards.

8.3 Resilience

Cross-disciplinary Sandia teams with expertise in resiliency, including the Resilient Energy Working Group, continued to identify and pursue opportunities to increase resilience

through innovative approaches. Personnel continued to build on current efforts to help increase resiliency at SNL/CA and will conduct additional studies to define this possibility in more detail. In 2024, those studies consisted of evaluations of the topics of biological resources, visual resources, hydrology, and geology and soils related to potential future energy infrastructure projects at SNL/CA.

Sandia personnel are also required to comply with Assembly Bill 32 which requires a reduction in greenhouse gas emissions across all sectors of society, ranging from large electric power-generating facilities to vehicles and appliances. Various regulations resulting from the Assembly Bill 32 legislation currently require organizations to report greenhouse gas emissions from mobile sources and refrigerants and to avoid or reduce greenhouse gas emissions from these sources. State requirements to quantify the economic and health outcomes of Assembly Bill 32 add to NNSA vulnerability assessment and resilience planning guidance for responses to weather-related impacts.

In fiscal year 2022, Sandia personnel completed a vulnerability assessment and resilience plan focused on site infrastructure. The plan evaluated expected extreme weather events projected for the year 2050, along with the probability of hazards arising from these events Table 8-4 lists natural hazards and projected effects to infrastructure at SNL/CA.

Table 8-4. Natural hazards and projected effects at SNL/CA

Regional Hazards Impacting Site Infrastructure	Asset and Infrastructure System Type	Effect on Area, Site, or Program
Cold waves	Main campus	Cold waves could cause building damage from pipe freezing.
Drought	Main campus	Drought could alter habitat, leading to the loss of trees, plantings, and sensitive species, and decreasing survival rates for local wildlife. Drought could cause water shortages and impaired water quality for the workforce.
Earthquakes	Specialized or mission critical equipment Site ecology and land preservation	Earthquakes could cause structural damage to mission critical buildings and landslides on the steep slopes located by the Arroyo Seco.
Hail	Site workforce	Hail could cause workforce injury.
Heat waves	Main campus	Heat waves would increase the demand for cooling, leading to possible regional brownouts, road degradation, loss of sensitive species, increased risk of heat exhaustion for the workforce, and mission work delays.
Precipitation	Site workforce	Precipitation events could cause mudslide damage and habitat alteration, electrical outages, and injury to the workforce.
Riverine flooding	Main campus	Arroyo Seco flooding could cause significant flooding due to the arroyo's proximity and the site's low elevation, leading to impacts to buildings, infrastructure, and site ecology.
Wildfires	Main campus	Wildfires could result in site closures, possible electrical outages, smoke exposure to the workforce, and significant structural and site ecology damage.

Environmental Reporting 2024: Resilience

The vulnerability assessment and resilience plan assessed potential risks to site infrastructure and recommended solutions to increase resilience at SNL/CA. Table 8-5 displays the resilience solution portfolio identified in the plan and the implementation status. These solutions are focused on addressing resilience planning gaps.

Table 8-5. Resilience solutions portfolio for SNL/CA

Solution	Priority Rank	Hazards Addressed	Implementation Status
HVAC Upgrades	Medium	Cold waves, heat waves, wildfires	A continually ongoing program replaces several million dollars' worth of HVAC equipment every year.
Seismic Reinforcing	Medium	Earthquakes, riverine flooding	Three major seismic improvement projects are currently in construction or have been recently completed.
Replace generators	Medium	Earthquakes, heat waves, precipitation, riverine flooding, wildfires	Efforts are underway to replace most site generators.
Replace boilers	Medium	Earthquakes, heat waves, precipitation, riverine flooding, wildfires	A program is being developed to replace and electrify site boilers.
Reroof	Medium	Cold waves, earthquakes, hail, heat waves, precipitation	A continually ongoing program maintains site roofing maintenance and improvements.
Upgrade electrical infrastructure	Medium	Cold waves, earthquakes, heat waves, precipitation, wildfires	A continually ongoing program is in place to replace, maintain, and upgrade electrical infrastructure.
Increase insulation	Medium	Cold waves, heat waves	There is a Building Envelope Life Cycle Asset Management Plan to maintain and improve building envelopes.
Building envelope sealing	Medium	Cold waves, heat waves	There is a Building Envelope Life Cycle Asset Management Plan to maintain and improve building envelopes.
Develop a microgrid	Medium	Earthquakes, heat waves, precipitation, riverine flooding, wildfires	A design is in development.
Develop water reduction strategies	Medium	Drought	Strategies are being identified.

HVAC = heating, ventilation, and air-conditioning

8.4 Audits, Assessments, and Inspections

Environmental programs are routinely subjected to audits, assessments, inspections, and/or verifications by external agencies and authorities. Table 8-6 summarizes the 2024 external audits, assessments, and inspections including any findings, notices of violation, or other environmental occurrences. The Sandia Internal Audit group also conducts assessments, including reviews of the implementation of applicable policies, processes, or procedures; evaluations of corrective action validation assessments; and surveillances and walk-throughs. Self-assessments, conducted by the SNL/CA environmental program staff, evaluate performance and compliance and identify deficiencies and opportunities for improvement as well as noteworthy practices and lessons learned. There were five self-assessments conducted in 2024.

Table 8-6. Audits, assessments, and inspections, 2024

Appraising Agency or Authority	Title or Description	Date Conducted	Summary
DNV Business Assurance USA Inc.	Environmental Management System ISO 14001:2015 Surveillance Audit	April 17, 2024	No violations
Alameda County Department of Environmental Health	Waste Tire Program Audit	May 20, 2024	No violations
City of Livermore Water Resources	Annual Inspection and Sampling of Wastewater Discharges and Categorical Process Laboratories	October 8-9, 2024	No violations
Livermore-Pleasanton Fire Department (CUPA)	Annual Certified Unified Program Agency (CUPA) Annual Regulatory Audit	October 22–24, 2024	No violations
Alameda County Department of Environmental Health	Annual Medical Waste Inspection	December 4, 2024	No violations
Alameda County Department of Environmental Health	Annual Navy Landfill Site Inspection	December 4, 2024	No violations
Department of Toxic Substances Control (DTSC)	Annual Department of Toxic Substances Control (DTSC) Annual Inspection	December 3, 2024	No violations

8.5 Environmental Occurrences

Under DOE O 232.2A, Chg 1 (MinChg), *Occurrence Reporting and Processing of Operations Information* (DOE O 232.2A, Chg 1 (MinChg)), *occurrences* are defined as "events or conditions that adversely affect, or may adversely affect, DOE (including the NNSA) or contractor personnel, the public, property, the environment, or the DOE mission." Events or conditions meeting the criteria thresholds identified in this order are occurrences. Whereas some environmental releases may not meet DOE O 232.2A, Chg 1 (MinChg1) reporting thresholds, they may still be reportable to outside agencies.

Occurrences that met DOE O 232.2A, Chg 1 (MinChg1) criteria are entered into the DOE Occurrence Reporting and Processing System database.

For this ASER, the Occurrence Reporting and Processing System database was queried for occurrences in the following reporting criteria groups (as defined by DOE O 232.2A Chg 1 [MinCh1]):

- Group 5, Environmental
- Group 9, Noncompliance Notifications
- Group 10, Management Concerns and Issues (with an identified environmental impact)
- Any occurrence that involved a Sandia environmental program

Qualifying occurrences that took place within a building are not provided in this report. During 2024, there were no environmental occurrences at SNL/CA.

8.6 Operating Experience

The Sandia Corporate Lessons Learned Program and the E&SH Operating Experience and Lesson Share Program develops and shares various lesson share documents with members of the workforce consistent with the purpose and objectives of DOE O 202.2A, *DOE Corporate Operating Experience Program*. The lesson share documents contain summaries of ES&H events or issues and associated key lessons are presented as thought-provoking statements and questions to promote learning and facilitate a dialogue between workers.

The E&SH Operating Experience and Lesson Share Program coordinators champion the creation of lesson share documents by Department 4672, ES&H Assurance, and other members of the workforce interested in creating lessons from ES&H events or issues at Sandia. All lesson share documents are made available to Sandia through multiple internal databases and websites for enhanced lesson searches. Selected lesson documents are also shared with the workforce through tier meeting flow downs and Sandia Daily News emails. Lessons Learned and ES&H Minutes are available on Sandia's internal Live Safe website, a digital storehouse for ES&H information and resources that help Sandia staff live safe and healthy lives. Environmentally focused ES&H minutes in FY24 included lesson shares focused on spill reporting and wildlife interactions.

8.7 Permits

Table 8-7 lists active environmental permits and cleanup orders for operations at SNL/CA in 2024. Additional information is provided in previous sections under the related program or regulation.

Table 8-7. Environmental permits and cleanup orders, 2024

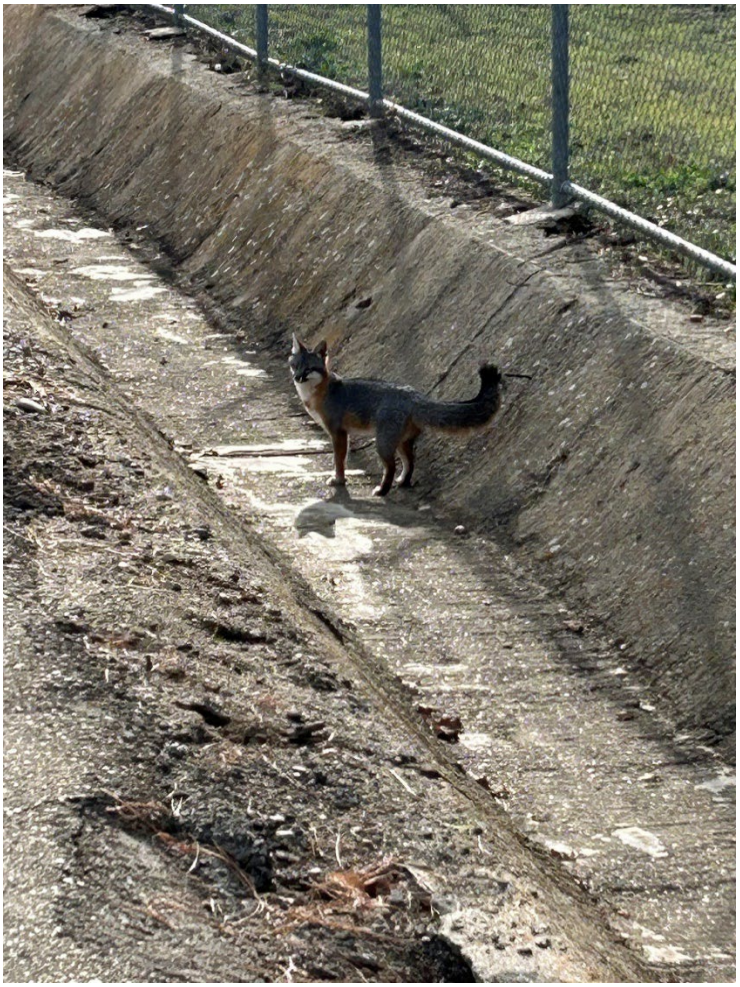
Type	Description	Permit or Registration Number or Location	Effective Date	Statute or Regulation	Issuing Agency
Environmental restoration	Site Cleanup Order No. 89-184	Order No. 89-184 (retired in May 2005) 2005 Regional Water Quality Control Board correspondence letter states final monitoring requirements	December 1989 (no expiration date)	California Water Code	Regional Water Quality Control Board, San Francisco
Hazardous materials	Hazardous materials business plan	CERS ID #10135531	March 1 to February 28, annually	California Health and Safety Code	Livermore-Pleasanton Fire Department
Hazardous waste	RCRA Hazardous Waste Facility Permit	EPA ID #CA2890012923/ Building 9611 and Building 961	October 2018 to October 2028	RCRA	California Department of Toxic Substances Control
Hazardous waste	Permit by rule	943PBR1 943PBR2/ Building 943	March 2 to March 1, annually	California Health and Safety Code	Livermore-Pleasanton Fire Department
Hazardous waste	Conditionally authorized permit to operate	SS1/Sewer Shed B968/Building 968	March 2 to March 1, annually	California Health and Safety Code	Livermore-Pleasanton Fire Department

Type	Description	Permit or Registration Number or Location	Effective Date	Statute or Regulation	Issuing Agency
Medical waste	Large-quantity generator with on-site treatment	PT0322429/ Building 968	July 10 to July 9, annually	California Health and Safety Code	Alameda County Department of Environmental Health
Medical waste	Small-quantity generator without on-site treatment	PT0304629/ Building 925	March 26 to March 25, annually	California Health and Safety Code	Alameda County Department of Environmental Health
Solid waste	Tire program identification number	128975-01 Building 9622	N/A (no expiration date)	California Tire Recycling Act	California's Department of Resources Recycling and Recovery
Universal waste	Generator statement	Business ID #516 Facility ID #396	February 1, 2006, indefinite (will amend if change occurs)	California Electronic Waste Recycling Act	California Department of Toxic Substances Control
Wastewater	Wastewater Discharge Permit	Permit number 1251	August 4, 2021, to August 3, 2026	Clean Water Act, California Water Code	City of Livermore Water Reclamation Plant
Wastewater	California General Order for Sanitary Sewer Systems-Waste Discharge Permit	Order WQ 2022-0103-DWQ	Adopted on December 6, 2022. In effect on June 5, 2023	Clean Water Act, California Water Code	California State Water Resources Control Board
Stormwater	State of California Industrial General Permit	National Pollutant Discharge Elimination System No. CAS000001 Industrial General Permit Order 2014-0057-DWQ as amended in 2015 and 2018. WDID 2 011002598	Latest amended order came into effect on July 1, 2020, and until administratively closed by California State Water Resources Control Board	Clean Water Act, California Water Code	California State Water Resources Control Board
Stormwater	State of California Construction General Permit	Construction General Permit Order 2022-0057-DWQ. WDID 2 01C403529 "SNL/CA A-Street/Hill Drainage Improvements Project"	Adopted on September 8, 2022. In effect on September 1, 2023.	Clean Water Act, California Water Code	California State Water Resources Control Board
Aboveground storage tanks	Storage statement	1211-12142017	December 14, 2017, indefinite (will reissue if change occurs); required in California Environmental Reporting System	California Aboveground Petroleum Storage Act	Livermore-Pleasanton Fire Department
Air	Permit to operate, non-retail gasoline-dispensing facility	Plant 290 Source 32 Building 963	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, maintenance and facilities adhesive usage	Plant 290 Source 93	July 1 to June 30, annually	Clean Air Act	BAAQMD

Type	Description	Permit or Registration Number or Location	Effective Date	Statute or Regulation	Issuing Agency
Air	Permit to operate, site-wide wipe cleaning	Plant 290 Source 95	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, standby generator	Plant 290 Source 104 Building 964	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, standby generator	Plant 290 Source 108 Building 9151	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, standby generator	Plant 290 Source 109 Building 910	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Registered emission sources, boilers, 9	Plant 290 sources 81, 82, 121, 122, 123, 124, 125, 126, 127	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, standby generator	Plant 290 Source 128 Building 902	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, standby generator	Plant 290 Source 130 Building 964 (outside)	July 1 to June 30, annually	Clean Air Act	BAAQMD
Air	Permit to operate, Robotic Paint Booth	Plant 290 Source 129 Building 942/1338	July 1 to June 30, annually	Clean Air Act	BAAQMD
Water Quality - Arroyo Seco Improvement Program	To implement elements of the Management Plan for Arroyo Seco at SNL/CA to address erosion and other streambed instability issues	Site No: 02-01-C0987/ Sandia National Laboratories, California	June 30, 2008 Indefinite monitoring will continue until success criteria is met	Section 401 of the Clean Water Act	Regional Water Quality Control Board, San Francisco Bay Region
Water Quality - Arroyo Seco Improvement Program	To implement channel improvements under the Arroyo Seco Improvement Program	File No: 2006-400195S/ Sandia National Laboratories, California	September 11, 2008 Indefinite monitoring will continue until success criteria is met	33 CFR 325.7, 326.4, and 326.5	U.S. Army Corps of Engineers
Biological opinion	National Nuclear Security Administration's Section 7 Consultation on the Proposed Maximum Operations Alternative	1-1-04-F-0077/ Sandia National Laboratories, California	December 8, 2004	Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act)	U.S. Fish and Wildlife Service

a Order WQ 2022-0057-DWQ supersedes the project's permit Order 2009-0009-DWQ as amended by Order 2010-0014-DWQ and 2012-0006-DWQ when applicable or by September 1, 2025.
CERS = California Environmental Reporting System
N/A = not applicable

Chapter 9. Quality Assurance



Gray Fox (*Urocyon cinereoargenteus*)

OVERVIEW ▪ Sandia personnel implement quality assurance requirements in various environmental programs for collecting samples, analyzing the samples, reporting the data, and managing records.

Sandia personnel are responsible for implementing quality assurance for operations—as specified in DOE O 414.1E, *Quality Assurance*; 10 CFR 830, *Nuclear Safety Management*, Subpart A, "Quality Assurance Requirements" (10 CFR 830); and ISO 9001:2015, *Quality Management Systems–Requirements* (ISO 9001:2015 2015)—via policy statements and processes and by executing the actions specified in those policies and processes, specifically QA001, *Quality Assurance Policy* (Sandia 2019). This includes ensuring the quality of a subcontracted laboratory's environmental monitoring data products by assessing its operations, program, projects and business systems.

9.1 Introduction

Quality assurance refers to guidelines, criteria, specifications, and methods for conducting work in a way that generates data of a desired quality, whereas *quality control* refers to the means employed to test and document the quality of data.

The quality of environmental monitoring data is assured as required by DOE O 414.1E, *Quality Assurance*. The environmental monitoring (which includes sampling) is conducted in accordance with program-specific sampling and analysis plans, work plans, or quality assurance plans. These plans meet applicable federal, state, and local requirements for conducting sampling and analysis activities, including procedures for collecting samples, preserving and handling samples, controlling samples, controlling laboratory quality, setting required limits of detection, controlling field quality, ensuring health and safety, setting schedules and frequency for sampling, reviewing data, determining data acceptability, and reporting.

Environmental samples for various programs are collected and submitted for analysis of non-radiological constituents on a calendar-year basis unless noted otherwise.

9.2 Environmental Sampling Activities

9.2.1 Sampling Handling and Analyses

Environmental sampling at SNL/CA is described in activity-specific standard operating procedures. These procedures provide detailed information about the sample collection process, including what types of equipment to use; how to calibrate equipment; how to properly collect, handle, and preserve samples; how to handle and ship samples; and how to manage any wastes generated during sampling.

To preserve the integrity of samples, a chain-of-custody process was maintained and documented for all samples collected in 2024.

Quality was controlled by using the following types of sampling processes:

- Field duplicate samples
- Matrix spike samples
- Field blanks
- Trip blanks

All samples are analyzed according to EPA-approved and/or CA-approved methods. In addition, during sample collection, field sampling technicians use calibrated field instrumentation for parameters such as pH.

In addition, the subcontracted analytical laboratory that processed the samples includes a quality check analysis as part of the analytical report. Implementing these procedures confirmed that (1) samples were representative of the environmental medium (e.g., soil, water, air, and biota) being monitored and (2) monitoring requirements outlined in permits, DOE directives, and other regulations were met.

In 2024, two subcontract analytical laboratories were used to analyze non-radiological environmental samples from SNL/CA.

- Alpha Analytical Laboratories, Inc.,
- McCampbell Analytical, Inc.

For environmental monitoring of ambient external gamma radiation, SNL/CA used the company Landauer for the optically stimulated thermoluminescent dosimeter data.

9.3 Quality Assurance Activities

The Environmental Management Department-specific Quality Assurance Project Plan (Sandia 2016a) addresses each of the 10 DOE O 414.1E criteria and documents those activities vital to assuring the quality of work performed.

9.3.1 Laboratory Quality Assurance Assessments and Validation

Sandia personnel work exclusively with commercial analytical laboratories that are certified by the state of California. Both Alpha Analytical laboratories and McCampbell Analytical held a Certificate of Environmental Accreditation from the California Environmental Laboratory Accreditation Program. Landauer is accredited by National Voluntary Laboratory Accreditation Program (NVLAP) and Department of Energy Laboratory Accreditation Program (DOELAP).

To receive accreditation, a laboratory must implement all applicable requirements identified in the Environmental Laboratory Accreditation Program certification process. California EPA requires periodic reassessments of laboratories, by regulatory agencies or approved third-party companies, in order for these laboratories maintain their certifications. If the certification were ever to be lost, another certified laboratory would be used.

9.3.2 DOE Treatment, Storage, and Disposal Facility Audits (DOECAP)

The DOE Consolidated Audit Program (DOECAP) seeks to reduce DOE's environmental program management risk and assist DOE Program Offices and contractors by providing the conduct of audits and assessments that are designed to assure commercial environmental analytical laboratories and treatment, storage, and disposal facilities used by DOE entities are operating in compliance with applicable federal, state, and local environmental, safety and health, and transportation regulations.

Sandia personnel send waste, including radiological and hazardous waste, off site for treatment and/or disposal to subcontracted off-site commercial waste vendor facilities. The DOECAP performs annual audits of treatment, storage, and disposal facilities.

The following list identifies recycling facilities and treatment, storage, and disposal facilities used by SNL/CA in 2024:

- Advanced Chemical Treatment
  967 Mabury Road
  San Jose, CA 95133
- Cruz Containers
  6531 Box Spring Road
  Riverside, CA 92507

- Altamont Landfill and Recovery Facility
  10840 Altamont Pass Road
  Livermore, CA 94551
- Clean Earth (AERC)
  189 Stauffer Boulevard
  San Jose, CA 95125
- Clean Harbors Aragonite, LLC
  11600 North Aptus Road
  Aragonite, UT 84029
- Clean Harbors Eldorado, LLC
  309 American Circle
  El Dorado, AR 71730
- Clean Harbors Grassy Mountain, LLC
  Interstate 80, Exit 41
  3mi. East, 7mi. North of Knolls
  Grassy Mountain, UT 84029
- Clean Harbors La Porte, LP
  500 Independence Parkway
  South La Porte, TX 77581
- Clean Harbors San Jose, LLC
  1021 Berryessa Road
  San Jose, CA 95133
- HealthWise Services Medical Waste Disposal
  4800 E. Lincoln Avenue
  Fowler, CA 93625
- Meyers Containers Management Services (Drum Recycler)
  21031 Cloud Way
  Hayward, CA 94545
- Seaport Environmental Services, LLC
  695 Seaport Blvd
  Redwood City, CA 94063
- SET Environmental Services
  450 Sumac Road
  Wheeling, IL 60090
- US Ecology (Beatty NV)
  Highway 95, 11 Mi. South of Beatty
  Beatty, NV 89003
- Veolia ES Technical Solutions LLC-Azusa
  107 S Motor Avenue
  Azusa, CA 91702
- World Oil Recycling
  2000 N Alameda Street
  Compton, CA 90222

The DOECAP reviews commercial treatment, storage, and disposal facilities for each facility's ability to meet the applicable requirements for storing, handling, transporting, processing, and final disposition of DOE waste and material as outlined in DOE O 435.1 Chg 2 (AdminChg), *Radioactive Waste Management*, and DOE O 414.1E, *Quality Assurance*. The audit teams are comprised of DOE federal and contractor subject matter experts.

In addition, established treatment, storage, and disposal facilities used for radioactive and mixed waste management undergo periodic assessments that consider the following: quality assurance management systems, sampling and analytical data quality, waste operations,

environmental compliance and permitting, radiological control, industrial and chemical safety, and transportation management.

To ensure radiological and hazardous wastes are managed as required, DOECAP results for treatment, storage, and disposal facilities are sent to SNL/CA personnel. Treatment, storage, and disposal facilities that manage only hazardous waste are audited every three years; this includes Clean Harbors and Veolia North America facilities.

Table 9-1 provides a summary of the types of assessments conducted in 2024 and the results. Priority I findings document a requirement deficiency that represents a substantial risk and liability for DOE. Priority II findings document a deviation from a requirement that could lead to a Priority I finding if not addressed and corrected. Observations document deviations from best management practices or opportunities for improvement. There were no Priority I findings for waste management facilities used by Sandia personnel in 2024.

Table 9-1. Treatment, storage, and disposal facility observations, assessments, and audits, 2024

Facility	Accrediting Body	Assessment Type	Results
Clean Harbors Aragonite, LLC	DOE Consolidated Audit Program	• Quality Assurance Management Systems (QA) • Sampling and Analytical Data Quality (SA) • Waste Operations (WO) • Environmental Compliance and Permitting (EC) • Industrial and Chemical Safety (IC) • Transportation Management (TM)	• 0 Priority I findings • 2 Priority II findings • 1 observation
Clean Harbors El Dorado, LLC	DOE Consolidated Audit Program	• Quality Assurance Management Systems (QA) • Sampling and Analytical Data Quality (SA) • Waste Operations (WO) • Environmental Compliance and Permitting (EC) • Industrial and Chemical Safety (IC) • Transportation Management (TM)	• 0 Priority I findings • 2 Priority II findings • 5 observations

9.4 Quality Control Activities

Quality control typically consists of additional data analyses to test the accuracy, precision, and representativeness of the data generated.

9.4.1 Quality Control Sampling

Project-specified quality control samples are submitted to subcontract laboratories in order to meet project data quality objectives and sampling and analysis plan requirements. Various

field quality control samples may be collected to assess the data quality and final usability. Errors, some of which are unavoidable, can be introduced into the sampling process, including potential contamination of samples in the field or during transportation. In addition, sample results can be affected by the variability present at each sample location.

With each sample batch, laboratory quality control samples are prepared concurrently at defined frequencies and analyzed in accordance with established methods. Subcontract laboratory personnel determine the analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement.

Quality control sample results are compared to either control criteria that is established statistically or to prescribed acceptance control limits. Quality control sample summaries are included in analytical reports prepared by subcontract laboratory personnel.

9.4.2 Data Validation

Sample collection, analysis request and chain of custody documentation, and measurement data are reviewed and validated for each sample collected. Analytical data reported by subcontract laboratories are reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to each program's method of compliance and data quality objectives.

Environmental Reporting 2024: Environmental Sampling

In 2024, Sandia personnel collected a total of 12 wastewater quality control samples, along with two blind spike samples. These blind spike samples closely mimicked the routine sample matrix but did not contain all the same constituents typically measured; they serve to evaluate background levels of these constituents and to identify potential contamination in the laboratory or field. Together, these samples accounted for 21.2 percent of the environmental samples collected.

Additionally, 12 groundwater quality control samples were collected, representing 52.2 percent of the total environmental samples. Furthermore, 6 stormwater quality control samples were gathered, which constituted 50.0 percent of the environmental samples collected. For detailed environmental sampling results, please refer to Table 9-2.

Table 9-2 summarizes the results of statistical analyses conducted on environmental samples in 2024. Stormwater sampling is reported following the state of California Industrial General Permit's reporting calendar (July 1, 2023 through June 30, 2024). One stormwater parameter, total phosphorus, did not meet the applicable passing criteria for the precision test component. Stormwater samples are taken from runoff streams that are constantly flowing in a storm weather environment. This creates the opportunity for samples to vary from one another and can present precise duplication challenges, especially if the concentration from the results are low. The wastewater parameter total dissolved solids failed the precision test due to one sample event that yielded abnormally low concentrations, which allowed for increased sensitivities to differences of the samples to be observed. However, this parameter passes once this sample event was removed. In 2024, three parameters—silver, copper, and mercury—did not meet the accuracy standards during testing.

A *certificate of analysis* is a document from the chemical, manufacturer, or service provider, which verifies that a product conforms to a set standard. A common example is a document demonstrating the known concentration of a constituent with acceptable margins based on vigorous testing.

Table 9-2. Environmental sampling statistical analyses, 2024

Sample Medium	Completeness Test	Precision Test		Accuracy Test	
	Results (Percent)	Number of Tests	Results	Number of Tests	Results
Groundwater	100	2	2 passed	N/A	N/A
Stormwater [a,b,c]	100	8	7 passed	N/A	N/A
Wastewater [c] (sanitary sewer)	100	6	5 passed	28	25 passed

[a] Stormwater samples were from the July 1, 2023, to June 30, 2024, reporting year.
[b] Stormwater samples are scheduled when a qualifying storm event occurs during operating hours and conditions are safe.
[c] Statistical outliers were removed
N/A = not applicable

9.5 Records Management

All analytical data packages, analysis request and chain-of-custody documents, and data validation reports are submitted to a Sandia record depository for cataloging and storage in accordance with internal procedures, DOE requirements, and the document control requirements of ISO 9001, *Quality Management* (ISO 9001:2015 2015), and ISO 14001, *Environmental Management Systems* (ISO 14001:2015 2015).

Appendix A. Groundwater and Sanitary Sewer Analytical Results

Willows (*Salix* spp.) along Arroyo Seco

Groundwater analysis results for 2024 are presented in Table A-1 and Table A-2, and well depth is presented in Table A-3. Routine monitoring results for sanitary sewer outfall are presented in Table A-4, Table A-5, and Table A-6.

Table A-1. Groundwater monitoring analytical results for metals, 2024

Parameter (μg/L)	Sample Date	Well ID AS-3A	Well ID AS-3B	Well ID AS-3C	Well ID AS-4	Method Detection Limit (μg/L)
Antimony	5/2/2024	0.17 [a]	0.25 [a]	12	0.16 [a]	0.084
Arsenic	5/2/2024	1.1	0.68	0.28 [a]	2.4	0.071
Barium	5/2/2024	110	110	130	76	0.52
Beryllium	5/2/2024	ND	ND	ND	ND	0.060
Cadmium	5/2/2024	ND	ND	ND	ND	0.050
Chromium	5/2/2024	7.8	6.8	6.1	3.0	0.78
Cobalt	5/2/2024	0.37 [a]	0.24 [a]	0.44 [a]	1.2	0.051
Copper	5/2/2024	1.3 [a]	1.0 [a]	ND	4.5	0.63
Lead	5/2/2024	0.63	0.98	ND	0.70	0.19
Mercury	5/2/2024	ND	ND	ND	0.11	0.031
Molybdenum	5/2/2024	2.2	2.2	4.6	1.4	0.19
Nickel	5/2/2024	1.2	0.74	ND	4.3	0.33
Selenium	5/2/2024	0.88	0.43	1.0	0.28 [a]	0.18
Silver	5/2/2024	ND	ND	ND	ND	0.051
Thallium	5/2/2024	ND	ND	ND	ND	0.067
Vanadium	5/2/2024	2.6	2.5	0.37 [a]	5.7	0.19
Zinc	5/2/2024	ND	ND	ND	ND	11

[a] Sample was found above the detection limit, but below the reporting limit.
N/A = not applicable
ND = not detected

Table A-2. Groundwater monitoring analytical results for organics, 2024

Parameter (μg/L)	Sample Date	Well ID AS-3A	Well ID AS-3B	Well ID AS-3C	Well ID AS-4	Well ID FM-1R	Well ID FM-7R	Well ID NLF-6	Method Detection Limit (μg/L)
Benzene	3/19/2024	N/A	N/A	N/A	N/A	0.073	0.47	N/A	0.0350
	5/2/2024	ND	ND	ND	ND	N/A	N/A	N/A	
	8/14/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
	9/12/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
Carbon Tetrachloride	5/2/2024	ND	ND	ND	ND	N/A	N/A	1.9	0.0340
Ethylbenzene	3/19/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	0.100
	5/2/2024	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	8/14/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
	9/12/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
Toluene	3/19/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	0.100
	5/2/2024	ND	ND	ND	ND	N/A	N/A	0.15[a]	
	8/14/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
	9/12/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
TPH-Diesel	3/19/2024	N/A	N/A	N/A	N/A	2600	2800	N/A	71
	5/2/2024	ND	ND	ND	ND	N/A	N/A	N/A	
	8/14/2024	N/A	N/A	N/A	N/A	19000	300	N/A	
	9/12/2024	N/A	N/A	N/A	N/A	6500	ND	N/A	
Chloroform	5/2/2024	ND	0.27	ND	ND	N/A	N/A	0.68	0.043
Xylenes	3/19/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	0.120
	5/2/2024	ND	ND	ND	ND	N/A	N/A	N/A	
	8/14/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	
	9/12/2024	N/A	N/A	N/A	N/A	ND	ND	N/A	

[a] Sample was found above the detection limit, but below the reporting limit.
N/A = not applicable
ND = not detected

Table A-3. Well depth and screen period intervals

Area	Well ID	Well Depth (feet)	Screen Period Interval (feet)
Arroyo Seco	AS-3A	112.58	100–110
	AS-3B	124.97	118–123
	AS-3C	157	150–155
	AS-4	28.57	15–25
Fuel Oil Spill site	FM-1R	129	99–129
	FM-7R	129	99–129
Navy Landfill	NLF-6	110	87–102

[a] Start of screen interval. Length of screen interval is unknown.

Table A-4. Sanitary sewer outfall monitoring analytical results for physical and biological parameters, 2024

Report Month	Sample Date	Laboratory ID Number[a]	Biochemical Oxygen Demand[b] (mg/L)	Chemical Oxygen Demand[b] (mg/L)	Total Dissolved Solids[b] (mg/L)	Total Suspended Solids[b] (mg/L)	Oil and Grease (Mineral)[c] (mg/L)	Oil and Grease (Animal and Vegetable)[c] (mg/L)	Cyanide[c] (mg/L)
January	1/2/2024	24A0328	99	220	310	91	<5.0	13	<0.005
February	2/6/2024	24B1195	130	100	580	41	<5.0	<5.0	<0.005
March	3/5/2024	2403221	120	180	430	86	<5.3	11.6	0.0038
April	4/2/2024	2404101	170	420	428	294	5.5	10.2	0.0046
May	5/2/2024	23E0465	96	240	360	160	<5.0	30	0.0055
June	6/4/2024	2406112	170	580	182	260	<5.1	12.0	0.0051
July	7/2/2024	2407059	120	330	282	176	<5.1	5.1	0.0055
August	8/6/2024	2408393	120	230	152	129	<5.1	19.3	0.0074
September	9/3/2024	2409030	ND	66	38	34.8	<5.1	21.0	0.0087
October	10/1/2024	2410047	ND	250	206	136	<5.1	9.0	0.0091
November	11/5/2024	2411214	130	320	154	202	<5.1	16.0	0.011
December[d]	12/3/2024	2412114	330	330	154	202	<1.7	9.2	0.0062
Sewer discharge limits[e]			**N/A**[f]	**N/A**[f]	**N/A**[f]	**N/A**[f]	**100**	**300**	**0.04**

Note: EPA analytical methods were SM5210B, SM5220D, SM2540C, SM2540D, EPA1664A, and Kelada-01.

[a] Analyses were performed by an off-site by independent and state-certified laboratory.

[b] Daily composite sample. The sample represents a representative composite for a 24-hour period.

[c] Grab sample.

[d] Site was shut down from December 25, 2023, through January 2, 2024.

[e] Discharge concentration limits, City of Livermore Municipal Code 13.32.

[f] N/A indicates not applicable (i.e., there is no specific discharge limit for this required parameter).

Table A-5. Sanitary sewer outfall monitoring analytical results for metals, 2024

Report Month	Sample Date	Laboratory ID Number[a]	Arsenic[b] (mg/L)	Cadmium[b] (mg/L)	Chromium[b] (mg/L)	Copper[b] (mg/L)	Lead[b] (mg/L)	Mercury[b] (mg/L)	Nickel[b] (mg/L)	Silver[b] (mg/L)	Zinc[b] (mg/L)
January	1/2/2024	24A0324	<0.0020	<0.0010	<0.0020	0.126	<0.0050	<0.00020	<0.010	<0.010	0.291
	1/9/2024	24A1851	<0.0020	<0.0010	0.0033	0.208	<0.0050	<0.00020	<0.010	<0.010	0.376
	1/16/2024	24A2910	<0.0020	<0.0010	<0.0020	0.154	<0.0050	<0.00020	<0.010	<0.010	0.292
	1/23/2024	24A3960	<0.0020	<0.0010	<0.0020	0.121	<0.0050	<0.00020	<0.010	<0.010	0.202
	1/30/2024	24A5066	<0.0020	<0.0010	<0.0020	0.0912	<0.0050	<0.00020	<0.010	<0.010	0.164
February	2/6/2024	24B1188	<0.0020	<0.0010	<0.0020	0.0914	<0.0050	<0.00020	<0.010	<0.010	0.184
	2/13/2024	24B2612	<0.0020	<0.0010	0.0025	0.0955	<0.0050	<0.00020	<0.010	<0.010	0.164
	2/20/2024	24B3522	<0.0020	<0.0010	<0.0020	0.0670	<0.0050	<0.00020	<0.010	<0.010	0.153
	2/27/2024	2402H62	<0.0025	<0.0025	<0.0025	0.120	<0.0025	<0.00025	<0.0025	<0.0025	0.200
March	3/5/2024	2403221	<0.0025	<0.0025	<0.0025	0.110	<0.0025	<0.00025	0.0041	<0.0025	0.180
	3/12/2024	2403759	<0.0025	<0.0025	0.0023	0.120	<0.0025	<0.00025	0.0043	<0.0025	0.200
	3/19/2024	2403C39	<0.0025	<0.0025	<0.0025	0.087	<0.0025	<0.00025	0.0043	<0.0025	0.180
	3/26/2024	2403G88	<0.0025	<0.0025	0.0076	0.240	0.0048	<0.00025	0.0081	<0.0025	0.450
April	4/2/2024	2404101	<0.0025	<0.0025	0.0028	0.110	<0.0025	<0.00025	0.0049	<0.0025	0.160
	4/9/2024	2404590	<0.0025	<0.0025	<0.0025	0.210	<0.0025	<0.00025	0.0039	<0.0025	0.300
	4/16/2024	2404C89	<0.0025	<0.0025	<0.0025	0.160	0.0029	<0.00025	0.0044	<0.0025	0.290
	4/23/2024	2404J05	<0.0025	<0.0025	<0.0025	0.160	<0.0025	<0.00025	0.0033	<0.0025	0.350
May	5/7/2024	2405455	<0.0025	<0.0025	0.0034	0.180	<0.0025	<0.00025	0.0047	<0.0025	0.250
	5/14/2024	2405A11	<0.0025	<0.0025	<0.0025	0.120	<0.0025	<0.00025	0.0029	<0.0025	0.170
	5/21/2024	2405E83	<0.0025	<0.0025	<0.0025	0.150	<0.0025	<0.00025	0.0045	<0.0025	0.230
	5/28/2024	2405J64	<0.0025	<0.0025	<0.0025	0.190	<0.0025	<0.00025	0.0041	<0.0025	0.240
June	6/4/2024	2406112	<0.0025	<0.0025	<0.0025	0.140	<0.0025	<0.00025	0.0034	<0.0025	0.200
	6/11/2024	2406681	<0.0025	<0.0025	<0.0020	0.160	<0.0025	<0.00025	0.0043	<0.0025	0.250
	6/18/2024	2406C06	<0.0025	<0.0025	<0.0025	0.170	<0.0025	<0.00025	0.0036	<0.0025	0.220
	6/25/2024	2406G71	<0.0025	<0.0025	<0.0025	0.140	<0.0025	<0.00025	0.0038	<0.0025	0.170

Report Month	Sample Date	Laboratory ID Number[a]	Arsenic[b] (mg/L)	Cadmium[b] (mg/L)	Chromium[b] (mg/L)	Copper[b] (mg/L)	Lead[b] (mg/L)	Mercury[b] (mg/L)	Nickel[b] (mg/L)	Silver[b] (mg/L)	Zinc[b] (mg/L)
July	7/2/2024	2407059	<0.0025	<0.0025	<0.0025	0.140	<0.0025	<0.00025	0.0035	<0.0025	0.210
	7/9/2024	2407463_REV1	<0.0025	<0.0025	0.0045	0.150	<0.0025	<0.00025	0.0034	<0.0025	0.190
	7/16/2024	2407868	<0.0025	<0.0025	0.0031	0.160	<0.0025	<0.00025	0.0039	<0.0025	0.200
	7/23/2024	2407D65	<0.0025	<0.0025	0.0055	0.270	0.0043	<0.00025	0.0055	<0.0025	0.340
	7/30/2024	2407J81	<0.0025	<0.0025	<0.0025	0.130	<0.0025	<0.00025	0.0036	<0.0025	0.170
August	8/6/2024	2408393	<0.0025	<0.0025	<0.0025	0.130	<0.0025	<0.00025	0.0031	<0.0025	0.150
	8/13/2024	2408A89	<0.0025	<0.0025	0.0030	0.130	0.0028	<0.00025	0.0051	<0.0025	0.240
	8/20/2024	2408E67	<0.0025	<0.0025	<0.0025	0.240	<0.0025	<0.00025	0.0030	<0.0025	0.240
	8/27/2024	2408K29	<0.0025	<0.0025	<0.0025	0.120	0.0043	<0.00025	0.0049	<0.0025	0.190
September	9/3/2024	2409030	<0.0025	<0.0025	0.0035	0.220	0.0025	<0.00025	0.0033	<0.0025	0.260
	9/10/2024	2409490	<0.0025	<0.0025	0.0038	0.260	0.0040	<0.00025	0.009	<0.0025	0.310
	9/17/2024	2409A50	<0.0025	<0.0025	<0.0025	0.087	<0.0025	<0.00025	0.0024	<0.0025	0.110
	9/24/2024	2409G14	<0.0025	<0.0025	<0.0025	0.098	<0.0025	<0.00025	0.0029	<0.0025	0.170
October	10/1/2024	2410047	<0.0025	<0.0025	<0.0025	0.079	<0.0025	<0.00025	<0.0025	<0.0025	0.120
	10/8/2024	2410595	<0.0025	<0.0025	<0.0025	0.110	<0.0025	<0.00025	0.031	<0.0025	0.150
	10/15/2024	2410B07	0.00060	<0.0025	<0.0025	0.071	<0.0025	<0.00025	0.0017	<0.0025	0.087
	10/22/2024	2410F81	<0.0025	<0.0025	<0.0025	0.100	<0.0025	<0.00025	0.0026	<0.0025	0.150
	10/29/2024	2410L58	<0.0025	<0.0025	0.0052	0.250	0.0096	<0.00025	0.010	0.0038	0.350
November	11/5/2024	2411214	<0.0025	<0.0025	<0.0025	0.093	<0.0025	<0.00025	0.0027	<0.0025	0.130
	11/12/2024	2411699	<0.0025	<0.0025	<0.0025	0.110	<0.0025	<0.00025	0.0025	<0.0025	0.160
	11/19/2024	2411B72	<0.0025	<0.0025	<0.0025	0.140	<0.0025	<0.00025	0.0030	<0.0025	0.190
	11/26/2024	2411H34	<0.0025	<0.0025	<0.0025	0.140	<0.0025	<0.00025	0.0028	<0.00025	0.220

Report Month	Sample Date	Laboratory ID Number[a]	Arsenic[b] (mg/L)	Cadmium[b] (mg/L)	Chromium[b] (mg/L)	Copper[b] (mg/L)	Lead[b] (mg/L)	Mercury[b] (mg/L)	Nickel[b] (mg/L)	Silver[b] (mg/L)	Zinc[b] (mg/L)
December[d]	12/3/2024	2412114	<0.0025	<0.00024	<0.0013	0.100	<0.0025	<0.00011	<0.0025	<0.0004	0.140
	12/10/2024	2412581	<0.0025	<0.0025	0.0034	0.240	0.0040	<0.00011	0.0049	<0.00020	0.280
	12/17/2024	2412B67	<0.0025	<0.00024	<0.0025	0.130	<0.0025	<0.00025	0.0033	<0.00010	0.200
	12/24/2024	2412G21	0.00053	<0.0005	<0.0002	0.130	0.0025	0.00005	0.0037	<0.0005	0.190
	12/31/2024	2501118	0.00052	<0.0050	<0.033	0.048	0.00088	<0.00026	0.002	<0.0005	0.090
Sewer discharge limits[c]			**0.06**	**0.14**	**0.62**	**1.0**	**0.20**	**0.01**	**0.61**	**0.20**	**3.00**

Note: EPA analytical method was 200.8.

[a] Analyses performed by an off-site by independent and state-certified laboratory.

[b] Samples are collected as a weekly composite.

[c] Discharge concentration limits, City of Livermore Municipal Code 13.32.

[d] Site shutdown from December 25, 2023, through January 2, 2024.

Table A-6. Sanitary sewer outfall monitoring analytical results for total toxic organics, 2024

Report Month	Sample Date	Laboratory ID Number[a]	Purgeable Priority Pollutants (µg/L)[b]	Result	Extractable Priority Pollutants (µg/L)[b]	Analytical Result	Organo-chlorine Pesticides (µg/L)[b]	Analytical Result
January	1/3/2024	23A0305	Chloroform	0.47 [c]	ND	ND	p,p-DDD	0.016 [c]
			Dibromochloromethane	1.4				
			Bromoform	1.2				
			Bromodichloromethane	0.57				
			Trihalomethanes (total)	3.7				
February	2/6/2024	24B1195	Chloroform	0.55	ND	ND	ND	ND
			Dibromochloromethane	1.7				
			Bromoform	1.9				
			Bromodichloromethane	0.59				
			Toluene	0.37				
March	3/5/2024	2403221	Chloroform	0.59	ND	ND	ND	ND
			Dibromochloromethane	1.6				
			Bromoform	0.6				
			Bromodichloromethane	1.0				
			Toluene	0.16 [c]				
April	4/2/2024	2404101	Chloroform	0.50	ND	ND	ND	ND
			Dibromochloromethane	1.2				
			Bromoform	0.63				
			Bromodichloromethane	0.95				
			Toluene	0.40 [c]				
May	5/7/2024	2405455	Chloroform	1.6	Phenol	1.5	ND	ND
			Dibromochloromethane	0.075 [c]				
			Bromoform	0.33 [c]				
			Bromodichloromethane	0.16				
			Toluene	0.23 [c]				

Report Month	Sample Date	Laboratory ID Number[a]	Purgeable Priority Pollutants (µg/L)[b]	Result	Extractable Priority Pollutants (µg/L)[b]	Analytical Result	Organo-chlorine Pesticides (µg/L)[b]	Analytical Result
June	6/4/2024	2406112	Chloroform	1.3	ND	ND	ND	ND
			Dibromochloromethane	0.075 [c]				
			Toluene	0.36 [c]				
			Bromodichloromethane	0.060				
July	7/2/2024	2407059	Chloroform	2.1	3 & 4-Methylphenol (m,p-Cresol)	44	Endosulfan II	0.047 [c]
			Dibromochloromethane	0.075 [c]	Phenol	11		
			Toluene	0.43 [c]	Fluorene	0.17 [c]		
			Bromodichloromethane	0.060	2,4,6-Trichlorophenol	0.16 [c]		
August	8/1/2024	23H0296	Bromodichloromethane	0.11	ND	ND	ND	ND
			Dibromochloromethane	0.088 [c]				
			Toluene	0.24 [c]				
September	9/3/2024	2409030	Bromodichloromethane	0.090	ND	ND	ND	ND
			Chloroform	2.90				
			Toluene	0.50				
October	10/1/2024	2410047	Bromodichloromethane	0.011	ND	ND	ND	ND
			Chloroform	2.90				
			Toluene	0.66				
November	11/5/2024	2411214	Bromodichloromethane	0.11	ND	ND	ND	ND
			Chloroform	2.50				
			Toluene	0.46 [c]				
December	12/3/2024	2412114	Bromoform	2.20	Fluoranthene	0.22 [c]	ND	ND
			Chloroform	1.6				
			Dibromochloromethane	1.1				
Sewer discharge limits[d]		**1,000 (sum per month)**[e]						

Note: EPA analytical methods were 624.1, 625.1, and 608.3.
Note: Trihalomethanes are reported in this table although they are common constituents of chlorinated water.

[a] Analyses performed by an off-site by independent and state-certified laboratory.
[b] Grab sample.
[c] Sample was found above the detection limit, but below the reporting limit
[d] Discharge concentration limits, City of Livermore Municipal Code 13.32.
[e] The toxic organic discharge limit for SNL/CA is 1,000 µg/L. The total toxic organic number is arrived at by summing up all organic constituents greater than 10 µg/L.
ND = not detected

Glossary

Barn Owl Juveniles (*Tyto alba*)

A

abatement The act of reducing the degree or intensity of or eliminating pollution.

aboveground storage tank A fixed, stationary, or otherwise permanently installed storage tank that is wholly or partially above the ground surface and used to contain oil of any kind (petroleum, non-petroleum, synthetic, animal, or vegetable).

ambient air The surrounding atmosphere, usually the outside air, as it exists around people, plants and structures. It does not include the air next to emission sources.

analyte A substance or chemical constituent undergoing analysis.

appraisal A documented activity performed in accordance with written procedures and specified criteria to evaluate an organization's compliance and conformance with programs, standards, and other requirements contained in orders, laws, and regulations or in other requirements.

arroyo A deep gully cut by an intermittent stream; a dry gulch.

audit (1) An examination of records or financial accounts to check their accuracy. (2) An adjustment or correction of accounts. (3) An examined and verified account.

avifauna The birds of a particular habitat, region, or geological period.

B

background radiation Relatively constant low-level radiation from environmental sources such as building materials, cosmic rays, and ingested radionuclides in the body.

basin (1) A low-lying area, wholly or largely surrounded by higher land, which ranges from a small, nearly enclosed valley to an extensive, mountain-rimmed depression. (2) An entire area drained by a given stream and its tributaries. (3) An area in which the rock strata are inclined downward from all sides toward the center. (4) An area in which sediment accumulates.

best management practice The preferred method or practice for managing operations.

biochemical oxygen demand A measure of the amount of dissolved oxygen that microorganisms need to break down organic matter in water. Used as an indicator of water quality.

biota The animal and plant life of a given region.

biotic Relating to or resulting from living organisms.

bird survey The process of counting birds visually and audibly.

built environment The human-made space (including structures, features, and facilities) in which people live, work and recreate.

C

categorical process An industrial process that discharges wastewater.

chemical oxygen demand The amount of oxygen required to degrade the organic compounds of wastewater. Used to measure the overall level of organic contamination in wastewater.

climate A description of an area's average weather conditions and the extent to which those conditions vary over long time intervals, generally decades or centuries.

commingling Mingling or mixing of several recyclable materials in one container.

containment An enclosed space or facility designed to contain and prevent the escape of hazardous material.

contamination The introduction of pollutants (e.g., microorganisms, chemicals, toxic substances, wastes, or wastewater) into a medium (i.e., water, air, or soil), in a concentration that makes that medium unfit for its next intended use. This applies to the surfaces of objects, buildings, and various household use and agricultural use products.

corrective action (1) Steps taken to clean up spills. The process includes designing cleanup procedures to guide hazardous waste treatment, storage, and disposal. (2) An action identified to correct a problem or prevent its recurrence.

criteria pollutants National ambient air quality standards for six common air pollutants.

D

data quality objective A strategic, systematic process for planning scientific data collection efforts.

decontamination The removal of adverse substances such as noxious chemicals, harmful bacteria, or other organisms, or radioactive material from exposed individuals, rooms and furnishings in buildings, or the exterior environment.
demolition The act or process of wrecking or destroying, especially destruction by explosives.
discharge Any liquid or solid that flows or is placed onto any land or into any water. This includes precipitation discharges to storm drains, accidental or intentional spilling, and leaking, pumping, pouring, emitting, emptying, or dumping any material or substance onto any land or into any water.
dose A term denoting the quantity of radiation energy absorbed.
dosimeter A portable detection device used to measure the total accumulated exposure to ionizing radiation.

E

ecology The relationship of living things to one another and their environment, or the study of such relationships.
ecosystem A network of living organisms (e.g., humans, animals, plants, and fungi) and nonliving components (e.g., air, water, mineral soil, buildings, and roads) that interact to comprise an overall environment.
effective dose equivalent The weighted average of the estimated biological effect of a dose of ionizing radiation in certain human organs or tissues; can be used to estimate the health-effects risk for an exposed individual.
effluent A liquid or gaseous waste discharged to the environment.
Electronic Product Environmental Assessment Tool A set of criteria for six categories of technology products to determine the environmental attributes of particular electronic office products.
emission A gaseous or liquid stream containing one or more contaminants.
endangered species Any species which is in danger of extinction throughout all or a significant portion of its range (as defined in the Endangered Species Act).
environment The sum of all external conditions affecting an organism's life, development, and survival.
environmental aspect An organization's activities, products, or services that can interact with the environment.
environmental assessment An environmental analysis prepared pursuant to NEPA to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.
environmental impact Any change to the environment, whether adverse or beneficial, wholly or partially, resulting from an organization's activities, products, or services.
environmental impact statement A NEPA compliance document that federal agencies are required to complete for major federal actions that significantly affect the environment. A tool for decision making, it describes an undertaking's positive and negative effects and cites alternative actions.
environmental management A program designed to maintain compliance with federal, state, and local requirements.
environmental management system A continuing cycle of planning, evaluating, implementing, and improving processes and actions undertaken to achieve environmental goals.
environmental monitoring The collection and analysis of samples or direct measurements of environmental media such as air, water, and soil.
environmental release Any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of material into the environment, which may include (but is not limited to) soil, air, and drain systems.
environmental restoration A project chartered with assessing and, if necessary, remediating inactive waste sites.
environmental restoration site Any location on the environmental restoration site list that has been identified as an area that is (or may be) contaminated—either on or beneath the land surface—as a result of operations. Contaminants may be chemicals, radioactive material, or both.
environment, safety, and health program A program designed to protect and preserve the environment and to ensure the safety and health of an organization's employees, contractors, visitors, and the public.

ephemeral stream A stream that flows only for a short duration during and following rainfall.
exceedance Violation of the regulatory limits for pollutants permitted by environmental protection standards.
explosives waste Any explosive substance, article, or explosive-contaminated item that cannot be used for its intended purpose and does not have a legitimate investigative or research use.
external radiation Radiation originating from a source outside the body.

F

fault A fracture in the continuity of a rock formation caused by the earth's crust shifting or dislodging, after which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.
fauna (1) Animals, especially the animals of a particular region or period, considered as a group. (2) A catalog of the animals of a specific region or period.
finding In reference to an audit or inspection, a finding is a factual statement documenting deviation from a regulatory or procedural requirement.
flora (1) Plants considered as a group, especially of a particular region or period. (2) The plant life characterizing a specific geographic region or environment.
fluvial sediment A sedimentary deposit consisting of material transported by, suspended in, or laid down by a river or stream.
foliar cover The leaf area of a plant or a plant grouping.
fungicide An agent that destroys fungi or inhibits their growth.

G

gamma radiation Very high-energy and high-frequency electromagnetic radiation that is emitted by the nuclei of radioactive substances during decay, or by the interactions of high-energy electrons with matter. They are similar to but have a shorter wavelength than X-rays.
geology The scientific study of the Earth's origin, history, and structure.
greenhouse gas emission An emission of one or more gases—comprising an aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, measured as carbon dioxide equivalent—with the potential to contribute to the atmospheric greenhouse effect by absorbing infrared radiation.
groundwater The water found beneath the earth's surface in pore spaces and in fractures of rock formations.

H

habitat The place or environment where a plant or animal naturally or normally lives and grows.
hazardous substance (1) Any material that poses a threat to human health and/or the environment by virtue of possessing one or more hazardous characteristics as defined by RCRA, its amendments, and related
hazardous waste A waste with chemical or physical properties that meets the definitions in federal and state regulations and may cause harm to human health or the environment if not managed properly
hazardous waste site Any facility or location at which hazardous waste operations take place.
herbicide A chemical pesticide designed to control or destroy plants, weeds, or grasses.
herpetofauna The reptiles and amphibians of a particular region, habitat, or geological period.
herpetology The study of reptiles and amphibians.
high-level radioactive waste Materials produced as a byproduct of the reactions that occur inside nuclear reactors and determined to be waste.
human environment Human environment means comprehensively the natural and physical environment and the relationship of present and future generations of Americans with that environment.

I

insecticide A pesticide compound specifically used to kill or prevent the growth of insects.
integrated safety management system A set of guidelines that systematically integrates safety into management and work practices at all levels, so missions are accomplished while protecting the worker, the public, and the environment.

L

lacustrine sediment Sediment formed in, or relating to, a lake.

low-level radioactive waste Items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation and determined to be waste.

M

migratory birds All birds listed in the Migratory Bird Treaty Act, 50 CFR 10.13, including any part, nest, or egg.

mixed waste Waste that contains both radioactive and hazardous constituents.

N

National Emission Standards for Hazardous Air Pollutants Emission standards set by EPA for air pollutants not covered by National Ambient Air Quality Standards that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health; secondary standards are designed to protect public welfare (e.g., building facades, visibility, crops, and domestic animals).

National Pollutant Discharge Elimination System A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, a tribal government, or a territorial government.

natural resource A resource (actual or potential) supplied by nature.

nitrate A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and which can have harmful effects on humans and animals. Nitrates in water can cause severe illnesses in infants and domestic animals. A plant nutrient and inorganic fertilizer, nitrate is found in septic systems, animal feedlots, agricultural fertilizers, manure, industrial wastewaters, sanitary landfills, and garbage dumps.

nitrite (1) An intermediate in the process of nitrification. (2) Nitrous oxide salts used in food preservation.

O

observation In reference to an audit or inspection, observations document deviations from best management practices or opportunities for improvement. As it relates to ecology and wildlife, an observation notes the occurrence of a species at a specific location.

occurrence Events or conditions that adversely affect, or may adversely affect, DOE (including the National Nuclear Security Administration) or contractor personnel, the public, property, the environment, or the DOE mission.

optically stimulated luminescent dosimeter A device used to measure ionizing radiation.

outfall The place where effluent is discharged into receiving waters.

ozone (O3) A colorless gas soluble in alkalis and cold water; a strong oxidizing agent; can be produced by electric discharge in oxygen or by the action of ultraviolet radiation on oxygen in the stratosphere (where it acts as a screen for ultraviolet radiation).

P

pH A measure of hydrogen ion concentration in an aqueous solution. Acidic solutions have a pH less than 7, basic solutions have a pH greater than 7, and neutral solutions have a pH of 7.

$PM_{2.5}$ Respirable particulate matter that has a diameter equal to or less than 2.5 microns.

PM_{10} Particulate matter that has a diameter equal to or less than 10 microns.

pollutant Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

polychlorinated biphenyl A family of highly toxic organic chlorine compounds. Because of their persistence, toxicity, and ecological damage via water pollution, the manufacture of PCBs was discontinued in the United States in 1976.

potable water Water that is safe for human consumption and food preparation.

Q

quality assurance A system of procedures, checks, audits, and corrective actions to ensure that research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

quality control A system used to determine analytical accuracy, precision, and contamination when samples are collected and to assess the data's quality and usability.

R

radioactive waste A radioactive waste is a waste that contains radioactive material. Radioactive waste is generated from operations at nuclear reactors, research institutions, or hospitals.

radionuclide A radioactive particle, man-made or natural, with a distinct atomic weight number.

radon A colorless, naturally occurring, radioactive, inert gas formed by the radioactive decay of rarnam atoms in soil or rocks.

reportable quantity A quantity of material, product compound, or contaminant that is reportable to a regulatory agency when released to the environment.

riparian Pertaining to, situated in, or adapted to living on the banks of rivers and streams.

rodenticide A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food or crops.

ruderal vegetation Plants that are the first to colonize disturbed lands.

S

sampling and analysis plan A plan that contains criteria required for conducting sampling activities.

secondary containment Any structure or device that has been installed to prevent leaks, spills, or other discharges of stored chemicals, waste, oil, or fuel from storage, transfer, or end-use equipment from being released to the environment. Examples of secondary containment include pans, basins, sumps, dikes, berms, or curbs.

sediment Transported and deposited particles or aggregates derived from rocks, soil, or biological material.

soil All loose, unconsolidated mineral or organic materials on the immediate surface of the earth that support plant growth.

solid waste Any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

statement of work A comprehensive description of the goods, services, or combination of goods and services for which Sandia subcontracts.

stormwater Water runoff from rainfall or snowmelt, including that discharged to the sanitary sewer system.

strike-slip fault A fault with horizontal movement along the break where slipping is parallel with the strike of the fault.

surface discharge A release of water and water-based compounds to roads, open areas, or confined areas such as reservoirs.

surface water Any body of water above ground level, including oceans, streams, rivers, lakes, wetlands, reservoirs, and creeks.

sustainability Those actions taken to maximize energy and water efficiency; minimize chemical toxicity and harmful environmental releases, particularly greenhouse gas; promote renewable energy development; and conserve natural resources while sustaining assigned mission activities.

T

threatened species Any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (as defined in the Endangered Species Act).

topography The physical features of a surface area, including relative elevations and the position of natural and man-made features.

total dissolved solids Solids in water that pass through a filter; a measure of the amount of material dissolved in water.

total suspended solids Solids in water that can be trapped in a filter. Solids can include silt, decaying plant and animal matter, industrial wastes, and sewage.

toxic chemical Any chemical listed in EPA regulations under "Emergency Planning and Community Right-to-Know Act of 1986–Section 313: Guidance for Reporting Toxic Chemicals."

transuranic waste Radioactive waste containing alpha-emitting radionuclides having an atomic number greater than 92 and a half-life greater than 20 years in concentrations greater than 100 nanocuries per gram.

transverse fault A fault that strikes obliquely or perpendicular to the region's general structural trend.

treatment, storage, and disposal facility A facility at which waste management operations include treatment, storage, or disposal of hazardous wastes as defined by federal and state laws and regulations.

U

upstream (1) In the direction opposite the flow of a stream. (2) In or to a position within the production stream closer to manufacturing processes.

V

vegetation Plant life or the total plant cover of an area.

volatile organic compound An organic chemical compound with a high vapor pressure causing it to evaporate.

W

waste management A method for dealing with the waste from humans and organisms, including minimizing, handling, processing, storing, recycling, transporting, and final disposal.

wastewater The spent or used water from a home, community, farm, or industry.

water pollution The presence in water of enough harmful or objectionable material to damage the water's quality in relation to the water's contemplated use(s).

watershed A region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water.

wetland An area that is saturated by surface water or groundwater, having vegetation adapted for life under those soil conditions, such as swamps, bogs, fens, marshes, and estuaries.

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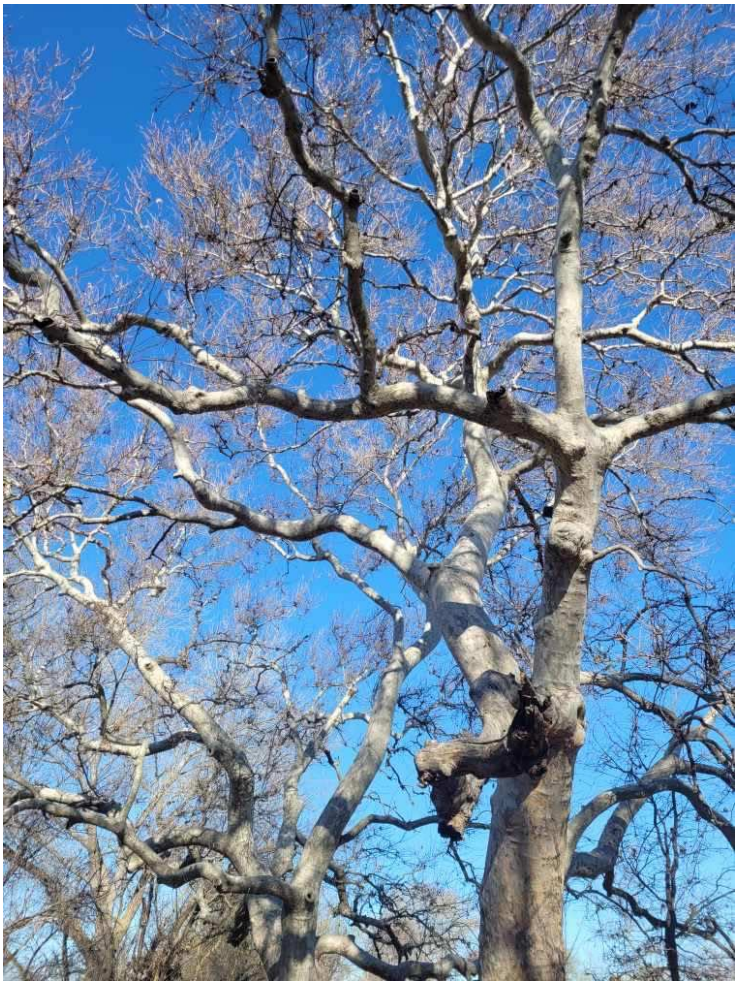

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