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ANNUAL SITE ENVIRONMENTAL REPORT
Idaho National Laboratory

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Prepared by

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As we present this report, we also take a moment to honor and celebrate the remarkable career of Betsy Holmes. Betsy has dedicated her professional life to the U.S. Department of Energy, Idaho Operations Office, where her expertise, commitment, and passion have made a significant impact. Her contributions have been invaluable, and her legacy will continue to inspire us.

Thank you, Betsy, for your years of service and dedication. We wish you all the best in your well-deserved retirement.

Rabbit at the Idaho National Laboratory (INL) Site.

To Our Readers:

The Idaho National Laboratory (INL) Site Environmental Report for Calendar Year 2024 is an overview of environmental activities conducted on and in the vicinity of the INL Site from January 1 through December 31, 2024. This report includes the following components:

- Effluent monitoring and environmental surveillance of air, water, soil, vegetation, biota, and agricultural products for radioactivity. These results are compared with the historical data, background measurements, and applicable standards and requirements to verify the INL Site does not adversely impact the environment or the health of humans or biota.
- A summary of environmental management systems in place to protect air, water, land, and other natural and cultural resources potentially impacted by INL Site operations.
- Ecological monitoring and other scientific research conducted onsite that may be of interest to the reader.

The report addresses three general levels of reader interest:

- The first level is a brief summary with a take-home conclusion. This is presented in the chapter highlights text box at the beginning of each chapter. There are no tables, figures, or graphs in the highlights. This section is intended to highlight general findings for an audience with a limited scientific background.
- The second level is a more in-depth discussion with figures, summary tables, and summary graphs accompanying the text. The chapters of the annual report represent this level, which requires some familiarity with scientific data and graphs. A person with some scientific background can read and understand this report after reading the subsection entitled, “Helpful Information.”
- The third level includes links to supplemental and technical reports and websites that support the annual report. This level is directed toward scientists who would like to see original data and more in-depth discussions of the methods used and the results.

A significant portion of the Annual Site Environmental Report (ASER) focuses on radioactivity levels measured in environmental media such as air, water, soil, and plants. To assist individuals with limited or no familiarity with radiological data or radiation dose, a guide was developed. This guide explains the terminology and concepts used in the ASER to help the reader understand the information. Additionally, a glossary of frequently used terms is available for reference.

Previous ASERs and links to other reference reports may be found in the Environmental Publications tab of the webpage.

The INL contractor is responsible for contributing to and producing the ASER.

Other contributors to the ASER include the Idaho Cleanup Project (ICP) contractor; DOE-ID; NOAA, Air Resources Laboratory, Special Operations and Research Division; and the USGS. Links to their websites are as follows:

- INL
- ICP
- U.S. Department of Energy–Idaho Operations
- NOAA, Air Resources Laboratory, Special Operations and Research Division
- USGS.

Environmental activities for the Naval Reactor Facility are not included in this ASER since NRF publishes their own Environmental Monitoring Report (FMP 2025).

The term INL Site contractors used throughout the report is referring to the INL and ICP contractors.

Scarab beetle.

Executive Summary:

Introduction

The INL Site is a U.S. Department of Energy (DOE) reservation located in the southeastern Idaho desert, approximately 23 miles west of Idaho Falls (see Figure ES-1). At 890 square miles (569,600 acres), the INL Site is roughly 85% of the size of Rhode Island. It was established in 1949 as the National Reactor Testing Station, and for many years, it was the site of the largest concentration of nuclear reactors in the world. Fifty-two nuclear reactors were built, including the Experimental Breeder Reactor-I, which, in 1951, produced the first usable amounts of electricity generated by nuclear power (INL Timeline). Researchers pioneered many of the world's first nuclear reactor prototypes and advanced safety systems at the INL Site. During the 1970s, the laboratory's mission broadened into other areas such as biotechnology, energy and materials research, and conservation and renewable energy.

Today, INL is a science-based, applied engineering national laboratory dedicated to supporting DOE's nuclear and energy research, science, and national defense missions.

INL's mission is to discover, demonstrate, and secure innovative nuclear energy solutions, other clean energy options, and critical infrastructure with a vision to change the world's energy future and secure the nation's critical infrastructure.

Figure ES-1. Regional location of the INL Site.

To mitigate environmental impacts and clear the way for the facilities required for the new nuclear energy research mission, the ICP has been charged with the environmental cleanup of the legacy wastes generated from World War II-era conventional weapons testing, government-owned reactors, and spent fuel reprocessing. The overarching aim of the project is to reduce risks to workers and production facilities, the public, and the environment, and to protect the Snake River Plain Aquifer.

PURPOSE OF THE INL SITE ENVIRONMENTAL REPORT

The INL Site's operations and ongoing cleanup mission involve a commitment to environmental stewardship and full compliance with environmental protection laws. As part of this commitment, the INL Site Environmental Report is prepared annually to inform the public, regulators, stakeholders, and other interested parties of the INL Site's environmental performance during the year. This report is published for the U.S. Department of Energy, Idaho Operations Office (DOE-ID) in compliance with DOE Order 231.1B, "Environment, Safety and Health Reporting." The purpose of the report is to provide the following:

- Present the INL Site, mission, and programs
- Report compliance status with applicable federal, state, and local regulations
- Describe the INL Site environmental programs and activities
- Summarize the environmental monitoring results
- Discuss potential radiation doses to the public residing in the vicinity of the INL Site
- Report on ecological monitoring and research conducted by contractors and affiliated agencies and by independent researchers through the Idaho National Environmental Research Park
- Present property clearance activities
- Describe quality assurance methods used to ensure confidence in monitoring data
- Provide supplemental technical data and reports that support the ASER.

MAJOR INL SITE PROGRAMS AND FACILITIES

INL is a combination of all operating contractors and DOE-ID, and includes the Idaho Falls campus and the research and industrial complexes termed the "INL Site" that is located approximately 23 miles west of Idaho Falls. For the purpose of this report, INL consists of those facilities operated by Battelle Energy Alliance, LLC (the INL contractor), or by the Idaho Environmental Coalition, LLC (the ICP contractor). INL Site contractors are referred to by their noted acronyms and include all facilities under their individual responsibilities.

The INL Site consists of several primary facilities situated on an expanse of otherwise undeveloped terrain. Buildings and structures at the INL Site are clustered within these facilities, which are typically less than a few square miles in size and separated from each other by miles of undeveloped land. In addition, DOE-ID owns or leases laboratories and administrative offices in Idaho Falls, some 23 miles east of the INL Site border. About 30% of employees work in administrative, scientific support, and non-nuclear laboratory programs at offices in Idaho Falls.

The major facilities at the INL Site are the Advanced Test Reactor (ATR) Complex, Central Facilities Area (CFA), Critical Infrastructure Test Range Complex (CITRC), Idaho Nuclear Technology and Engineering Center (INTEC), Materials and Fuels Complex (MFC), Naval Reactors Facility (NRF), Radioactive Waste Management Complex (RWMC), and Test Area North (TAN), which includes the Specific Manufacturing Capability (SMC). The Research and Education Campus (REC) is in Idaho Falls. Facility missions are outlined in Chapter 1, Subsection 1.5.3.

ENVIRONMENTAL COMPLIANCE (CHAPTER 2)

One measure of the achievement of the environmental programs at the INL Site is compliance with the applicable environmental regulations, which have been established to protect human health and the environment. The compliance of INL Site and DOE-ID programs with federal and state environmental protection requirements, such as statutes, acts, agreements, executive orders, and DOE directives are presented in Table 2-1.

ENVIRONMENTAL RESTORATION (CHAPTER 2)

Environmental restoration at the INL Site is conducted under the Federal Facility Agreement and Consent Order (FFA/CO) among DOE, the state of Idaho, and the U.S. Environmental Protection Agency (EPA). The FFA/CO specifies actions that must be completed to safely cleanup sites in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and with the corrective action requirements of the Resource Conservation and

Recovery Act. The INL Site is divided into ten Waste Area Groups (WAGs) as a result of the FFA/CO, and each WAG is divided into smaller cleanup areas called Operable Units. Since the FFA/CO was signed in 1991, the INL Site has cleaned up sites containing asbestos, acids and bases, radionuclides, unexploded ordnance and explosive residues, polychlorinated biphenyls, heavy metals, and other hazardous materials. Comprehensive remedial investigation/feasibility studies have been conducted at all WAGs and closeout activities have been completed at six WAGs. In 2024, all institutional controls and operational and maintenance requirements were maintained, and active remediation continued on WAGs 1, 3, and 7.

ENVIRONMENTAL PROTECTION PROGRAMS (CHAPTER 2, CHAPTER 3)

Directives, orders, guides, and manuals are DOE's primary means of establishing policies, requirements, responsibilities, and procedures for DOE offices and contractors. Among these are a series of orders directing each DOE site to implement sound stewardship practices that are protective of the public and the environment. These orders require the implementation of an environmental management system (EMS), a Site Sustainability Plan, a radioactive waste management program, and programs addressing radiation protection of the public and the environment. The INL Site contractors have each established and implemented an EMS and have contributed to the INL Site Sustainability Plan, as required by DOE and executive orders. Each EMS integrates environmental protection, environmental compliance, pollution prevention, and waste minimization into work planning and execution throughout all work areas. The INL Site Sustainability Plan contains strategies and activities that will lead to continual greenhouse gas reductions, as well as energy, water, and transportation fuels efficiency at the INL Site. Plan requirements are integrated into each INL Site contractor's Integrated Safety Management System and EMS.

ENVIRONMENTAL MONITORING OF AIR (CHAPTER 4)

Airborne releases of radionuclides from INL Site operations are reported annually in a document prepared in accordance with the 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." An estimated total of 1,588 curies (5.88×10^{13} Bq) of radioactivity, primarily in the form of short-lived noble gas isotopes, were released as airborne effluents in 2024. This represents a significant decrease in emissions compared to 2023. These airborne releases of radionuclides are reported to comply with the regulatory requirements and are considered in the design and conduct of INL Site environmental surveillance activities.

The INL Site environmental surveillance monitoring programs, which are conducted by the INL Site contractors, emphasize the measurement of airborne radionuclides because air transport is considered the major potential pathway from INL Site releases to human receptors. During 2024, the INL contractor monitored ambient air at 36 locations (e.g., 20 onsite, seven boundary locations, nine offsite). The ICP contractor focused on ambient air surveillance monitoring of waste management facilities, namely INTEC and RWMC.

Air particulate samples were collected weekly by the INL contractor and biweekly by the ICP contractor. These samples were initially analyzed for gross alpha and gross beta activity. The particulate samples were then combined into composite samples and analyzed for gamma-emitting radionuclides and specific alpha- and beta-emitting radionuclides. Charcoal cartridges were also collected weekly by the INL contractor and analyzed for radioiodine.

All radionuclide concentrations in ambient air samples were below DOE radiation protection standards for air. There were a few statistical differences between the monthly and quarterly datasets collected by the INL contractor during 2024 that can be attributed to expected statistical variation in the data and not to INL Site releases. All concentrations were within the historical measurements made during the past ten years (2014–2024) and were well below the DOE Derived Concentration Technical Standards for these radionuclides.

The INL contractor collected atmospheric moisture samples at three stations onsite, three stations offsite, and two boundary stations in 2024. Precipitation was collected at one location onsite, two boundary locations, and one offsite location. The samples were all analyzed for tritium. The results were within measurements made historically and below the DOE Derived Concentration Technical Standards. Tritium measured in these samples is most likely the result of natural production in the atmosphere and not the result of INL Site effluent releases.

ENVIRONMENTAL MONITORING OF GROUNDWATER, DRINKING, AND SURFACE WATER (CHAPTER 5, CHAPTER 6)

The INL Site contractors monitor liquid effluents (wastewater), drinking water, groundwater, and storm water runoff at the INL Site, for both radioactive and nonradioactive constituents, and for compliance with applicable laws and regulations, DOE orders, and other requirements. Wastewater is typically discharged from INL Site facilities to infiltration ponds or to

evaporation ponds. Wastewater effluent discharges occur at percolation ponds southwest of INTEC, the ATR Complex Cold Waste Ponds, and the MFC Industrial Waste Pond. DOE-ID complies with the state of Idaho groundwater quality, wastewater, and reuse rules for these effluents through reuse permits, which provide for monitoring of the wastewater and groundwater in the area. During 2024, liquid effluent and groundwater monitoring were conducted in support of reuse permit requirements. An annual site performance report for each permitted reuse facility was prepared and submitted to the Idaho Department of Environmental Quality. No permit limits were exceeded at INTEC or MFC. One groundwater chromium result in one monitoring well at the ATR Complex slightly exceeded the groundwater quality standard. The source of this elevated chromium is unlikely to be a result of current effluent discharges to the ATR Complex Cold Waste Ponds but rather due to other factors, such as historical contamination.

In addition to the monitoring conducted in support of the reuse permits, liquid effluent and groundwater surveillance monitoring also was performed at the ATR Complex Cold Waste Ponds, INTEC, and the MFC Industrial Waste Pond to comply with environmental protection objectives of DOE orders. The 2024 results were consistent with the historical measurements. All radioactive parameters were below the applicable health-based levels.

Drinking water parameters are regulated by the state of Idaho under the authority of the Safe Drinking Water Act. The INL Site contractors monitored 11 drinking water systems at the INL Site in 2024. (The NRF contractor monitors an additional drinking water system; those results are reported separately by NRF). The results were below limits for all relevant drinking water standards.

Surface water flows off the Subsurface Disposal Area (SDA) following periods of heavy precipitation or rapid snowmelt. During these times, water may be pumped out of the SDA retention basin into a drainage canal, potentially carrying radionuclides originating from radioactive waste or contaminated surface soil off the SDA. Surface water is collected when it is available. The detected radioactive concentrations were well below the standards established by DOE for radiation protection of the public and the environment.

ENVIRONMENTAL MONITORING OF THE EASTERN SNAKE RIVER PLAIN AQUIFER (CHAPTER 6)

The eastern Snake River Plain Aquifer is perhaps the single-most important aquifer in the state of Idaho. Composed of layered basalt lava flows and some sediment, it covers an area of approximately 27,972 km^2 (10,800 mi^2). The highly productive aquifer has been declared a sole source aquifer by the EPA due to the nearly complete reliance on the aquifer for drinking water supplies in the area.

The USGS began monitoring the groundwater below the INL Site in 1949. Currently, the USGS performs groundwater monitoring, analyses, and studies of the eastern Snake River Plain Aquifer under and adjacent to the INL Site. These activities use an extensive network of strategically placed monitoring wells on and around the INL Site. In 2024, the USGS continued to monitor localized areas of chemical and radiochemical contamination beneath the INL Site produced by past waste disposal practices, in particular, the direct injection of wastewater into the aquifer at INTEC. Results for monitoring wells sampled within the plumes show nearly all wells had decreasing trends of tritium and ^{90}Sr concentrations over time.

Volatile organic compounds (VOCs) are present in water from the eastern Snake River Plain Aquifer because of historical waste disposal practices at the INL Site. Several purgeable VOCs were detected by the USGS in at least one of the 24 groundwater monitoring wells sampled at the INL Site in 2024. Most concentrations of the 61 analyzed compounds were either below the laboratory reporting levels or their respective primary contaminant standards. Trend test results for tetrachloromethane concentrations in water from the RWMC production well show a decreasing trend in that well since 2005. The more recent decreasing trend indicates that remediation efforts designed to reduce VOC movement to the aquifer are having a positive effect. Concentrations of tetrachloromethane from USGS-87 and USGS-120, south of RWMC, have had an increasing trend since 1987; however, concentrations have decreased through time at USGS-88. Trichloroethene and Tetrachlormethane were detected above the maximum contaminant level (MCL) in one perched well sampled by the USGS at RWMC, which was collected prior to the abandonment of this well.

Groundwater surveillance monitoring continued for the CERCLA WAGs onsite in 2024. At TAN (WAG 1), groundwater monitoring continues to monitor the progress of remediation of the plume of trichloroethylene and to monitor strontium-90 (^{90}Sr) and cesium-137 (^{137}Cs). Remedial action consists of three components: in situ bioremediation, pump and treat, and monitored natural attenuation. Amounts of ^{90}Sr and ^{137}Cs were present in the wells in the source area at levels higher than those prior to starting in situ bioremediation. The elevated concentrations of these radionuclides are due to chemical processes associated with in situ bioremediation activities. The radionuclide concentrations will continue to be evaluated to determine whether they will meet the remedial action objectives by 2095.

Groundwater samples were collected from seven aquifer wells in the vicinity of the ATR Complex (WAG 2) during 2024 and were analyzed for ^{90}Sr, cobalt-60 (^{60}Co), tritium, and chromium. Chromium and tritium were the only analytes detected but the concentrations were below the respective drinking water MCL established by the EPA.

Groundwater samples were collected from 14 aquifer monitoring wells at and near INTEC (WAG 3) during 2024 and analyzed for a suite of radionuclides and inorganic constituents. The detections of ^{90}Sr, technetium-99 (^{99}Tc), and nitrate + nitrate (as nitrogen) exceeded their respective drinking water MCLs in one or more aquifer monitoring wells at or near INTEC, with ^{90}Sr exceeding its MCL by the greatest margin in a downgradient well south of the former INTEC injection well. All other well locations showed ^{90}Sr levels similar to or slightly lower than those reported in previous samples.

Monitoring groundwater at CFA (WAG 4) consists of CFA landfill monitoring and the monitoring of a nitrate plume south of CFA. Wells at the landfill were monitored in 2024 for metals (filtered), VOCs, and anions (e.g., nitrate, chloride, sulfate). No CFA landfill monitoring samples exceeded an MCL, but the manganese secondary maximum contaminant level (SMCL) was exceeded in one well, and two other wells exceeded a pH SMCL. Nitrate continued to exceed the EPA MCL in one well in the plume south of the CFA in 2024; however, the data show a downward trend since 2006.

Groundwater samples were collected from 12 monitoring wells near and downgradient of the RWMC (WAG 7) in May 2024, which were analyzed for radionuclides, inorganic constituents, and VOCs. Concentrations did not exceed an MCL at any well and were consistent with the historical detections.

Groundwater monitoring at MFC as part of WAG 9 CERCLA monitoring was discontinued in 2022, as discussed in Chapter 6. In 2024, groundwater monitoring continued in support of the MFC Industrial Waste Pond Reuse Permit and DOE orders. Three wells were sampled for radionuclides, metals, and other water quality parameters in the spring and fall of 2024. Overall, the results remain below the primary constituent standard/secondary constituent standards and continue to show no evidence of impacts from MFC activities.

Wells along the southern INL Site boundary (as part of WAG 10) are sampled every two years. Groundwater samples were not collected in 2024. The next sampling event will occur in 2025.

Groundwater is monitored annually at the Remote-Handled Low-Level Waste Facility for gross alpha, gross beta, carbon-14 (^{14}C), iodine-129 (^{129}I), ^{99}Tc, and tritium. Samples were collected from three monitoring wells in the spring of 2024. Measurements of ^{14}C, ^{129}I, and ^{99}Tc were not detected in any samples. The results for gross alpha, gross beta, and tritium remain below the primary constituent standard/secondary constituent standard and show no discernible impacts to the aquifer from Remote-Handled Low-Level Waste Facility operations. Tritium in all three wells continue to gradually decline over time.

Drinking water and surface water samples were sampled downgradient of the INL Site and analyzed for gross alpha and beta activity and tritium. Tritium was not detected in the surface water samples or drinking water samples. The gross alpha and beta results were within the historical measurements and below the EPA's screening level. The data appear to show no discernible impacts from activities at the INL Site.

ENVIRONMENTAL MONITORING RESEARCH CONDUCTED BY USGS (CHAPTER 6)

The USGS INL Project Office drills and maintains research wells that provide information about subsurface water, rock and sediment, and contaminant movement in the eastern Snake River Plain Aquifer at and near the INL Site. In 2024, the USGS published two research reports, two software packages, and five data releases covering hydrogeologic conditions and monitoring at the INL Site.

ENVIRONMENTAL SURVEILLANCE MONITORING OF AGRICULTURAL PRODUCTS, WILDLIFE, SOIL, AND DIRECT RADIATION MEASUREMENTS (CHAPTER 7)

To help assess the impact of contaminants released to the environment by operations at the INL Site, agricultural products, wildlife, and direct radiation were sampled and analyzed for radionuclides in 2024. The agricultural products were collected onsite, offsite, and at boundary locations by the INL contractor. The results are as follows:

- ***Agricultural Products.*** No human-made radionuclides were detected in any of the agricultural products (e.g., lettuce, grain, potatoes, alfalfa) collected in 2024. An amount of ^{90}Sr was detected in a milk sample collected in Terreton but

the measurement was within the range of the historical values and well below the Derived Concentration Standard of ^{90}Sr in milk (5,800 pCi/L).

- ***Big Game.*** No human-made radionuclides were detected in big game animal samples collected in 2024.
- ***Waterfowl.*** Amounts of ^{60}Co and ^{90}Sr were detected in exterior subsamples of waterfowl collected at CFA and from the Sewage Lagoons at the INL Site. An amount of ^{90}Sr was detected in an exterior subsample of a control duck collected from the South Fork of the Snake River. All results were within the historical measurements.
- ***Direct Radiation.*** Direct radiation measurements made at onsite, offsite, and boundary locations were consistent with the historical and natural background levels.

RADIATION DOSE TO THE PUBLIC AND BIOTA FROM INL SITE RELEASES (CHAPTER 8)

Humans, plants, and animals potentially receive radiation doses from various INL Site operations. DOE sets dose limits for the public and biota to ensure that exposure to radiation from INL Site operations is not a health concern. Potential radiological doses to the public from INL Site operations were calculated to determine compliance with pertinent regulations and limits (see Table 8-5). The calculated dose to the maximally exposed individual in 2024 from the air pathway was 0.015 mrem (0.15 µSv), which is well below the 10-mrem standard established by the Clean Air Act. The maximally exposed individual is a hypothetical member of the public who could receive the maximum possible dose from INL Site releases as determined by the air dispersion model. This person is assumed to live at a location east of INL's east entrance and south of Highway 20. For comparison, the dose from natural background radiation was estimated in 2024 to be 388 mrem (3.9 mSv) to an individual living on the Snake River Plain.

The maximum potential population dose to the approximately 358,426 people residing within an 80 km (50 mi) radius of any INL Site facility was calculated as 0.012 person-rem (0.00012 person-Sv), below that expected from exposure to background radiation (139,069 person-rem or 1,391 person-Sv).

In 2024, no human-made radionuclides were detected in edible portions of big game animals or waterfowl, indicating there is no dose associated with ingestion of game animals. Therefore, the total dose the representative person off the INL Site could potentially receive was estimated to be 0.015 mrem (0.15 µSv) in 2024. This is 0.015% of the DOE health-based dose limit of 100 mrem/yr (1 mSv/yr) from all pathways for the INL Site.

Tritium has been detected previously in two USGS monitoring wells located onsite along the southern boundary. A hypothetical individual ingesting the maximum concentration of tritium (3,250 pCi/L) via drinking water from these wells would receive a dose of approximately 0.136 mrem (0.00136 mSv) in one year. This is an unrealistic pathway to humans because there are no drinking water wells located along the southern boundary of the INL Site. The maximum contaminant level established by the EPA for tritium (20,000 pCi/L) corresponds to a dose of approximately 4 mrem (0.04 mSv [40 µSv/yr]).

A dose to a maximally exposed individual located in Idaho Falls, near the DOE Radiological and Environmental Sciences Laboratory and the INL Research Center, both within the REC, was calculated for compliance with the Clean Air Act. For 2024, the dose was conservatively estimated to be 0.005 mrem (0.05 µSv), which is less than 0.1% of the 10-mrem/yr federal standard.

Doses also were evaluated for nonhuman biota at the INL Site using a graded approach. Based on the conservative screening calculations, there is no evidence that INL Site-related radioactivity in soil or water is adversely affecting the populations of plants or animals.

NATURAL AND CULTURAL RESOURCES CONSERVATION AND MONITORING (CHAPTER 9)

Natural resources conservation, monitoring, and land-stewardship activities onsite are organized in four categories: (1) planning and implementing conservation efforts for high-priority natural resources; (2) frequently evaluating the regulatory rankings, distribution, and populations for special status species; (3) ongoing monitoring and research to provide baseline and trend data for specific taxa and broader ecological communities; and (4) conducting land-stewardship activities to minimize impacts to natural resources and restore ecological conditions, where appropriate.

DOE has developed conservation plans to address species of elevated conservation concern and the valuable ecosystems they inhabit. Conservation plans that are specific to or include the INL Site are the Candidate Conservation

Agreement for Greater sage-grouse (*Centrocercus urophasianus*), the INL Site Bat Protection Plan, the Sagebrush Steppe Ecosystem Reserve, and the Migratory Bird Conservation Plan and Avian Protection Planning documents. Many of these plans include conservation measures; best management practices; monitoring programs; and annual reports to facilitate, evaluate, and communicate results of conservation efforts for resources with high-conservation priority.

To better inform conservation efforts, biologists regularly evaluate the regulatory status of key special status species identified by state or federal agencies. For animals, these include 28 species of birds, 11 species of mammals, one species of reptile, and one species of amphibian. There are also currently 29 special status plant species that have been documented to occur or have appropriate habitat onsite. Many of the plant species are rare and occur very infrequently within their optimal habitats. While several animals and plants listed as threatened or endangered under the Endangered Species Act are present in the state of Idaho, none are known to occur onsite.

Additional ecological monitoring has been conducted for more than 70 years, with some studies dating back to the 1950s. The focus of this work is to better understand the INL Site's ecosystem and biota and to determine the impact on populations of these species from activities conducted at the INL Site. Natural resource monitoring activities include breeding bird surveys, a midwinter raptor survey, long-term vegetation transect surveys, and vegetation mapping. Furthermore, the INL Site was designated as a National Environmental Research Park in 1975 and serves as an outdoor laboratory for environmental scientists to study Idaho's native plants and wildlife in an intact and relatively undisturbed ecosystem. Ongoing National Environmental Research Park activities range from characterizing sagebrush steppe ecohydrology to identifying high-quality foodscape for sage-grouse.

Land-stewardship activities involve managing ecosystems to increase habitat connectivity and enhance ecosystem services through planning, assessment, restoration and rehabilitation activities. Areas where DOE-ID is actively employing land-stewardship activities include wildland fire-protection planning, management, and recovery; restoration and revegetation; and weed management.

The INL Cultural Resource Management Office coordinates cultural resource-related activities at the INL Site and implements the 2023 Programmatic Agreement (DOE-ID 2023) and the INL Cultural Resource Management Plan (DOE-ID 2016) with oversight by DOE-ID's Cultural Resource Coordinator. Cultural resource identification and evaluation studies in 2024 included: (1) archaeological field surveys, (2) cultural resource monitoring and recorded updates related to INL Site project activities and research, (3) comprehensive evaluations of 45-year-old and older built environment resources, and (4) meaningful collaboration with members of the Shoshone-Bannock Tribes and public stakeholders.

QUALITY ASSURANCE (CHAPTER 10)

Quality assurance and quality control programs are maintained by contractors conducting environmental surveillance monitoring and by laboratories performing environmental analyses to help provide confidence in the data and ensure data completeness. Programs involved in environmental surveillance monitoring developed quality assurance programs and documentation that follow requirements and criteria established by DOE. Environmental surveillance monitoring programs implemented quality assurance program elements through quality assurance project plans developed for each contractor. Adherence to procedures and quality assurance project plans was maintained during 2024. Data reported in this document were obtained from several commercial, government, and government-contractor laboratories. To ensure quality results, these laboratories participated in several laboratory performance testing and evaluation programs. Quality issues that arose with laboratories used by INL Site contractors during 2024 were addressed with those laboratories and have since been resolved.

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Acronyms:

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
ALLWDF	active low-level waste disposal facility
AMWTP	Advanced Mixed Waste Treatment Plant
ARIR	Administrative Record Information Repository
ARP	Accelerated Retrieval Project
ASER	Annual Site Environmental Report
ATR	Advanced Test Reactor
BBS	breeding bird survey
BCG	Biota Concentration Guide
BEA	Battelle Energy Alliance, LLC
BLM	Bureau of Land Management
BLR	Big Lost River
BMP	best management practices
BORAX	Boiling Water Reactor Experiment
CAA	Clean Air Act
CAP	criteria air pollutant
CAP88-PC	Clean Air Act Assessment Package-1988 computer model, PC
CARP	Climate Adaptation and Resilience Plan
CCA	Candidate Conservation Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CITRC	Critical Infrastructure Test Range Complex
CRMO	Cultural Resource Management Office
CTF	Contained Test Facility
CWA	Clean Water Act
CWP	Cold Waste Pond
D&D	decontamination and decommissioning
DCS	Derived Concentration Standard
DEQ	Department of Environmental Quality (state of Idaho)
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOECAP	U.S. Department of Energy Consolidated Audit Program
DOE-ID	U.S. Department of Energy, Idaho Operations Office
DOME	Demonstration of Microreactor Experiments
DOSEMM	dose multi-media
DQO	data quality objective
EA	Environmental Assessment
EBR-I	Experimental Breeder Reactor No. 1
EBR-II	Experimental Breeder Reactor No. 2
EC	Environmental Checklist
ECP	Environmental Compliance Permit
EFS	Experimental Field Station
EIS	Environmental Impact Statement
EMS	Environmental Management System
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEAT	Electronic Product Environmental Assessment Tool
ERP	Environmental Review Process
ES&S	Environmental Support and Services
ESA	Endangered Species Act
ET	evapotranspiration
FEC	facility emission cap
FFA/CO	Federal Facility Agreement and Consent Order
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSV	Fort St. Vrain
FY	fiscal year
HeTO	Heritage Tribal Office
HFC	hydrofluorocarbons
HFEF	Hot Fuel Examination Facility
HTTF	High Temperature Test Facility
HVAC	heating, ventilation, and air conditioning
HWMA	Hazardous Waste Management Act
HYSPLIT	Hybrid Single-particle Lagrangian Integrated Trajectory
IC	institution controls
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
ICPP	Idaho Chemical Processing Plant
IDAPA	Idaho Administrative Procedures Act
IDFG	Idaho Department of Fish and Game
IEC	Idaho Environmental Coalition, LLC
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
INL Site Contractors	INL contractor and ICP contractor
INTEC	Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant)
IPDES	Idaho Pollutant Discharge Elimination System
IRC	INL Research Center
ISA	Idaho Settlement Agreement
ISB	in situ bioremediation
IWP	Industrial Waste Pond

IWTU	Integrated Waste Treatment Unit
IWTS	Integrated Waste Tracking System
LAN	local area network
LED	light-emitting diode
LLW	low-level waste
LTV	long-term vegetation
MAPEP	Mixed Analyte Performance Evaluation Program
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
MCLG	maximum contaminant level goals
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
MOA	Memorandum of Agreement
MOI	Museum of Idaho
MTR	Materials Test Reactor
NA	not applicable
NAREL	National Analytical Radiation Environmental Laboratory
ND	not detected
NEPA	National Environmental Policy Act
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NHS	National and Homeland Security
NM	not measured
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NRF	Naval Reactors Facility
NRG	Natural Resources Group
NRIC	National Reactor Innovation Center
NS	no sample
NSUF	National Scientific User Facility
O&M	Operations and Maintenance
OPEX	Operating Experience
ORPS	Occurrence Reporting and Processing System
OSLD	optically stimulated luminescence dosimeter
OU	Operable Unit
PCB	polychlorinated biphenyls
PCC	Precontact Context
PCS	primary constituent standard
PDD	program description document
PE	performance evaluation
PFAS	perfluoroalkyl substances
PL	primary line
PT	performance testing
PTC	permit to construct
PWS	public water system
QA	quality assurance
QC	quality control
R&D	research and development
RBDA	risk-based disposal approval
RCL	Radioanalytical Chemistry Laboratory
RCRA	Resource Conservation and Recovery Act
REC	Research and Education Campus
RESL	Radiological and Environmental Sciences Laboratory
RHLLW	Remote-Handled Low-level Waste Disposal Facility
ROD	Record of Decision
RRTR	Radiological Response Training Range
RWMC	Radioactive Waste Management Complex
SARA	Superfund Amendments and Reauthorization Act
SCS	Secondary Constituent Standard
SDA	Subsurface Disposal Area
SDWA	Safe Drinking Water Act
SGCA	Sage-grouse Conservation Area
SGCN	Species of Greatest Conservation Need
SGIN	Species of Greatest Information Need
SMC	Specific Manufacturing Capability
SMCL	secondary maximum contaminant level
SNF	spent nuclear fuel
SSER	Sagebrush Steppe Ecosystem Reserve
STEAM	science, technology, engineering, arts, and mathematics
STP	Sewage Treatment Plant
SWAP	Statewide Wildlife Action Plan
TAN	Test Area North
TCE	trichloroethylene
TFF	Tank Farm Facility
TRA	Test Reactor Area
TREAT	Transient Reactor Experiment and Test Facility
TRU	transuranic
TSCA	Toxic Substances Control Act
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTL	upper tolerance limit
VISTA	inVentory of INL equipment, laboratories, and experTise for reseArch
VOC	volatile organic compound
WAG	waste area group
WFMC	Wildland Fire Management Committee
WIPP	Waste Isolation Pilot Plan
WWII	World War II

Units:

Bq	becquerel
C	Celsius
cfm	cubic feet per minute
CFU	colony forming unit
Ci	curie
cm	centimeter
cps	counts per second
d	day
F	Fahrenheit
ft	feet
g	gram
gal	gallon
Gy	gray
ha	hectare
keV	kilo-electron-volts
kg	kilograms (10^3) gram
km	kilometer (10^3) meter
L	liter
lb	pound
m	meter
µCi	microcurie (10^{-6}) curies
µg	microgram (10^{-6}) grams
µR	microroentgen (10^{-6}) roentgen
µS	microsiemen (10^{-6}) siemen
µSv	microsievert (10^{-6}) sievert
Ma	million years
mCi	millicurie (10^{-3}) curies
MeV	mega electron volt
mg	milligram (10^{-3}) grams
MG	million gallons
mGy	milligray (10^{-3}) gray
Ml	million liters
mi	mile
min	minute
mL	milliliter (10^{-3}) liter
mR	milliroentgen (10^{-3}) roentgen
mrad	millirad (10^{-3}) rad
mSv	millisievert (10^{-3}) sievert
oz	ounce
pCi	picocurie (10^{-12} curies)
R	roentgen
rad	radiation absorbed dose
rem	roentgen equivalent man
Sv	sievert
yd	yard
yr	year

Abronia mellifera.

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