DOE/ID-11088
Revision 6

U.S. Department of Energy
Idaho Operations Office

Idaho National Laboratory Site Environmental Monitoring Plan

September 2023

Idaho National Laboratory

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Prepared for the
U.S. Department of Energy
Idaho Operations Office

EXECUTIVE SUMMARY

The U.S. Department of Energy's (DOE) Idaho National Laboratory (INL) Site consists of nine major facility areas located in the southeastern Idaho desert and several laboratories and administrative buildings located in Idaho Falls, Idaho, approximately 48 km (30 mi) east of the INL Site boundary. This plan describes routine environmental compliance and surveillance monitoring of airborne and liquid effluents, and ecological and meteorological conditions on and in the vicinity of the INL Site.

Environmental monitoring discussed in this plan is conducted in accordance with DOE Order 458.1, "Radiation Protection of the Public and the Environment." The purpose of DOE Order 458.1 is to establish requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. The objectives of the order include: (1) conducting DOE radiological activities so that exposure to members of the public is maintained within the dose limits established in the order; (2) controlling radiological clearance of DOE real and personal property; (3) ensuring that potential radiation exposures to members of the public are as low as reasonably achievable; (4) ensuring DOE sites have the capabilities, consistent with the types of radiological activities conducted, to monitor routine and non-routine radiological releases and to assess the radiation doses to members of the public; and (5) protecting the environment from the effects of radiation and radioactive material.

This plan includes the rationale for monitoring, the types of media monitored, where the monitoring is conducted, and information regarding access to analytical results. Environmental monitoring activities are conducted by a variety of organizations consisting of:

- Idaho National Laboratory
- Idaho Cleanup Project
- United States Geological Survey
- National Oceanic and Atmospheric Administration.

Monitoring of airborne and liquid effluents is performed to verify compliance with permitting requirements, state and federal regulations, and environmental protection policies and commitments. Surveillance monitoring addressed in this document is driven by DOE Order 458.1 and is performed to characterize preoperational conditions, detect, characterize, and respond to releases from Site operations and activities, assess impacts, estimate dispersal patterns in the environment, characterize the exposures and doses to individuals and the population, and evaluate the potential impacts to biota in the vicinity of the release.

Non-routine activities, such as special research studies and the characterization of individual sites for environmental restoration, are outside the scope of this plan. Environmental monitoring activities at Naval Reactors Facility conducted by Fluor Marine Propulsion, LLC, are not included in this plan.

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FIGURES

TABLES

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ACRONYMS

AMWTP	Advanced Mixed Waste Treatment Project
ARLSORD	Air Resources Laboratory/Special Operations and Research Division
ARP	Accelerated Retrieval Project
ARA	Auxiliar Reactor Area
ASER	Annual Site Environmental Report
ASME	American Society of Mechanical Engineers
ATR	Advanced Test Reactor
BBS	Breeding Bird Survey
BEA	Battelle Energy Alliance, LLC
BLR	Big Lost River
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
CPP	Chemical Processing Plant
CRMO	Cultural Resources Management Office
CTF	Contained Test Facility
CWA	Clean Water Act
D&D	deactivation and decommissioning
DEQ	Department of Environmental Quality
DOE	Department of Energy
DOE-ID	U.S. Department of Energy, Idaho Operations Office
EBR	Experimental Breeder Reactor
EDE	effective dose equivalent
EPA	Environmental Protection Agency
ESER	Environmental Surveillance, Education and Research
ESRPA	Eastern Snake River Plain Aquifer
F&SS	Facilities and Site Services
FAST	Fluorinel Dissolution Process and Fuel Storage
HSL	Health Services Laboratory
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
IDAPA	Numbering designation for all administrative rules in Idaho promulgated according to the Idaho Administrative Procedure Act
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	INL Research Center
IWD	Industrial Waste Ditch
IWP	Industrial Waste Pond
IWTU	Integrated Waste Treatment Unit
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
MSC	Monitoring and Surveillance Committee
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NRF	Naval Reactors Facility
NRG	Natural Resources Group
OSLD	optically stimulated luminescent dosimeters

PBF	Power Burst Facility
PINS	Portable Isotopic Neutron Spectroscopy
PTC	Permit to Construct
QA	quality assurance
R&D	research and development
RCRA	Resource Conservation and Recovery Act
REC	Research and Education Campus
RESL	Radiological and Environmental Sciences Laboratory
RHLLW	Remote-Handled Low-Level Waste
ROD	Records of Decision
RSWF	Radioactive Scrap and Waste Facility
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SMC	Specific Manufacturing Capability
SNF	spent nuclear fuel
SSF	Sawtelle Street Facility
TAN	Test Area North
TREAT	Transient Reactor Test
TSA	Transuranic Storage Area
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAG	Waste Area Groups
WNS	White-nose syndrome

Idaho National Laboratory Site Environmental Monitoring Plan

GENERAL INFORMATION

1. Purpose

This plan provides a high-level summary of environmental monitoring performed by various organizations within and around the INL Site as required by DOE Order 435.1, "Radioactive Waste Management," DOE Order 458.1, "Radiation Protection of the Public and the Environment," DOE-HDBK-1216-2015, "Environmental Radiological Effluent Monitoring and Environmental Surveillance" (DOE 2015); and in accordance with 40 Code of Federal Regulations (CFR) 61, Subpart H, "National Emission Standards for Hazardous Air Pollutants" (NESHAP). The purpose of these orders is to: (1) implement sound stewardship practices that protect the air, water, land, and other natural and cultural resources that may be impacted by DOE operations; and (2) establish standards and requirements for the operations of DOE and DOE contractors with respect to protection of the environment and members of the public against undue risk from radiation. This plan describes the organizations responsible for conducting environmental monitoring across the INL Site, the rationale for monitoring, the types of media being monitored, where the monitoring is conducted, and where monitoring results can be obtained.

Detailed documents used by contractors or agencies to implement requirements are referenced in this plan, with internal monitoring procedures and program plans being referenced generally and external governing documents being referenced specifically. This plan covers all planned monitoring and environmental surveillance. Non-routine activities, such as special research studies and characterization of individual sites for environmental restoration, are outside the scope of this plan.

1.1 INL Site Description

The INL Site is approximately 2,305 square kilometers (km^2) (890 square miles [mi^2]) and is located on the eastern Snake River Plain in southeastern Idaho, as indicated in Figure 1-1. It was established as a nuclear energy research and development (R&D) testing station in the 1949 and was designated a National Environmental Research Park in 1975. All land within the Site is protected as an outdoor laboratory where the effects of energy development, industrial activities on the environment, and the complex ecological relationships of this cool desert ecosystem can be studied. The INL Site is owned by DOE and administered through its Idaho Operations Office (DOE-ID). The DOE-ID oversees operations at the INL Site.

Subsurface geology consists of successive layers of basalt and sedimentary strata, overlain by wind- and water-deposited sediments. Most of the Site is in the closed Mud Lake-Lost River drainage basin, which has been informally named the Pioneer Basin. Surface waters within the Pioneer Basin include the Big Lost River (BLR), the Little Lost River, and Birch Creek drainages, which drain mountain watersheds located to the north and northwest of the Site. All three drainages may flow onto the Site during high flow years, but are otherwise ephemeral. In addition, local rainfall and snowmelt contribute to surface water, mainly during the spring. The portion of surface water that is not lost to evaporation infiltrates into the subsurface. Both aquifer and surface waters are used for irrigating crops and other applications outside the Site.

The primary groundwater source of the region is the Eastern Snake River Plain Aquifer (ESRPA), as observed in Figure 1-2. The ESRPA is approximately 320 km (199 mi) long, 30 to 100 km (20 to 60 mi)

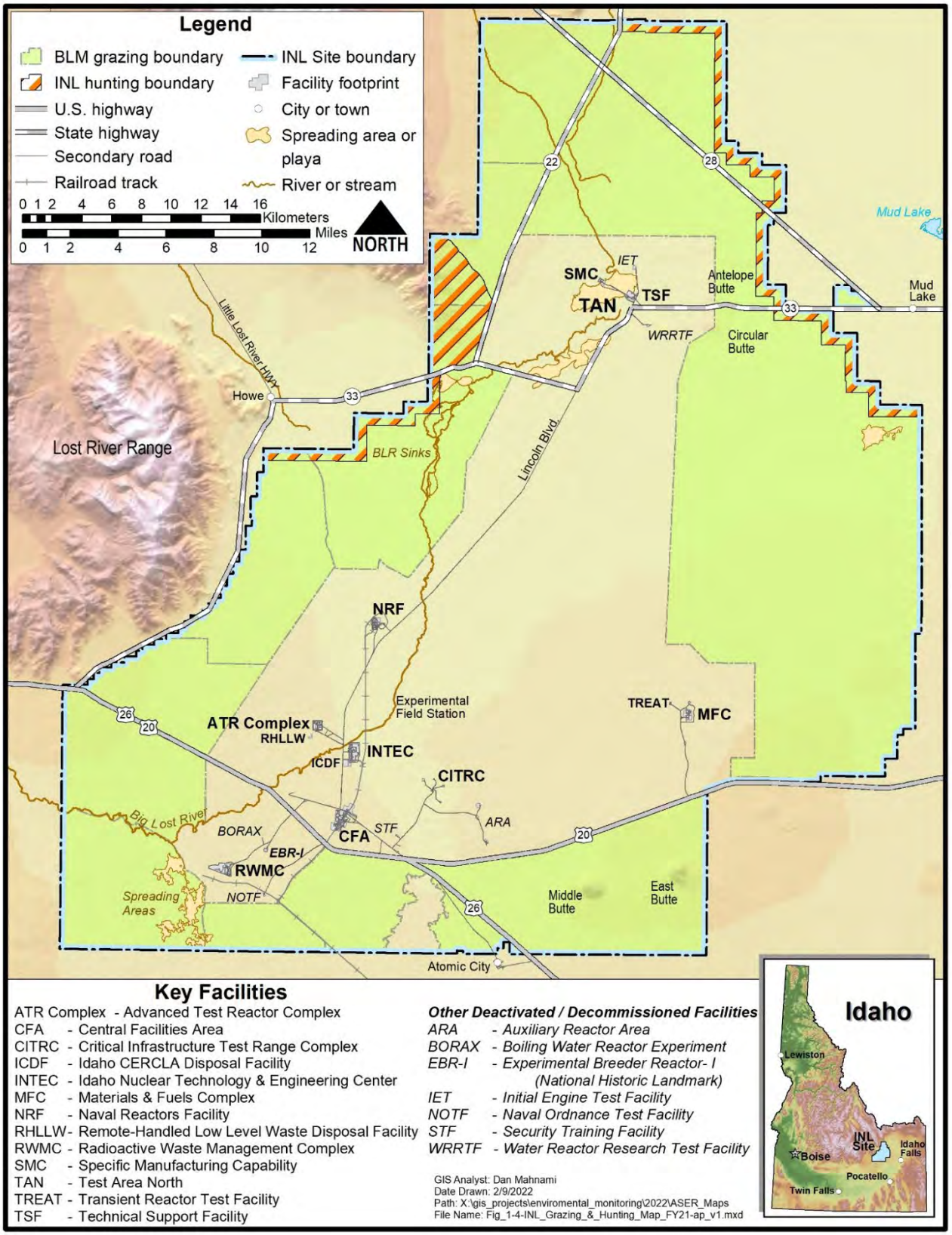

Figure 1-1. INL Site.

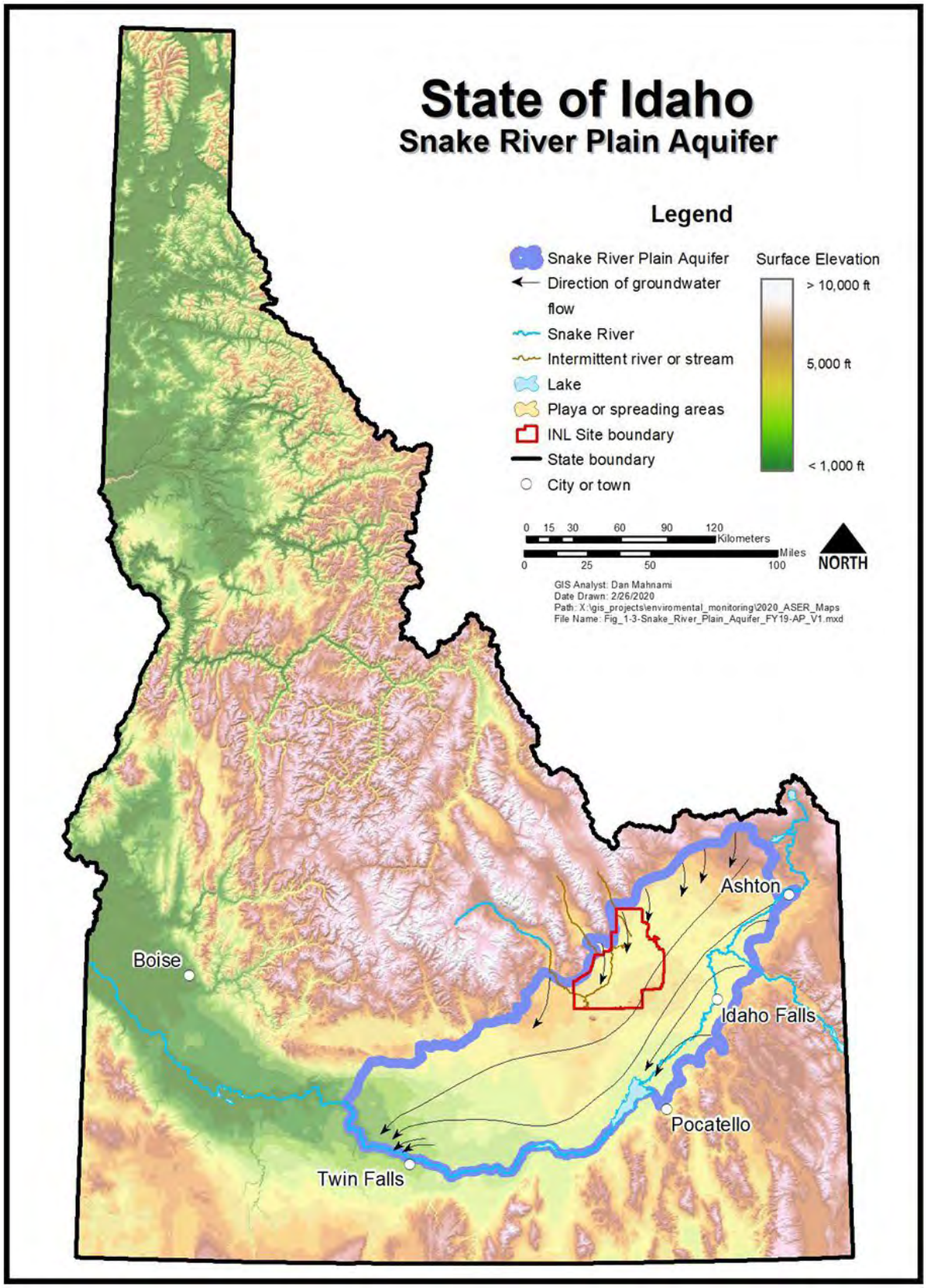

Figure 1-2. INL Site in relation to the ESRPA.

wide, and encompasses an area of about 2,500,000 hectares (6,177,635 acres). This sole-source aquifer is one of the most productive in the U.S, is a source of drinking water to more than 200,000 people, and supplies irrigation water to a large regional agricultural and aquaculture economy.

The depth to the ESRPA varies from approximately 60 m (200 ft) in the northern part of the INL Site to more than 270 m (900 ft) in the southern part. The aquifer is recharged from infiltrating precipitation and irrigation seepage, runoff from the surrounding highlands, and groundwater underflows from the surrounding watersheds. Groundwater in the ESRPA flows generally to the southwest, although locally the direction of flow is influenced by recharge from rivers, surface water, spreading areas, and heterogeneities in the aquifer. Groundwater flow rates in the vicinity of the INL Site range from approximately 1.5 to 6 m (5 to 20 ft) per day.

Annual rainfall at the INL Site is light, and the region is classified as arid to semiarid (Clawson, et al. 2018). The long-term average (from March 1950 through 2022) annual precipitation at the Site is 21.4 cm (8.41 in. at the Central Facilities Area [CFA] station). Monthly precipitation is usually highest in April, May, and June and lowest in July and August. The average daily temperature is 18.4°C (65.2°F) in the summer, and the average daily temperature is -7.4°C (18.7°F) in the winter. The annual average daily temperature is 5.7°C (42.4°F). The Site is in the belt of prevailing westerly winds, which are channeled within the plain to produce a southwesterly wind at most locations on the Site.

1.2 Summary of INL Site Facilities

The INL Site consists of nine major facilities and several laboratories and administrative buildings located approximately 48 km (30 mi) east of the Site boundary in Idaho Falls, Idaho. Battelle Energy Alliance, LLC (BEA), is the management and operating contractor for INL. In this document, BEA is referred to as the INL contractor. Idaho Environmental Coalition, LLC (IEC), is the Idaho Cleanup Project (ICP) contractor. The term INL Site contractors refer to both contractors.

1.2.1 INL Facilities

The CFA houses many technical and support services for the INL contractor, including administrative offices, monitoring and calibration laboratories, fire protection, medical services, warehouses, vehicle and equipment pools, and bus operations.

The Advanced Test Reactor (ATR) Complex is the world’s most sophisticated nuclear reactor testing complex and has extensive facilities for studying the effects of radiation on materials, testing nuclear fuels, and producing medical and industrial isotopes.

The Research and Education Campus (REC) in Idaho Falls consists of office and classroom complexes and multiple laboratory facilities, including many one-of-a-kind advanced labs dedicated to the full spectrum of physical and life science research. The laboratories are ‘modular’ with respect to their provision, for ease of utility tailoring and flexibility. There are other advanced R&D laboratories located in Idaho Falls, including engineering demonstration facilities, robotics laboratories, material research laboratories, and advanced information technology and computer simulation and modeling facilities.

The Materials and Fuels Complex (MFC) is the prime testing center in the U.S. for demonstration and proof-of-concept of nuclear energy technologies. R&D activities at this facility are focused on areas of national concern, including energy, nuclear safety, spent nuclear fuel (SNF) treatment, nonproliferation, decommissioning and decontamination technologies, nuclear material disposal, and homeland security.

The Remote-Handled Low-Level Waste (RHLLW) Disposal Facility is a Hazard Category 2 nuclear facility which provides below-grade, permanent radioactive waste disposal capability critical for INL nuclear research and Naval Reactors missions at the INL Site.

The Critical Infrastructure Test Range Complex (CITRC) is an isolated and secure microcosm of many of the critical infrastructure systems important to the operation of our country, including power, transportation, cybersecurity, and communications. This INL facility was chosen to be a "Test Range" due to its remote location and dedication to various research, development, and testing activities.

The Specific Manufacturing Capability (SMC) facility, located at Test Area North (TAN), houses a unique project that began with a Memorandum of Understanding between DOE and the U.S. Army in February 1985. Operated by the INL contractor, the SMC Project manufactures armor for the Army's M1A2 Abrams battle tank.

1.2.2 ICP Facilities

The Idaho Nuclear Technology and Engineering Center (INTEC) was established in the 1950s to recover usable uranium in SNF from government reactors and to store it. The current work scope at INTEC includes removing excess nuclear material, closing radioactive and hazardous waste tanks, processing the liquid radioactive waste into a stable carbonate for shipment offsite at the Integrated Waste Treatment Unit (IWTU), transferring SNF from wet to dry storage, remediating the SNF basin, treating and disposing of waste, closing liquid waste tanks, remediating contaminated environmental sites, and demolishing facilities.

The Idaho Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Disposal Facility (ICDF) is a landfill located just southeast of INTEC. It has been operating since 2003 to dispose of low-level waste and mixed low-level waste from the CERCLA environmental restoration activities within the INL Site.

Three primary areas comprise the Radioactive Waste Management Complex (RWMC)—the Subsurface Disposal Area (SDA), the Transuranic Storage Area (TSA), and the Administrative Area. The SDA is a 97-acre area that consists of approximately 35 acres of waste that was buried in disposal pits and trenches from the early 1950s until 1970, when disposal practices changed, and above ground storage of waste was established in the TSA. The Administrative Area primarily houses office and maintenance support functions. Current ICP missions involve the CERCLA program for deactivation and demolition of Accelerated Retrieval Project (ARP) structures and Organic Contamination in the Vadose Zone well abandonment that support installation of an evapotranspiration (ET) barrier over the SDA footprint. In addition to the CERCLA program, ICP waste management program scope involves treatment, characterization, storage, packaging, and transportation of stored transuranic and low-level waste streams that have been retrieved from aboveground pads in the TSA that are destined for offsite disposal at the Waste Isolation Pilot Plant and other appropriate offsite disposal facilities. Waste management operations in the TSA are conducted primarily at the Advanced Mixed Waste Treatment Project under the Resource Conservation and Recovery Act (RCRA) authority.

TAN, which is located at the north end of the Site, was built in the 1950s to house the nuclear-powered airplane project. Cleanup operations were completed for OU1-10 at TAN, including demolition of 44 facilities. The OU1-07B remedy is ongoing and consists of three parts for the trichloroethylene plume: In situ bioremediation in the hot spot, pump, and treat in the medial zone, and monitored natural attenuation in the distal zone of the plume. In addition, monitoring associated with monitored natural attenuation of the radionuclide (cesium-137 and strontium-90 [^{90}Sr]) plumes is ongoing.

The ICP is responsible for deactivation and demolition of several prototype reactor facilities at the Naval Reactors Facility (NRF). Air permit applicability evaluations determined this work will not generate significant emissions (i.e., the dose to the MEI is less than 10^{-5} mrem) and air monitoring is not required.

1.3 Summary Other Facilities

There are two facilities that are not a part of the INL Site despite being located onsite and in the city of Idaho Falls. These facilities are the NRF, which is operated by Fluor Marine Propulsion, LLC, and the Radiological and Environmental Sciences Laboratory (RESL), which is a government-owned laboratory operated by DOE-ID and is located in Idaho Falls within the REC.

1.3.1 NRF

NRF is specifically excluded from detailed discussion in this monitoring plan. As established in Executive Order 12344, the Naval Nuclear Propulsion Program is exempt from the requirements of "Radiation Protection of the Public and the Environment" (DOE Order 458.1); and "Quality Assurance" (DOE Order 414.1D Chg. 2). The director for the Naval Nuclear Propulsion Program establishes reporting requirements and methods implemented within the program, including those necessary to comply with appropriate environmental laws. NRF's program is documented in the "Naval Reactors Facility Environmental Monitoring Program" (Fluor Marine Propulsion Corporation).

1.3.2 RESL

RESL and its predecessor organizations have been part of DOE-ID since 1949. RESL has conducted DOE's Mixed Analyte Performance Evaluation Program since 1994, through a performance-based program that tests the ability of the laboratories to correctly analyze for radiological, stable organic, and inorganic constituents that are representative of those at DOE sites. It provides an unbiased technical component to DOE oversight of contractor operations at DOE facilities and sites. As a reference laboratory, it conducts cost-effective measurement quality assurance programs that help assure that key DOE missions are completed in a safe and environmentally responsible manner. By assuring the quality and stability of key laboratory measurement systems throughout DOE, and by providing expert technical assistance to improve those systems and programs, it assures the reliability of data on which decisions are based. As a result, customers and stakeholders have greater confidence that those programs protect workers, the public, and the environment. RESL's core scientific capabilities are in analytical chemistry and radiation calibrations and measurements.

2. INL SITE ENVIRONMENTAL MONITORING OVERVIEW

Effluent monitoring of airborne emissions and liquid effluents is driven by DOE and U.S. Environmental Protection Agency (EPA) requirements, state and federal regulations, and facility operating permits. Effluent monitoring refers to the collection and analysis of samples or measurements of liquid and gaseous effluents for characterizing and quantifying contaminants, assessing radiation exposures of members of the public, controlling effluents at or near the point of discharge, and demonstrating compliance with applicable standards and permit requirements. Liquid and airborne effluents from facilities are monitored for radiological and non-radiological parameters.

Environmental surveillance is the collection and analysis of environmental samples (i.e., air, water, soil, biota, and agricultural products) or direct measurements of environmental media. These activities are performed to generate measurement-based estimates of the amounts or concentrations of contaminants in the environment. Measurements are performed by sampling and laboratory analysis or by measurement of direct radiation in the environment. Environmental surveillance activities are discussed in more detail in Section 4 and are conducted to:

- Comply with DOE Order 458.1
- Determine potential effects of contaminants on the public and the environment
- Evaluate pathways through which contaminants move in the environment.

In addition to effluent monitoring and environmental surveillance, meteorological conditions are monitored in and around the INL Site. Meteorological monitoring provides information needed to support and interpret the results of other monitoring and surveillance activities, particularly for air dispersion modeling. Meteorological monitoring activities are discussed in Section 5.

Ecological resource monitoring documents sensitive and threatened species on the INL Site, evaluates habitat needs, and monitors biota population trends and weed invasions in disturbed areas. These data better enable the evaluation of environmental impacts of operations and help to determine restoration and mitigation needs. These activities are discussed in Section 4.9.

Cultural resource monitoring efforts fulfill aspects of federal responsibilities outlined in Section 110 of the National Historic Preservation Act. Monitoring enables the Cultural Resources Management Office (CRMO) staff to gather baseline data and assess the condition of known cultural resources that have the potential to be impacted by natural processes, unauthorized activities, or inadvertently by project activities. If impacts are noted during monitoring visits, appropriate notifications are made as outlined in the following CRMO procedures: “Archeological Section 106 Survey and Monitoring (Field Work),” “Architectural Properties Section 106 Reconnaissance Level Survey and Monitoring,” “Archeological Section 110 Survey and Monitoring (Field Work),” and “Architectural Properties Section 110 Monitoring Field Procedure.” By identifying impacts to cultural resources in this manner and taking appropriate action to address the cause of the impacts, federal stewardship responsibilities to prevent further deterioration are fulfilled. Certain properties that are of special significance to the Shoshone-Bannock Tribes are monitored at least once per year while others are chosen based on known threats (i.e., close to public roads, ongoing projects in the vicinity) or length of time since being visited. Due to the prevalence of highly-sensitive resources, all projects that disturb the ground in and around the CITRC area are monitored. Details of the annual monitoring activities are summarized and accessible to the public in the INL Cultural Resource Management Annual Report for each fiscal year.

A separate system of environmental monitoring and surveillance is activated during environmental events, which may be planned as in startup of new equipment or process, or unplanned, such as

operational events or wildfires. This environmental event monitoring is discussed in Section 6. Environmental reporting on compliance and regulatory sampling is discussed in Section 7. The locations of monitoring stations within and surrounding the Site are shown in Section 2.1.

Appendix A includes tables for various media monitored at the INL Site and contains each sample point and geographic location along with the organization responsible for the monitoring.

2.1 History of Environmental Monitoring at the INL

Some of the earliest environmental monitoring on the INL Site was completed by the U.S. Weather Bureau, which created a Research Station in 1948 to support the National Reactor Testing Station, as the INL Site was then called. The Research Station still exists as the Air Resources Laboratory/Special Operations and Research Division (ARLSORD) of the National Oceanic and Atmospheric Administration (NOAA). The station's task was to develop a basic understanding of regional meteorology and climatology, with a focus on protecting the health and safety of workers and nearby residents using meteorological measurements and transport and dispersion models.

In 1949, the Health and Safety Division of the Idaho Operations Office of the Atomic Energy Commission collected numerous samples to determine the pre-reactor radionuclide background in soil, plants, animals, etc., at the INL Site. The U.S. Geological Survey (USGS) also began monitoring hydrologic conditions of the ESRPA in 1949 by sampling two wells on the INL Site.

In 1959, the first of several aerial radiological surveys of the INL Site was performed under the direction of DOE-ID to determine the extent of natural and man-made radioactivity. Subsequent aerial surveys performed in 1965, 1974, and 1982 (EGG-1183-1681), as well as in 1990, focused mainly on characterizing facilities and associated regions of the Site.

Between 1956 and 1963, ecological research was conducted on the INL Site by the Health Services Laboratory (HSL), which focused on movement of radioactive contaminants through the food chain.

Rabbits were sampled as indicators of the extent of contamination around Site facilities. In 1970, HSL established a routine soil sampling and monitoring program for radionuclides in the surface soils near INL Site facilities and the surrounding area.

In 1973, the RESL Program incorporated a biological component that included extensive studies of radioactively-contaminated areas and transport by biota from these areas. In 1977, HSL merged with RESL and the RESL Program continued onsite and offsite monitoring through 1993.

In 1989, the INL Site was placed on the National Priorities List, found at http://www.epa.gov/superfund/sites/npl/. In 1991, DOE, EPA, and the state of Idaho signed the "Federal Facility Agreement and Consent Order" (DOE-ID 1991a) under 42 USC §9601, "Comprehensive Environmental Response, Compensation, and Liability Act" to ensure that environmental hazards associated with contaminant releases were identified and remediation was completed. Since 1991, comprehensive remedial investigations, feasibility studies, and Records of Decision (RODs) have been completed for most of the ten Waste Area Groups (WAGs) identified under CERCLA, and in some areas, remediation has been completed. As part of CERCLA regulatory commitments, long-term monitoring is ongoing.

Also, in 1989, the Idaho Legislature established a comprehensive state oversight program for the INL Site. In 1990, Idaho became the first state in the nation to negotiate an agreement (Environmental Oversight and Monitoring Agreement) with DOE to provide funding for independent environmental oversight and

monitoring of a DOE facility. Over the years, the Department of Environmental Quality (DEQ) INL Oversight Program has developed an effective monitoring network to verify and supplement INL Site monitoring programs and to assure that DOE activities protect Idaho's environment. The DEQ INL Oversight Program also provides independent information concerning DOE impacts on the public and environment.

In 1994, DOE transferred the responsibility for onsite environmental surveillance from RESL to the prime INL management and operating contractor, and all offsite environmental surveillance and biological monitoring were transferred to a DOE-direct contractor, the Environmental Science and Research Foundation. In 2000, DOE awarded a small business set-aside contract to perform the scope under the Environmental Surveillance, Education and Research (ESER) Program. The onsite program was split in 2005 with the award of contracts to the INL contractor (e.g., BEA) and the ICP contractor (e.g., IEC), the facilities and activities of which are discussed in other parts of this plan. In December 2020, the transition of the ESER Program to the INL contract managed by BEA was initiated by DOE. The transition was successfully completed in September 2021, effectively transferring and integrating all ESER procedures, processes, and personnel with the INL environmental monitoring program.

Environmental monitoring performed by the various contractors in charge of facility operations initially involved limited sampling of liquid and airborne effluents from the facilities to develop waste inventory information and to meet operational monitoring objectives. Over the years, these contractor-run monitoring programs have evolved to ensure compliance with applicable federal, state, and local regulations and protect human health and the environment.

2.2 Environmental Monitoring Organizations

Several organizations conduct environmental monitoring activities on or in the vicinity of the Site. The INL Site contractors conduct monitoring at the facilities they operate. Other organizations perform INL Site-related environmental monitoring but do not operate facilities—NOAA and the USGS. Currently, the INL contractor has Site-wide environmental monitoring responsibilities and conducts environmental monitoring on and around the INL Site.

2.2.1 INL Site Contractors

The INL Site contractors conduct environmental monitoring activities at facilities under their respective areas of purview, as discussed in Section 1.3 of this plan. In addition, the INL contractor performs offsite environmental surveillance; wildlife habitat and vegetation surveys, and ecological research on and near the Site; research concerning at-risk species, pollutants in the environment, and revegetation; environmental education concerning ecological and radiological issues around the INL Site; and preparing the Annual Site Environmental Report (ASER) summarizing environmental monitoring activities across the INL Site, required by DOE Order 231.1B. The INL Site contractors perform liquid and airborne effluent monitoring, along with environmental surveillance of ambient air, groundwater, drinking water, surface water, soils, and external radiation. The INL contractor also monitors precipitation, biota, agricultural products (i.e. milk, grain, lettuce, potatoes, and alfalfa), and game animals. Compliance monitoring programs have been instituted to meet the monitoring requirements of federal, state, and local regulations, permits, and DOE orders. Requirements exist to sample drinking water, liquid effluents, and groundwater. Facilities with airborne emissions are responsible for monitoring airborne effluents in compliance with the standards set forth in Public Law 91-604, "Clean Air Act Amendments of 1990," and "Rules for the Control of Air Pollution in Idaho" (IDAPA 58.01.01). Those facilities with Reuse Permits are monitored as required by their associated permits in accordance with the "Wastewater Rules" (IDAPA 58.01.16), the "Recycled Water Rules" (IDAPA 58.01.17), and the "Ground Water Quality Rule" (IDAPA 58.01.11).

The INL Site contractors perform CERCLA monitoring of groundwater. A majority of CERCLA monitoring is performed by the ICP contractor because the INL contractor is only responsible for the CERCLA work at MFC. Sites with residual contamination will need to be monitored, controlled, operated, and maintained by institutional controls to protect human health and the environment.

Post-closure monitoring is conducted to evaluate the effectiveness of the final remedies and ensure that no additional contamination is occurring. However, even though CERCLA regulates most INL Site stewardship activities, some stewardship activities may be regulated under RCRA, including post-closure groundwater monitoring. The monitoring of facilities operated by the INL Site contractors will continue at the remediation areas for the period negotiated in the five-year review reports for the RODs, in RCRA closure plans, or in other laws or agreements that govern the remedies. Table 2-1 provides a summary of the environmental monitoring organization activities on the INL Site.

Table 2-1. Summary of INL Site environmental monitoring organization activities.

Media	Organization			
	INL	**ICP**	**USGS**	**NOAA**
Effluent				
Airborne	X	X	—	—
Liquid	X	X	—	—
Surveillance				
Ambient Air	X[a]	X	—	—
Drinking Water	X	X	—	—
Precipitation	X		—	—
Groundwater	X	X	X	—
Surface Water	X	X	X	—
Soil	X	X	—	—
Biota	X	—	—	—
Agricultural Products and Game Animals	X	—	—	—
External Radiation	X	X	—	—
Ecological	X	X	—	—
Meteorological	—	—	—	X

a. Includes collection of atmospheric moisture samples.

The staff of CRMO monitors cultural resources for the INL Site contractors. The CRMO provides cultural resource management services to the ICP contractor through an agreement between the two contractors. CRMO services facilitate coordinated and seamless management of cultural resources for DOE-ID and inform and educate stakeholders about the more than 13,000-year history of rich and varied human land use on the INL Site. The CRMO staff of professional archeologists, historians, and anthropologists conduct monitoring to determine whether natural events or human activities are impacting cultural resources and provide current information regarding the resources' preservation and protection. As required through an agreement between DOE-ID and the Shoshone-Bannock Tribes, the CRMO staff invite tribal participation during monitoring activities of properties that are of importance to them (Agreement-in-Principle 2022). Cultural resource management is described in detail in the "Idaho National Laboratory Cultural Resources Management Plan" (DOE/ID-10997).

The Natural Resources Group (NRG) also supports the INL Site contractors through species and habitat conservation, ecological monitoring, biological site characterization, and facilitating land stewardship activities. For some species of elevated concern or with extensive populations and key habitats on the INL Site, DOE-ID has developed conservation plans to protect species and the valuable ecosystems they inhabit. 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 species with high conservation priority. The NRG manages the annual monitoring and reporting efforts associated with these plans, as well as implements conservation measures through the Environmental Management System. Additional ecological monitoring has been conducted for more than 70 years on the INL Site, with some studies dating back to the 1950s. The NRG manages this work with a focus to better understand the INL Site's ecosystem and biota, and to determine the potential impact on these natural systems from activities conducted at the INL Site. These data, along with project-specific characterization studies are used by the NRG to provide biological summaries to support regulatory processes associated with new mission activities. Finally, land stewardship support involves utilizing the NRG to provide ecological expertise for managing ecosystems on the INL Site through planning, assessment, restoration, and rehabilitation activities. Areas where the INL is actively employing land stewardship activities include wildland fire protection planning, management, and recovery; restoration and revegetation; and invasive species management.

2.2.2 USGS

The USGS conducts water sampling and takes water-level measurements at INL. The data collected are publicly available through the National Water Information System (USGS 2022). The USGS and other organizations use these data to describe changes in hydrologic and geochemical conditions of the ESRPA and to evaluate the effects of waste disposal and other activities at the INL Site through interpretive reports. USGS groundwater monitoring is detailed in "Idaho National Laboratory Groundwater Monitoring and Contingency Plan" (DOE/ID-11034).

The USGS monitors more than 140 wells and five surface water sites within a regional network in the ESRPA, both on- and offsite, to study contaminant migration and determine groundwater quality and quantity as they relate to Site operations. The USGS also collects water-level measurements from approximately 208 wells to denote changes in storage and hydraulic gradient in the ESRPA and Perched water systems. Well placement within the regional network and constituent selection supplement existing groundwater monitoring programs conducted by the INL Site contractors. The USGS also collects real-time streamflow information at five sites along the BLR and one site on Antelope Creek to provide estimates of snowmelt runoff and recharge to the aquifer and to provide data for flood control studies.

2.2.3 NOAA

NOAA provides meteorological services and supporting research to the INL Site through the ARLSORD, which operates a large meteorological monitoring network to characterize the meteorology and climatology of the eastern Snake River Plain, which includes the INL Site.

Meteorological monitoring data are required to characterize atmospheric transport and diffusion conditions in the vicinity of the Site and to represent other meteorological conditions (e.g., precipitation, temperature, atmospheric moisture) that are important to environmental surveillance activities, such as air quality and radiological monitoring.

2.2.4 Idaho Environmental Monitoring Program

The Idaho Environmental Monitoring Program is jointly supported by the DEQ INL Oversight Program, DOE-ID, NOAA, and the Shoshone-Bannock Tribes. Four weather stations were constructed in 1997 at publicly accessible locations in southeastern Idaho. These stations are located in Idaho Falls, Fort Hall, Terreton, and the BLR Rest Area on U.S. Highway 20/26.

2.3 Laboratory-Wide Monitoring Committees

2.3.1 INL Water Committee

The INL Water Committee was established in 1994 to coordinate drinking water-related activities across the Site and to provide a forum for exchanging information related to drinking water systems. In 2007, the committee was expanded to include wastewater, stormwater, and groundwater interests. In 2011, the Water Committee incorporated membership from the former Water Resource Committee to serve as a resource for the coordination and exchange of technical information on water-related activities.

The committee meets quarterly and includes participants from DOE-ID, USGS, INL, ICP, and NRF. Guests from outside the laboratory are sometimes invited to attend, such as from DEQ and the city of Idaho Falls. Water and wastewater-related issues addressed during these meetings include regulatory issues, the cross-connection program, construction activities, facility-specific activities, sampling, analytical results, and training.

2.3.2 Monitoring and Surveillance Committee and Groups

The INL Site has a Monitoring and Surveillance Committee (MSC) with participating organizations from DOE-ID, INL, ICP, NRF, the DEQ INL Oversight Program, NOAA, USGS, and the Shoshone-Bannock Tribes. Chartered in 1997, the MSC provides a means for exchanging and sharing technical information, expertise, and data. The purpose of the MSC is to provide a collaborative atmosphere in which the participating organizations can communicate and discuss what they are doing in the areas of environmental monitoring and surveillance and make recommendations where appropriate.

3. EFFLUENT MONITORING

Operations of INL Site facilities have the potential to release pollutants, such as radioactive and non-radioactive contaminants, into the environment. These pollutants can enter the atmosphere as airborne effluents and can enter surface and groundwater as liquid effluents or storm water runoff via injection wells. The following subsections summarize the effluent monitoring currently conducted by various organizations at the INL Site.

3.1 Airborne Effluent

Regulated facilities at the INL Site are required under Public Law 91-604 and IDAPA 58.01.01 to measure and estimate airborne effluents. These facilities include:

- CFA
- INTEC
- CITRC
- MFC
- RWMC:
  - RWMC-Advanced Mixed Waste Treatment Project (RWMC-AMWTP)
  - RWMC-ARP
- TAN
- ATR Complex
- SMC
- RRTR
- REC.

One Permit to Construct (PTC) with a Facility Emission Criteria Air Pollutant air quality permit incorporating all facility-specific PTCs has been issued by DEQ. This permit includes various permit requirements, such as emission limits, and operating, monitoring, recordkeeping, and reporting requirements applicable to specific air emission sources at the various INL Site facilities. Many of the facility-specific PTCs have since been terminated at the request of DOE by DEQ or permit conditions have been rolled into the PTC Facility Emission Criteria Air Pollutant permit.

Numerous stack emissions are monitored for radioactive pollutants, but specific aspects of stack emission monitoring, such as the radionuclides being measured, depend on the facility source term. Some monitoring is required by regulation, permit, or DOE orders, and some monitoring is conducted as a best management practice or to fulfill requirements for periodic confirmatory measurements. Where monitoring is performed, emissions are normally sampled after abatement (e.g., filtration through a high-efficiency particulate air filter); emissions can also be estimated by other means, such as by using engineering calculations and process knowledge.

Continuous monitoring is required for emission points that have a potential to emit radionuclides[1] in quantities that could result in an effective dose equivalent (EDE) to a member of the public in excess of

[1] The "potential to emit radionuclides" is evaluated by assuming normal facility operations; however, no credit is taken for reduction of emissions by abatement equipment.

0.1 mrem per year, which is 1% of the of 10 mrem emission standard per year specified by 40 CFR 61, Subpart H.

Monitoring for compliance and screening purposes is conducted in accordance with the guidance of 40 CFR 61, Appendix B, "Method 114," American National Standards Institute (ANSI), "Sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities" (ANSI N13.1-1999), and the air monitoring recommendations of DOE-HDBK-1216-2015 (DOE 2015).

The contractor associated with each permitted facility at the INL Site is responsible for airborne effluent monitoring at its facility. Figure 3-1 shows the locations of those emission sources that currently require continuous monitoring by Subpart H of 40 CFR 61. Sources shown in Figure 3-1 at RWMC include both RWMC-AMWTP and RWMC-ARP, as listed in Section 3.1. The following information on airborne effluent emissions and sources associated with contractor-operated facilities is summarized in "National Emission Standards for Hazardous Air Pollutants INL Report for Radionuclides" (DOE/ID-11441).

Other sources with the potential to emit low quantities of radioactive emissions also exist at other contractor-operated facilities. Emissions from sources that could cause annual doses to the maximally exposed individual (MEI) greater than 10^{-5} mrem are periodically monitored and included in calculating the INL Site's annual EDE to members of the public.

3.1.1 INL Contractor

INL contractor-operated facilities are monitored for air emissions associated with R&D and operational activities as described in the following paragraphs. Release points at INL Site facilities that do not require continuous monitoring are sampled periodically to provide emissions data for INL Site reports and permit requirements, as well as best management practice.

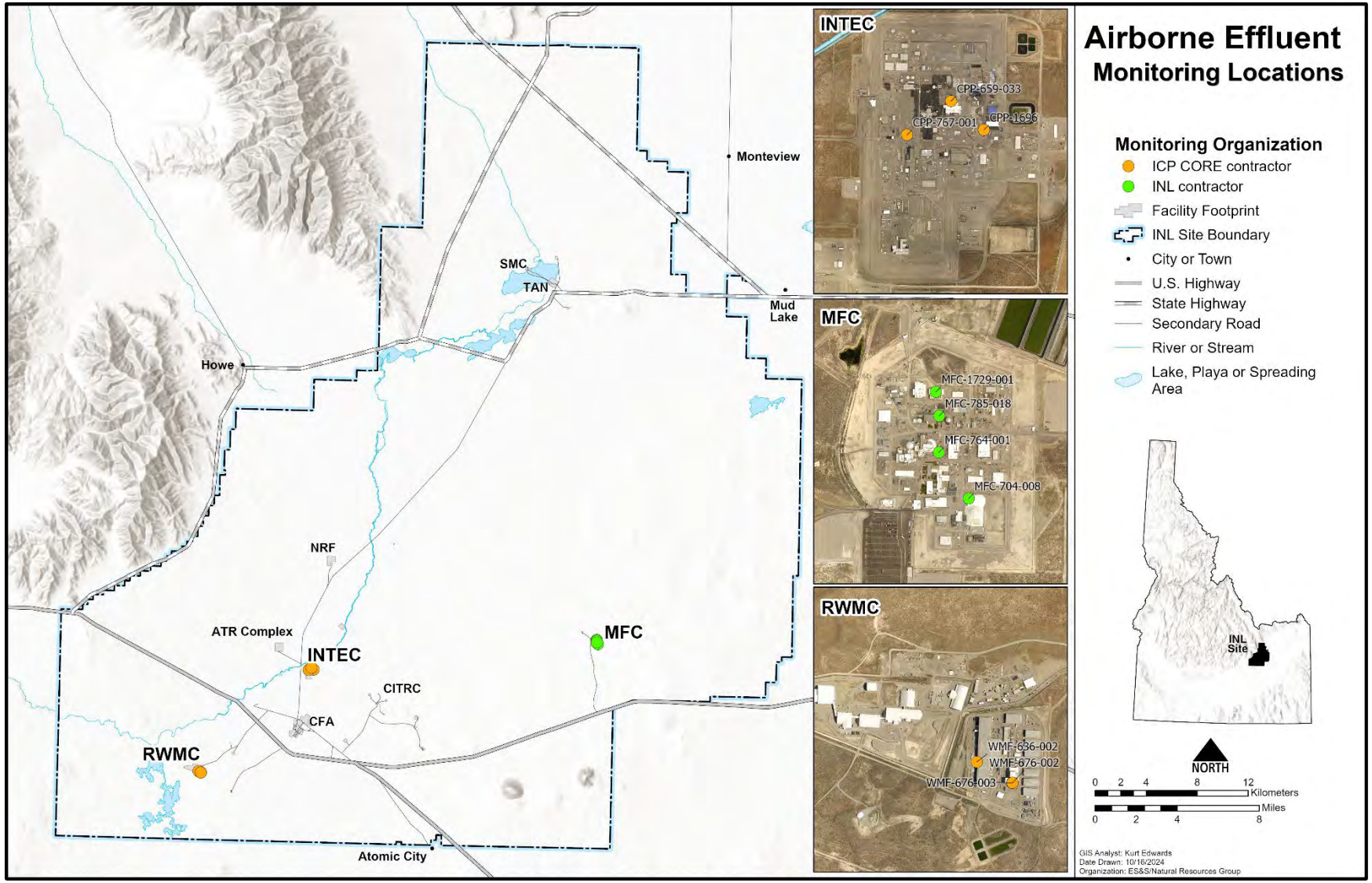

Figure 3-1. Airborne effluent monitoring locations that currently require continuous monitoring by Subpart H of 40 CFR 61.

- **CFA.** Minor releases occur from CFA facilities where work is routinely conducted with small quantities of radioactive materials. This includes operations at the CFA Laboratory Complex building CFA-625. Only trace quantities of radioactive materials are used at the facility. Additional radioactive emissions are associated with decontamination activities, sample analyses, and site remediation.
- **ATR Complex.** Radiological air emissions from the ATR Complex are primarily associated with operation of the ATR. These emissions include noble gases, iodine isotopes, and other mixed fission and activation products. Other radiological air emissions are associated with hot cell operations, sample analysis, site remediation, R&D activities, and wastewater evaporation.
- **REC.** Radiological releases from the REC could arise from laboratory fume hoods within buildings at the INL Research Center (IRC) facility. Exhaust from most of the fume hoods is released directly to the outside atmosphere via the heat recovery fan system in the IRC heating, ventilating, and air conditioning system. Other potential release points include the IRC Laboratory Building (IF-603), the National Security Building (IF-611), and RESL (IF-683).
- **MFC.** MFC has four release points that require continuous emission monitoring as specified under 40 CFR 61, Subpart H: the Fuel Conditioning Facility Main Stack (MFC-764); the Hot Fuel Examination Facility Stack (MFC-785); the Fuel Manufacturing Facility (MFC-704); and the Irradiated Materials Characterization Laboratory (MFC-1729).
- **SMC.** Operations at SMC include material development, fabrication, and assembly work to produce armor packages for the U.S. Department of the Army. Other activities include developing tools and fixtures and preparing and testing metallurgical specimens. Radiological air emissions from SMC are associated with the processing of depleted uranium. Potential emissions are uranium isotopes and associated radioactive progeny.
- **INTEC.** INTEC operations that result in emissions are at the EPA Radiological Dispersion Device Decontamination Project located in Chemical Processing Plant (CPP)-653.
- **CITRC**. Releases include training exercises for first responders for release of radioactive material. Small amounts of short-lived radionuclide are placed on various surfaces within a building as part of the training exercise.
- **RRTR**. Radiological releases include training exercises using both sealed and non-sealed sources for military and first responders for radiological dispersal devices and improvised nuclear devices.

3.1.2 ICP Contractor

The ICP remediation, waste management, and operational activities are conducted in compliance with federal and state rules. The ICP radiological emissions originate from the operation of process equipment; SNF storage and handling; deactivation and demolition activities, as applicable; waste management operations; and other mission activities. The ICP monitors radioactive emissions as described in the following paragraphs:

- **INTEC.** Emissions from INTEC are primarily associated with waste management operations (i.e., treatment and repackaging activities), the operation of process equipment, SNF dry storage, the ventilation of radioactively-contaminated buildings, and the maintenance and servicing of contaminated equipment. Radioactive emissions include both particulate and gaseous radionuclides. The IWTU has three continuously monitored point sources (two regulated, and one voluntary) and various other diffuse and non-diffuse sources. Voluntary continuous monitoring is performed for the New Waste Calcining Facility (CPP-659-033). Regulated continuous

monitoring is conducted for the Fluorinel Dissolution Process and Fuel Storage (FAST) Facility (CPP-767) as well as the IWTU (CPP-1696) which started waste operations in 2023.

- **RWMC-ARP.** Radiological emissions from formerly operated ARP facilities previously complied with NESHAP monitoring standards using an EPA-approved ambient air monitoring program that meets the requirements specified by 40 CFR 61.93(g). Following the recent demolition of the deactivated and decommissioned CERCLA ARP retrieval enclosures (ARPs II-IV, VIII, and IX) and the abandonment of the three Organic Contamination in the Vadose Zone units (vapor-vacuum extraction units D, E, and F, in the SDA) there are no remaining air emission point sources at the RWMC-ARP. However, until the ET barrier is installed, heavy equipment operation in the SDA while hauling clean fill (gravel), placing it, and grading the SDA in preparation for the construction of the ET barrier may potentially disturb soils containing radioactive particles. Therefore, the EPA-approved ambient air monitoring program remains active to identify potential releases.

  Periodic measurements of carbon-14 (^{14}C) and tritium (^{3}H) gaseous emissions from the three vapor-vacuum extraction units were formerly performed twice a year; however, measurements of these radionuclides were discontinued in 2018, and emissions are now determined using historical averages. The emissions of gaseous ^{3}H and ^{14}C radionuclides to the atmosphere are also generated from the corrosion of activated beryllium blocks buried at the SDA. Curie emissions are estimated based on Site-specific corrosion data for buried beryllium, ^{3}H and ^{14}C inventories, and fractional release rates. Soil-gas measurements of ^{14}C and ^{3}H collected near known beryllium disposal locations were conducted through fiscal year 2018 but have since been discontinued. Millions of gallons of groundwater contaminated with ^{3}H (originating from upgradient sources) are extracted annually from the Snake River Plain Aquifer at the RWMC production well for use at the facility. In accordance with the provisions of the ICP Drinking Water Program, radiological constituents, including ^{3}H, are routinely sampled. Annual emissions are calculated based on the entire volume of groundwater pumped from the ESRPA, which is ultimately discharged to the four sewage lagoons; the annual ^{3}H analyses results; and a release fraction applicable for tritiated water.

- **RWMC-AMWTP**. Operational features associated with the AMWTP consist of processes to vent waste containers; the nondestructive examination of container contents; and the treatment, repackaging, storage, assembly, and loading of waste containers for transport and disposal. Operational activities at the RWMC-AMWTP, operated within the TSA, could potentially result in the release of radiological and other pollutants into the atmosphere. Currently, RWMC-AMWTP continuously monitors for radioactive particulates at two stack locations on WMF-676 in accordance with 40 CFR 61.93(c). These emissions are calculated, documented, and included in INL's annual NESHAP report.
- **Experimental Breeder Reactor (EBR)-I.** Three high-volume air samplers are located near the EBR-I facility, and a fourth sampler is operated at Howe, Idaho, to provide background samples for NESHAP monitoring. The execution of the ARP ambient air measurement project is documented in ICP plans and procedures. For emissions from the ARP, the EBR-I facility is a conservative surrogate location for the INL Site's MEI.
- **TAN.** The new Pump and Treat Facility is part of the OU 1-07B CERCLA remediation project, which is operated to treat contaminated groundwater at TAN. Its treatment process targets various organic contaminants of concern. As the result of its extraction, it also releases ^{90}Sr and ^{3}H to the atmosphere.

3.2 Liquid Effluent

Operations at the INL Site may result in the release of liquid effluent discharges containing radioactive or non-radioactive pollutants. Effluent monitoring includes the collection and analysis of samples and other measurements to establish the type and concentrations of pollutants in liquid discharges from facilities. Monitoring also provides data to evaluate the effectiveness of liquid effluent treatment and control systems, identifies potential contaminant source areas and environmental problems, and provides a mechanism for detecting, characterizing, and reporting unplanned releases.

The discharge of wastewater to the land surface is regulated under IDAPA 58.01.11, IDAPA 58.01.17, and IDAPA 58.01.16. Three facilities operated by the INL Site contractors have Reuse Permits issued by DEQ; all three require monitoring of liquid effluents for facility-specific parameters.

Additional liquid effluent monitoring is performed in support of DOE environmental protection objectives. Radiological liquid effluents are monitored in accordance with DOE Order 458.1 and the recommendations of DOE-HDBK-1216-2015 (DOE 2015). A risk-based approach is used by the INL contractor to determine which nonpermitted effluent streams or additional nonpermitted parameters require monitoring. The ICP contractor has a similar approach as well. The risk-based approach considers the likelihood that an effluent measurement equals or exceeds a regulatory limit or environmental release level. It will also determine the severity of the exceeded levels, were such an event to occur.

Figure 3-2 shows liquid effluent monitoring locations currently sampled across the INL Site. Some facilities have in-line alarm monitors located upstream from the routine effluent monitoring locations. These monitors are used to detect radiation or pH levels that fall outside predetermined levels.

3.2.1 INL Contractor

The INL contractor conducts sampling on the wastewater reuse systems at MFC and the ATR Complex, and monitors for non-radioactive and radioactive parameters in liquid waste effluents as required by the applicable Reuse Permit and DOE environmental protection objectives. Liquid effluent monitoring activities, including locations, frequencies, and analyses, are performed in accordance with the INL contractor's Liquid Effluent Monitoring Program documents.

Reuse permits are in effect for the ATR Complex Cold Waste Pond, and the MFC Industrial Waste Pond (IWP). In April 2020, the MFC Industrial Waste Ditch (IWD) was connected to a new lift station and pipeline that transports IWD effluent into the existing IWP pipeline. A minor modification was issued by DEQ to remove the IWD from the current MFC Reuse Permit. The ATR Complex and MFC Reuse Permits do not specify maximum effluent concentrations for any specific constituents. These facilities also have specific radiological and other parameters monitored for surveillance purposes in order to comply with DOE Order 458.1. Furthermore, the permits generally require that data from groundwater monitoring wells associated with each permit comply with the Idaho groundwater quality primary and secondary constituent standards found in IDAPA 58.01.11. The permits specify maximum annual discharge volumes. The permitted reuse facilities are monitored in accordance with state of Idaho requirements.

The INL Site facilities located in Idaho Falls are required to comply with the applicable regulations in Chapter 1, Section 8 of the "Municipal Code of the City of Idaho Falls." Industrial wastewater acceptance forms are obtained for facilities that dispose liquid effluent through the sewer system for the city of Idaho Falls. Industrial wastewater acceptance forms include general requirements that apply to all REC facilities and specific monitoring requirements for the IRC, owing to the nature of activities conducted therein. The

city of Idaho Falls monitors effluents from the IRC for compliance with the city's wastewater acceptance criteria.

3.2.2 ICP Contractor

A Reuse Permit is in effect for the INTEC New Percolation Ponds. Discharge of wastewater to the land surface is regulated by IDAPA 58.01.16 and IDAPA 58.01.17. The INTEC Reuse Permit requires liquid effluent monitoring with a release limit of 1,095 million gallons per year and 3 million gallons per day. The facility also has specific radiological and other field parameters monitored for surveillance purposes in order to comply with DOE Order 458.1. Furthermore, the permit generally requires that data from groundwater monitoring wells at the New Percolation Ponds comply with the IDAPA 58.01.11 groundwater quality primary and secondary constituent standards. The permit also specifies daily and annual discharge volumes. Liquid effluent monitoring is performed in accordance with ICP Liquid Effluent Monitoring Program documents.

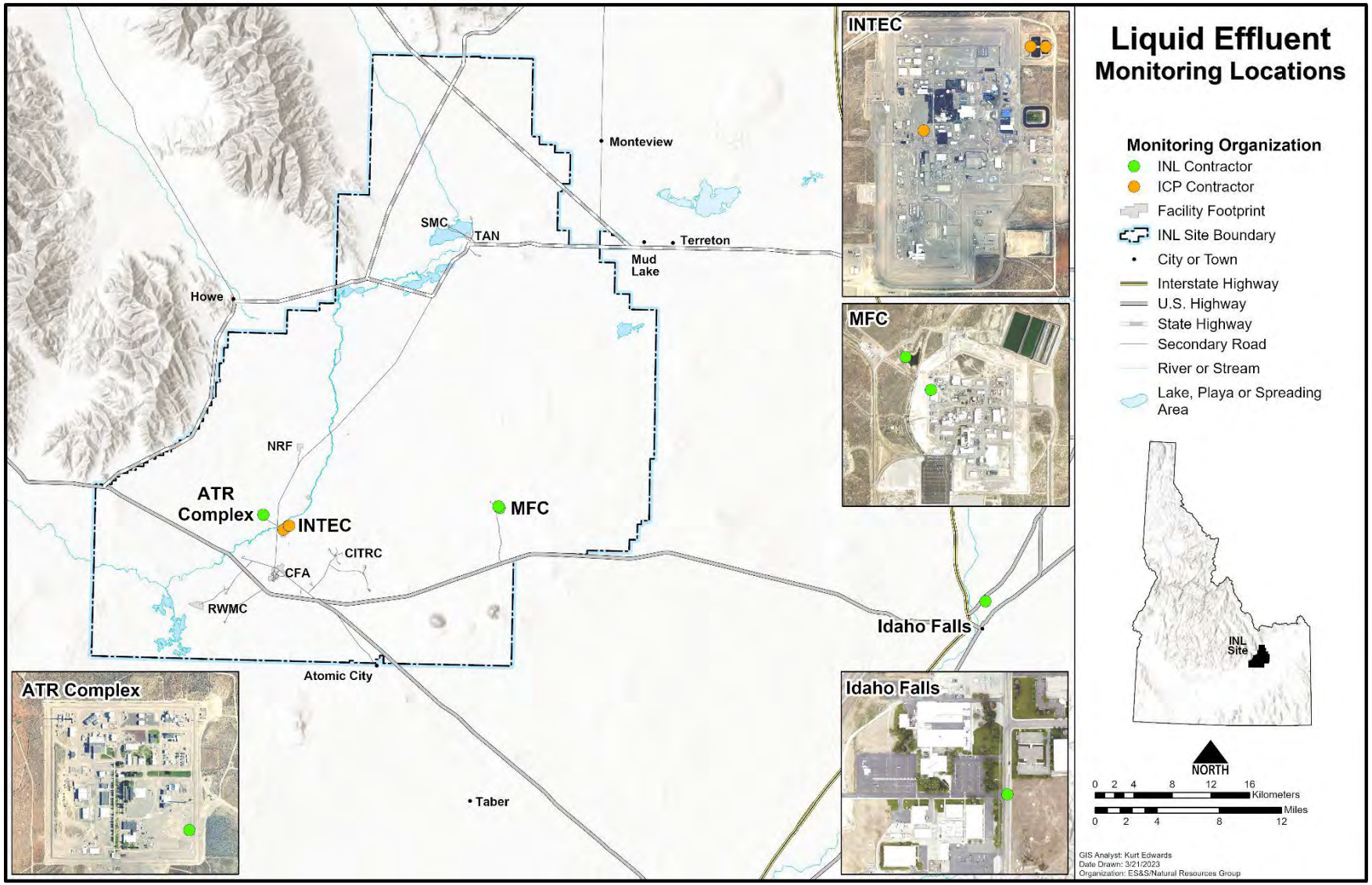

Figure 3-2. Liquid effluent monitoring locations.

4. ENVIRONMENTAL SURVEILLANCE

Environmental surveillance at the INL Site includes the collection and analysis of samples or direct measurements of air, water, soil, biota, and agricultural products. Environmental surveillance is conducted by several organizations to support laboratory-wide compliance with DOE Order 458.1, environmental laws and regulations, and DOE agreements, and follows the guidance in DOE-HDBK-1216-2015 (DOE 2015) for establishing environmental surveillance programs.

Separate onsite environmental surveillance is required for waste management facility operations to meet DOE Order 435.1, "Radioactive Waste Management," requirements. The SDA at RWMC-ARP and the ICDF are low-level waste disposal facilities and are required to be monitored for compliance with DOE Order 435.1. Waste management surveillance monitoring is designed to be more facility- or source-specific than other Site-wide surveillance.

4.1 Ambient Air

Air is the most likely transport pathway through which INL Site contaminants could reach offsite populations according to "Idaho National Engineering Laboratory Historical Dose Evaluation" (DOE-ID 1991b). Using a network of low-volume air samplers, several organizations monitor ambient air to compare concentrations at onsite release locations with offsite control locations (Rood and Sondrup 2015). The network of ambient air monitoring locations is shown in Figure 4-1.

Ambient air particulate matter and airborne radionuclides are also sampled during wildfires or other emergency events using a separate network of high-volume air samplers. Refer to Section 6.1 for a discussion of air monitoring performed for operational emergencies. The ambient air monitoring network was evaluated and optimized using a defensible methodology and modeling tool that objectively assessed the air monitoring network design against established performance objectives. The evaluation began with the development of a frequency of detection methodology, which is the fraction of events that result in a detection at any given sampler. The methodology is further described in "Development and Demonstration of a Methodology to Quantitatively Assess the INL Site Ambient Air Monitoring Network" (INL 2014). The application of the frequency of detection method to optimize the regional network is described in "Application of Frequency of Detection Methods in Design and Optimization of the INL Site Ambient Air Monitoring Network" (Rood and Sondrup 2015). Additional work was completed in 2019 to apply the methodology to potential release points in Idaho Falls and to optimize the in-town ambient air network. The in-town evaluation is described in "Assessment of INL Ambient Air Radiological Monitoring for Idaho Falls Facilities" (INL 2019a).

The various organizations conducting air monitoring are discussed below.

4.1.1 INL Contractor

The INL contractor measures airborne radionuclides and monitors for potential trends in radioactivity in accordance with "Planning and Management of Environmental Support and Services Monitoring Services Activities," (PLN-8510) and other supporting documents. Ambient air monitoring activities support INL Site compliance with DOE Order 458.1 and the Idaho Air Quality Operating Permit.

Airborne particulates released from INL Site facilities, natural radioactivity, and global fallout from historical nuclear detonations or nuclear accidents are collected on- and offsite using low-volume samplers with 2 in. filters. Potential gaseous iodine releases are monitored using activated charcoal cartridges. Atmospheric moisture is collected using digital flow meters and molecular sieves to monitor

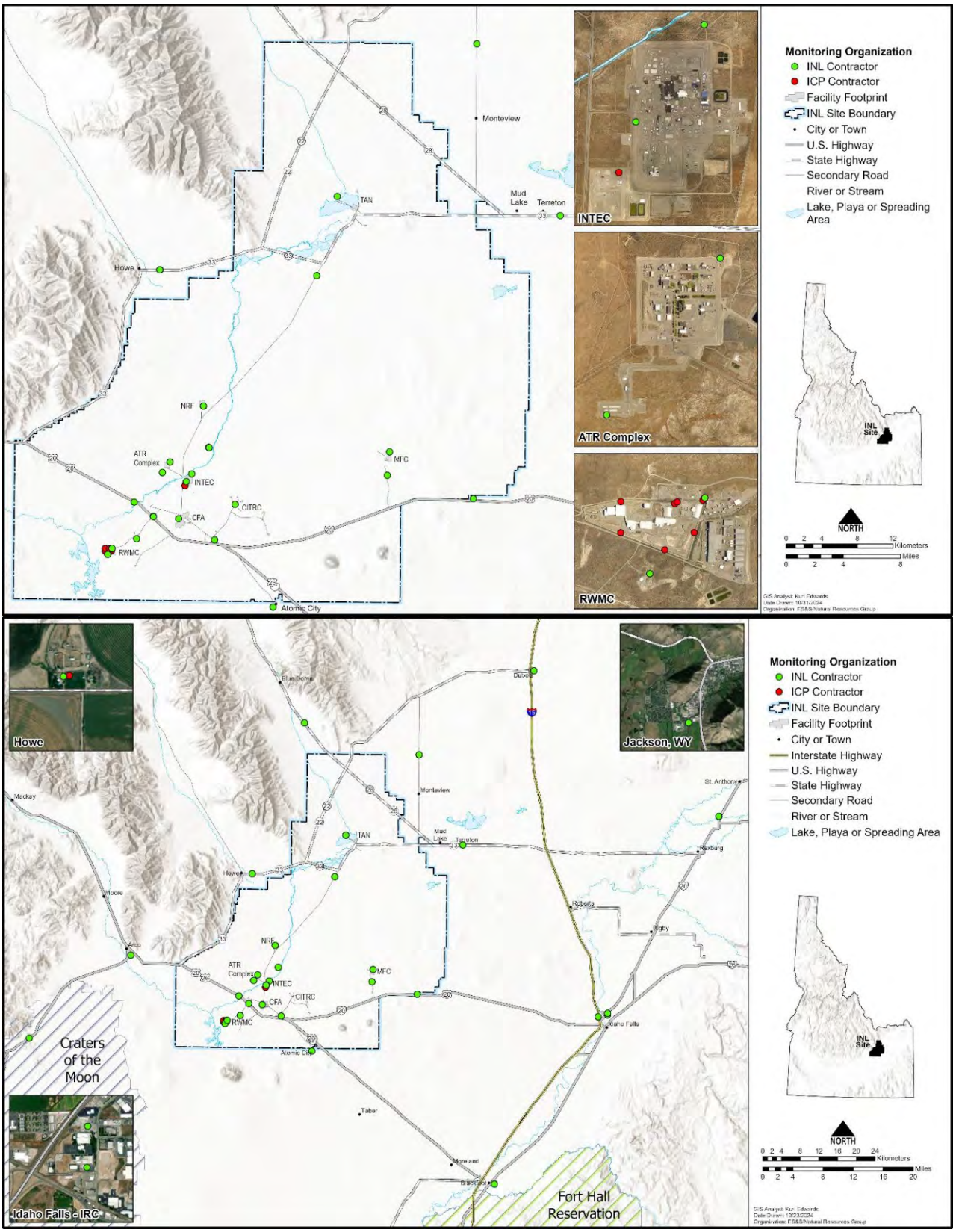

Figure 4-1. INL Site environmental surveillance ambient air sampling locations (onsite [top] and regional [bottom]).

for ^{3}H in water vapor, as observed in Figure 4-2. Precipitation is also monitored for ^{3}H at many of the same locations where atmospheric moisture is monitored. A high-volume air sampler in Idaho Falls is operated as part of the EPA's RadNet Program, which monitors environmental radioactivity across the U.S. to provide high-quality data for assessing public exposure and environmental impacts resulting from nuclear emergencies and baseline data during routine operations.

4.1.2 ICP Contractor

The ICP contractor measures airborne radionuclides and monitors for potential trends in radioactivity in the environment. The ICP ambient air monitoring activities support the waste management facility requirements of DOE Order 435.1. A series of samplers that monitor radioactive particulates is used around the RWMC SDA and at the ICDF. Airborne materials from the SDA and ICDF are predominantly fugitive dusts potentially contaminated with small amounts of sorbed radionuclides. The samplers are located along the periphery of the SDA in predominant wind paths from disposal activities and at a control location north of Howe, Idaho.

4.2 Drinking Water

Groundwater supplies the drinking water systems at the INL Site, and drinking water is monitored according to regulations to ensure that the drinking water at the facilities is safe for consumption in accordance with IDAPA 58.01.08, "Idaho Rules for Public Drinking Water Systems," "Safe Drinking Water Act Amendments of 1996"(Public Law 104-182), and "National Primary Drinking Water Regulations" (40 CFR Part 141). All onsite contractors participate in the INL Drinking Water Program as a means of sharing information, but each contractor administers its own drinking water monitoring program. Because of known contaminants, certain parameters are monitored more frequently than required.

Monitoring is based on the classification and size of the water systems (i.e., transient or non-transient non-community). Offsite drinking water systems are also monitored due to the potential for contaminant migration beyond the Site boundary and are collected from taps. Samples collected offsite are included as drinking water samples but are not used for compliance with drinking water regulations. Instead, they are used to assess groundwater quality. Section 4.3 discusses the groundwater monitoring samples taken directly from wellheads. Transient non-community water systems on the Site are located at CITRC, EBR-I, Gun Range, NRF deactivation and decommissioning (D&D), and the Main Gate. Non-transient non-community water systems have more stringent compliance requirements than transient non-community water systems. The non-transient non-community water systems at the Site are located at ATR Complex, CFA, INTEC, MFC, RWMC, and TAN Contained Test Facility.

Cross-connection programs are in place to protect water systems from potential contamination. These programs are responsible for the installation, maintenance, and testing of approved backflow prevention assemblies and inspection of buildings to prevent the potential of contamination hazards and the elimination of cross-connections. The INL Site contractors have a cross-connection program.

Figure 4-3 shows on and offsite drinking water monitoring locations. Onsite drinking water samples are collected from the point of entry to each distribution system or manifold, directly from the wellheads, and from buildings associated with each drinking water distribution system. Individual sampling points from each drinking water distribution system are not shown on Figure 4-3 because these sample points include most buildings connected to the distribution system.

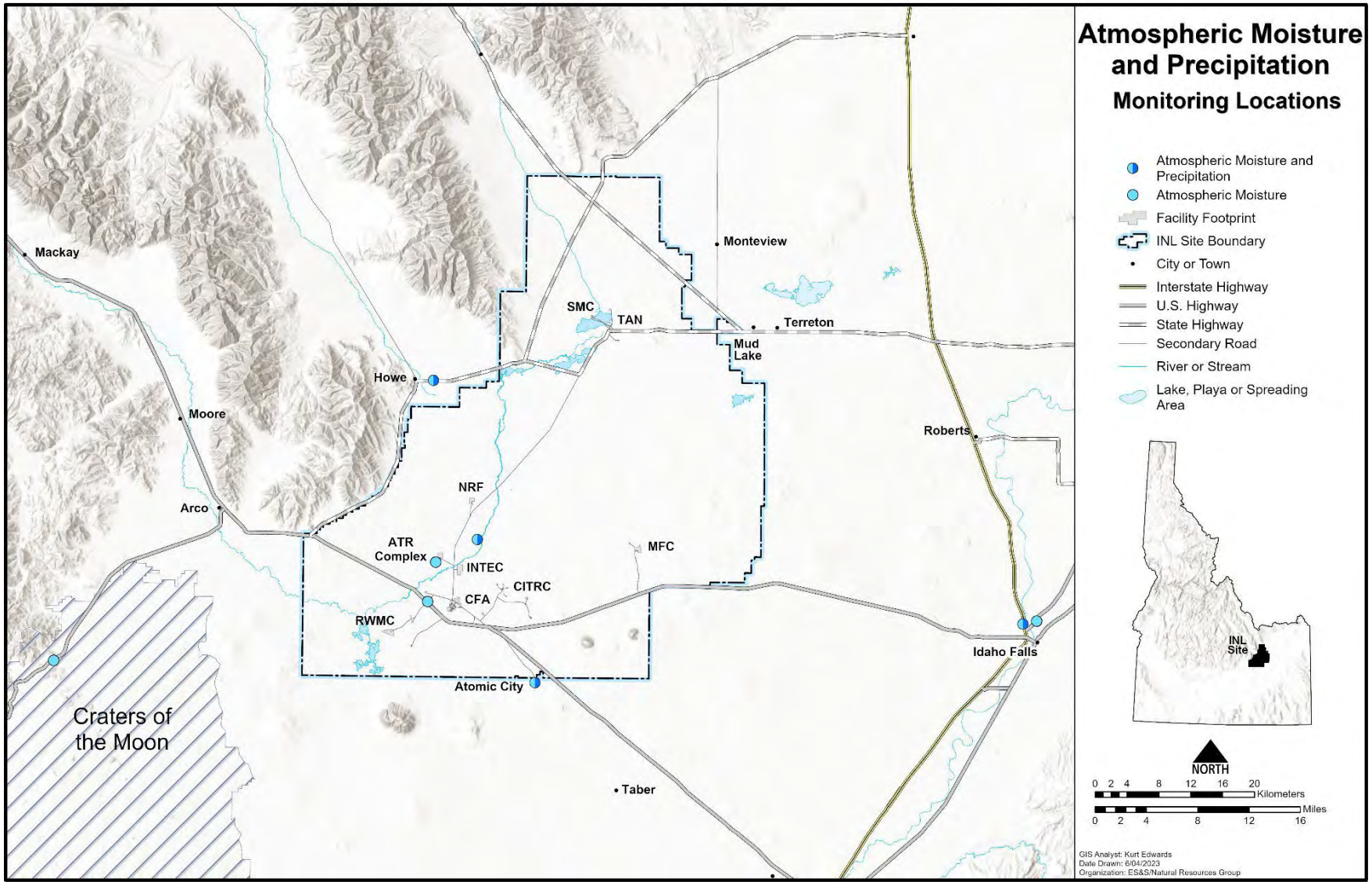

Figure 4-2. INL contractor atmospheric moisture and precipitation monitoring locations.

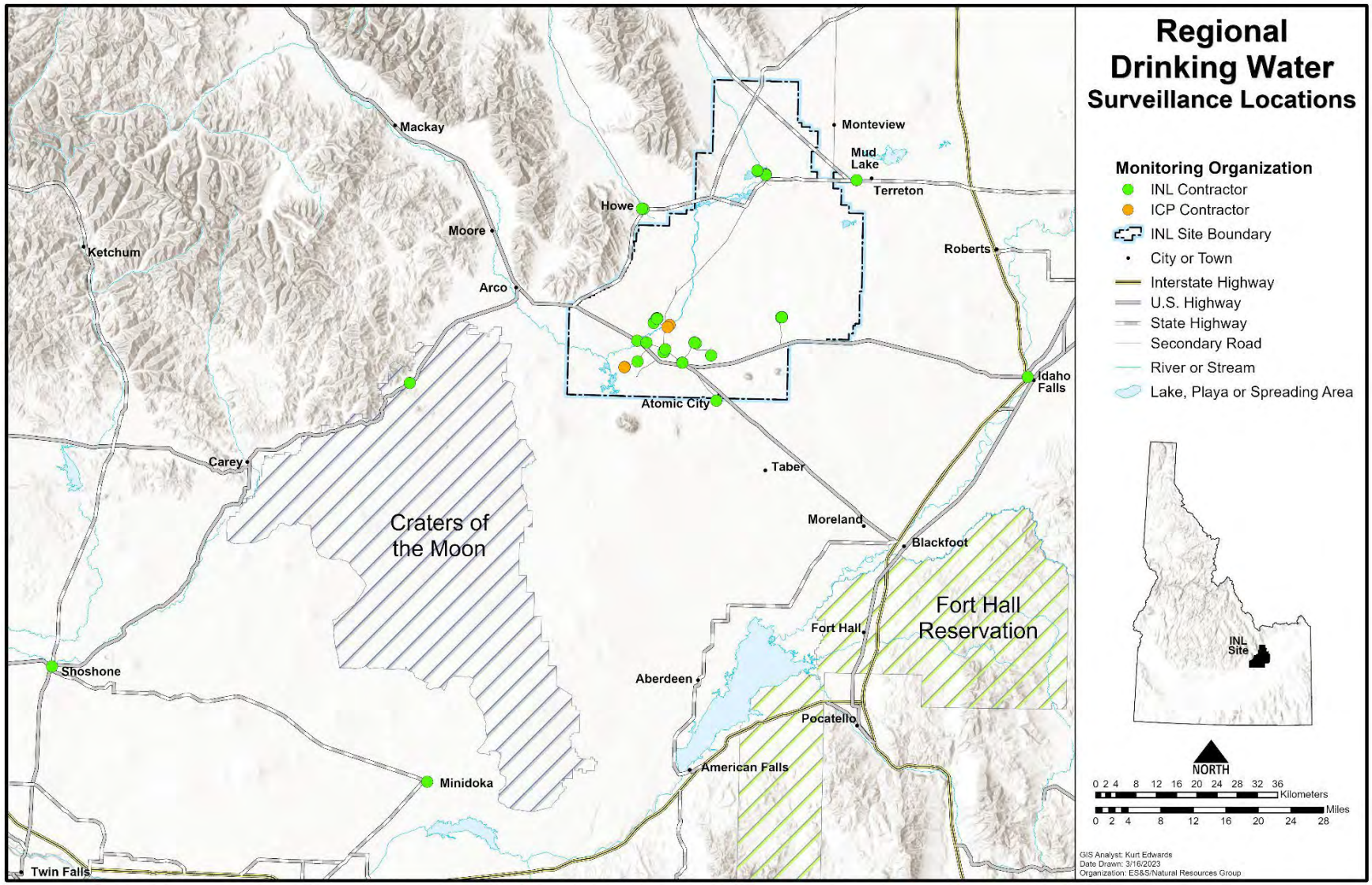

Figure 4-3. On- and offsite drinking water monitoring locations.

4.2.1 INL Contractor

The INL contractor performs drinking water monitoring and is responsible for all Site drinking water systems, except for INTEC, NRF D&D, and RWMC, which are ICP contractor facilities. Currently, the INL contractor monitors 13 wells and eight distribution systems across the INL Site for both radiological and non-radiological parameters. Compliance sampling locations, parameters, and frequencies are determined by DEQ in the Idaho Public Water System Switchboard, which is located at https://www.deq.idaho.gov/water-quality/drinking-water/public-water-system-switchboard/.

A licensed backflow assembly tester performs cross-connection inspections and testing of all backflow prevention assemblies for the INL drinking water systems and facilities. Facility inspections are performed annually, and backflow prevention assemblies are tested upon installation, after repair, or relocation, and at a minimum, annually.

The INL contractor collects offsite surveillance drinking water samples at Atomic City, Craters of the Moon, Howe, Idaho Falls, Minidoka, Mud Lake, Shoshone, and the public rest stop on Highway 20/26. The rest stop is the only public drinking water site located close to the mapped ^{3}H plume from the INL Site. Howe is monitored because it is close to the INL Site boundary and BLR Sinks. The water at Atomic City, Minidoka, Mud Lake, and Shoshone is co-sampled with the DEQ INL Oversight Program. A subsample of the Idaho Falls sample is sent to EPA for analysis as part of the EPA RadNet program. These locations are all distant from the INL Site groundwater plume but were selected in 2010 as a result of the amended sampling design based on historical data and public interest (DOE/ID-11485). The Craters of the Moon and Idaho Falls locations are outside the influence of the groundwater plume and are used for background comparison with the other sites. All offsite, surveillance samples are analyzed for gross alpha and beta activity and ^{3}H.

4.2.2 ICP Contractor

The ICP contractor monitors drinking water systems at INTEC, NRF D&D, and RWMC. The ICP contractor is responsible for regulatory compliance at these facilities. Compliance sampling locations, parameters, and frequencies are determined by DEQ in the Idaho Public Water System Switchboard, located at https://www.deq.idaho.gov/water-quality/drinking-water/public-water-system-switchboard/.

A licensed backflow assembly tester performs cross-connection inspections and testing of all backflow prevention assemblies for the ICP drinking water systems and facilities. Facility inspections are performed annually, and backflow prevention assemblies are tested upon installation, after repair, or relocation, and at a minimum, annually.

4.3 Groundwater

Historic waste disposal practices have produced localized areas of contamination in the ESRPA beneath the INL Site. The ESRPA is the source of regional drinking water and supplies irrigation water to a large, regional agricultural and aquaculture economy. Onsite groundwater samples are taken from wells near each facility, in areas of known contamination, and regionally across the Site—including the upgradient of Site operations. Contaminants resulting from past INL Site operations have been detected in the ESRPA beyond the Site's southern boundary at concentrations far below regulatory limits. Offsite groundwater samples are taken near the INL Site boundary, downgradient of the INL Site, and near the terminus of the ESRPA.

Groundwater is monitored at the INL Site by multiple organizations to:

- Satisfy specific CERCLA-related remedial action objectives and/or regulatory requirements contained in RODs, RCRA regulations, Reuse Permits, and DOE Orders
- Determine the nature and extent of groundwater contamination during CERCLA remedial investigation and feasibility study activities
- Evaluate general groundwater conditions and contaminant fate and transport on a regional and subregional scale as performed by the USGS and WAG 10.

The groundwater monitoring programs established by the contractors responsible for managing and operating INL Site facilities, at a minimum, address regulatory compliance and remediation goals at each of the facilities for which they have management responsibility. "Idaho National Laboratory Groundwater Monitoring and Contingency Plan" (DOE/ID-11034) provides an overview of the routine groundwater monitoring conducted onsite and specifies how the recommended elements of a groundwater monitoring program under DOE Order 458.1 are met. All approved CERCLA documents and associated groundwater monitoring activities can be found in the Administrative Record/Information Repository at https://idaho-environmental.com/ARIR/.

4.3.1 INL Contractor

The INL contractor is responsible for groundwater monitoring to fulfill the requirements of the MFC IWD and ATR Complex Cold Waste Pond Reuse Permits. Groundwater monitoring to meet DOE environmental surveillance monitoring requirements is also performed by the INL contractor at MFC, ATR Complex, and the RHLLW Disposal Facility.

The INL contractor is also responsible for CERCLA groundwater monitoring at MFC, which is. required by the WAG 9 ROD that began in 1998 and was discontinued at the end of 2022. Termination of the WAG 9 semiannual groundwater monitoring is formalized in the "Five-Year Review of CERCLA Response Actions at the Idaho National Laboratory Site – Fiscal Years 2015-2019" (DOE-ID 2021).

4.3.2 ICP Contractor

Except for MFC and NRF, the ICP contractor is responsible for groundwater monitoring conducted at all other CERCLA site monitoring locations, Reuse Permit compliance at INTEC, and RCRA post-closure monitoring at INTEC's Waste Calcining Facility and CPP-601/627/640 Landfill. The ICP contractor currently performs data interpretations to determine the cumulative impact of CERCLA sites at the INL Site.

4.3.3 USGS

USGS monitors ESRPA wells within its defined regional network (both onsite and at boundary locations) to study contaminant migration and determine groundwater quality and quantity as they relate to Site operations. The Site boundaries are monitored to detect groundwater contaminants entering and leaving the INL Site. Wells within the Site boundary are monitored to evaluate contaminant movement in the ESRPA between facilities.

Each monitoring well in the USGS regional network is monitored for the contaminants of concern specific to its locale and known or suspected contaminant sources. In general, onsite ESRPA wells outside of facility fences are sampled by the USGS annually, depending on location. Samples are routinely collected and analyzed for radionuclides, volatile organic compounds, trace elements, and

anions (Bartholomay et. al. 2021). Sampling locations, methodologies, and parameters are specified in "Field Methods and Quality Assurance Plan for Water-Quality Activities and Water-Level Measurements, U.S. Geological Survey, Idaho National Laboratory, Idaho" (DOE/ID-22230).

4.4 Surface Water

The BLR system includes the Little Lost River, BLR, Birch Creek, and associated tributary channels, playas, and sinks. No streams or rivers flow from within the Site to locations outside the boundaries, and during most years, the channels of the BLR system on the INL Site are dry. However, surface water samples are taken when water is present both on and around the Site to monitor the surface water pathway. Currently, no discharges of storm water or liquid effluent from INL Site facilities require monitoring under 33 USC §1251, "Federal Clean Water Act." Figure 4-4 shows all the current on- and offsite surface water monitoring locations.

4.4.1 INL Contractor

Surface water is sampled on the BLR through the INL Site, as it has the potential to carry contaminated soil to the BLR Sinks. Samples are analyzed for gross alpha and beta activity and ^{3}H. In addition, gamma spectroscopy is performed on these samples, as cesium-137 is a ubiquitous soil contaminant at the INL Site.

Samples are collected opportunistically at five locations along the BLR, from Highway 20/26 to the BLR Sinks when water is available. Water is also collected at Birch Creek as a control.

Surface water is also collected semiannually at locations downgradient (in terms of groundwater flow) of the BLR Sinks at Buhl, Hagerman, and Twin Falls. These locations are co-sampled with the DEQ INL Oversight Program and are analyzed for gross alpha and beta activity and ^{3}H.

4.4.2 ICP Contractor

Surface and near-surface soils at RWMC-ARP have become contaminated from waste handling and biotic intrusion during past flooding of open pits. Surface water runoff is sampled at the SDA because of the potential for surface water runoff to become contaminated. Sampling locations, parameters, and frequencies are documented in associated procedures. These samples are collected to comply with the following objectives:

- Meet the requirements for waste management facility monitoring per DOE Order 435.1.
- Determine concentrations of radionuclides in surface water leaving the facility.
- Report comparisons of measured concentrations against derived concentration guides for the public. Derived concentration technical standards are calculated from DOE dose equivalent tables and based on DOE radiation protection standards given in DOE Order 458.1.
- Detect and report significant trends in measured concentrations of radionuclides in surface waters leaving the SDA with the potential of leaving the facility.

Water which enters WMF-636 at RWMC-AMWTP is collected in four underground tanks. When these tanks need to be emptied, the water is sampled for radionuclides to ensure it has not become contaminated prior to being discharged to the SDA drainage canal. These sample locations and parameters are documented in ICP plans and procedures. Sample results have not indicated contamination above release limits.

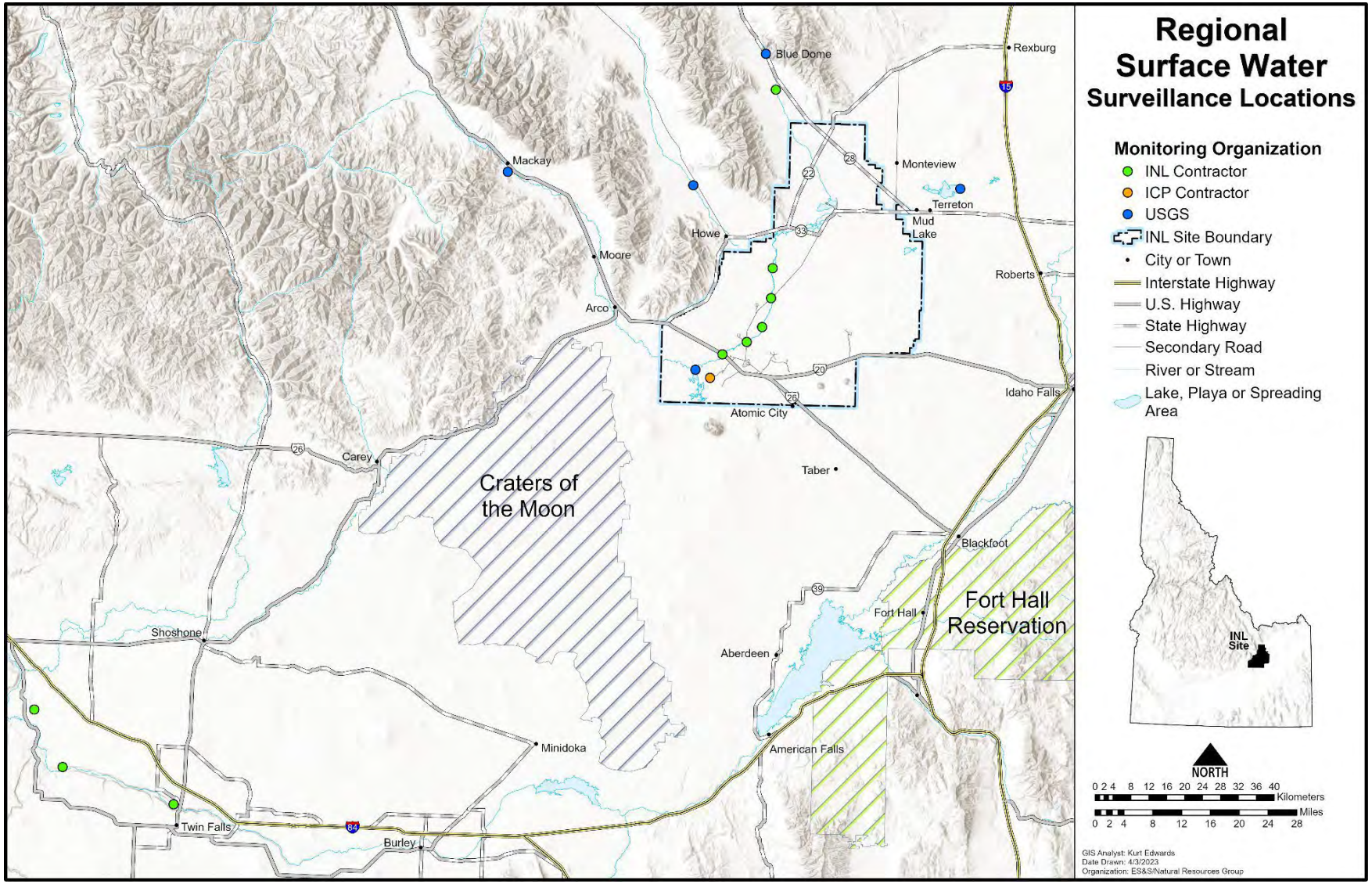

Figure 4-4. On- and offsite surface water monitoring locations.

4.4.3 USGS

When flow occurs in the BLR or other selected streams, surface water samples are collected annually and submitted for radionuclide and chemical analyses to determine the effect that surface water flow has on the chemistry of groundwater beneath the Site.

The USGS takes surface water samples from Birch Creek, the Little Lost River, and Mud Lake, and from two locations on the BLR. The BLR onsite sampling location is at the INL Diversion Dam near RWMC. The offsite sampling location is located below Mackay Dam near Mackay. Details on surface water sampling performed by the USGS are specified in "Field Methods and Quality Assurance Plan for Water-Quality Activities and Water-Level Measurements, U.S. Geological Survey, Idaho National Laboratory, Idaho" (DOE/ID-22230).

4.5 Soil

Some INL Site soils have been contaminated by radioactive and non-radioactive effluents from INL Site operations and from nuclear weapons testing fallout. Soil sampling is conducted at the Site to:

- Determine present concentrations of non-radioactive contaminants and radioactivity (natural and anthropogenic) in soil
- Identify and quantify changes in contaminant concentrations in the soil potentially originating from INL Site operations
- Comply with regulatory requirements
- Provide data used to calculate fugitive air emissions.

4.5.1 INL Contractor

The INL contractor conducts soil sampling in compliance with DOE Order 458.1 requirements for monitoring to determine the impacts of operations on the environment and public health. Figure 4-5 shows regional and onsite soil monitoring locations.

Soil monitoring activities are conducted primarily to determine whether long-term deposition of airborne materials released from INL Site facilities have resulted in a buildup of radionuclides in the environment. To evaluate the need for soil monitoring at INL, evaluations of the deposition of airborne particulates released from each INL facility were modeled using CALPUFF, a non-steady state Lagrangian-puff-dispersion model (INL 2014), and estimated particulate deposition rates (INL 2017). The modeling results show that only RWMC has the potential for soil contaminant accumulations to be detectable in a time period less than the range of decades. Dispersion and deposition modeling of source terms at other facilities (e.g., INTEC, MFC) shows the potential for surface accumulations to be detectable only after hundreds to thousands of years (INL 2017). Soils are analyzed every five years around RWMC, the Experimental Field Station, the Rest Area on U.S. Highway 20/26, and 12 offsite locations. Co-sampling is conducted with the DEQ INL Oversight Program at St. Anthony, Mud Lake, Monteview, Butte City, and Carey. Geostatistical and trend analyses are performed on the radiological data to evaluate the soil radionuclide concentrations over time at the INL Site.

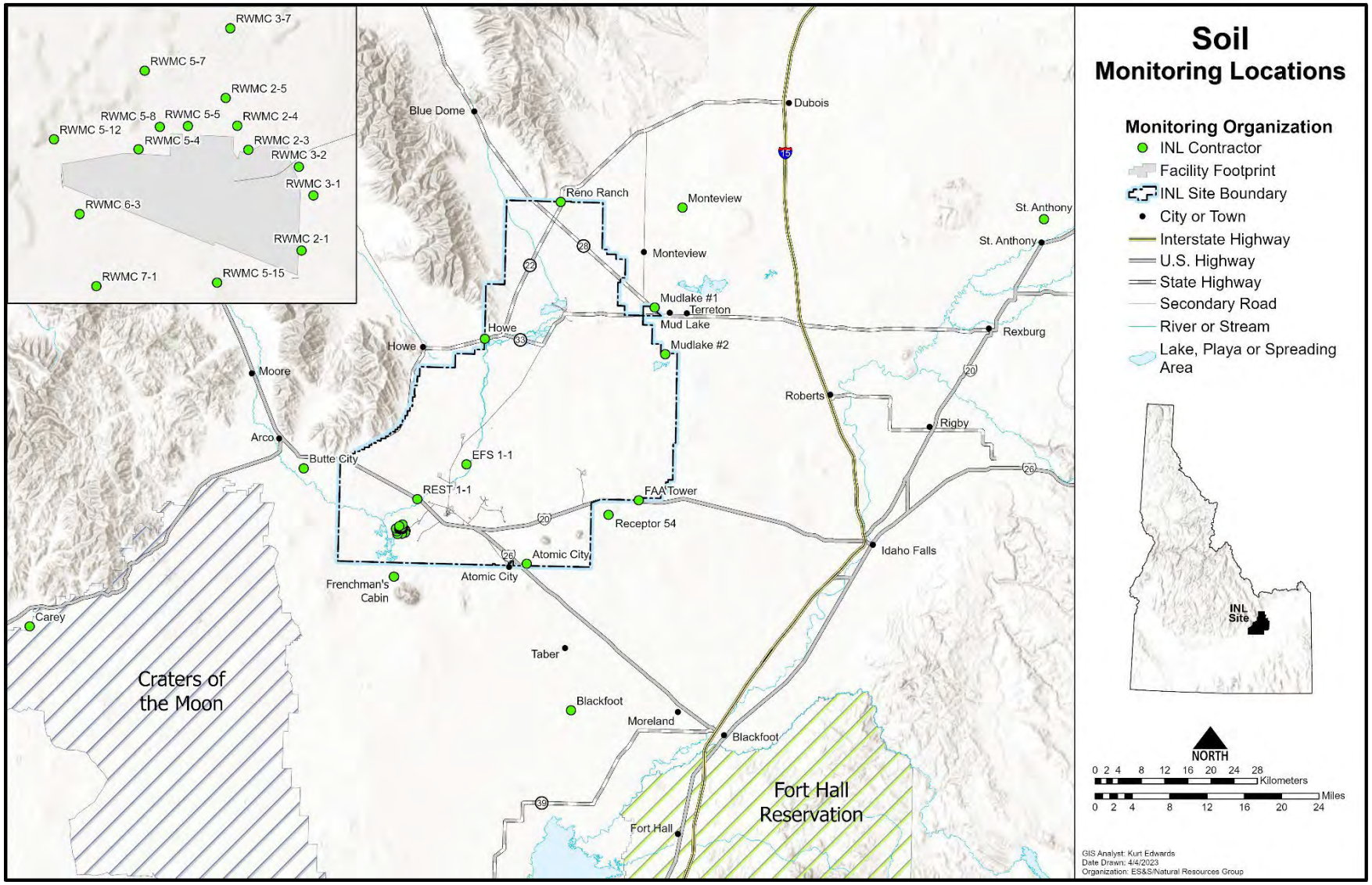

Figure 4-5. Soil monitoring locations.

4.5.2 ICP Contractor

Figure 4-6 shows the locations where ICP contractors perform additional vapor monitoring. This vapor monitoring is performed to comply with "Record of Decision Declaration for Central Facilities Area Landfills I, II, and III (Operable Unit 4-12), and No Action Site, (Operable Unit 4-03)" (DOE-ID 1995), to support ongoing work for a WAG 7 Remedial Investigation/Feasibility Study of RWMC areas, and as part of the Monitoring Plan for Test Area North Operable Unit 1-07B (DOE-ID 2022).

At CFA, vapor monitoring is performed through a series of vapor sampling ports at varying depths adjacent to the landfills in accordance with "Long-Term Monitoring and Field Sampling Plan for the Central Facilities Area Landfills I, II, III, under Operable Unit 4-12" (DOE-ID 2018).

At RWMC-ARP, vapor monitoring is performed to support the WAG 7 CERCLA activities (DOE-ID 2025). The data collected for WAG 7 are also used to satisfy the requirements of DOE Order 435.1. Vapor monitoring is sampled in the vadose zone using an extensive system of vapor sampling ports inside and outside of the SDA boundary.

At TAN, vapor samples are analyzed onsite for major gases, methane, carbon dioxide, and oxygen, using a GEM 5000 or an instrument with similar capabilities. This data is used to aid in the determination of ISB/background conditions in the source area (DOE-ID 2022).

4.6 Biota

Plants represent a potential linkage in transfer of soil-borne contaminants to primary consumers and higher trophic levels. The leaves, florets, and shoots of plants can accumulate constituent concentrations caused by wind-blown contamination and uptake from the soil. Belowground plant components can also accumulate certain contaminants, although most birds and mammals are expected to consume primarily aboveground components. Plants are sampled to determine potential migration of facility contaminants and to ensure waste-confinement integrity.

Wildlife have access to some areas on the Site containing radioactive contamination. Because wildlife have the potential to move offsite and be harvested by the public for consumption, wildlife are sampled to document levels of radioactivity in the edible tissues. Small mammal species are sampled to determine long-term ecological impacts of contamination and assess waste-confinement integrity.

4.6.1 INL Contractor

Because large game animals (e.g., pronghorn, mule deer, elk) are wide ranging and a popular food source for many area residents, the INL contractor collects samples of game animals that are killed on roadways on or near the INL Site. Thyroid and samples of muscle and liver tissue are collected from each animal and analyzed for radioactivity. Figure 4-7 shows locations where biota samples have been collected in the past. These locations vary from year-to-year depending on the number and locations of motor vehicle accidents involving big game.

The INL contractor also collects waterfowl on an annual basis from liquid waste disposal ponds on the Site and from offsite control areas. The ponds sampled include the ATR Complex sewage lagoon and an offsite location. Past results indicate waterfowl may use the Hypalon-lined pond at the ATR Complex, but no sampling is conducted there. Edible tissues, viscera, and remaining tissues (e.g., feathers, skin, bones) from waterfowl are each analyzed for gamma-emitting radionuclides.

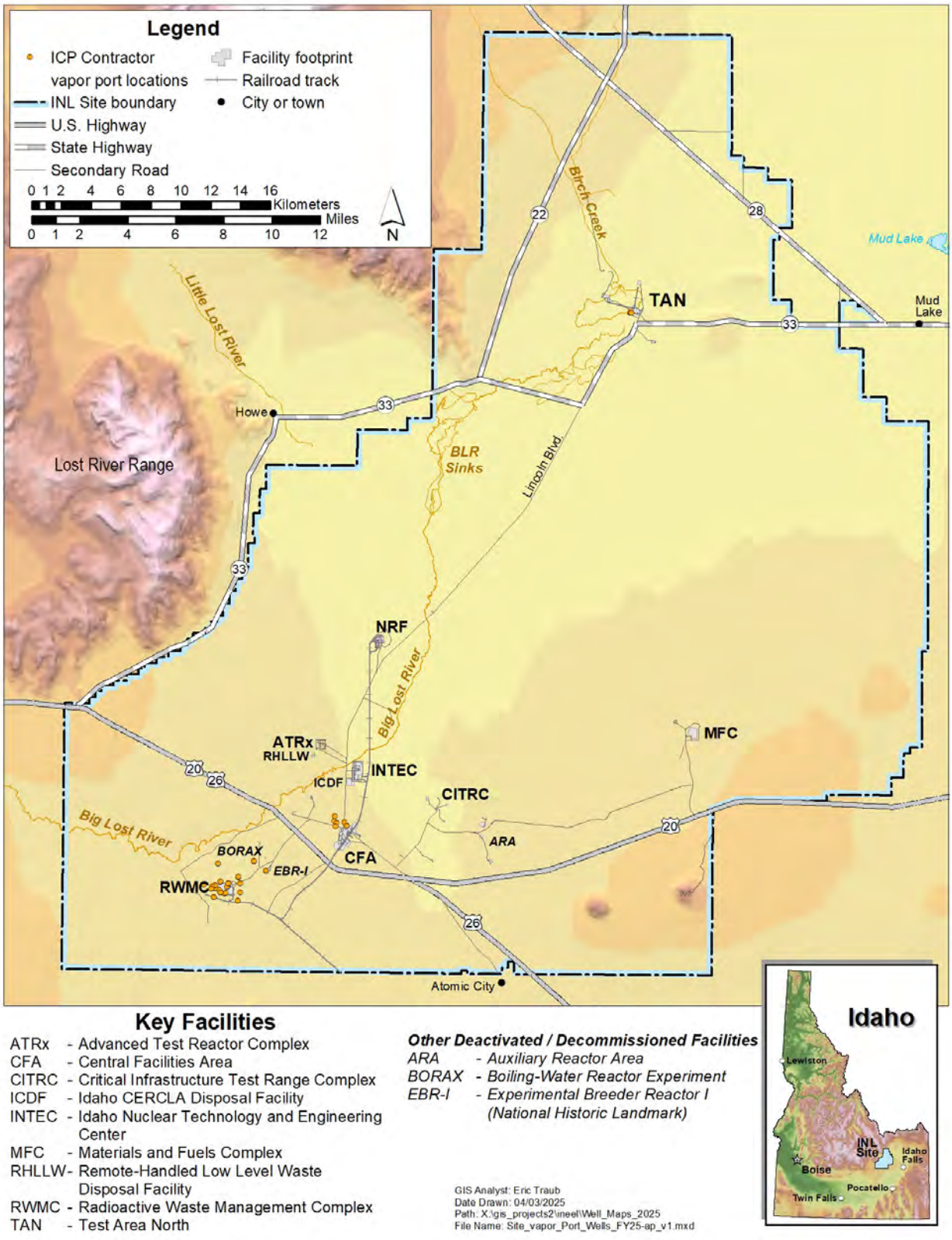

Figure 4-6. Vapor port monitoring locations.

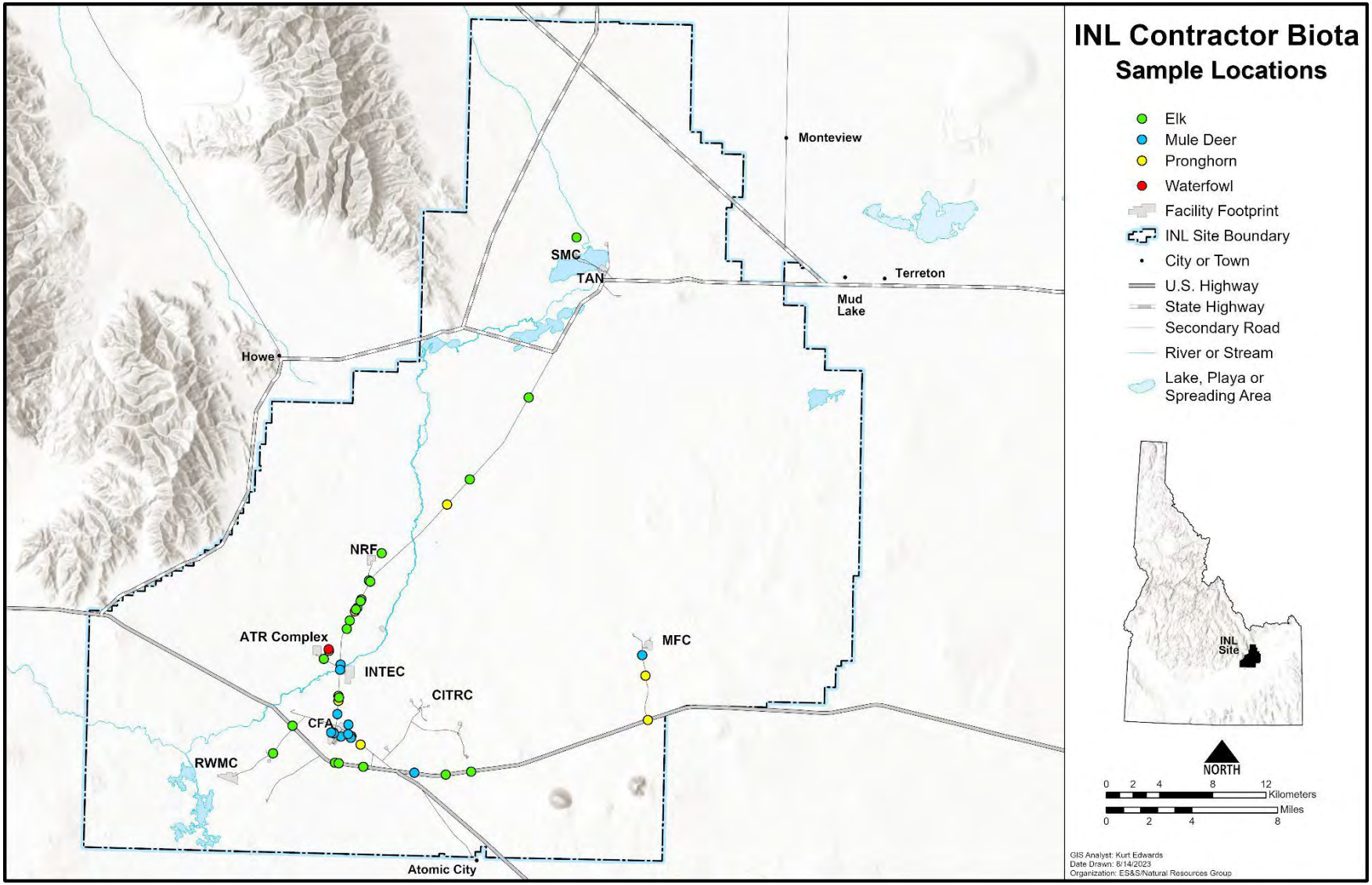

Figure 4-7. INL contractor biota sample locations.

At DOE-ID's request, the INL contractor may also monitor other biota on a non-routine basis if there are emerging issues or concerns expressed by external parties. For example, Yellow-bellied marmots, also called rock chucks, were monitored to evaluate the potential radiological dose to Shoshone-Bannock Tribal members who may harvest animals that were exposed to radioactive waste in the SDA.

Ecological studies, such as population surveys on birds and mammals, as well as community structure surveys on soil, fauna, and plants, are performed by the INL contractor at varying times during the year as described in Section 4.9.

4.6.2 ICP Contractor

The ICP contractor previously performed biota sampling activities. Routine biota monitoring was discontinued in 2018 with DOE concurrence. It was concluded that sufficient data had been collected, indicating no potential for public exposure through biota at RWMC. Data had demonstrated no impacts of biota transporting radionuclides from buried waste or contaminated soil, and there were no longer increasing trends. Sample areas and sample media have diminished due to the changed footprint of the SDA. Planned waste management activities and maintenance in the SDA (e.g., overburden depth, weed control) will remain unchanged in the foreseeable future, so it is reasonable to assume the biota uptake will be consistent with past results between now and planned cap installation (approximately 2028). The ICP Environmental Surveillance Program recommended discontinuing biota sampling.

4.7 Agricultural Products

The INL Site is located in a large agricultural area that produces products that are economically important to the state of Idaho. These food products are monitored because they are a direct route of human exposure through ingestion. Milk, meat, and produce may become contaminated via atmospheric deposition, irrigation using contaminated water, and livestock ingesting contaminated water or feed.

Figure 4-8 shows the locations where agricultural products are monitored. The INL contractor performs most of the agricultural monitoring in the vicinity of the INL Site. The agricultural products monitored are chosen because they are commonly consumed and are readily available for radionuclide analysis. The INL procedures for milk, lettuce, wheat, potatoes, and alfalfa sampling provide details for the collection and processing of agricultural products.

4.7.1 Milk

Milk is monitored at offsite locations because it is a potential pathway to the public for radioactive materials from INL Site activities, particularly radioiodine and ^{90}Sr. Some samples are taken from single-family dairies; others are taken from commercial dairies. Dairies in Rigby and Terreton are sampled weekly; the rest are sampled monthly.

4.7.2 Lettuce

Lettuce from portable lettuce growers and local gardeners is collected at selected locations annually to measure the uptake of radionuclides from soil and deposition from air and because they are a part of the typical diet. Lettuce is a broadleaf crop, which is known to be a good interceptor of radionuclides in airborne particulates. Samples are analyzed for gamma-emitting radionuclides and ^{90}Sr.

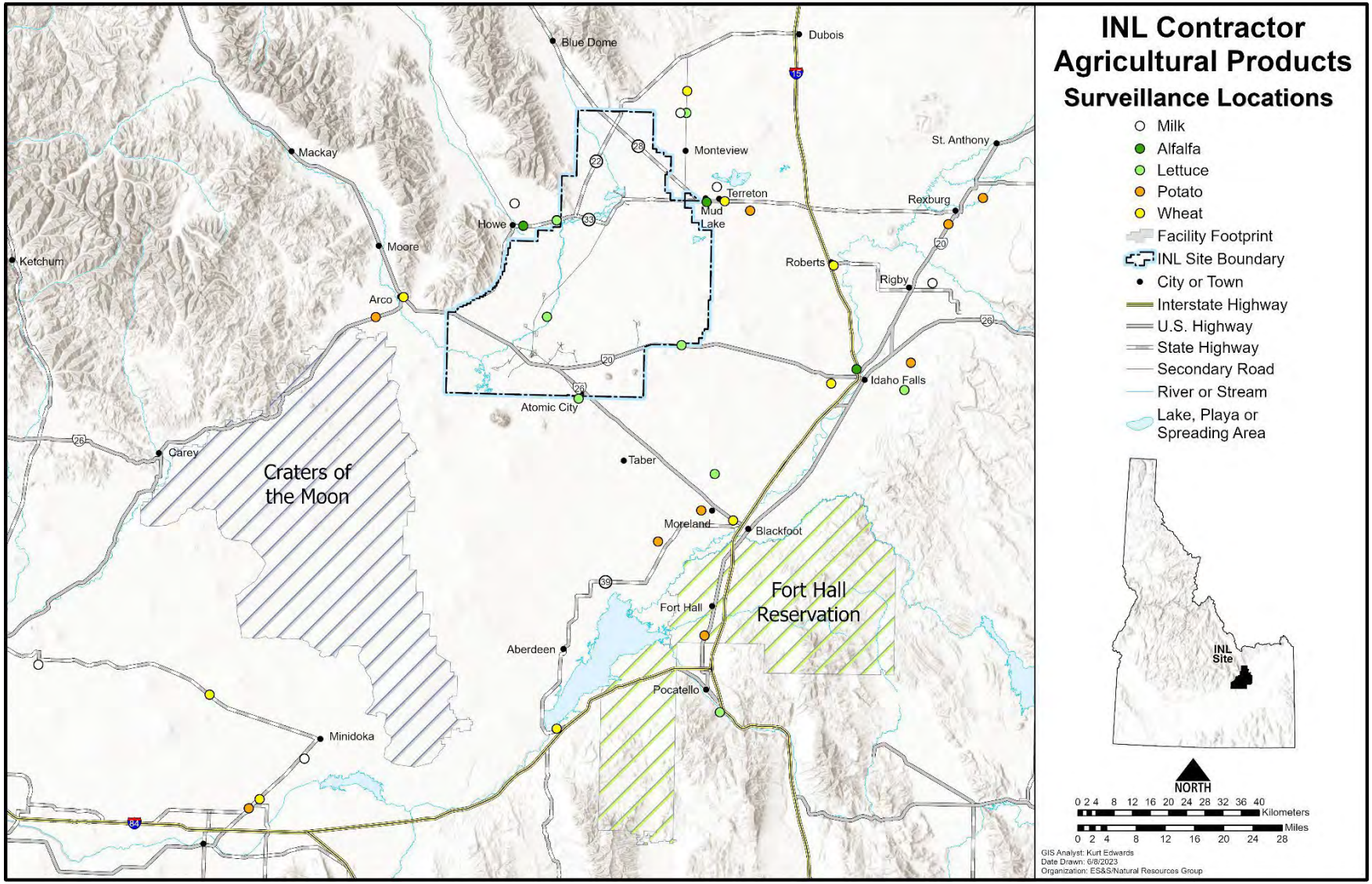

Figure 4-8. INL contractor agricultural products monitoring locations.

4.7.1 Potatoes

Although potatoes were not generally considered to be as good an indicator of radionuclide uptake as leafy vegetables, routine potato sampling was resumed in 1994 due to public interest in Idaho's most famous product. Potato samples are obtained annually from warehouses in the vicinity of the Site during harvest. Potatoes are also obtained from out-of-state areas to serve as control samples. Samples are analyzed for gamma-emitting radionuclides and ^{90}Sr.

4.7.2 Wheat

Wheat is sampled because it potentially represents a major part of the typical diet. Wheat samples are collected and processed from several areas in southeastern Idaho. These samples are collected annually during harvest time at local grain elevators. Samples are analyzed for gamma-emitting radionuclides and ^{90}Sr.

4.7.3 Alfalfa

Alfalfa is collected from select locations near the Site because it is commonly included in the diet of dairy cows and could serve as a potential pathway for radionuclide uptake. Samples are collected from Mud Lake/Terreton, Howe, and Idaho Falls. Samples are analyzed for gamma-emitting radionuclides and ^{90}Sr.

4.8 External Radiation

External (or penetrating) radiation is measured using radiation dosimeters, pressurized ion chambers, and gamma radiation detectors at facilities, roadways, and surrounding communities. Sources of external radiation include natural radioactivity, cosmic radiation, fallout from nuclear weapons testing, radioactivity from fossil fuel burning, and radioactive effluents from INL Site operations. The contribution of INL Site operations to background radiation exposure is determined by comparing exposures measured at the Site boundary locations to those at distant locations.

Radiation monitoring is performed at the INL Site to:

- Characterize penetrating radiation levels at specific points of interest at waste management facilities and at the perimeter of Site facilities.
- Detect and report significant trends in measured levels of penetrating radiation.

To meet these objectives, INL Site contractors measure gamma radiation exposure rates and cumulative exposures and perform gamma radiation surveys both on- and offsite.

Environmental dosimeters are used to measure cumulative exposures to ambient penetrating radiation for monitoring locations. The dosimeters measure changes in ambient exposures possibly attributed to handling, processing, transporting, or disposing of radioactive waste. The dosimeters are located along major highways, in surrounding communities, and around the perimeter fences of each major facility. The dosimeters are placed 0.9 m (3 ft) above ground and are collected and analyzed in May and November of each year to determine background exposures resulting from natural terrestrial sources, cosmic radiation, and fallout from testing nuclear weapons.

Environmental dosimeters located at the INL Site boundary, as well as offsite, are used to assess the actual external radiation dose to an individual living at the INL Site boundary and to members of the public living beyond the INL Site boundary, within 50 miles of any Site facility.

A global positioning radiometric scanner system is used to conduct gamma radiation surveys. These surveys measure gross gamma radiation and are used to identify general areas of radioactivity. Gamma radiation surveys are used to screen soils that have become contaminated with gamma-emitting nuclides and to detect penetrating radiation exposures outside the fenced areas from a variety of possible sources inside the facility.

The global positioning radiometric scanner is mounted on a four-wheel drive vehicle. Annual gamma radiation surveys are conducted around the perimeter of selected facilities on an annual schedule to document penetrating radiation fields. Two plastic scintillation detectors identify contaminated areas, and both the global positioning system and radiometric data are recorded. Because these surveys involve facility perimeters, these monitoring locations are not displayed on either of the external radiation figures.

4.8.1 INL Contractor

External radiation monitoring is performed by the INL contractor as described in "Planning and Management of Environmental Support and Services Monitoring Services Activities" (PLN-8510). Optically stimulated luminescent dosimeters (OSLDs) are maintained at locations on the Site along major highways, around the perimeter fences of each major facility, and at offsite locations, as indicated in Figure 4-9. An OSLD is placed at each location approximately one meter above the ground surface. The dosimeters are changed semiannually, normally in May and November. OSLD technology involves the absorption of ionizing radiation energy by trapping electrons that are excited to a higher energy band. The trapped electrons in the OSLD are released by exposure to green light from a laser. OSLD technology offers a nondestructive reading of the OSLD allowing for multiple readings of the dosimeter. Results read by the instrument are in units of mrem, ambient dose.

Comparing exposures measured at the distant and boundary locations with those onsite assists in interpreting impacts made by INL.

4.8.2 ICP Contractor

External radiation monitoring is performed by the ICP contractor as described in associated procedures. Annual surveys are conducted per DOE Order 435.1, which provide compliance requirements for detecting gross gamma radiation at the RWMC-ARP and around the ICDF.

4.8.3 NOAA

The NOAA ARLSORD is primarily responsible for meteorological monitoring at the Site (see Section 5). In the past, ARLSORD maintained its own external radiation sensors at towers in the meteorological monitoring network, but these have been deactivated.

4.9 Ecological Monitoring

The NRG conducts an array of ecological monitoring activities on the Site to provide ecological and natural resources support for land management issues and to supply ecological information and expertise to support activities that affect natural resources. These activities include wildlife and vegetation surveys, revegetation planning and assessments, weed management support, assessing potential impacts to ecological resources, and facilitating ecological research on the Idaho National Environmental Research Park.

Specific ecological monitoring work at the INL Site involves collecting data related to the abundance and distribution of certain species or groups of species. Results provide information on ecological conditions and trends that are used to:

- Provide assessments of the condition and trend of INL Site ecological resources

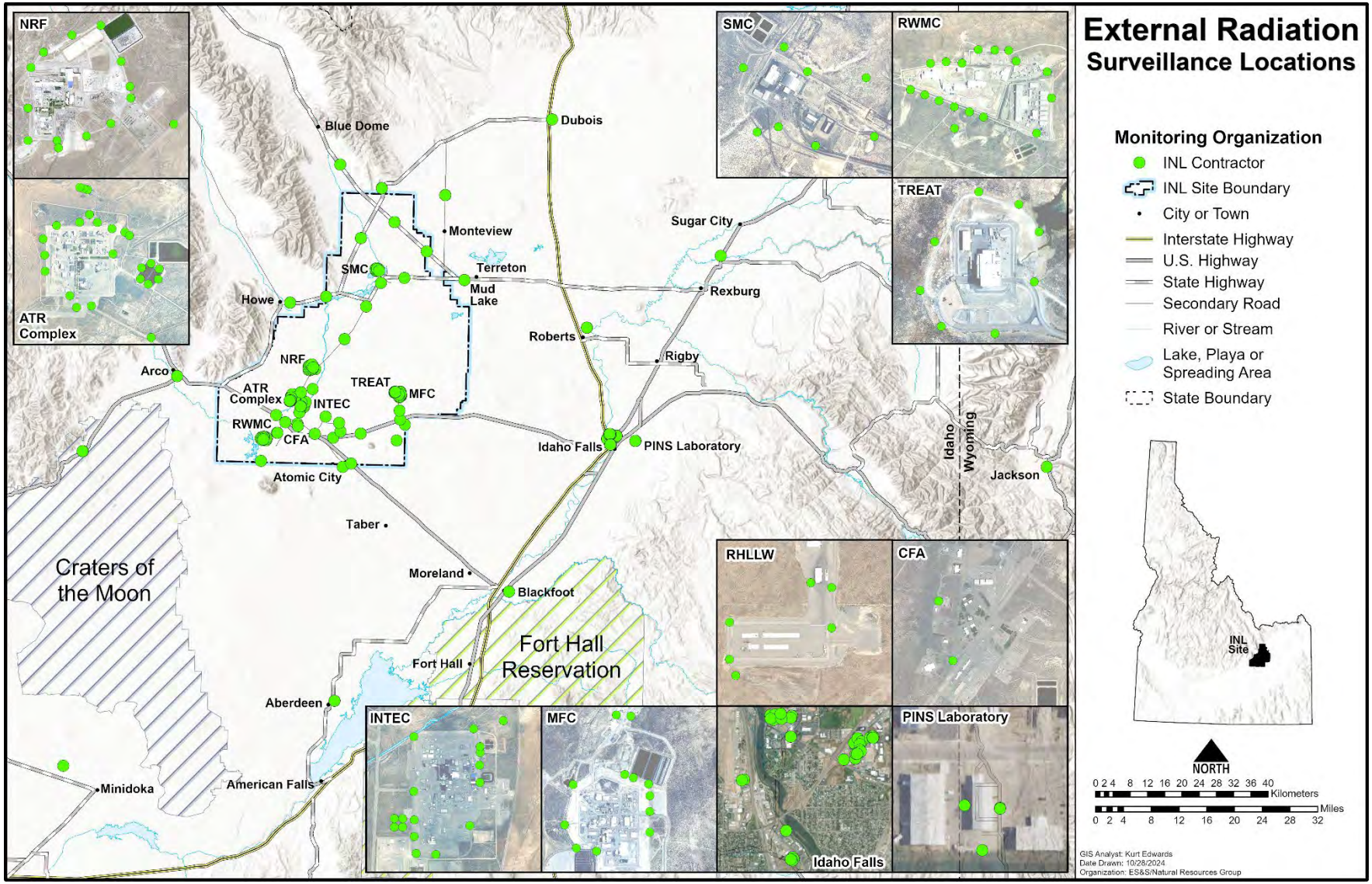

Figure 4-9. External radiation monitoring locations.

- Assess compliance with federal and state regulations and agreements
- Provide assessments of the likely impacts to ecological resources from human-caused or natural disturbances
- Propose mitigation for minimizing adverse impacts to ecological resources from INL Site activities
- Support long-term stewardship goals for conserving ecological resources
- Provide baseline data to support ecological research opportunities at the Idaho National Environmental Research Park.

Ecological monitoring data are summarized in various technical reports which are available on the NRG website at https://inl.gov/. Results of data summary and analysis are reported to DOE-ID and various state and federal natural resource and agricultural agencies with whom DOE-ID collaborates.

4.9.1 Native Vegetation and Invasive Plants

Long-term vegetation transect plots were established in 1950 to monitor the potential effects of activities at the National Reactor Testing Station, the land that would later become the INL Site, on ecological resources. Although local biota was not affected by early nuclear energy research, the long-term vegetation transect plots have continued to be sampled for vegetation abundance and now provide one of the most significant data sets for understanding vegetation dynamics in sagebrush steppe. These plots are among the most intensive and scientifically rigorous efforts by any agency to document long-term changes in sagebrush steppe. Initially, 100 permanent plots were established on two intersecting transects, as observed in Figure 4-10. Eighty-nine plots remain and they are surveyed at approximately five-year intervals, with the most recent survey effort completed in 2022. Results of summary and trend analyses are included in a technical report that is drafted after each survey effort has been completed. Data collected at each plot include cover by species using line intercept and point interception frames and density and frequency.

Beginning in 2013, vegetation data were collected to characterize habitat quality for greater sage-grouse (*Centrocercus urophasianus*). A total of 225 plots are monitored—75 annually—and each of the remaining 150 are on a five-year rotation (INL/RPT–23-70807). Data from these plots provide information about the condition of current sagebrush habitat, as well as habitat that is recovering from wildland fire, in addition to trends in the abundance of functional groups that influence habitat condition. These data are also used to evaluate how threats, like livestock grazing and wildland fire, are affecting habitat condition across the INL Site. Results are reported in the “Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site” (INL/RPT-23-70807) report each year. This project is currently the only vegetation data set collected annually for the INL Site. The monitoring effort features an inclusive design so that the data can be used to address a range of issues related to the abundance and distribution of native and non-native plants, in addition to the characterization of sagebrush habitat condition. Data collected at each plot include a suite of qualitative variables like presence of sage-grouse sign and disturbance and several quantitative variables including cover by species, height by species, sagebrush density and juvenile frequency, and a complete species list.

In 2011, a comprehensive vegetation map of the INL Site was completed using a standardized approach that is commonly accepted across several federal land management agencies. This mapping methodology utilizes the National Vegetation Classification System and involves three steps. The first step involves the collection of plot-level vegetation abundance data and classifying those data into vegetation, or map classes, using multivariate statistical techniques. The second step includes acquisition of aerial imagery and delineating vegetation class polygons using photo interpretation. The third and final step of the

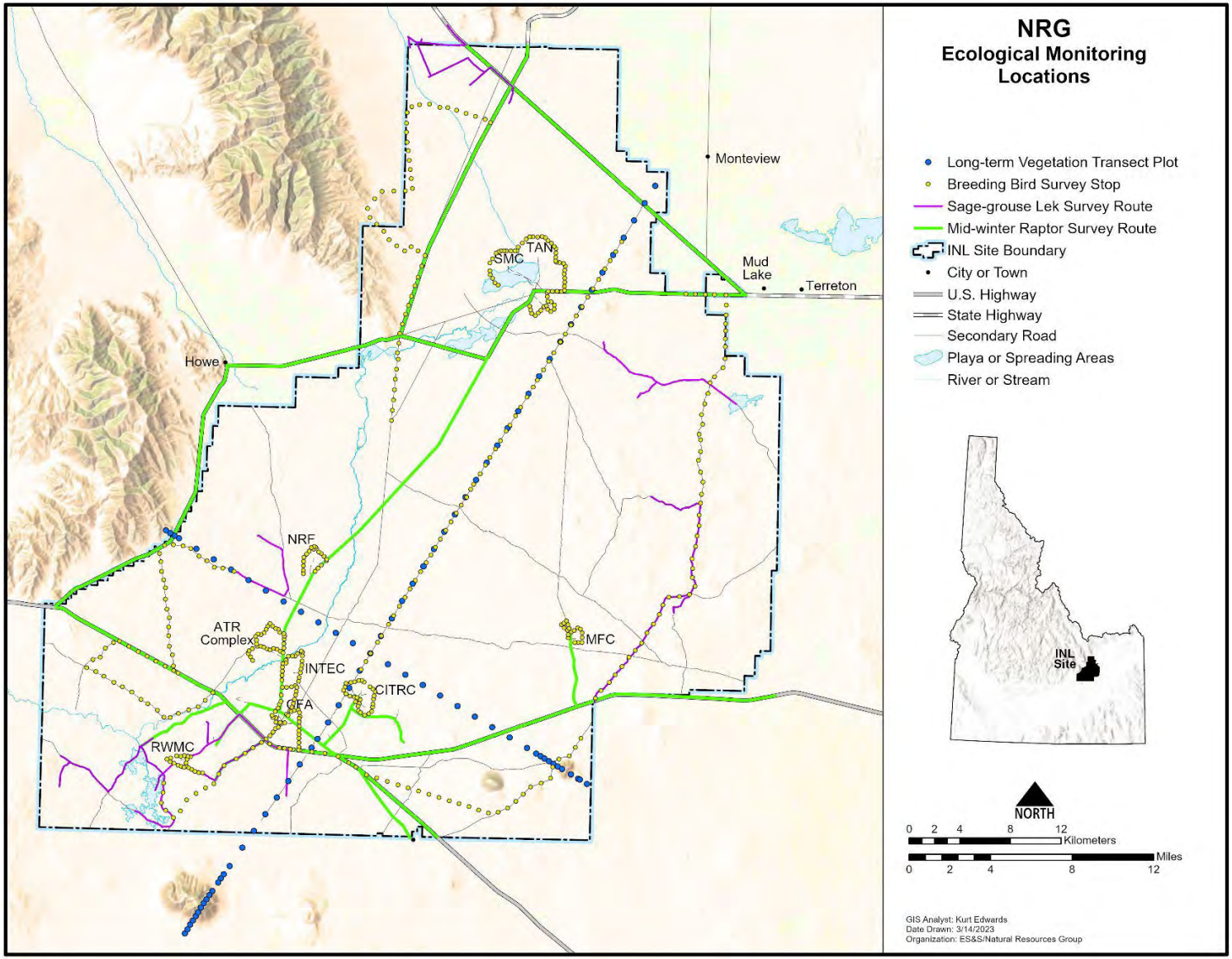

Figure 4-10. Select NRG program ecological monitoring locations.

process involves collecting independent field data to verify the accuracy of the final map. This is an important step for informing map users about the strengths and potential limitations of the map. The INL Site vegetation map has become one of the most important ecological data sets for the INL Site. It is used extensively to support National Environmental Policy Act compliance, habitat assessment, and post-fire restoration planning. The vegetation map is updated approximately every five, depending on image availability; a comprehensive update was completed in 2019 (VFS-ID-ESER-LAND-064) and an update limited to re-delineating polygons in areas that have burned since the last update will be initiated in 2023. A current INL Site vegetation map is presented in a technical report that is drafted after each mapping update is completed.

To improve sagebrush habitat in burned areas, sagebrush (*Artemisia tridentata*) seedlings are planted in high-priority restoration areas every year. Seedling plantings are funded through post-fire recovery plans, compensatory mitigation requirements associated with infrastructure development, or partnerships with land management agencies to address older wildland fire footprints where recovery is slow. The locations of a subset of seedlings are marked at the time of planting and these seedlings are monitored for survivorship at 1- and 5-year post-planting intervals. Results are reported in the "Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site" (INL/RPT-23-70807) report each year. Survivorship monitoring provides valuable information about the potential trajectory of habitat recovery in a planted area and survivorship estimates can be used to improve the success of future plantings.

Revegetated sites are also monitored at one- and five-year intervals, or as appropriate based on local site conditions. The NRG has been tasked with developing a document outlining revegetation performance measures and the revegetation assessment process for evaluating progress toward meeting those performance measures. The assessment process will entail two steps. The first is a semi-qualitative approach using species ranks and cover categories to rapidly assess the initial outcome of revegetation efforts with respect to the presence and distribution of native perennial species. The second step is a quantitative approach using point interception techniques to assess the ground cover of the revegetated area in comparison to the background vegetative cover of the surrounding plant community. The purpose of the first step is to ensure that the condition of the revegetated area is sufficient to progress toward a desired final state without additional intervention, while the purpose of the second step is to identify when the revegetated area has reached 70% of background cover for native perennial species and can be removed from further consideration for additional action. Initial testing of the sampling approach began in 2022, and the process used to assess revegetated areas for progress toward a desired final condition will be completed in 2023. Assessment results are reported directly to DOE-ID and are summarized in the ASER.

The NRG and the Facilities and Site Services (F&SS) noxious weeds crew collaborate to identify and monitor noxious weed abundance and distribution across the INL Site. Noxious weed identification and monitoring includes estimating weed population sizes and mapping their locations. Systematic and targeted surveys are conducted by F&SS every growing season to identify any new populations.

Incidental locations of noxious weeds are also mapped by NRG field crews and locations are shared with F&SS on a regular basis so that they may be included on the treatment schedule. Each growing season, a subset of weed populations that have been treated previously are revisited to evaluate the efficacy of treatment and to schedule a revisit if necessary. Results of noxious weed monitoring and treatment results are reported directly to DOE-ID and are summarized in the ASER.

Finally, vegetation monitoring often occurs for a few years after a fire in areas that have burned. Monitoring efforts in those areas are specifically tailored to the natural resource concerns and recovery goals for the location. Monitoring may be conducted to determine whether natural recovery is sufficient or whether active recovery treatment may be required, and monitoring may be conducted on areas where treatments have been conducted to evaluate the effectiveness of those treatments. Noxious weed distribution, cheatgrass (*Bromus tectorum*) abundance, and sagebrush reestablishment are some of the vegetation metrics most often monitored after a wildland fire on the INL Site. Post-fire monitoring recommendations are made in wildland

fire-specific ecological resource recovery plans and results are reported to the Wildland Fire Management Committee in fire-specific technical reports, as appropriate.

4.9.2 Mammals

Surface lava features on the INL Site present a diversity of rocky habitats, including an abundance of lava tube caves, which are used year-round by resident and transient bat species. The regional importance of the INL Site for bats has long been recognized, and as a result, researchers have investigated bat populations at the INL Site since the 1970s. Some of the largest known hibernation sites for several bat species are found on the INL Site.

White-nose syndrome (WNS) is a disease caused by a cold-adapted fungus (*Pseudogymnoascus destructans*). Since its discovery in 2006, WNS has rapidly spread to bat populations in most large hibernation sites in the eastern half of the U.S. and Canada. The U.S. Fish and Wildlife Service (USFWS) estimates that WNS has killed between 5.5 and 6.7 million bats of 12 species. In the fall of 2021, the fungus that causes WNS was discovered in Minnetonka Cave; however, no bats have been found infected with WNS in Idaho. There are several species of bats on the INL Site that could be affected by WNS. One of these species, little brown myotis (*Myotis lucifugus*) is undergoing a status review for listing under the Endangered Species Act. Four additional species that occur on the INL Site could be affected by WNS, the western small-footed myotis (*Myotis ciliolabrum*), big brown bat (*Eptesicus fuscus*), Yuma bat (*Myotis yumanensis*), and western long-eared myotis (*Myotis evotis*).

The emergence of threats such as WNS and commercial wind energy development has led to significant declines in bat populations and increased conservation concerns in the U.S. Due to these threats and the potential for impacts to INL Site development and operations, DOE-ID and the Naval Reactors Laboratory Field Office/Idaho Branch Office directed the ESER Program to develop a pilot investigation of INL Site-wide bat monitoring. In 2018, the bat monitoring program on the INL Site was developed in collaboration with the USFWS and Idaho Department of Fish and Game. Bat monitoring supports the analysis of baseline conditions, including spatial and temporal distribution and diversity of bat species at the INL Site, as well as allowing to track trends. Initial work led to the development of an INL Site Bat Protection Plan, which is intended to support planning and reduce impacts to the INL mission in the case of a bat being listed under the Endangered Species Act, as well as potential impacts to bats from INL activities. Additionally, the INL Bat Protection Plan directs a program of bat conservation based on acoustic monitoring at long-term monitoring stations, biennial hibernaculum surveys, and surveillance for the appearance of WNS in INL Site bat populations.

The INL Site provides summer range, winter range, calving or fawning areas, and migration corridors for a variety of big game species. DOE-ID has collected decades of baseline data on big game populations and movements on the INL Site and has collaborated with its regional agency partners on larger scale efforts. Until 2011, large mammal surveys were conducted in January and July of each year to estimate abundance and distribution of elk, deer, and pronghorn. The surveys were done from the air on a representative sample of transects. Data were collected in a manner that is comparable with those collected by neighboring agencies (i.e., Idaho Department of Fish and Game, Bureau of Land Management, and the U.S. Forest Service). From 2010 through 2012, the scope of the big game surveys was changed from conducting flights across the INL Site to placing global positioning system collars on elk. At the time, this study provided defensible and reliable data for National Environmental Policy Act documents and enabled a more complete and reliable assessment of impacts from infrastructure development, roadway accidents, and wildfires. This study provided information on migratory corridors, agricultural area access, contaminant area access, and the evaluation of potential radionuclide contamination of human receptors off the INL Site. The NRG continues to provide collaborative support to DOE-ID's agency partners as needed.

4.9.3 Birds

In October 2014, DOE-ID and the USFWS entered into a Candidate Conservation Agreement (CCA) for greater sage-grouse (*Centrocercus urophasianus*). The CCA provides a framework for monitoring greater sage-grouse and their habitat on the INL Site and tracking potential effects of INL Site operations on greater sage-grouse populations and habitat. The CCA is implemented through a series of delineated tasks and annual reporting to USFWS. Greater sage-grouse populations on the INL Site are monitored annually by surveying their use of leks.

Greater sage-grouse leks on the INL Site are monitored weekly as either an individual lek (VFS-ID-ESER-LAND-064) or as a part of a lek route (see Figure 4-10) for a minimum of 4 weeks, beginning in March. The surveys are conducted by visiting those leks at dawn and counting the number of individual birds. The methods used along lek routes provide comparable data to those collected by neighboring agencies and the data collected are shared with them. As directed by the CCA, additional lek surveys are conducted in the spring to identify all active leks on the INL Site.

Ravens have been reported to be a threat to greater sage-grouse eggs and chicks. Beginning in 2012 through 2021, raven nests built on INL infrastructure have been inventoried and monitored from April 1 to May 31. These include buildings, power poles, chimneys, stacks, and other vertical structures. Monitoring of raven nest occurrences was used to develop nesting hotspots to identify areas where nesting deterrents may benefit nesting sage-grouse the most.

Midwinter eagle surveys were initiated during 1979 by the USGS to develop a population index of wintering bald eagles in the lower 48 states, determine bald eagle distribution, and identify previously unrecognized areas of important wintering habitat. In 1983, two USGS midwinter eagle survey routes were established on the INL Site that encompass the northern and southern portions of the INL Site (see Figure 4-10). Initially, the counts focused on eagle populations; however, biologists recognized the importance of collecting data on raptor abundances during this survey and started recording all raptors—including owls, hawks, and falcons in 1985. In 1992, the list of recorded species expanded to include corvids and shrikes. Raptor populations tend to fluctuate with slight changes in the environment, such as prey availability and weather conditions. Therefore, they are often used as environmental indicators to determine the effects of human development on the environment and the general health of the ecosystem.

The Breeding Bird Survey (BBS) is a large-scale survey of North American birds administered by the USGS. It is a roadside route survey of avifauna designed to monitor the abundance and distribution of birds primarily covering the continental U.S. and southern Canada. These surveys yield useful information about population dynamics, the effects of weather and fire on avian abundance, the effects of INL Site operations on avifauna, and the breeding status of several bird species of concern, including sagebrush obligate species and other species exhibiting declines throughout their range. Thirteen BBS routes are surveyed on the INL Site (see Figure 4-10). Five remote routes are standard 40 km (25 mi) BBS routes consisting of 50 stop locations at approximately 0.5 mi (0.8 km) intervals. These routes traverse the remote areas of the INL Site and include major habitat types throughout the Site. Eight facility routes consisting of 18–60 stop locations at approximately 0.2 mi (0.32 km) intervals are in and around major Site facility complexes. The data collected are comparable to those collected by other neighboring agencies and the data collected on the five remote routes are reported to USGS annually.

5. METEOROLOGICAL MONITORING

The meteorological monitoring program supports laboratory-wide environmental monitoring activities, as well as emergency response. Short- and long-term weather conditions have a substantial effect on the INL Site environment, particularly with respect to the movement of contaminants in air and the groundwater system. Meteorological monitoring is performed to record weather conditions, such as wind speed and direction, temperature, and precipitation, so that this information may be used with predictive models to estimate the concentration of contaminants after they have been released to the environment. Meteorological monitoring results are also used to plan environmental measurement programs or for modeling required for compliance with air quality regulations. For example, the Site contractors perform modeling to show compliance with ambient air quality regulations and to comply with requirements to estimate offsite dose (see Section 9 for a discussion of dose assessment modeling). Figure 5-1 shows the meteorological monitoring locations.

Results of past work related to the tower network are summarized in the "Climatography of the Idaho National Laboratory 4th Edition" (Clawson, K. L. et al. 2018) and DOE-ID-12119 (DOE-ID 1991).

5.1 NOAA

Meteorological services and supporting research are provided to the INL Site by the NOAA ARLSORD, which provides real-time meteorological data, climatological data, weather predictions, and dispersion calculations for routine operations and emergency response.

ARLSORD operates a MESONET (MESOscale meteorological monitoring NETwork) that covers an area of approximately 3,885,000 hectares (15,000 mi2) to characterize the meteorology and climatology of the INL Site. The NOAA INL MESONET consists of 34 meteorological towers both on and around the Site. Most of the towers are 15 m (50 ft) tall and take wind speeds and direction measurements at 15 m (50 ft), temperatures at 2 m and 15 m (6 and 50 ft), and relative humidity at 2 m (6 ft) above ground level. Three taller towers range from 46 m to 76 m (150 ft to 250 ft) high and are instrumented at multiple levels. Many towers have additional sensors for precipitation, solar radiation, and barometric pressure. All of the tower measurements are averaged over 5-minute periods and transmitted to ARLSORD in near real-time via radio-frequency communication.

In addition to the meteorological towers, ARLSORD operates a mini-sonic detection and ranging (Sodar) system at a Site just north of INTEC. This system is capable of providing high-resolution wind and turbulence measurements up to 200 m (650 ft) above the ground, which is the layer of the atmosphere where the greatest change in wind speed and direction occur.

ARLSORD has also developed a program called INL Viz to display meteorological data in near real-time from the NOAA INL MESONET. INL Viz is publicly available on the Internet at https://www.noaa.inl.gov/viz. In addition, ARLSORD maintains the NOAA INL Weather Center at https://niwc.noaa.inl.gov that provides a range of meteorological information relevant to the INL Site.

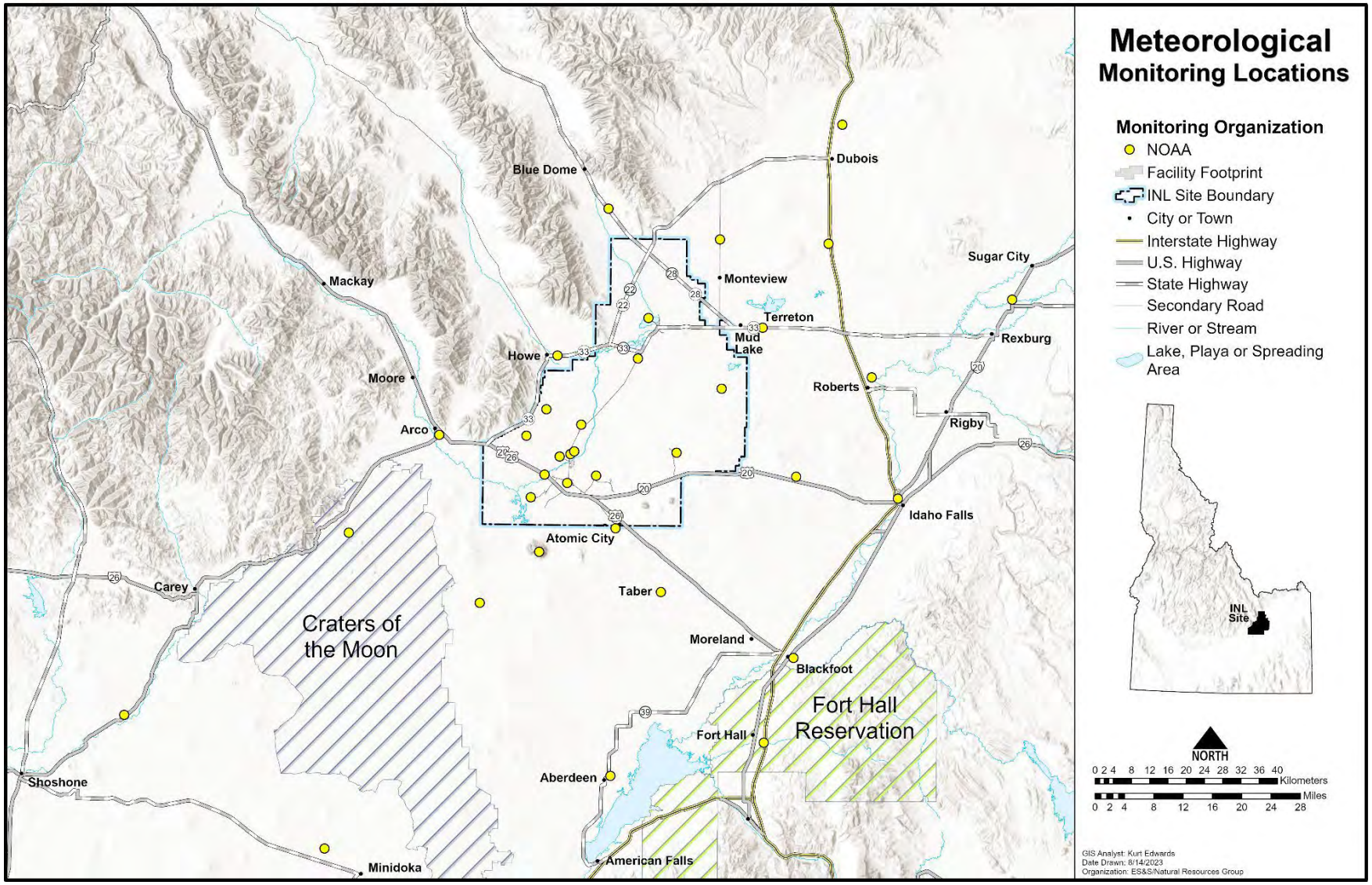

Figure 5-1. Meteorological monitoring locations.

6. ENVIRONMENTAL EVENT MONITORING

Environmental event monitoring is an essential part of safe operations because of the potential impacts the release of radioactive or regulated materials from Site facilities, either from unplanned accidental operational events or natural events, could have on the environment and the public. Environmental events at the Site can be widespread (e.g., a wildland fire spread by high winds) or facility-specific (e.g., a chemical spill limited to a small area immediately around the spill). Data from event-specific monitoring are used to evaluate the potential impact of an event to personnel, the environment, and the public.

Responses to environmental events vary depending on the severity of the event and are conducted by the responsible contractor. The INL contractor responds to all events. Figure 6-1 shows the locations of samplers specifically intended for use during an environmental event. Locations of portable or routine samplers are not shown.

6.1 Response to an Emergency or Unplanned Release

The INL Site has an extensive program to identify chemical and radioactive hazards, evaluate associated risks, prevent accidental releases, and respond appropriately in the event of a release. This comprehensive INL Site Emergency Preparedness Program is addressed in the "INL Emergency Plan/RCRA Contingency Plan" (INL 2019b) which is used by the Emergency Response Organization and other trained personnel in the event of an emergency and provides the overall process for responding to and mitigating consequences of emergencies that might arise at the Site. Emergency plans for the INL Site consolidate all emergency planning requirements for federal, state, and local agencies. Mutual aid agreements are in place between the INL and state and local agencies to respond to emergencies. One such agreement allows local fire departments to respond to fires on the Site and allows the INL fire department to respond to fires offsite.

In the event of an emergency or unplanned release, anthropogenic or natural radioactivity can be released into the air. These releases could result from direct atmospheric release from a facility, or by redistribution by fire or winds of anthropogenic or natural radioactivity contained in soil and vegetation. During such events, the INL contractor collects field data and reports the results to the Emergency Response Organization. Data collected include readings of penetrating radiation levels, airborne and surface contamination levels, and radiation surveys outside of facility fences. Three types of air samples can be taken during environmental events that are declared operational emergencies, or which involve soil contamination areas:

- Immediate short-term 'grab' samples
- Stationary 24-hour samples at strategic locations specific to the event
- Routine environmental samples taken at standard locations (continuous monitoring).

The plan also includes spill prevention and response requirements for each facility. Spills and releases are reported to the Spill Notification Team, which determines if the spill or release is reportable and assists operations in making appropriate release notifications. The INL contractor follows a procedure that applies to unplanned laboratory releases and follows appropriate steps to comply with regulatory requirements based on the spilled material and quantity.

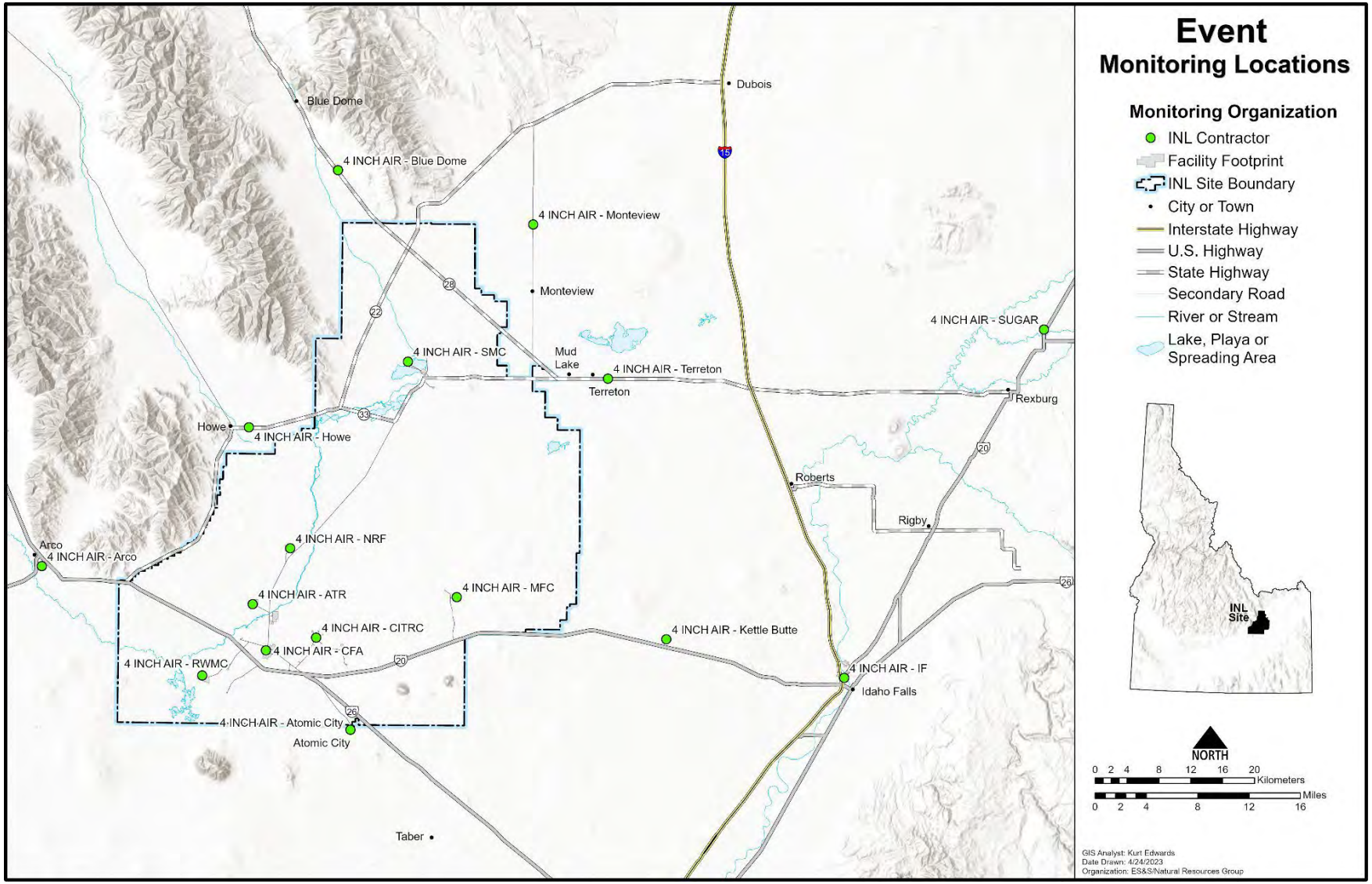

Figure 6-1. Event monitoring locations.

6.1.1 INL Contractor

High-volume air samplers owned and maintained by Environmental Support and Services are located at 16 of the ARLSORD towers operated by NOAA. As shown in Figure 6-1, these samplers are intended for use in the event of a radiological accident at the Site and are not used for routine environmental monitoring. Event air monitoring locations are checked at least weekly to verify the functionality of the equipment. Samplers can be turned on and off remotely upon request from personnel by an operator stationed at ARLSORD or in the Emergency Operations Center.

Short-term grab samples can be taken in the field by the Environmental Support and Services Monitoring Services organization to provide gross radiation levels for early indication of event conditions. The grab samples are taken using portable high-volume air monitors to assess exposure potential, verify the effectiveness of onsite protective actions, and determine the need for offsite protective actions. The high-volume air monitor locations are selected by the Emergency Operations Center based on wind direction and conditions specific to the event. High-volume air monitors are capable of drawing large quantities of air through a particulate filter over a short period of time (approximately 15 minutes). Monitors are used to detect gross alpha- and beta-emitting radionuclides. Screening results of short-term samples are generally available within 1–2 hours after samples are collected.

The INL contractor maintains a monitoring network of low-volume air samplers that take continuous air samples at fixed locations. Results from these routine environmental samples are used to supplement other event-specific measurements to determine and document the nature and quantity of any radioactive material detected in ambient air on and around the INL Site.

6.1.2 ICP Contractor

The ICP Spill Notification Team is responsible for release notifications in accordance with federal and state regulations, DOE orders, executive orders, and company requirements. The ICP Spill Notification Team provides 24/7-coverage. The team documents all spills at ICP facilities, determines whether releases are reportable, documents required information, determines thresholds, and makes release notifications within the prescribed timeframes.

RWMC-AMWTP has installed ANSI N13.1-1999)-compliant monitors with alarms on two stacks at the RWMC-AMWTP. If the stack monitors initiate an alarm, RWMC-AMWTP will respond using a graded approach to minimize the release by switching filter banks and/or shutting down the processes. Real-time monitors with alarm capability are also in use at the continuously monitored INTEC stacks at FAST and IWTU.

6.2 Response to an Exceedance

Each INL contractor maintains its own plans or procedures to ensure that appropriate, timely notifications to appropriate authorities occur and that corrective actions are taken in the event that monitoring results exceed a regulatory limit or, in some cases, a preset trigger level. Specific actions—to be taken when validated monitoring results are above certain trigger levels—are identified in the applicable permits and regulations (e.g., RCRA, Reuse Permits, Safe Drinking Water Act [Public Law 104-182]). These actions include reporting any exceedances to the appropriate federal, state, or local agencies, along with initiating appropriate corrective actions in a timely manner. The types of corrective actions could vary depending on the specific regulation and could include follow-up analysis or confirmation sampling, removing a potable water well from service, or remedial action.

For reportable occurrences, specific actions to be taken are identified in DOE Order 231.1B, " Environment, Safety and Health Reporting," which establishes reporting requirements and categorizes releases of radionuclide and hazardous substances or regulated pollutants. Taking the following general steps when responding to an environmental data exceedance will ensure that coordinated actions are taken and INL Site stakeholders are notified in a timely manner:

1. Discover, confirm, and make initial notification.
2. Categorize environmental data exceedance.
3. Determine and initiate appropriate response.
4. Complete necessary reporting and notification.

7. REPORTS

General reporting requirements for effluent and environmental monitoring activities at the INL Site are outlined in DOE Order 231.1B and DOE Order 458.1. These orders specify the reporting responsibilities, timing, and distribution of several routine environmental reports. The requirements for preparing and distributing accident-related or unusual occurrence reports are provided in DOE Order 231.1B. The following are the principal objectives of DOE's reporting system, as stated in DOE-HDBK-1216-2015 (DOE 2015):

- Alert DOE management to occurrences for the purpose of investigating and evaluating causes and identify appropriate measures to prevent recurrences
- Obtain early, complete, and factual information on occurrences as a basis for reports to the Secretary of Energy, Congress, other federal agencies, and the public, as appropriate
- Identify trends in areas of concern for DOE and contractor operations
- Provide a basis for improving codes, guides, and standards used in the DOE and contractor operations
- Monitor, evaluate, and report onsite discharges, liquid and airborne effluents, and environmental conditions in the vicinity of DOE sites to assess the levels of radioactive pollutants and their impact on the public and the environment
- Comply with regulations and DOE orders.

Compliance monitoring data driven by specific permits or regulatory requirements are reported to federal, state, and local agencies in formats and frequencies specified by the respective regulatory document. Table 7-1 lists effluent and environmental monitoring reports at the INL Site.

Table 7-1. Effluent monitoring and environmental monitoring reports at the INL Site.

Report Title	Frequency	Summary Description
Annual Site Environmental Report	Annual	Prepared by the INL contractor. Summarizes DOE, USGS, and contractor data from environmental monitoring activities and data from monitoring programs. Includes a yearly environmental compliance summary for the INL Site.
INL Site Environmental Surveillance Program Reports	Quarterly	Prepared by the INL contractor. Reports the results of on- and offsite monitoring under the INL contractor, including air, agricultural, external radiation, soil, water, and wildlife sampling.
ICP Environmental Surveillance Program Reports	Quarterly	Prepared by the ICP contractor. Reports the results of environmental monitoring performed in compliance with DOE Orders 435.1 and 458.1, and ambient air monitoring performed for compliance with radiological NESHAP.
Injection Well Monitoring Reports	As Required	Prepared by the INL Site contractors. Provides the analytical results from monitoring of storm water runoff discharged to injection wells.
Semiannual Report for the Hazardous Waste Management Area/RCRA Post-closure Permit for the Waste Calcining Facility at INTEC	Semiannual	Prepared by the ICP contractor. Summarizes the analytical results from Hazardous Waste Management Area/RCRA groundwater monitoring conducted for the Waste Calcining Facility Post-closure Permit.
USGS Scientific Investigations Reports	Every Three Years	Prepared by the USGS. Summarizes USGS data, describes hydrologic conditions and distribution of selected constituents in groundwater and surface water in and around the INL Site.
Reuse Site Performance Reports for the INL Site	Annual	Prepared by the INL Site contractors. Reports required information for each permitted reuse facility to include: (a) all permit monitoring data; (b) the status of any permit special compliance conditions; and (c) interpretive discussions of monitoring data with respect to environmental impacts by the facility.
Monthly and Semiannual Liquid Effluent Reports to the city of Idaho Falls	Monthly and Semiannually	Prepared by the INL contractor. Provides monthly pH logs and semiannual monitoring reports from the IRC effluent to the city of Idaho Falls sewer system.
Storm Water Discharge Monitoring Report	As Required	Prepared by the INL Site contractors. Reports the storm characteristic information and all analytical results from National Pollutant Discharge Elimination System permit monitoring.
CERCLA 5-Year Review Reports	Every Five Years	Prepared by the INL Site contractors. Reports the overall effectiveness of remedial actions covered by a CERCLA ROD.
CERCLA Post-Record of Decision Monitoring Reports	As Specified in the ROD	Prepared by the ICP contractor. Summarizes the data collected in support of remedial actions and long-term monitoring.

7.1 INL Site Contractors Reporting Requirements

The INL Site contractors are responsible for reporting requirements for their respective facilities regarding:

- Source-specific and Site-wide air permits required for compliance with "Clean Air Act Amendments of 1990" (Public Law 94-604) and "Rules for the Control of Air Pollution in Idaho" (IDAPA 58.01.01)
- Permits required for compliance with "Recycled Water Rules" (IDAPA 58.01.17)
- Permits required for compliance with "Rules for the Construction and Use of Injection Wells in the State of Idaho" (IDAPA 37.03.03)
- Laboratory-wide permits and records required under the RCRA: (a) "Toxic Substances Control Act" (Public Law 94-469); (b) "Emergency Planning and Community Right to Know Act" (42 USC 11001); and (c) "Federal Insecticide, Fungicide, and Rodenticide Act" (7 USC 136)
- "Comprehensive Environmental Response, Compensation, and Liability Act" (42 USC 9601)
- "Safe Drinking Water Act Amendments of 1996" (Public Law 104-182).

The INL contractor is also responsible for reporting requirements associated with the following:

- City Order Chapter 1, Section 8, Permits required for compliance with city of Idaho Falls Sewer Ordinance and Municipal Stormwater Discharge Permit
- Other deliverables specified in the respective Contract Data Requirements List.

In addition, the INL contractor prepares the ASER each calendar year with input from the various organizations performing environmental monitoring on and around the INL Site. The ASER is available electronically, summarizes data from effluent monitoring programs and environmental monitoring activities, and includes a yearly environmental compliance summary for the INL Site. The ASER is prepared as required by DOE Order 231.1B.

The INL contractor prepares quarterly reports summarizing monitoring results that are posted on the INL external web page. The ICP contractor prepares quarterly reports summarizing monitoring results that are provided for internal review by DOE-ID.

7.2 USGS Reporting

All data collected by the USGS INL Project Office are publicly available after review. Most data are published in periodic data reports and used in interpretive reports. The ASER contains an appendix that lists the abstracts of USGS publications for the calendar year. The USGS National Water Information System website (USGS 2022) is open to the public. This system permits public electronic access and retrieval of USGS water data, including groundwater and water quality data. The website address is: https://waterdata.usgs.gov/id/nwis/.

7.3 NOAA Reporting

The NOAA ARLSORD, "Quality Program Plan, NOAA Air Resources Laboratory Special Operations and Research Division" (NOAA 2023), addresses the requirements of DOE Order 414.1D Chg. 2, Quality Assurance, and is consistent with "Determining Meteorological Information at Nuclear Facilities," (ANSI/ANS-3.11-2015) and "Quality Assurance Requirements for Nuclear Facility Applications" (ASME-NQA-1). Implementing procedures include regular, independent system and performance audits,

written procedures and checklists, follow-up actions, and continuous automated and visual data checks to ensure representation and accuracy. The plan and implementing procedures provide the framework to ensure that the NOAA INL MESONET meets the elements of DOE-HDBK-1216-2015 (DOE 2015) and DOE Order 458.1.

Meteorological data are transmitted every five minutes from each station in the NOAA INL MESONET via radio to the ARLSORD facility in Idaho Falls. The data receive nearly continuous monitoring and quality control screening. Data are recorded on electronic media and stored in a dedicated, computerized archive, with backup media maintained as recommended by DOE-HDBK-1216-2015 (DOE 2015).

The ARLSORD's data specific to the INL Site are available electronically in near real-time at: https://niwc.noaa.inl.gov. Results of past work are summarized in "Climatography of the Idaho National Laboratory 4th Edition" (Clawson, et al. 2018) and "Idaho National Engineering Laboratory Historical Dose Evaluation" (DOE-ID 1991b).

8. QUALITY ASSURANCE

An effective quality assurance (QA) program is essential to the collection of quality data. This section presents QA procedures and practices used as part of the effluent and environmental monitoring programs. This section does not provide a QA plan for monitoring at the INL Site; rather, it defines QA requirements applicable to environmental programs. Each monitoring organization incorporates the required components into its QA documentation for environmental monitoring.

The primary policy, requirements, and responsibilities for establishing and maintaining plans and actions that ensure QA in DOE activities are provided in DOE Order 414.1D Chg. 2, "Quality Assurance;" 10 CFR 830, Subpart A, "Quality Assurance Requirements;" and American Society of Mechanical Engineers ASME), "Quality Assurance Requirement for Nuclear Facility Applications" (ASME-NQA-1-2008). The ASME-NQA-1-2008 is the preferred standard for activities at nuclear facilities. Additional QA program requirements found in 40 CFR 61, Appendix B, "Method 114," must be met for all radiological air emission sources continuously monitored for compliance with 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides other than Radon from Department of Nuclear Facilities."

The EPA policy on QA plans is based on the national consensus standard "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (ANSI/ASQC E4-1994). The EPA approach to data quality centers on the data quality objective process. Data quality objectives are project-dependent and are determined on the basis of the data users' needs and the purpose for which data are generated. Quality elements applicable to environmental monitoring and decision-making are specifically addressed in "Guidance for Quality Assurance Project Plans" (EPA 2001) and "EPA Requirements for Quality Assurance Project Plans - EPA QA/R-5" (EPA 2002a). These elements are included in the following general categories:

- Project management
- Data generation and acquisition
- Assessment and oversight
- Data validation and usability.

8.1 QA Requirements

The QA procedures are designed using a graded approach to ensure sample integrity, precision, and accuracy in the analytical results, to ensure that the environmental data is representative and complete, and to ensure that the data are reliable and defensible. The following subsections describe how each monitoring organization implements the above QA requirements.

8.1.1 INL Contractor

The INL contractor incorporates relevant requirements from the "Quality Assurance Program Description" (PDD-13000) into the plans and procedures for implementing monitoring programs for non-CERCLA activities. The program's plans address the QA elements, as stated in "EPA Requirements for Quality Assurance Project Plans - EPA QA/R5" (EPA 2001) to ensure that the required standards of data quality are met.

In addition, the INL contractor uses a documented approach for collecting, assessing, and reporting environmental data. Environmental surveillance and compliance monitoring are conducted in accordance with "Planning and Management of Environmental Support and Services Monitoring Services Activities" (PLN-8510), "Data Management Plan for the INL Environmental Support and Services Monitoring

Services Program" (PLN-8515), and "Environmental Support and Services Monitoring Services Surveillance Plan" (PLN-8550) in order to assure that analytical work for environmental and effluent monitoring supports data quality objectives.

8.1.2 ICP Contractor

All CERCLA monitoring activities at the INL Site are conducted in accordance with "Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Removal Actions" (DOE/ID-10587). The Quality Assurance Project Plan was written in accordance with "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Office of Emergency and Remedial Response," (EPA 2002b). RWMC and INTEC facilities maintain a QA program in accordance with 40 CFR 61, Appendix B, as required, for all radiological air emission sources that are continuously monitored for compliance with "National Emission Standards for Emissions of Radionuclides other than Radon from Department of Nuclear Facilities" (40 CFR 61, Subpart H) and Section 7.1 "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities" (ANSI N1-3.1-1999). The QA requirements are documented in associated procedures.

8.1.3 NOAA

The NOAA QA plan (NOAA 2021) is based on "Quality Assurance Requirements for Nuclear Facility Applications" (ASME-NQA-1-2008) and addresses the requirements of DOE Order 414.1D Chg. 2. Implementing procedures include regular independent system and performance audits, written procedures and checklists, follow-up actions, and continuous automated and visual data checks to ensure representativeness and accuracy. The plan and implementing procedures provide the framework to ensure that NOAA INL MESONET meets the elements of "Environmental Radiological Effluent Monitoring and Environmental Surveillance" (DOE 2015) and DOE Order 458.1.

All meteorological sensors in the NOAA INL MESONET are inspected, serviced, and calibrated semiannually as recommended by American Nuclear Society guidelines found in "Determining Meteorological Information at Nuclear Facilities" (ANSI/ANS-3.11-2015). Unscheduled service is also promptly performed whenever a sensor malfunctions.

8.2 Sample and Analysis Management Activities

Sample and analysis management activities are performed separately by various monitoring organizations. Functions performed by each of these monitoring organizations include:

- Developing a sample and analysis plan or equivalent
- Coordinating sampling
- Obtaining analytical laboratory services
- Processing analytical laboratory data packages
- Managing sample and analytical data
- Verifying and validating analytical data (where applicable)
- Coordinating sample disposition.

Most subcontract laboratories used by the INL Site contractors are assessed by a DOE Consolidated Audit Program approved third-party accreditation body. The accreditation body assesses the laboratory according to the most recent version of the "Department of Defense/Department of Energy Consolidated

Quality Systems Manual" (QSM 2021). This program uses trained and certified personnel to perform in-depth assessments of subcontract laboratories to review:

- Personnel training and qualifications
- Detailed analytical procedures
- Calibration of instrumentation
- Participation in an inter-comparison program
- Use of blind controls
- Analysis of calibration standards.

Assessment results are maintained by the DOE Consolidated Audit Program. Laboratories are required to provide corrective action plans for audit findings.

The Mixed Analyte Performance Evaluation Program, as described in Section 1.4.2, and Performance Evaluation samples are two ways in which to oversee a laboratory's capabilities. Performance Evaluation samples are performed as a double-blind evaluation and are incorporated into the quality control samples sent to the laboratory per INL Site contractors QA plans.

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9. RADIOLOGICAL DOSE EVALUATION

Potential radiological doses to the public from INL Site operations are evaluated to determine compliance with pertinent regulations and limits. Two different computer codes are used to estimate doses. The EDE for a MEI member of the public from INL Site airborne releases of radionuclides is calculated annually using the methods prescribed by Subpart H of 40 CFR 61 and documented in an annual NESHAP report for radionuclides "National Emission Standards for Hazardous Air Pollutants INL Report for Radionuclides" (DOE/ID-11441). The annual dose to the public for the MEI and the collective 80 km (50 mi) population and the biota dose are estimated annually and documented in "Idaho National Laboratory Site Environmental Report" (DOE/ID-12082).

9.1 Maximum Individual Dose—Airborne Emissions Pathway

The EDE to an individual member of the public is calculated from airborne emission sources across the INL Site to demonstrate compliance with Subpart H of 40 CFR 61 and DOE Order 458.1. Subpart H requires that emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 millirem per year. The purpose of DOE Order 458.1 is to implement sound stewardship practices that protect the air, water, land, and other natural and cultural resources impacted by DOE operations, and by which DOE cost-effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements. DOE Order 458.1 states that it is also a DOE objective that potential exposures to members of the public be as far below the limits as is reasonably achievable.

Because individual radiological impacts to the public surrounding the INL Site remain too small to be measured by available monitoring techniques, the dose to the public from INL Site operations is calculated using the reported amounts of radionuclides released from INL Site facilities using EPA-approved air dispersion models. Compliance to Subpart H of 40 CFR 61 is demonstrated primarily using the CAP-88 computer model.

9.1.1 Dose Evaluation Using CAP-88 Computer Code

Use of the CAP-88 computer model is required by the EPA to demonstrate compliance with the " Clean Air Act Amendments of 1990" (Public Law 91-604). Using the CAP-88 model and information on the reported amounts of radionuclides released from INL Site facilities, the EDE to the MEI is estimated. CAP-88 uses dose and risk tables developed by the EPA. It does not include shielding by housing materials but does include a factor to allow for shielding by surface soil contours from radioactivity on the ground surface.

The ARLSORD performs annual meteorological and dispersion assessments as part of environmental compliance at the Site. Yearly wind statistics are generated for many of the towers in the meteorological network; these are used to run the CAP-88 atmospheric dispersion model required for NESHAP compliance (40 CFR 61, Subpart H). CAP-88 makes its calculations based on the joint frequency of wind conditions from a single wind station located near a facility (or emission source) in a straight line from that source and ignores recirculation.

9.1.2 Dose Evaluation Using HYSPLIT Dispersion Model

The ARLSORD uses a dispersion model called HYSPLIT to estimate radiological pollutant emissions from the INL Site. This model is the primary dispersion model used by NOAA for a variety of applications. The model is run over an entire year, using observations from the meteorological network,

and the resulting total integrated concentrations are used to evaluate the dose to members of the public to show compliance with DOE Order 458.1 (NOAA-TM-ERL-ARL-224,) (Draxler and Hess 1997).

This method offers a more realistic dose estimate for the Site than that from the CAP-88 computer model. The dispersion algorithms within the model are based on current atmospheric research on plume dispersion and use hourly averaged observations from the ARLSORD tower network. HYSPLIT is used only for calculating population dose. Unlike CAP-88, HYSPLIT can account for spatial and temporal wind variations associated with the complex topography near the Site.

9.2 80-Kilometer (50-Mile) Population Dose

An estimate of the collective EDE, or population dose, from inhalation, immersion, ingestion, and deposition resulting from airborne releases of radionuclides from the INL Site is determined from the HYSPLIT evaluations and information on the population within 80 km (50 mi) of an INL Site facility. Results of the HYSPLIT population dose evaluations are used to show compliance with DOE Order 458.1. The population dose is calculated from the average dispersion coefficient for the county census division, the population in each census division within that county, and the normalized dose received at the location of the MEI from the HYSPLIT evaluation. This gives an approximation of the dose received by the entire population in a given county division. Total population dose is the sum of the population dose for the various county divisions. The calculation overestimates dose because radioactive decay and deposition of the isotopes is not calculated during transport over distances greater than that to the MEI. Population estimates are reviewed and updated annually, as necessary.

9.3 Biota Dose

Maximum radionuclide concentrations in waterfowl and game animals collected from the INL Site are used to estimate a potential dose from ingestion. Estimates of the potential dose an individual may receive from occasionally ingesting meat from game animals consider that waterfowl may reside briefly at the various waste disposal ponds on the Site and those game birds and other game animals may reside on or migrate across the Site. The potential dose estimate is based on the highest concentrations of radionuclides in waterfowl or game animals sampled from the Site.

A graded approach is used to evaluate the potential dose to aquatic and terrestrial biota from contaminated soil and water according to “A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota” (DOE-STD-1153-2019). The graded approach evaluates the impacts of a given set of radionuclides on aquatic and terrestrial ecosystems by comparing available concentration data in soils and water with biota concentration guides. Details and justifications for applying the graded approach at the INL Site can be found in “Biota Dose Assessment Guidance for the INEEL” (Morris 2003).

10. REFERENCES

10 CFR 830, Subpart A, "Quality Assurance Requirements," Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration, Washington, D.C., current version.

40 CFR 61, Appendix B, "Method 114," Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration, Washington, D.C., current version.

40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration, Washington, D.C., current version.

40 CFR 61.93(g), "Emission Monitoring and Test Procedures," Environmental Protection Agency, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration, Washington, D.C., current version.

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Appendix A. Monitoring Locations

The tables in this appendix contain individual sampling locations for media discussed in this environmental monitoring plan and that are included in the maps and figures in the plan. Figure 3-1 shows the locations of those emission sources that currently require continuous monitoring by Subpart H of 40 CFR 61. The following definitions apply to the headings found in the following tables:

- **Location Name:** The common name assigned to a sample (e.g., 400.3, SDA 2.3).
- **Monitoring Organization:** The name of the sampling organization or group.
- **Location Description:** A description of geographical location assigned to the GRL_ID (i.e., 32; MFC – Inside facility fence).

Table A-1. Airborne effluent monitoring locations.

Location Name	Monitoring Organization	Location Description
Accelerated Retrieval Project	ICP	RWMC/SDA – Inside facility fence
FAST STACK	ICP	INTEC – FAST Stack (CPP-767)
Glovebox Stack (WMF-676-003)	ICP	RWMC – TSA/AMWTP area
Zone 3 Stack (WMF-676-002)	ICP	RWMC – TSA/AMWTP area
EBR-II/FCF Main Stack (MFC-764-001)	INL	MFC – Inside facility fence
HFEF Stack (MFC-785-018)	INL	MFC – Inside facility fence

Table A-2. Vapor monitoring locations.

Location Name	Monitoring Organization	Location Description
CFA-GAS-V-004	ICP	CFA Landfill
CFA-GAS-V-005	ICP	CFA Landfill
CFA-GAS-V-006	ICP	CFA Landfill
CFA-GAS-V-007	ICP	CFA Landfill
CFA-GAS-V-008	ICP	CFA Landfill
CFA-1931	ICP	CFA Landfill
CFA-1932	ICP	CFA Landfill
M4D	ICP	RWMC facility area
M10S	ICP	RWMC facility area
M1SA	ICP	RWMC facility area
M3S	ICP	RWMC facility area
M6S	ICP	RWMC facility area
M7S	ICP	RWMC facility area
RWMC-GAS-V-072	ICP	RWMC facility area
RWMC-GAS-V-076	ICP	RWMC facility area
RWMC-GAS-V-079	ICP	RWMC facility area
RWMC-GAS-V-080	ICP	RWMC facility area
RWMC-GAS-V-081	ICP	RWMC facility area
RWMC-VVE-V-067	ICP	RWMC facility area
SOUTH-1835	ICP	RWMC facility area
SOUTH-1898	ICP	RWMC facility area
SOUTH-GAS-V-005	ICP	RWMC facility area
SOUTH-GAS-V-007	ICP	RWMC facility area
SOUTH-GAS-V-008	ICP	RWMC facility area
SOUTH-MON-A-001	ICP	RWMC facility area
SOUTH-MON-A-003	ICP	RWMC facility area
SOUTH-MON-A-004	ICP	RWMC facility area
SOUTH-MON-A-009	ICP	RWMC facility area
SOUTH-MON-A-010	ICP	RWMC facility area
TAN-31	ICP	TAN facility area
TAN-2271	ICP	TAN facility area
TAN-2272	ICP	TAN facility area
TAN-2336	ICP	TAN facility area
USGS-118	ICP	RWMC facility area
VVE-1	ICP	RWMC facility area
VVE-10	ICP	RWMC facility area
VVE-3	ICP	RWMC facility area
VVE-4	ICP	RWMC facility area
VVE-6	ICP	RWMC facility area
VVE-7	ICP	RWMC facility area
WWW1	ICP	RWMC facility area
77-1	ICP	RWMC facility area
78-4	ICP	RWMC facility area

Table A-3. Atmospheric moisture monitoring locations.

Location Name	Monitoring Organization	Location Description
Atomic City	INL	Atomic City at NOAA tower
Craters	INL	Craters of the Moon
EFS	INL	Experimental Field Station: west of facility fence
Howe	INL	Howe
Idaho Falls	INL	Idaho Falls: north of Sawtelle Street Facility (SSF) on east side of Foote Dr.
IF	INL	Idaho Falls: located at the IRC facility, southeast corner of building IF-627
VAN B	INL	Van Buren Blvd just north of U.S. Highway 20/26

Table A-4. Liquid effluent monitoring locations.

Location Name	Monitoring Organization	Location Description
CPP-769	ICP	INTEC: Sewage Treatment Lagoon, building CPP-769
CPP-773	ICP	INTEC: Sewage Treatment Lagoon, building CPP-773
CPP-797	ICP	INTEC: building CPP-797 inside facility fence
IRC	INL (monitored by the city of Idaho Falls for INL)	Idaho Falls IRC Facility: point located in the center of the N. Boulevard at main IRC entrance
MFC Industrial Waste Pipeline	INL	MFC: west of building MFC-793C inside the facility fence
MFC IWP	INL	MFC: IWP
TRA Cold Waste Pond	INL	ATR Complex: building TRA-764

Table A-5. Ambient air surveillance locations.

Location Name	Monitoring Organization	Location Description
Arco	INL	Arco: NOAA tower 0.5 miles south of U.S. Highway 20/26 near mile marker 249
Atomic City	INL	Atomic City at NOAA tower
Blackfoot	INL	Blackfoot: Mountain View Middle School
Blue Dome	INL	Blue Dome
CFA	INL	CFA: North of building CF-690
CPP	INL	INTEC: Along the west side of the facility fence south of Cleveland Blvd.
Craters of the Moon	INL	Craters of the Moon
DuBois	INL	DuBois
EBR 1	INL	EBR-I: Inside facility fence south of building EBR-602
EFS	INL	Experimental Field Station: West of facility fence
FAA Tower	INL	FAA Tower: U.S. Highway 20 west of mile marker 282
Gate 4	INL	Sand Dunes NOAA tower: South of Lincoln Blvd. guard gate #4
Howe	INL	Howe
Idaho Falls	INL	Idaho Falls: North of SSF on east side of Foote Dr.
INTEC	INL	INTEC: North of facility fence
IRC	INL	Idaho Falls: Located at the IRC facility, east of building IF-605
IRCN	INL	Idaho Falls: Located at the IRC facility, north of building IF-603
Jackson Hole	INL	Jackson Hole, Wyoming
Main Gate	INL	Main Guard Gate
MFCN	INL	South side of Radioactive Scrap and Waste Facility (RSWF) facility fence (MFC-771)
MFCS	INL	Location near the northeast corner of MFC-735, the guard checkpoint on Taylor Blvd.
Monteview	INL	Monteview: Near intersection of E 2700 N and N 800 E
NRF	INL	NRF: NW of new communication tower south of the main parking lot
PBF	INL	Near CITRC
Rest Area	INL	BLR Rest Area on U.S. Highway 20/26
RHLLW	INL	RH-LLW Disposal Facility
RTC	INL	ATR Complex: NE corner of facility fence
RWMC	INL	RWMC: Northeast of Pit 9 just outside of facility fence
RWMCS	INL	RWMC: Near the power pole on the NE side of Cold Test Pit South
SMC	INL	TAN/SMC: North of SMC facility fence at NOAA tower
Sugar City	INL	Sugar City
Terreton	INL	On Highway 33 next to Rocknak's Hardware
Van Buren	INL	Van Buren Blvd just north of U.S. Highway 20/26

Table A-6. Drinking water monitoring locations.

Location Name	Monitoring Organization	Location Description
CPP-1767 Sump	ICP	North of INTEC
CPP-1767 Sump	ICP	North of INTEC
CPP-614	ICP	INTEC: Inside of facility fence
NRF D&D Trailer	ICP	Trailers to the southeast
WMF-603 Entry Point	ICP	RWMC in Operations Area
WMF-603 Sink	ICP	RWMC in Operations Area
ANL 1 (a.k.a. EBR-II #1 [MFC-754])	INL	MFC Well inside facility fence
ANL 2 (a.k.a. EBR-II #2 [MFC-756])	INL	MFC Well inside facility fence
Atomic City	INL	Atomic City north central end of town south of Taber Rd.
Badging Facility (a.k.a. Main Gate B27-603)	INL	Main Gate Building B27-603
Badging Facility Well	INL	Main Gate Well B27-605
CFA-1 (a.k.a. CFA-651 [Well #1])	INL	CFA Facility center
CFA-1603 Manifold	INL	CFA Facility center
CFA-2 (a.k.a. CFA-642 [Well #2])	INL	CFA Facility center
Craters of the Moon	INL	Craters of the Moon
EBR-601	INL	EBR-I Building
EBR-I (a.k.a. EBR-711 Well)	INL	EBR-I Well
FET-1 (a.k.a. TAN-632 [Well #1])	INL	TAN/Contained Test Facility (CTF) Well outside SMC fence
FET-2 (a.k.a. TAN-639 [Well #2])	INL	TAN/CTF Well outside SMC fence
Gun Range B21-608	INL	Gun Range Building B21-608
Howe City Park	INL	Howe: West of town center
Idaho Falls	INL	Idaho Falls
MFC-1740	INL	MFC inside facility fence
Minidoka	INL	Minidoka
Mud Lake Well #2 (Control)	INL	Mud Lake Well #2 (Control) North of State Highway 33
PBF-638 CITRC Manifold	INL	CITRC Manifold at PBF Support Area
Rest Area	INL	BLR Rest Area on U.S. Highway 20/26
Rifle Range Well	INL	Gun Range Well B21-607
Shoshone	INL	Shoshone
SPERT-1 (a.k.a. PBF-602 [Well #1])	INL	CITRC Well at PBF Support Area
SPERT-2 (a.k.a. PBF-614 [Well #2])	INL	CITRC Well at PBF Support Area
TAN-1612 Manifold	INL	TAN/CTF outside SMC fence
TRA-696 Wellfield	INL	ATR Complex inside facility fence near northeast corner

Table A-7. Surface water surveillance locations.

Location Name	Monitoring Organization	Location Description
SDA Lift Station	ICP	RWMC: Inside of the SDA on the south end of ARP V
Alpheus Springs	INL	Alpheus Springs
Bill Jones Fish Farm	INL	Bill Jones Fish Farm
BLR at EFS	INL	Experimental Field Station: Northeast of facility fence
BLR at INTEC	INL	BLR at INTEC: Just west of Lincoln Blvd. bridge
BLR at NRF	INL	Lincoln Blvd. bridge northeast of NRF
BLR AT Rest Area	INL	BLR Rest Area on U.S. Highway 20/26
BLR Control (Birch Creek)	INL	State Highway 22, mile marker 41
BLR Sinks	INL	BLR Sinks
Clear Spring	INL	Clear Spring
Birch Creek	USGS	Blue Dome: East of State Highway 28 near mile marker 45
BLR @ INL Diversion	USGS	BLR Diversion near USGS gauge station
BLR near Mackay	USGS	Mackay
Little Lost River	USGS	Howe
Mud Lake	USGS	Terreton: northeast of State Highway mile marker 51

Table A-8. Soil surveillance locations.

Location Name	Monitoring Organization	Location Description
Atomic City	INL	Near Atomic City on T-Road 4 approximately 0.7 miles east of U.S. 26
Blackfoot	INL	Blackfoot
Butte City	INL	Butte City: 1.3 miles south of mile post 252
Carey	INL	Carey
EFS	INL	Experimental Field Station: West of facility fence
FAA Tower	INL	FAA Tower: U.S. Highway 20 west of mile marker 282
Frenchman's Cabin	INL	Frenchman's Cabin
Howe	INL	Howe: 0.6 miles east of mile marker 22 on State Highway 33 east of Howe
Monteview	INL	Monteview
Mudlake #1	INL	Mud Lake: approximately 0.3 miles north of mile marker 16 on State Highway 28
Mudlake #2	INL	Mud Lake: approximately 4.2 miles south of mile marker 44 on State Highway 33
RECEPTOR 54	INL	Southeast of MFC
Reno Ranch	INL	Reno Ranch: approximately 0.3 miles north of mile marker 40 on State Highway 22
REST 1-1	INL	BLR Rest Area on U.S. Highway 20/26
RWMC 2-1	INL	RWMC: East of TSA facility fence
RWMC 2-3	INL	RWMC: North of facility fence
RWMC 2-4	INL	RWMC: North of facility fence
RWMC 2-5	INL	RWMC: North of facility fence
RWMC 3-1	INL	RWMC: East of TSA facility fence
RWMC 3-2	INL	RWMC: East of facility fence
RWMC 3-7	INL	RWMC: North of facility fence
RWMC 5-4	INL	RWMC: North of facility fence
RWMC 5-5	INL	RWMC: North of facility fence
RWMC 5-7	INL	RWMC: North of facility fence
RWMC 5-8	INL	RWMC: North of facility fence
RWMC 5-12	INL	RWMC: North of facility fence
RWMC 5-15	INL	RWMC: South of facility fence
RWMC 6-3	INL	RWMC: South of facility fence
RWMC 7-1	INL	RWMC: South of facility fence
St. Anthony	INL	St. Anthony

Table A-9. Agricultural Products Surveillance Locations.

Location Name	Media	Monitoring Organization	Location Description
Howe	Alfalfa	INL	Howe
Idaho Falls	Alfalfa	INL	Idaho Falls: North of SSF on east side of Foote Dr.
Mud Lake	Alfalfa	INL	Mud Lake: South of State Highway 33 on N 1100 E
Atomic City	Lettuce	INL	Atomic City at NOAA tower
Blackfoot	Lettuce	INL	Blackfoot (Shoemaker Farms)
Blackfoot	Lettuce	INL	Blackfoot (Wheeler Farms)
EFS	Lettuce	INL	Experimental Field Station: West of facility fence
FAA Tower	Lettuce	INL	FAA Tower: U.S. Highway 20 west of mile marker 282
Howe	Lettuce	INL	Howe
Idaho Falls	Lettuce	INL	Idaho Falls (Little Field Produce)
Monteview	Lettuce	INL	Monteview: Near intersection of E 2700 N and N 800 E
Pocatello	Lettuce	INL	Bowman Produce
Sugar City	Lettuce	INL	Sugar City: Located north of 2983 E 2000 N
Daloris Dairy	Milk	INL	Rigby (Daloris Dairy)
Dietrich	Milk	INL	Dietrich (Astle Dairy)
Howe	Milk	INL	Callister Dairy north of Howe
Minidoka	Milk	INL	Whitesides Dairy
Monteview	Milk	INL	Paradise Grove Dairy
Terreton	Milk	INL	Korn Dairy
Arco (Telford's Lost River)	Potato	INL	Arco (Telford's Lost River)
Idaho Falls (Scoresby's)	Potato	INL	Idaho Falls (Scoresby's)
Pocatello (Swore Farms)	Potato	INL	Pocatello (Swore Farms)
Rexburg (Pole line Rd)	Potato	INL	Rexburg (Pole line Rd)
Shelley	Potato	INL	Shelley: Exit 108 Potato stand
Sugar City	Potato	INL	Sugar City: Food Dudes
Terreton	Potato	INL	Terreton
American Falls	Wheat	INL	American Falls
Arco	Wheat	INL	Arco: West of U.S. Highway 20/26 near mile marker 249
Blackfoot	Wheat	INL	Blackfoot
Howe	Wheat	INL	Callister Dairy north of Howe
Kimama	Wheat	INL	Kimama
Monteview	Wheat	INL	Monteview
Moreland	Wheat	INL	Moreland
Roberts	Wheat	INL	Roberts (Osgood Grain): Located at 616-626 N Bassett Rd.
Rupert	Wheat	INL	Rupert
Terreton	Wheat	INL	Terreton: State Highway 33 east of mile marker 47

Table A-10. External radiation surveillance locations.

Location Name	Monitoring Organization	Location Description
Aberdeen	INL	Aberdeen
ANL O-12	INL	MFC: West of perimeter fence near guard gate
ANL O-14	INL	MFC: East of perimeter fence near NOAA tower
ANL O-15	INL	MFC: Northeast of perimeter fence
ANL O-16	INL	MFC: Northeast of perimeter fence by sewage treatment lagoons
ANL O-18	INL	MFC: West of perimeter fence
ANL O-19	INL	MFC: Southeast corner of MFC main parking lot
ANL O-20	INL	MFC: East of perimeter fence northwest NOAA tower
ANL O-21	INL	MFC: East of perimeter fence northwest NOAA tower
ANL O-22	INL	MFC: Northeast of perimeter fence by sewage treatment lagoons
ANL O-23	INL	East side of RSWF facility fence (MFC-771)
ANL O-24	INL	North side of RSWF facility fence (MFC-771)
ANL O-25	INL	West side of RSWF facility fence (MFC-771)
ANL O-26	INL	South side of RSWF facility fence (MFC-771)
ANL O-7	INL	MFC: West of perimeter fence
ANL O-8	INL	MFC: North of the bridge on Buchanan Blvd
ARA I&II O-1	INL	Auxiliary Reactor Area (ARA): ARA I and II facility location
Arco O-1	INL	Arco: NOAA tower 0.5 miles south of U.S. Highway 20/26 near mile marker 249
Atomic City E-1	INL	U.S. Highway 26: South of mile marker 278
Atomic City O-2	INL	Atomic City at NOAA tower
Blackfoot O-9	INL	Blackfoot: Mountain View Middle School
Blue Dome E-1	INL	Blue Dome
CFA O-1	INL	CFA: West of Building CFA-690
Craters of Moon O-7	INL	Craters of the Moon
Dubois E-1	INL	DuBois
EBR1 O-1	INL	EBR-I: Parking lot
EBR1 O-2	INL	EBR-I view area
EBR1 O-3	INL	EBR-I view area
EFS O-1	INL	Experimental Field Station: West of facility fence
GATE 4 O-1	INL	Sand Dunes NOAA tower: South of Lincoln Blvd. guard gate #4
Haul E O-1	INL	East Haul Road entrance west of Taylor Blvd.
Haul W O-2	INL	370-ft east of west Haul Road entrance gate north of ARA III
Howe O-3	INL	Howe
Hwy20 Mile O-266	INL	U.S. Highway 20 mile marker 266
Hwy20 Mile O-270	INL	U.S. Highway 20 mile marker 270
Hwy20 Mile O-276	INL	U.S. Highway 20 and the intersection of Taylor Blvd. on the east side of the road
Hwy22 T28 O-1	INL	State Highway 22: approximately 0.2 miles north of mile marker 33
Hwy28 N2300 O-2	INL	State Highway 28: approximately 0.3 miles north of mile marker 27
Hwy33 T17 O-3	INL	State Highway 33: near mile marker 36
ICPP O-14	INL	INTEC: East of facility fence
ICPP O-15	INL	INTEC: Northeast of facility fence

Table A-10. (continued).

Location Name	Monitoring Organization	Location Description
ICPP O-17	INL	INTEC: Northwest of facility fence
ICPP O-19	INL	INTEC: West of facility fence
ICPP O-20	INL	INTEC: West of facility fence
ICPP O-21	INL	INTEC: Southwest of facility fence
ICPP O-22	INL	INTEC: South of facility fence
ICPP O-25	INL	INTEC: Southeast of facility fence
ICPP O-26	INL	INTEC: East of facility
ICPP O-27	INL	INTEC: East of facility fence
ICPP O-28	INL	INTEC: East of facility fence
ICPP O-30	INL	INTEC: West of facility fence
ICPP O-9	INL	INTEC: Northeast of facility fence
ICPP TreeFarm O-1	INL	INTEC: West of facility fence
ICPP TreeFarm O-2	INL	INTEC: West of facility fence
ICPP TreeFarm O-3	INL	INTEC: West of facility fence
ICPP TreeFarm O-4	INL	INTEC: West of facility fence
Idaho Falls O-10	INL	Idaho Falls: North of SSF on east side of Foote Dr.
IF-603E O-2	INL	Idaho Falls: Located at the IRC facility, east of building IF-603
IF-603N O-1	INL	Idaho Falls: Located at the IRC facility, north of building IF-603
IF-603S O-3	INL	Idaho Falls: Located at the IRC facility, south of building IF-603
IF-603W O-4	INL	Idaho Falls: Located at the IRC facility, west of building IF-603
IF-616N O-36	INL	North of building IF-616 at Willow Creek building (WCB)
IF-627 O-30	INL	Idaho Falls: Located at the IRC facility near building IF-627
IF-638E O-2	INL	Idaho Falls: Located at the IRC facility, east of building IF-638
IF-638N O-1	INL	Idaho Falls: Located at the IRC facility, north of building IF-638
IF-638S O-3	INL	Idaho Falls: Located at the IRC facility, south of building IF-638
IF-638W O-4	INL	Idaho Falls: Located at the IRC facility, west of building IF-638
IF-695 O-1[a]	INL	Idaho Falls: Lindsay building
IF-695 O-2[a]	INL	Idaho Falls: Lindsay building
IF-695 O-3[a]	INL	Idaho Falls: Lindsay building
IF-695 O-4[a]	INL	Idaho Falls: Lindsay building
IF-665 O-1	INL	Idaho Falls: Northeast of building
IF-665 O-2	INL	Idaho Falls: Northeast roadway intersection
IF-665 O-3	INL	Idaho Falls: East of building

a. This building was changed from 652A to 695 in 2023.

Table A-10. (continued).

Location Name	Monitoring Organization	Location Description
IF-665 O-4	INL	Idaho Falls: South of building
IF-665 O-5	INL	Idaho Falls: Southwest of building
IF-665W O-37	INL	West of building IF-665 at the REC
IF-670D O-34	INL	Idaho Falls: Inside of building IF-670
IF-670E O-32	INL	Idaho Falls: North side of building IF-670 on the wall
IF-670N O-31	INL	Idaho Falls: North side of building IF-670 on the wall and east of chain-link fence
IF-670S O-33	INL	Idaho Falls: Inside of building IF-670
IF-670W O-35	INL	Idaho Falls: West side of building IF-670 on the wall near the door
IF-675D O-33	INL	Idaho Falls: Portable Isotopic Neutron Spectroscopy (PINS) Laboratory located east of Hitt Rd. on E 14th N
IF-675E O-31	INL	Idaho Falls: PINS Laboratory located east of Hitt Rd. on E 14th N
IF-675S O-34	INL	Idaho Falls: PINS Laboratory located east of Hitt Rd. on E 14th N
IF-675W O-35	INL	Idaho Falls: PINS Laboratory located east of Hitt Rd. on E 14th N
IF-688B O-1	INL	Idaho Falls: Energy Innovation Laboratory
IF-688B O-2	INL	Idaho Falls: Energy Innovation Laboratory
IF-689 O-7	INL	IRC: Southwest side of IF-698
IF-689 O-8	INL	IRC: Southeast side of IF-698
IF-IDA O-38	INL	Idaho Falls south of John's Hole Bridge
IF-IRC O-39	INL	On the southern perimeter fence at the IRC facility
Jackson E-1	INL	Jackson Hole, Wyoming
LincolnBlvd O-1	INL	CFA: East of Lincoln Blvd. near Main St. intersection
LincolnBlvd O-15	INL	Lincoln Blvd.: Just north of mile maker 15 on the east side of the road
LincolnBlvd O-25	INL	TAN: South of Technical Support Facility on State Highway 33 (Lincoln Blvd.)
LincolnBlvd O-3	INL	Lincoln Blvd. south of ICDF: east side of road
LincolnBlvd O-5	INL	Lincoln Blvd. mile marker 5: east side of road
LincolnBlvd O-9	INL	Lincoln Blvd. mile marker 9: east side of road
Main Gate O-1	INL	Main Guard Gate
Minidoka E-1	INL	Minidoka
Monteview O-4	INL	Monteview: Near intersection of E 2700 N and N 800 E
Mud Lake O-5	INL	Mud Lake: South of State Highway 33 on N 1100 E
NRF O-11	INL	NRF: West of facility and west of Washington Blvd.
NRF O-16	INL	NRF: North of facility
NRF O-18	INL	NRF: West of facility
NRF O-19	INL	NRF: South of facility
NRF O-20	INL	NRF: South of facility
NRF O-25	INL	NRF: East of facility
NRF O-26	INL	NRF: East of facility
NRF O-27	INL	NRF: East of facility
NRF O-28	INL	NRF: East of facility
NRF O-29	INL	NRF: East of facility
NRF O-30	INL	NRF: Northeast of facility

Table A-10. (continued).

Location Name	Monitoring Organization	Location Description
NRF O-31	INL	NRF: North of facility
NRF O-32	INL	NRF: North of facility
PBF SPERT O-1	INL	CITRC: North of Jefferson Rd. and building PBF-632 located at the former PBF Control Area
Reno Ranch O-6	INL	Reno Ranch: State Highway 22 near mile marker 41
REST O-1	INL	BLR Rest Area on U.S. Highway 20/26
RHLLW O-1	INL	RHLLW Disposal Facility
RHLLW O-2	INL	RHLLW Disposal Facility
RHLLW O-3	INL	RHLLW Disposal Facility
RHLLW O-4	INL	RHLLW Disposal Facility
RHLLW O-5	INL	RHLLW Disposal Facility
RHLLW O-6	INL	RHLLW Disposal Facility
RobNOAA	INL	Roberts: at NOAA tower
RRL17 O-1	INL	State Highway 28: 100-ft north of mile marker 21 and approximately 100-ft west of the road
RRL24 O-1	INL	Howe: 0.4 miles west of mile marker 23 on State Highway 33 east of Howe and is 140-ft south of the road
RRL3 O-1	INL	T-1 Road: North of Frenchman's Cabin 1.8 miles
RRL5 O-1	INL	East peak of East Butte
RRL6 O-1	INL	East side of T-4 road approximately 1 mile south of U.S. Highway 20, mile marker 277
RWMC O-11A	INL	RWMC: North of facility fence
RWMC O-13A	INL	RWMC: North of SDA facility fence
RWMC O-19A	INL	RWMC: South of facility fence
RWMC O-21A	INL	RWMC: South of SDA facility fence
RWMC O-23A	INL	RWMC: South of facility fence
RWMC O-25A	INL	RWMC: South of SDA facility fence
RWMC O-27A	INL	RWMC: South of facility fence
RWMC O-29A	INL	RWMC: South of SDA facility fence
RWMC O-39	INL	RWMC: East of facility fence near Main Gate
RWMC O-3A	INL	RWMC: North of facility fence
RWMC O-41	INL	RWMC: East of TSA facility fence
RWMC O-43	INL	RWMC: South of TSA facility fence
RWMC O-46	INL	RWMC: North of Operation Area facility fence
RWMC O-47	INL	RWMC: South of facility fence at the Cold Test Pit south burial ground
RWMC O-5A	INL	RWMC: North of facility fence
RWMC O-7A	INL	RWMC: North of facility fence
RWMC O-9A	INL	RWMC: North of SDA facility fence near north gate
Sugar City E-1	INL	Sugar City
TAN LOFT O-10	INL	TAN/SMC: West of the SMC facility fence
TAN LOFT O-11	INL	TAN/SMC: South of SMC facility on the west side of Nile Ave

Table A-10. (continued).

Location Name	Monitoring Organization	Location Description
TAN LOFT O-12	INL	TAN/SMC: South of SMC facility on the north side of Nile Ave and the railroad tracks
TAN LOFT O-13	INL	TAN/SMC: East of the SMC facility 600-ft north side of Nile Ave near a large dirt berm
TAN LOFT O-6	INL	TAN: South of SMC facility fence
TAN LOFT O-7	INL	TAN: East of SMC facility fence
TAN LOFT O-8	INL	TAN/SMC: Northeast corner of the SMC facility fence
TAN LOFT O-9	INL	TAN/SMC: North of SMC facility fence at NOAA tower
TRA O-1	INL	ATR Complex: South of facility
TRA O-10	INL	ATR Complex: North of facility fence
TRA O-11	INL	ATR Complex: West of facility
TRA O-12	INL	ATR Complex: West of facility
TRA O-13	INL	ATR Complex: West of facility
TRA O-14	INL	ATR Complex: Parking lot along facility fence
TRA O-15	INL	ATR Complex: South of facility
TRA O-16	INL	ATR Complex: East of facility
TRA O-17	INL	ATR Complex: South of TRA-715 evaporative ponds
TRA O-18	INL	ATR Complex: East of TRA-715 evaporative ponds
TRA O-19	INL	ATR Complex: North of TRA-715 evaporative ponds
TRA O-20	INL	ATR Complex: North of TRA-715 evaporative ponds
TRA O-21	INL	ATR Complex: West of TRA-715 evaporative ponds
TRA O-22	INL	ATR Complex: South of TRA-715 evaporative ponds
TRA O-23	INL	ATR Complex: North side of Monroe Blvd. near intersection
TRA O-24	INL	ATR Complex: East of facility
TRA O-25	INL	ATR Complex: East of facility
TRA O-26	INL	ATR Complex: North of facility
TRA O-27	INL	ATR Complex: North of facility
TRA O-28	INL	ATR Complex: North of facility
TRA O-6	INL	ATR Complex: Northeast of facility
TRA O-7	INL	ATR Complex: North of facility
TRA O-8	INL	ATR Complex: North of facility
TRA O-9	INL	ATR Complex: North of facility
TREAT O-1	INL	East side of Transient Reactor Test (TREAT) facility
TREAT O-2	INL	East side of TREAT facility
TREAT O-3	INL	North side of TREAT facility
TREAT O-4	INL	North side of TREAT facility
TREAT O-5	INL	West side of TREAT facility
TREAT O-6	INL	West side of TREAT facility
TREAT O-7	INL	South side of TREAT facility
TREAT O-8	INL	South side of TREAT facility
VanB O-1	INL	Van Buren Blvd just north of U.S. Highway 20/26

Table A-11. Flora and fauna surveillance locations.

Location Name	Media	Monitoring Organization	Location Description
Sewage Lagoons	Flora and Fauna	INL	ATR Complex-Main Sewage Lagoon TRA 736

Table A-12. Precipitation surveillance locations.

Location Name	Monitoring Organization	Location Description
Atomic City	INL	Atomic City at NOAA tower
EFS	INL	Experimental Field Station: West of facility fence
Howe	INL	Howe
Idaho Falls	INL	Idaho Falls: North of SSF on east side of Foote Dr.

Table A-13. Meteorological monitoring locations.

Location Name	Monitoring Organization	Location Description
690	NOAA	CFA: north of Building CFA-690
ABE	NOAA	Aberdeen: behind U.S. Agricultural Research Services
ARC	NOAA	Arco: Sewage Treatment Plant
ATO	NOAA	Atomic City: west side of town
BAS	NOAA	Base of Howe Peak: East of milepost 9 on Highway 33
BLK	NOAA	Blackfoot: Mountain View Middle School
BLU	NOAA	Blue Dome: Highway 28 north of milepost 38
CIT	NOAA	CITRC: At PBF Support Area
COX	NOAA	Southwest of Big Southern Butte approximately 10 miles (Cox's Well)
CRA	NOAA	Craters of the Moon: South of visitor center
DEA	NOAA	Dead Man Canyon: East of Highway 33 on T-Road 11
DUB	NOAA	Dubois: Sheep Experiment Station
FOR	NOAA	Fort Hall: Shoshone-BannockTribes Public Safety
GRI	NOAA	INTEC/Grid 3 NOAA tower
HAM	NOAA	Hamer: West of I-15 on Camas-Monteview Road
HOW	NOAA	Howe: East of town
IDA	NOAA	Idaho Falls: South of John's Hole Bridge
KET	NOAA	Kettle Butte: North of milepost 293 off Highway 20
LOS	NOAA	BLR Rest Area on U.S. Highway 20/26
MFC	NOAA	MFC: West side of MFC facility fence
MIN	NOAA	Minidoka: North of the intersection of Highway 24 and N 400 E
MON	NOAA	Monteview: Near intersection of E 2700 N and N 800 E
NRF	NOAA	NRF: Southeast side of NRF facility
PRO	NOAA	0.5 miles northeast of INTEC/Grid 3 NOAA tower
RIC	NOAA	Richfield: East of town
ROB	NOAA	Roberts: Market Lake Wildlife Management Area
ROV	NOAA	ROVER: Northeast of the intersection T-Road 4 and T-Road 8

Table A-13. continued.

Location Name	Monitoring Organization	Location Description
RWM	NOAA	RWMC: North of RWMC
SAN	NOAA	Sand Dunes NOAA tower: South of Lincoln Blvd. guard gate #4
SMC	NOAA	TAN/SMC: North of SMC facility fence at NOAA Tower
SUG	NOAA	Sugar City: Idaho Transportation Department District 6
SUM	NOAA	Big Southern Butte Summit
TAB	NOAA	N 2000 W near Taber Road
TER	NOAA	Terreton: State Highway 33 east of mile marker 47 (Rocknaks Hardware Store)
TRA	NOAA	ATR Complex: West of facility fence

Table A-14. Event monitoring locations.

Location Name	Monitoring Organization	Location Description
690	INL	CFA: North of Building CFA-690
ARC	INL	Arco: Sewage Treatment Plant
ATO	INL	Atomic City: West side of town
BLU	INL	Blue Dome: Highway 28 north of milepost 38
CIT	INL	CITRC: PBF Support Area
MFC	INL	MFC: West side of MFC facility fence
HOW	INL	Howe: East of town
IDA	INL	Idaho Falls: South of John's Hole Bridge
KET	INL	Kettle Butte: North of milepost 293 off Highway 20
SMC	INL	TAN/SMC: North of SMC facility fence at NOAA tower
MON	INL	Monteview: Near intersection of E 2700 N and N 800 E
NRF	INL	NRF: Southeast side of NRF facility
RWM	INL	RWMC: North of RWMC
SUG	INL	Sugar City: Idaho Transportation Department District 6
TER	INL	Terreton: State Highway 33 east of mile marker 47 (Rocknak’s Hardware Store)
TRA	INL	ATR Complex: West of facility fence