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# National Reactor Innovation Center (NRIC) Infrastructure Integration Plan

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Jakob Meng, James Case, Shaun Evans, and Alex Schoonen
*Idaho National Laboratory*

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# REVISION LOG

| Revision No. | Date | Affected Pages | Description |
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| 0 | 4/28/2023 | All | New document |
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# SUMMARY

The NRIC Infrastructure Integration Plan serves as a roadmap for integrating future test reactors at the Idaho National Laboratory's (INL's) desert Site into core infrastructure and services required for reactor operations. This document is not intended to serve as a requirements document, nor does it list all infrastructure requirements for each reactor planned for testing at the Site. It represents an overview of the most likely infrastructure and services that will be required by some or all the test reactors, as well as what infrastructure and services exist at the Site that have the potential to support and enable NRIC test reactors.

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# ACKNOWLEDGEMENTS

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# ACRONYMS

| | |
|---|---|
| ANSI | American National Standards Institute |
| ATR | Advanced Test Reactor |
| CFA | Central Facilities Area |
| CITRC | Critical Infrastructure Test Range Complex |
| DOE | U. S. Department of Energy |
| DOE-ID | U.S. Department of Energy Idaho Operations Office |
| DOE-NE | U.S. Department of Energy Office of Nuclear Energy |
| EES&T | Energy and Environment Science and Technology |
| FERC | Federal Energy Regulatory Commission |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| IPC | Idaho Power Company |
| IPUC | Idaho Public Utilities Commission |
| MFC | Materials and Fuels Complex |
| N&HS | National and Homeland Security |
| NERC | North American Electric Reliability Corporation |
| NRC | Nuclear Regulatory Commission |
| NRF | Naval Reactors Facility |
| NRIC | National Reactor Innovation Center |
| NS&T | Nuclear Science and Technology |
| RHLLW | Remote-handled low-level waste |
| RMP | Rocky Mountain Power |
| RWMC | Radioactive Waste Management Complex |
| SMC | Specific Manufacturing Capability |
| TAN | Test Area North |

# National Reactor Innovation Center (NRIC) Infrastructure Integration Plan

## 1. INTRODUCTION

### 1.1 Background

The National Reactor Innovation Center (NRIC) was authorized by the Nuclear Energy Innovation Capabilities Act (NEICA). NRIC is led by Idaho National Laboratory (INL) and is charged with partnering with industry to enable the testing of advanced nuclear reactors. Multiple reactor test projects are anticipated through the U.S. Department of Energy (DOE) Advanced Reactor Demonstration Program (ARDP) as well as independent of the ARDP. Some are considering INL locations.

### 1.2 Purpose

The NRIC Infrastructure Integration Plan serves as a roadmap for integrating future test reactors at the Idaho National Laboratory's (INL's) desert Site into core infrastructure and services required for reactor operations. This document is not intended to serve as a requirements document, nor does it list all infrastructure requirements for each reactor planned for testing at the Site. It represents an overview of the most likely infrastructure and services that will be required by some or all the test reactors, as well as what infrastructure and services exist at the Site that have the potential to support and enable NRIC test reactors.

Given the unique needs of individual advanced-reactor projects and the varied locations for them at the Site, it is not prudent to provide an all-inclusive document related to infrastructure integrations. Where possible, contact information for the appropriate subject-matter experts (SMEs) for the different infrastructures discussed has been provided in the respective sections. This document is provided to help NRIC and test-reactor project planners begin to assess their infrastructure needs, determine what infrastructure and services may already be in place in the vicinity of the reactor site, and provide INL infrastructure SME contact information to enable the next steps in the planning process.

### 1.3 Stakeholders

This section discusses the key stakeholders associated with the NRIC efforts. For the purposes of this roadmap, stakeholders will be organized into five key groups: utilities, federal entities, tribal entities, INL internal entities, and reactor owners and users.

#### 1.3.1 Utilities

INL and the affected service utility will coordinate with advanced-reactor developers for potential infrastructure-upgrade needs. The primary utilities impacted by this roadmap include the following:

##### *1.3.1.1 IDAHO POWER COMPANY*

The IPC is the sole provider of electricity to INL. IPC is regulated by the Idaho Public Utilities Commission (IPUC), and the rates, terms, and conditions for electric service provided by IPC to INL must be approved by the Commission.

#### *1.3.1.2 ROCKY MOUNTAIN POWER (RMP)*

RMP is an IPUC-regulated electric-power utility, responsible for key infrastructure feeding the INL power grid. Among these infrastructures are the Antelope Substation and associated transmission lines (including Goshen-Antelope, Brady-Antelope, Antelope-Lost River, and Antelope-Scoville).

### 1.3.2 Federal Entities

#### *1.3.2.1 U.S. DEPARTMENT OF ENERGY IDAHO OPERATIONS OFFICE (DOE-ID)*

DOE-ID is the federal agency responsible for the regulatory and contract oversight of INL. Battelle Energy Alliance, LLC (BEA), operates and manages INL at the direction of DOE-ID (DOE-ID 2021).

#### *1.3.2.2 NUCLEAR REGULATORY COMMISSION*

The Nuclear Regulatory Commission (NRC) is the federal commission responsible for ensuring the safe use of radioactive materials for beneficial civilian purposes while protecting people and the environment. Thus, the NRC regulates commercial nuclear power plants and other uses of nuclear materials. NRC is responsible for the oversight of any non-DOE-owned nuclear-reactor demonstration. (NRC 2022)

#### *1.3.2.3 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION*

The North American Electric Reliability Corporation (NERC) is a not-for-profit regulatory authority; its mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. For this reason, NERC is responsible for establishing certain threshold values that a system must adhere to in order to maintain a secure and stable power grid (NERC 2022).

#### *1.3.2.4 FEDERAL ENERGY REGULATORY COMMISSION*

The Federal Energy Regulation Commission (FERC) is a federal agency that regulates the transmission and wholesale of electricity and natural gas in interstate commerce (FERC 2022).

#### *1.3.2.5 IDAHO PUBLIC UTILITIES COMMISSION*

IPUC is responsible for regulation of both investor-owned and privately owned utilities that provide gas, water, electricity, and some telephone services for profit. IPUC has the authority to set rates and makes rules governing utility operations (IPUC 2022).

### 1.3.3 Tribal Entities

#### *1.3.3.1 SHOSHONE-BANNOCK TRIBES*

A significant portion of INL was previously inhabited by the Shoshone-Bannock Tribes, and they have significant cultural history on the INL Site. Agreements between INL and the Shoshone-Bannock Tribes, require constant communication and input for the continued success of the Laboratory while protecting the cultural heritage of the Shoshone-Bannock Tribes.

### 1.3.4 INL Internal Entities

#### *1.3.4.1 INL ENVIRONMENTAL AND CULTURAL RESOURCES*

INL Environmental and Cultural Resources organizations ensure compliance with all federal, state, local, and Laboratory environmental regulations and policies. These entities conduct environmental reviews and studies of proposed projects.

#### *1.3.4.2 INL POWER MANAGEMENT*

INL Power management functions as a utility that operates and maintains INL-owned power-grid infrastructure.

#### *1.3.4.3 INL NET-ZERO PROGRAM*

INL is committed to a sustainable, equitable and resilient climate future. INL will lead by example, committing to becoming a national carbon-neutral prototype and achieving net-zero emissions in INL operations by 2031. Achieving net zero means drastically reducing onsite emissions and offsetting the limited residual emissions from activities that are impossible to decarbonize. This is a substantial and long-term commitment under which INL will use technological innovations and partnerships, increased efficiencies, and novel approaches to demonstrate the path forward to establish a clean-energy economy. A crucial element of this strategy is the integration of innovative clean-energy sources, including nuclear, into INL's power grid (INL 2022).

#### *1.3.4.4 NRIC*

In 2019, DOE announced the launch of NRIC and that INL would lead in supporting private-sector technology developers in the development of innovative nuclear reactor technologies. That mission entails facilitating technology development by allowing developers potential access to INL's infrastructure, including the power grid. A key NRIC goal is to understand electric industry issues relevant to INL's operations with test reactors located at INL and interconnected to either INL's government-owned transmission system or nearby transmission or subtransmission facilities owned by utilities. In addition, because test reactors can generate electricity for which owners of those facilities would be eligible for compensation, INL and NRIC are interested in understanding how that electricity might be sold to DOE.

#### *1.3.4.5 CENTRAL FACILITIES AREA*

The Central Facilities Area (CFA) is located in the south-central portion of the INL Site, about three miles northwest of the intersection of Highways 20 and 26. CFA is an industrial-support area originally developed for use by the Navy and has since served as the main service and support center for INL's desert facilities. Functions housed at CFA include laboratories, security operations, fire protection, a medical facility, communication systems, warehouses, a cafeteria, vehicle and equipment pools, the bus system, the headquarters for INL Power Management with technicians and crafts such as electricians, carpenters, and equipment operators.

#### *1.3.4.6 IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER*

Idaho Nuclear Technology and Engineering Center (INTEC) facilities are used for safely storing high-level waste such as calcine and spent nuclear fuel, repackaging remote-handled transuranic waste, and processing remaining liquid-sodium-bearing waste.

#### *1.3.4.7 ADVANCED TEST REACTOR*

INL's nuclear research capabilities rely heavily on the Advanced Test Reactor (ATR), located at the ATR Complex on the INL Site, 47 miles west of Idaho Falls. ATR's capabilities and infrastructure are accessible through various programs that support the U.S. and international nuclear research efforts. ATR is the only U.S. research reactor capable of providing large-volume, high-flux thermal-neutron irradiation in a prototype environment. The reactor's singular design makes it possible to study the effects of intense neutron and gamma radiation on reactor materials and fuels.

#### *1.3.4.8 NAVAL REACTORS FACILITY*

The Naval Reactors Facility (NRF) was created to support the U.S. Navy's Nuclear Propulsion Program. For 50years, NRF tested reactor designs, received naval spent nuclear fuel for examination and storage, and trained approximately 40,000 navy personnel using prototypes to operate nuclear power plants on ships. From the early 1950s through the mid-1990s, NRF built and operated prototype nuclear propulsion plants for submarines and aircraft carriers. While the complex consists of three naval nuclear reactor prototype plants, the Expended Core Facility, Dry Fuel Storage Facility, and support buildings, only the Expended Core Facility remains active. The Expended Core Facility, which was built in 1958, receives, inspects, and conducts research on, and provides temporary storage for naval spent nuclear fuel. It also prepares and examines developmental nuclear-fuel-material samples. NRF work helps in the design of longer-lived cores, minimizing the creation of spent nuclear fuel and the need for disposition.

#### *1.3.4.9 TEST AREA NORTH/SPECIFIC MANUFACTURING CAPABILITY*

The Test Area North (TAN) is located in the northern portion of the INL Site. In general, TAN consisted of facilities originally built for handling, storing, examining, researching, and developing spent nuclear fuel. The Radiological Response Training Range is located at TAN. It has a unique capability to provide a large outdoor testing and training location where short-lived, dispersed radioactive materials can be disseminated or radioactive sources placed to provide direct support to federal agencies responsible for the nuclear-forensics mission. The Specific Manufacturing Capability (SMC) Project is also located at TAN. The SMC is the complex responsible for production of heavy armor that helps make U.S. Army Abrams Tanks the world's best armored vehicles.

#### *1.3.4.10 MATERIALS AND FUELS COMPLEX*

The Materials and Fuels Complex's (MFC's) core research and/or production competencies exist in the following areas:

- Nuclear fuels fabrication and characterization
- Transient irradiation testing
- Radiation damage in fuel cladding and in-core structural materials
- Advanced manufacturing of nuclear fuels and reactor components
- Nuclear fuel recycling
- Focused basic research that advances the applied technology mission
- Nuclear nonproliferation and nuclear forensics
- Space nuclear power and isotope technologies
- Storage and handling of used fuel and associated materials
- Disposition of waste and materials, including onsite disposition of remote-handled low-level waste (RHLLW).

#### *1.3.4.11 CRITICAL INFRASTRUCTURE TEST RANGE COMPLEX*

The Critical Infrastructure Test Range Complex (CITRC) offers an isolable electrical transmission and distribution system and a comprehensive communications test bed. CITRC is a national user facility that supports research, development, and demonstration of technologies, systems, and policies to protect the nation's infrastructure. CITRC encompasses a collection of specialized test beds and ranges, including the full-scale Electric Power Reliability Test Bed; the carrier-grade Wireless Test Bed for integrated power and wireless testing; the Water Test Bed, which is a full-scale representation of a municipal water system; the Radiological Dispersion Devices Training Ranges and Biotechnology Center, where specialized, hands-on training is conducted with military and civilian first responders; and locations used for nuclear-nonproliferation detection testing and aqueous reprocessing. CITRC creates a centralized location where government agencies, utility companies, and equipment manufacturers can work together to develop or test solutions to many of the nation's most-pressing security issues.

#### *1.3.4.12 MISSION ORGANIZATIONS*

The various mission organizations, including National & Homeland Security (N&HS), Energy and Environment Science and Technology (EES&T), and Nuclear Science and Technology (NS&T), all have significant interest in electric-power infrastructure on the INL Site due to ongoing missions.

### 1.3.5 Reactor Owners and Users

For reactors installed in a grid connection system that exports power to the utility side of the meter (or is privately owned and submetered), the reactors are anticipated to be NRC-licensed. Thus, they will not be owned by DOE.

## 1.4 Assumptions

It is assumed that siting of future reactor test projects will be consistent with preferred locations outlined in INL/EXT-20-57821, *Evaluation of Sites for Advanced Reactor Demonstrations at Idaho National Laboratory*. Figure 1 illustrates the general areas of those locations.

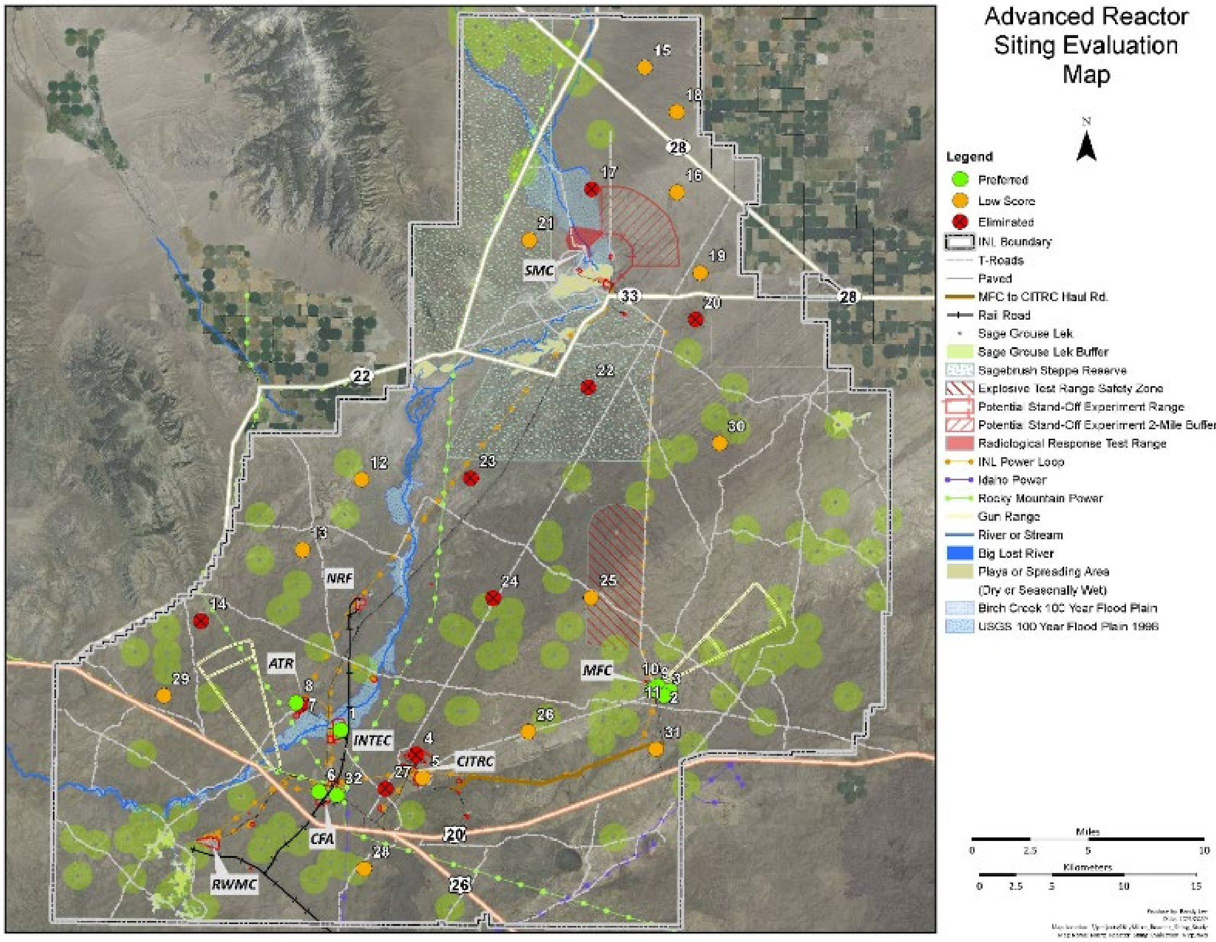


Figure 1. Advanced Reactor Siting Evaluation Map (INL/EXT-20-57821).

# 2. INFRASTRUCTURE INTERFACES

## 2.1 Power

### 2.1.1 Existing DOE-Owned Transmission Grid

The DOE Office of Nuclear Energy (DOE-NE) owns and operates the power-distribution system that covers the 890 square mile INL desert site. The system is made up of 10 substations and roughly 70 miles of overhead 138kV-rated transmission lines (see Figure 2). The majority of the transmission system exists in a loop configuration, allowing it to supply reliable and redundant power to mission essential infrastructure, including the ATR, MFC, CITRC, and SMC(INL 2019).

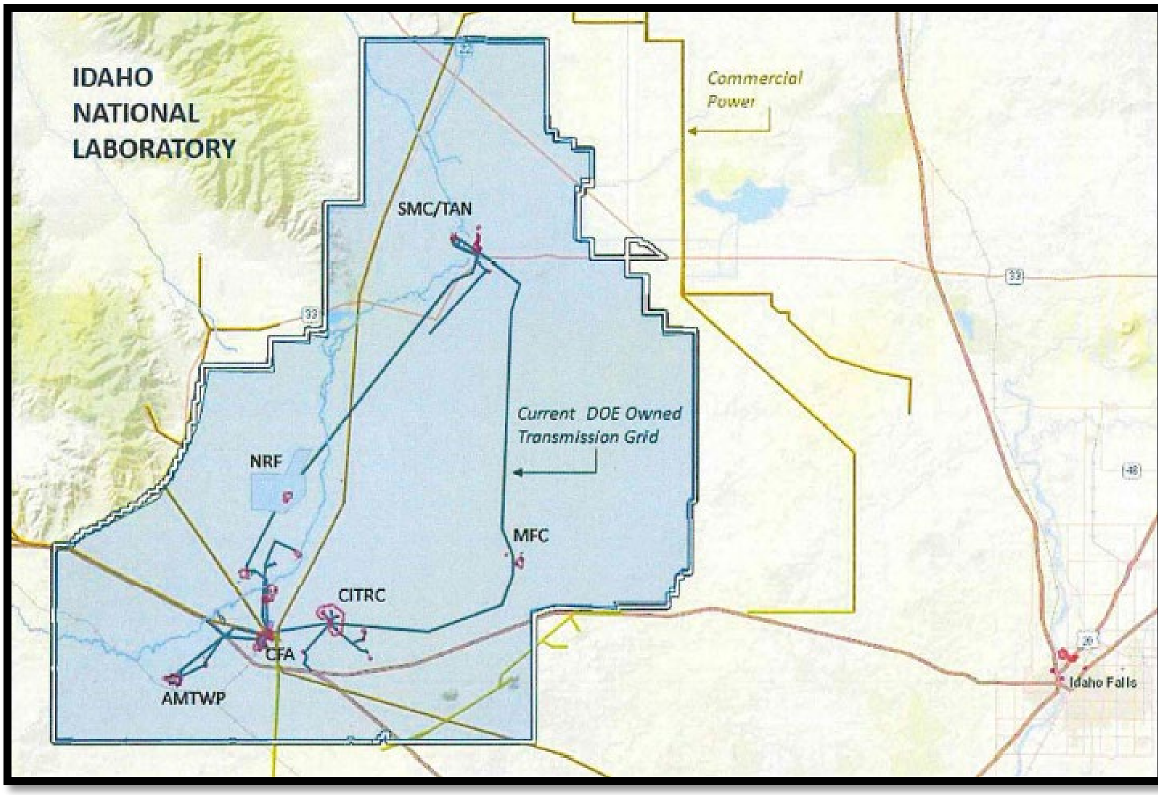


Figure 2. The INL's DOE-owned power transmission system connects with commercial power distribution infrastructure (DOE 2019).

### 2.1.2 House/Ancillary Power

Those reactor test projects on the INL Site that require continuous utility-supplied house power for system operations and ancillary loads will need to be tied into the existing DOE-owned and operated power-distribution system. Projects located within one of the existing powered facilities, such as MFC or CITRC, that are downstream/on the low voltage side of an existing substation have the capability to be tied into circuits at those locations. However, consideration must be given to available system capacity, project power consumption, and potential risks to existing equipment. Entities requiring house power will be required to coordinate planning, engineering, and construction activities with INL Power Management personnel ("INL Infrastructure Capacity Report—ATR" in NRIC Teams folder).

### 2.1.3 Emergency/Backup Power

Reactor test projects on the INL Site that require emergency or backup power to ensure safe shutdown in the event of loss of commercial power will need to install standby backup generation sufficient to meet minimum power requirements for safe system shutdown. Installation of diesel or other standby generators will require coordination with INL Environmental and Power Management personnel (SAR-153, "Upgraded Final Safety Analysis Report For The Advanced Test Reactor," Chapter 8—Electric Power, in NRIC Teams folder from Grid Connection Roadmap).

## 2.2 Network Communications

### 2.2.1 Voice Communications and Telephony Services

Telephony services are available throughout large portions of the INL Site. Battelle Energy Alliance could provide these services to reactor-testing sites without significant hurdles; however, the telephony system is limited in capacity and could pose potential bottlenecks depending on the amount of services a given reactor test site requires.

### 2.2.2 Fiber-Optic Network

Battelle Energy Alliance (BEA) currently owns and operates a fiber-optic network across the desert site, including fiber access. The main fiber trunk that runs from Idaho Falls to the Site poses potential bottleneck issues for reactor-test projects requiring significant Internet data throughput. The Idaho Falls-to-Site fiber trunk is approximately 30 years old; it presently consists of just eight fiber strands that are already fully allocated. Information Management (IM) has plans to upgrade the fiber system from eight strands to 288 strands. IM is also working on upgrades to enable speeds up to 400Gig/s. These upgrade plans are in the early stages, and no official plans are in place to conduct the work. Current cost estimates to run new fiber from Idaho Falls to the Site range between $20 million and $45 million for overhead, power-pole-type construction, to roughly $800 million for underground trench-type construction. One commercial entity is currently working on installing fiber from Idaho Falls to Boise, Idaho. This would pass through the desert site and could present an additional option for reactor test projects if and when the project is complete.

### 2.2.3 Millimeter-Wave Technology

Millimeter-wave technology is available throughout some locations on the INL Site. Millimeter-wave technology is an extremely high frequency (EHF) radio, allowing transmission between 30 and 300 GHz. It provides extremely high throughput and low latency communications at short ranges.

### 2.2.4 WiMax Wireless Network

Worldwide Interoperability for Microwave Access (WiMax) wireless broadband technology is available throughout large portions of the Site via transmitters on Howe Peak and the East Butte. For reactor tests operating in remote areas of the site, where other forms of communications are not available, a WiMax connection can be established by IM and INL Communications staff.

## 2.3 Water and Sewer

### 2.3.1 Facility and Drinking Water

For the majority of reactor testing, potable water will be transported to the test site and supplied to common support areas. Onsite water tanks and pressure systems will be provided by the reactor test projects as appropriate.

For prolonged tests, potable water may be obtained by drilling a system of wells in accordance with Idaho Administrative Procedure Act (IDAPA) Title 58.01.08, "Idaho Rules for Public Drinking Water Systems," and IDAPA Title 37.03.09, "Well Construction Standards Rules." The water from the wells would then be pumped to the surface and stored in storage tanks. The water would need to be passed through a water treatment system before being sent to the facilities for use. Entities requiring the establishment of permanent drinking-water systems will be required to coordinate planning, engineering, and construction activities with INL Environmental and Facilities and Site Services staff.

### 2.3.2 Reactor Operations Support Water

Most advanced reactors require no active reactor-support water. Most designs can also be implemented with air cooling, greatly reducing required water use. If support water is needed, a well will need to be drilled.

Entities requiring the establishment of reactor operations support-water systems will be required to coordinate planning, engineering, and construction activities with INL Environmental and Safety and Health organizations.

### 2.3.3 Fire Water Sources and Pumps

Fire water would need to come from a source separate from main water. This source, such as a large-capacity storage tank or tanks, could be filled from the main water source. This would allow fire water and backup cooling water to have their own water source, supplemented by the main water supply as needed.

Multiple pumps may be required to pump water through the fire system. This would also need to generate enough pressure to provide backup cooling to the reactor in the event of loss of coolant where a separate system for backup cooling does not exist. Fire water pumps would be the responsibility of the appropriate test reactor and would require coordination with the INL fire marshal.

### 2.3.4 Sewage

Reactor sites outside of existing facilities with sewage services, such as MFC, will be required to acquire or develop their own solutions for sewage. In most cases, this need can likely be fulfilled by renting portable restrooms (port-a-potties) from local providers. In cases where a more permanent solution is desired, the likely route would be the installation of a sewage lagoon such as that at ATR Complex, as is described in reference document INL/EXT-13-29642 (August 2013). This would also require a water source, either available or installed by drilling a well or installation and maintenance of a large onsite non-potable-water storage take.

## 2.4 Roads, Grounds, and Rail

### 2.4.1 Roadways

The INL contains a number of highways, roads, and trails, ranging from paved state highways, paved INL roads, improved gravel roads, and lightly used two-track trails. The majority of these roadways are not accessible to the public. INL's primary roadways are designed in accordance with the American Association of State Highway and Transportation Officials' (AASHTO) "Standard Specification for Highway Bridges," as class highway semi-trailer (HS)-20 (tons). Several roadways have been designed to accommodate these heavy loads.

Transportation plans must be coordinated with and evaluated by INL's Facilities and Site Services.

### 2.4.2 Rail Lines

Due to the weight and size of reactors to be tested, extended transportation by traditional roadways is largely not feasible. INL inspects and performs maintenance required on 21.5 miles of onsite INL railroad system to a Class 1 standard or better in accordance with the Federal Rail

Administration standards (see PLN-1084). These lines connect to the Union Pacific rail line which is serviced from near Blackfoot, Idaho.

The rail system provides on-site service to INL's CFA and NRF. Rail sidings within the INL Site enable controlled loading and unloading of materials, as well as appropriate physical security. Figure 3 illustrates the statewide rail system serving INL.

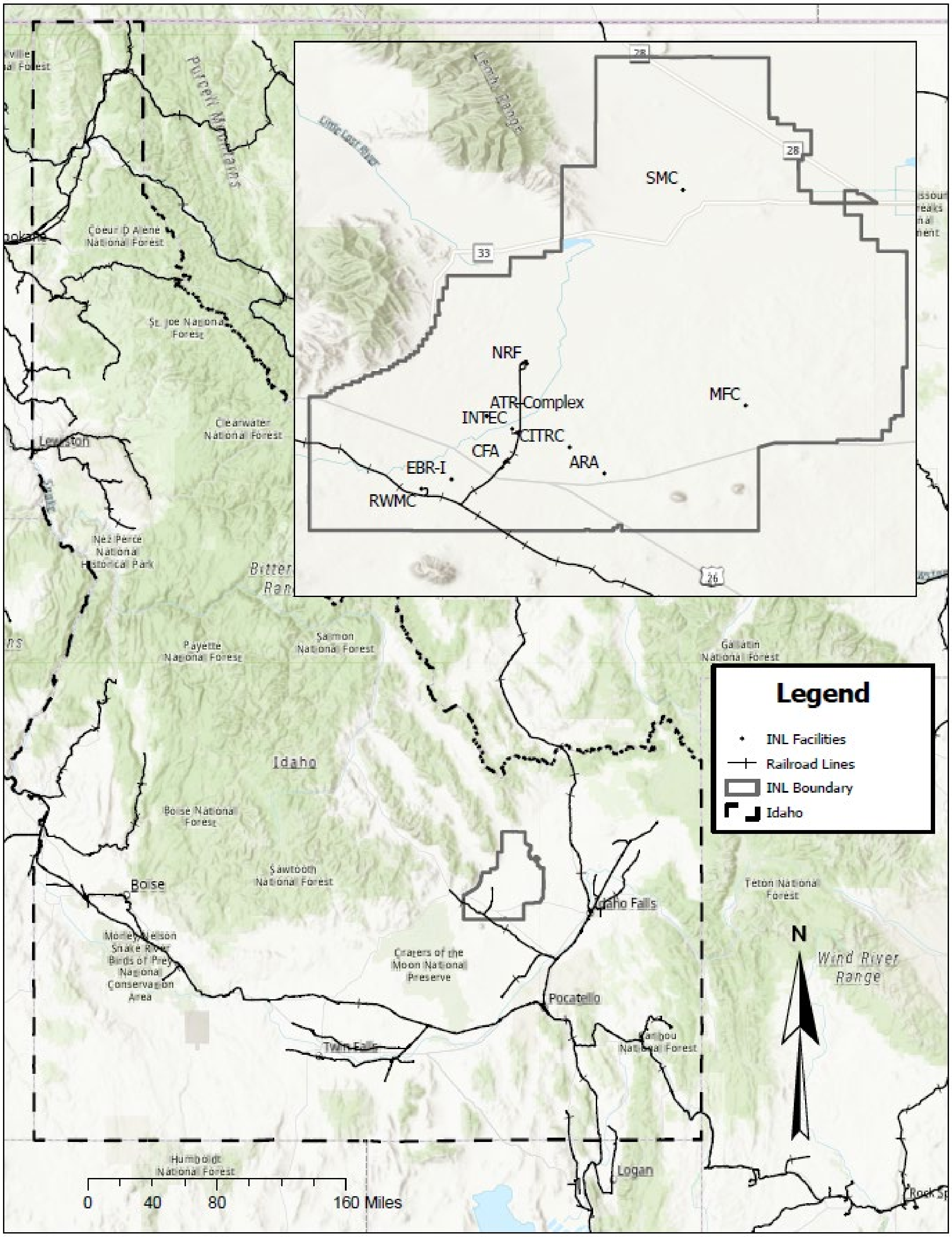


Figure 3. Southern Idaho railway system (Idaho Transportation Department. https://itd.idaho.gov/wp-content/uploads/2016/06/IdahoFreightNetworkRailAirWater.pdf)

INL will work with reactor owners to determine a transportation plan.

# 2.5 Services

## 2.5.1 Emergency Management

INL is responsible for providing Emergency Management services to all on-site activities. These services include:

- Performing emergency-management operations, including providing emergency and security notifications and support for the coordination and execution of emergency-event activities and drills
- Receiving and disseminating information pertaining to outages, alarm monitoring, telecommunications, hazardous shipments, weather, and national warning systems
- Providing emergency reporting, answering, and dispatching services, and acting as the Emergency Management public-liaison representative
- Operating and maintaining readiness of the INL Emergency Operations (EOC) and Emergency Command Centers (ECC).

The INL Emergency Management Department will collaborate with test reactors deployed on the INL Site to ensure both that appropriate mitigation, response, and recovery plans are in place and that appropriate INL functions are engaged.

## 2.5.2 Fire Department and Emergency Medical Services

The INL Fire Department provides fire and emergency medical services (EMS) response to the INL Site. These services include:

- Establishes qualified personnel and equipment to respond to emergencies—medical, structure fires, wildland fires, vehicle accidents, and special hazards (e.g., confined space rescue, hazardous material [HAZMAT], and high- and low-angle rescues)
- Acquires and maintains equipment and attracts and hires personnel to sustain a state of readiness to respond to events
- Maintains operational fire stations located at CFA, MFC, and TAN
- Executes and maintains the Emergency Response Baseline Needs Assessment, pre-incident plans, and annual vegetation/defensible space inspections
- Provides EMS at CFA Medical, including
    - A Registered Nurse, 24/7
    - A Medical Provider on location, Monday through Thursday from 7:00 AM until 5:30 PM, and on call all other times
    - A medical decontamination facility for treatment of radiologically contaminated injuries or radiation-induced illnesses.

Per the 2021 INL Emergency Response Baseline Needs Assessment (BNA), INL/EXT-21-62192, “for structural firefighting, NFPA 1710 establishes 4 minutes as the maximum travel time for arrival of an initial engine company; 8 minutes for the arrival of a full-alarm assignment to 90% of incidents; and for the arrival of personnel qualified as first responders with AED, within 4 minutes of 90% of EMS incidents.” Overall response times are largely dependent on travel times associated with the location of the incident. Table 1 from the BNA indicates typical INL Fire Department travel times, indicating that response times to test-reactor sites will be dependent on the location of the reactor.

Table 1. INL Fire Department Response Travel Times to Site Areas (INL/EXT-21-62192).

| INL Fire Station Responding | Site Area | Distance (miles) | Time (minutes) |
|---|---|---|---|
| 1 | AMWTP | 6.1 | 7 |
| 1 | ATR Complex[ba] | 4.4 | 5 |
| 1 | CFA | 0.5 | 1 |
| 1 | CITRC/PBF | 6 | 6.5 |
| 1 | INTEC | 3.0 | 4 |
| 2 | MFC | 0.5 | 2 |
| 1[a] | MFC | 19.7 | 20 |
| 1 | NRF | 8.2 | 8 |
| 1 | RWMC | 5.9 | 6.25 |
| 3 | SMC/TAN | 1.5 | 2.25 |
| 1 | SMC/TAN | 27.5 | 26.25 |

a Denotes a second engine company response from a station different from the initial response.
b Includes RHLLWF.

The INL Fire Department has noted in its BNA that “significant infrastructure is planned for the NRF area and potentially south of Highway 20/26 for the proposed Small Modular Reactor Project. INL’s population and high-value-property distribution is changing and not optimally protected by the current model.”

### 2.5.3 Emergency Communications

The INL Emergency Dispatch Center provides enhanced-911 services to the INL Site. INL’s Emergency Dispatch Center, coupled with INL’s Warning Communications Center, serves to provide services including:

- Centralized fire-alarm-system monitoring
- Alarm testing support and reporting
- Fire Department dispatching
- Fire-protection impairment tracking
- Argus alarm monitoring services
- Protective Force response dispatching
- Emergency Response Organization activation.

While INL’s enhanced-911 services are integrated with other regional 911 centers to provide coordinated communications and emergency response across multiple jurisdictions (and thus work with all commercial phone services), services such as centralized fire-alarm system monitoring and Argus alarm monitoring require enhanced integration with the INL Alarm Reporting System to ensure all initiating devices and fire-alarm panels appropriately report to the Fire Alarm Center head-end unit.

### 2.5.4 Safeguards and Security (including Protective Force and Site Badging and Access)

INL's Safeguards and Security directorate is responsible for providing unarmed and armed protective forces to the site tenant's perimeter. Additionally, Safeguards and Security provides general site badging and access service, as well as monitoring of INL's Argus Alarm Monitoring Services. Safeguards and Security is responsible for physical security, personnel security, foreign visits and assignments, classification and declassification, classified matter protection and control, nuclear material control and accountability, and operations security.

### 2.5.5 Radio Frequency Communication

INL manages all radio frequency (RF) emissions across the INL. To ensure effective RF communications and limit interference, INL:

- Provides RF Communications, which includes Land Mobile Radio (LMR) P25 frequency-transmission services
- Provides sitewide strategic and tactical planning, including frequency management
- Coordinates wireless- and radio-communication system integration and connectivity needs
- Manages the INL RF spectrum as required by the National Telecommunications and Information Administration
- Performs and coordinates spectrum assessments and federal emergency readiness and security activities.

**NOTE:** *Radios and signal boosters are not included in these services.*

### 2.5.6 Seismic Monitoring, Reporting, and Program Management

The INL Seismic Monitoring Program provides INL with earthquake data and staff expertise to support the requirements of DOE Order 420.1C, "Facility Safety." The INL Seismic Monitoring Program supports the safety of SSCs, workers, and the public and the operations of INL nuclear facilities and waste-management activities. Specifically, the program supports safety of operations through:

- Continuous monitoring and reporting of earthquake activity
- Integration of earthquake data into INL probabilistic seismic hazard analyses
- Development of INL seismic-design criteria
- Early warning of volcanic-related earthquakes as an indicator of potential volcanic activity near INL.

The INL Seismic Monitoring Program operates 37 permanent seismic stations for the purpose of determining the time, location, and size of earthquakes occurring in the vicinity of INL. Earthquake data are compiled to develop a historical database that defines their spatial distributions, magnitudes, and frequency of occurrence. INL seismic stations and seismic monitoring area (SMA) sites are located near sources of future earthquakes, including three major Quaternary-normal faults, volcanic rift zones, and the eastern Snake River Plain (ESRP) (see Figure 4). Thirteen broadband seismic stations are located within INL boundaries for assessing shallow crustal damping to develop site-specific ground-motion models for probabilistic seismic hazard analyses.

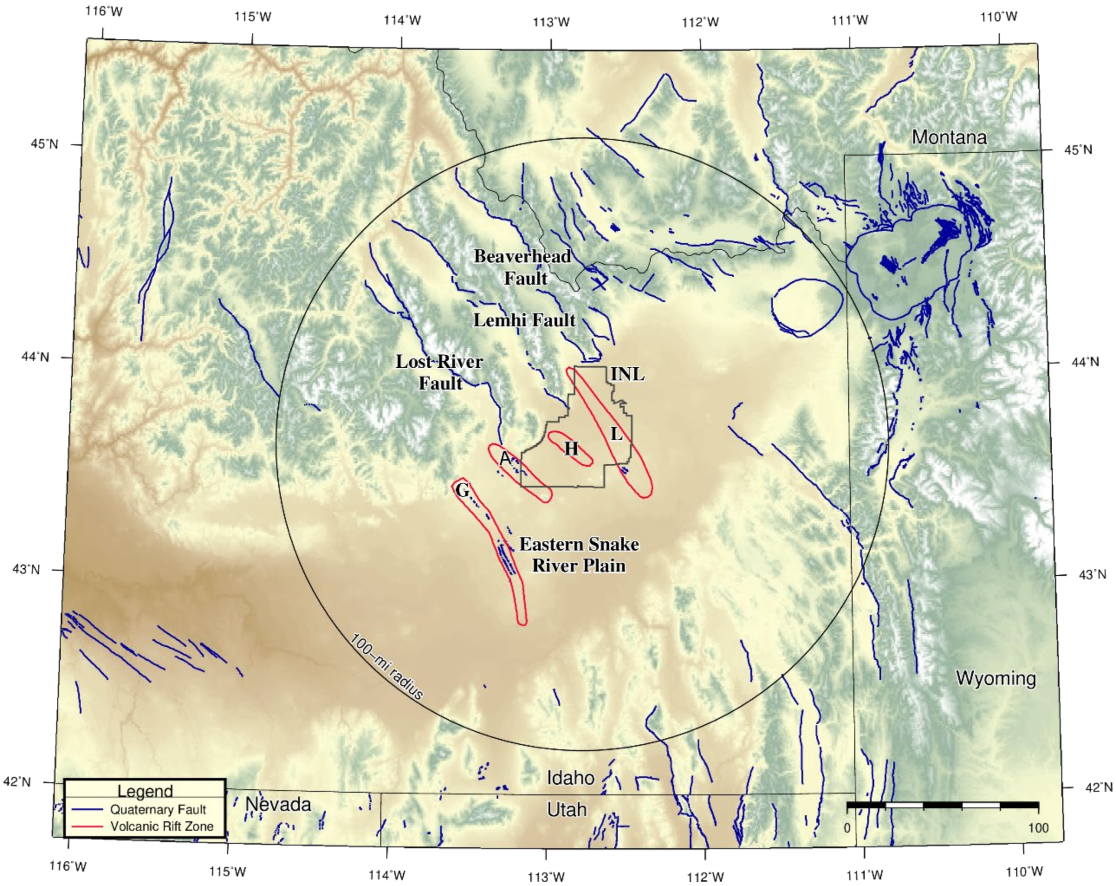


Figure 4. Map shows location of the earthquake reporting area with a 161-km (100-mile) radius around INL.

Additionally, the INL Seismic Monitoring program operates 18 continuous geopositioning satellite (GPS) sites to provide data for purposes of determining rates of crustal deformation and coseismic deformation in the event of large earthquake. GPS velocity gradients are used to identify regions with higher crustal deformation rates (such as the Yellowstone Caldera in Wyoming) relative to regions with lower deformation rates (e.g., the Snake River Plain, Idaho). Regions with high deformation rates generally have higher rates of earthquakes.

The INL Seismic Monitoring Program also operates 43 sites that have SMAs or three-component accelerometers for the purpose of recording strong ground motions from local moderate or major earthquakes. Nine SMAs are located in INL buildings to determine building responses to strong ground motion in the event of a large earthquake. Thirteen SMAs at “free-field” sites (i.e., not within buildings) are located at or near INL facility areas and are used to determine levels of free-field ground shaking for either rock or soil conditions. Twelve sites, co-located at seismic stations within the INL boundaries, have three-component accelerometers to record near-field ground motions from small-to large-magnitude normal faulting earthquakes. The remaining eleven three-component accelerometers are co-located at seismic stations surrounding the ESRP (quakes.inl.gov/SitePages/Home.aspx).

### 2.5.7 Cultural Resource Monitoring, Reporting and Program Management

Cultural-resource management is a critical component of stewardship and operational excellence at the INL Site, where federal laws and regulations, state laws, DOE policies, and DOE-ID legal commitments to the Shoshone-Bannock Tribes, state of Idaho, and the federal Advisory Council on Historic Preservation require consideration of cultural resources in the conduct of all work. The scope of this management responsibility is wide, including resources that represent thousands of years of human land use in the region. Several unique categories of cultural resources are actively managed, including:

- Pre-historic and historic archaeological sites encompassing aboriginal hunter-gatherer use along with trade, irrigation, and homesteading activities
- World War II and Cold War era buildings, structures, and landscapes
- Archival collections with intrinsic and research value regarding the development and evolution of INL.

The INL Cultural Resource Management Office (CRMO) has developed an advanced toolkit and range of innovative cultural-resource assessment strategies to address the legally mandated management requirements for such resources. With several decades of combined professional experience, established relationships with important stakeholders, an active program of ongoing research projects, and active files spanning nearly 50 years of cultural-resource investigations and research at INL, the INL CRMO team provide necessary services and expertise to effectively integrate cultural-resource consideration into project and land-use planning and implementation for a wide variety of INL projects and programs (crmo.inl.gov/SitePages/Home.aspx).

Specific roles and responsibilities of the CRMO include:

- Providing Cultural Resource Monitoring, Reporting, and Program Management, which includes implementing all facets of the INL Cultural Resources Management plan (CRMP) that includes updating the facility inventory, eligibility determination.
- Coordinating tracking of federal undertakings and actions/mitigations by outside agencies, universities, or subcontractors.
- Maintaining INL cultural resource records.

NOTE: The State Historical Preservation Office has the final facility-eligibility determination approval and final CRMP review and issuance. This does not include performance of cultural resource reviews for federal undertakings. ("Undertakings means a project, activity or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, those carried out with federal financial assistance, and those requiring a federal permit, license, or approval." See 36 Code of Federal Regulations (CFR) 8001.6(y).

### 2.5.8 Environmental Management System

INL balances research, development, and demonstration activities in support of the mission with the protection and preservation of human health and the environment together with compliance with applicable laws, regulations, and other requirements. INL's Environmental Management System integrates environmental protection, environmental compliance, pollution prevention, and continual improvement into work planning and execution through work areas as part of the Integrated Safety Management System (eshq.inl.gov/EMS/SitePages/Home.aspx).

### 2.5.9 Waste Management/Landfill Services

The Waste Management Program opens and maintains disposition paths for radioactive, hazardous, and mixed waste generated by activities at INL. Specific scope of the Waste Management Program includes:

- Providing guidance to facilities, programs, and projects for effective waste-management strategies to ensure regulatory, state, and DOE Order 435.1 compliance
- Managing waste in accordance with disposal-facility certification to ensure efficient and compliant disposition
- Maintaining service centers to assist generators in funding waste disposition
- Establishing and maintaining a radioactive-waste management basis in accordance with DOE Oder 435.1, "Radioactive Waste Management" (eshq.inl.gov/waste_management/SitePages/Home.aspx).

Entities requiring the use of waste management and landfill services should coordinate with INL Environmental, Safety and Health and Facilities and Site Services staff.

# 3. REACTOR TESTING PARTNER RESPONSIBILITIES

Each reactor test is unique. As such, reactor test partner responsibilities will be specific to the test being performed. Responsibilities may include, but are not limited to the following:

- Radiological controls and radiological monitoring
- Creation and maintenance of facility roads and grounds
- Operations
- Labor
- Wells or supply of potable, non-potable, and fire water to meet facility needs and requirements (if not located within existing BEA facilities)
- Sewer systems or temporary sewage solutions if not located within existing BEA facilities
- Coordination with INL Engineering Services to ensure safe operations within operational constraints
- Coordination with INL Agreements Management will be necessary for all reactor testing to ensure appropriate agreements are in place for services to be provided.
- All coordination efforts will be led by NRIC and documented in appropriate agreements prior to beginning work.

# 4. INFRASTRUCTURE IMPROVEMENT NEEDS

INL Fire Department has noted in its BNA that "significant infrastructure is planned for the NRF area and potentially south of Highway 20/26 for the proposed Small Modular Reactor Project. INL's population and high-value property distribution is changing and not optimally protected by the current model."

The main fiber trunk from Idaho Falls to desert site is near its maximum capacity at current usage. IM has future plans to execute an upgrade and expansion, but any immediate or near-term needs for large amounts of data bandwidth on the fiber network by reactor projects could require an expedited upgrade process.

Depending on the location of each reactor, in addition to the load size and voltage requirements, additional power transformers and associated protection equipment may be required.

For reactors wishing to generate electrical power and inject it onto the existing DOE-owned system, significant additional system modifications and improvements may be required. See the NRIC Grid Connection Roadmap for more details (Case et al. 2023).

# 5. APPENDICES

Appendix A, Points of Contact

# 6. REFERENCES

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# Appendix A

# Points of Contact

| Name | Contact Information | Area of Expertise |
|---|---|---|
| Brandon Deschamps | Brandon.Deschamps@inl.gov | Communications Systems |
| George Griffith | George.Griffith@inl.gov | INL SMR RDD&D |
| Philip Schoonover | Philip.Schoonover@inl.gov | DOME and LOTUS Testbeds |
| Ian Archibald | Ian.Archibald@inl.gov | Power Management |
| K'Lynn Harmon | Klynn.Harmon@inl.gov | Emergency Response/Fire |
| Joseph Stewart | Joseph.Stewart@inl.gov | Roads and Grounds |
| Joseph Stewart | Joseph.Stewart@inl.gov | Water/Sewer |
| Thomas Stoops | Thomas.Stoops@inl.gov | INL Net Zero Initiative |
| Stephanie Weir | Stephanie.Weir@inl.gov | Environmental Management |
| Brandon Deschamps | Brandon.Deschamps@inl.gov | Information Management /Cybersecurity |