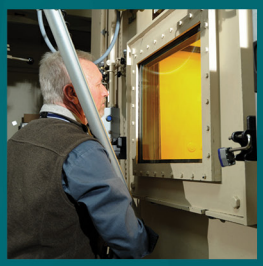
DOE/ID-11528

Idaho National Laboratory

2015-2025 TEN-YEAR SITE PLAN

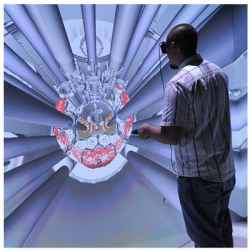


Developing and Maintaining the INL Infrastructure

July 2015

Idaho National Laboratory

Research at the Biomass Feedstock National Scientific User Facility supports conversion of feedstock into clean energy for the future.



The Computer Assisted Virtual Environment supports research at the Center for Advanced Energy Studies.

Transuranic Surveillance Glovebox is a work platform providing radiological containment and an inert atmosphere to perform surveillance and repackaging of transuranic material in the Zero Power Physics Reactor.

INL's unique infrastructure includes an independent electric power grid consisting of utility-scale transmission lines, substations, distribution systems, and controls.

Researcher using real-world control system knowledge to advance the physical and cyber security protection of industrial control system.

The heavy vehicle simulator located at the Center for Advanced Energy Studies, a public-private research enterprise on INL's campus, allows researchers to glean human performance data to learn how improved driver behavior can influence fuel efficiency.

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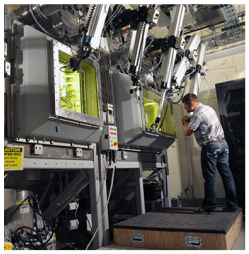
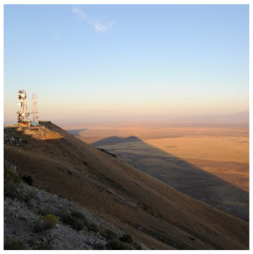
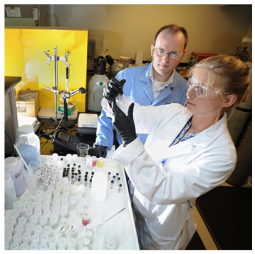
2015-2025 TEN-YEAR SITE PLAN



Developing and Maintaining the INL Infrastructure

July 2015

Idaho National Laboratory

Idaho National Laboratory
2015–2025 Ten-Year Site Plan

DOE/ID-11528
Revision 0

July 2015

Approvals

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Laboratory Director
Idaho National Laboratory
President and Chief Executive Officer
Battelle Energy Alliance, LLC

27 July 2015
Date

Rick Provencher
Manager
Idaho Operations Office
U.S. Department of Energy

July 28, 2015
Date

Tracey Bishop
Deputy Assistant Secretary for
Nuclear Facility Operations
U.S. Department of Energy

July 30, 2015
Date

INL AT-A-GLANCE

Location:
Idaho Falls, Idaho

Type:
- Nuclear Energy
- National and Homeland Security
- Energy and Environment
- Multiprogram Laboratory

Lead Program Secretarial Office:
U.S. Department of Energy (DOE) Office of Nuclear Energy

Contractor:
Battelle Energy Alliance, LLC

Responsible Site Office:
U.S. DOE Idaho Operations Office

Website:
http://www.inl.gov/

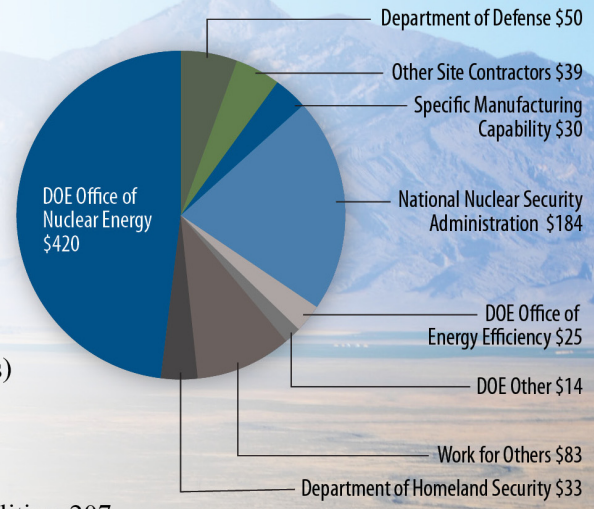
DOE-NE Physical Assets:
(Fiscal year 2014 Facility Information Management System snapshot for nonprogrammatic-owned and operating assets)

- Land area: 569,178 acres
- 286 buildings and trailers, 2.4 M gross ft^2
- Nonprogrammatic other structures and facilities: 207
- Replacement plant value: $3.3B
- Deferred maintenance: $63M
- Repair needs: $77M
- Average asset condition index
  All assets: 0.981 (target 0.950)
  Mission-critical: 0.997 (target 0.970)
  Mission-dependent: 0.962 (target 0.9250)
  Not mission-dependent: 0.951 (target 0.900)

Human Capital (as of 2/23/2015):
- 3,619 full-time-equivalent employees
- 19 postdoctoral researchers
- 26 graduate student interns
- 29 undergraduate student interns

Nuclear Science User Facilities:
Three designated facilities with 130 participants

FY 2014 NEW FUNDING BY SOURCE ($M):



The mission of Idaho National Laboratory (INL) is to discover, demonstrate, and secure innovative nuclear energy solutions, other clean energy options, and critical infrastructure. Accordingly, the Laboratory provides research leadership in nuclear energy, critical infrastructure protection, and clean energy deployment. To execute research leadership, the Laboratory pairs national leaders with critical physical infrastructure while forming key national and international partnerships. This Ten-Year Site Plan (1) outlines the infrastructure vision for INL for the next decade, (2) describes the facilities needed to accomplish the Department of Energy's mission, and (3) details the plans necessary to accomplish the task and continue the ongoing growth of INL.

Since INL was created in 2005, the Laboratory has experienced significant growth with associated growing impact. The addition of seven new major research and development facilities along University Boulevard has provided not only major new capability and collaborative space in national security, clean energy, and transportation sciences, but has transformed the image of the Laboratory that is provided to new or returning visitors. Major improvements have been made to the nuclear capabilities of the Laboratory, including upgrades to the Advanced Test Reactor and the addition of new fuel fabrication capability in the Experimental Fuels Facility and new post-irradiation capability in both the Fuels and Applied Science Building and newly constructed Irradiated Materials Characterization Laboratory. Creation of two new user facilities, the Wireless National User Facility and Biomass Feedstock National User Facility, has provided major research and development centers that anchor major capability in the Laboratory. The combination of facilities to support nuclear research and development, critical infrastructure protection, and clean energy deployment provide the nation's most complete set of energy systems demonstration facilities.

In the next 5 years, additional capability will be completed that fills gaps in INL's advanced nuclear fuel and materials development capability. This includes the restart of the Transient Reactor Test Facility for studying transient behavior and building of the Sample Preparation Laboratory to support handling of radioactive experiments and a broad range of mechanical testing capability for examining radioactive materials. The Laboratory also anticipates adding significant new capability to support its growing stature in modeling and simulation. These facilities, combined with the advances in INL modeling and simulation capability, provide a robust capability for the development of advanced fuels and materials for nuclear systems.

Hosting national infrastructure alone is no longer sufficient to meet changing national energy supply, environmental, and other security needs. Making certain INL assets are available for use by other entities—such as industry, academia, national laboratories, and agencies beyond INL—is a necessary and proper use of the facilities. To optimize the use of precious national resources, INL embraces the user facility model, not only hosting a capability but also making it available to researchers across the nation. Pairing the best ideas with the best capability must be the goal.

Todd R. Allen
Deputy Laboratory Director, Science and Technology
Idaho National Laboratory

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ACRONYMS

AL	Analytical Laboratory
AMWTP	Advanced Mixed Waste Treatment Project
APIE	advanced post-irradiation examination
ATR	Advanced Test Reactor
ATRC	Advanced Test Reactor Critical
CAES	Center for Advanced Energy Studies
CETT	Collaboratory for Energy Transitions and Transformations
CFA	Central Facilities Area
CITRC	Critical Infrastructure Test Range Complex
DOE	Department of Energy
DOE-EM	Department of Energy Office of Environmental Management
DOE-ID	Department of Energy Idaho Operations Office
DOE-NE	Department of Energy Office of Nuclear Energy
E&E	Energy and Environment
EIL	Energy Innovation Laboratory
EML	Electron Microscopy Laboratory
EO	Executive Order
EROB	Engineering Research Office Building
ESL	Energy Systems Laboratory
FASB	Fuels and Applied Science Building
FCF	Fuel Conditioning Facility
FMF	Fuel Manufacturing Facility
FY	fiscal year
HFEF	Hot Fuel Examination Facility
ICP	Idaho Cleanup Project
IMCL	Irradiated Materials Characterization Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IORC	Information Operations and Research Center
IRC	Idaho National Laboratory Research Center
LLW	low-level waste
LOB	Laboratory Operations Board
LWR	light water reactor
MFC	Materials and Fuels Complex
N&HS	National and Homeland Security
NNSA	National Nuclear Security Administration
NRAD	Neutron Radiography Reactor
NR	Office of Naval Reactors
NRC	Nuclear Regulatory Commission
NRF	Naval Reactors Facility
OSF	other structure and facility (one of four Facility Information Management System categories of real property)
PIE	post-irradiation examination
R&D	research and development
RCL	Radioanalytical Chemistry Laboratory
REC	Research and Education Campus
RESL	Radiological and Environmental Sciences Laboratory
RH-LLW	remote-handled low level waste
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SMC	Specific Manufacturing Capability
SNM	special nuclear material
S&S	safeguards and security
SPL	Sample Preparation Laboratory
SSPSF	Space and Security Power Systems Facility
TREAT	Transient Reactor Test Facility
TRIGA	Training, Research, Isotopes, General Atomics
TYSP	Ten-Year Site Plan
U.S.	United States
V&D	validation and demonstration
ZPPR	Zero Power Physics Reactor

1. MISSIONS AND CORE CAPABILITIES

This Idaho National Laboratory (INL) Ten-Year Site Plan (TYSP) describes the approach for managing real-property assets to meet the Department of Energy (DOE) Office of Nuclear Energy (DOE-NE) mission to advance nuclear power as a resource capable of meeting the nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate.

As the DOE-NE national nuclear laboratory, INL serves a unique role in civilian nuclear energy research. INL has history preeminence in reactor and fuel-cycle technology research, development, and demonstration going back to the 1950s and stewardship over the majority of the DOE infrastructure for nuclear energy development. INL assists DOE-NE by leading, coordinating, and participating in research, development, and demonstration performed by national laboratories, United States (U.S.) universities, and collaborating international research institutions.

INL is a multiprogram laboratory. Many competencies arising from expertise or infrastructure were initially developed for the nuclear energy mission. Besides nuclear energy, INL missions encompass protecting the homeland, energy development and security, and environmental stewardship. The customer base is broad, which supports missions of DOE, other federal agencies, universities, and industry where INL has distinctive capabilities. INL also serves a unique role in the Intermountain West Region as a technical resource and advisor on local and regional issues related to the future direction of energy production and distribution.

Other federal agencies supported by INL include the National Aeronautics and Space Administration, Department of Defense, Department of Homeland Security, Nuclear Regulatory Commission (NRC), and Department of the Interior. Some of this work involves the application of INL's nuclear energy capabilities (e.g., nuclear forensics, nuclear nonproliferation, and radioisotope power systems assembly and testing), while other work is an extension of INL's capabilities and expertise in analysis, testing, and validation and demonstration (V&D) in areas such as critical infrastructure protection, clean energy systems, energy storage, and related enabling technologies.

INL Vision

INL will change the world's energy future and secure our critical infrastructure.

INL Mission

Discover, demonstrate, and secure innovative nuclear energy solutions, other clean energy options, and critical infrastructure.

INL works closely with the nuclear industry on DOE research initiatives to bring a commercial perspective to research and development (R&D) efforts and meet industry's specific needs. INL supports industry partners in other segments of the energy sector, automobile manufacturing, and agribusiness with engineering and applied research.

INL continues to mature its R&D strategy to be positioned to address the world's most challenging problems in advancing nuclear energy, securing and modernizing critical infrastructure, and enabling clean energy deployment (see Figure 1). R&D outcomes and impacts have been defined to clearly focus INL capabilities and assets on achieving critical mission objectives.

This TYSP serves as the INL real property asset plan. Section 1 links INL R&D functions and core capabilities to mission objectives provided in the DOE-NE Roadmap (DOE 2010), annual DOE-NE program guidance, and reports such as the *Facilities for the Future of Nuclear Energy Research: A Twenty-Year Outlook* (DOE-NE 2009). Strategies for managing assets in this TYSP build on the 2008 recommendations of the National Academy of Sciences (NAS 2008), which recognized the need for DOE-NE to invest in research capabilities and develop a process for prioritizing, evaluating, and obtaining additional capabilities. Section 2 describes how INL Campuses and facilities support key mission objectives, Section 3 discusses investment strategies to sustain the readiness of mission-enabling infrastructure, and Section 4 summarizes changes in this TYSP from the previously published version. Though this TYSP provides budget formulation documents, it is not itself a budget document.

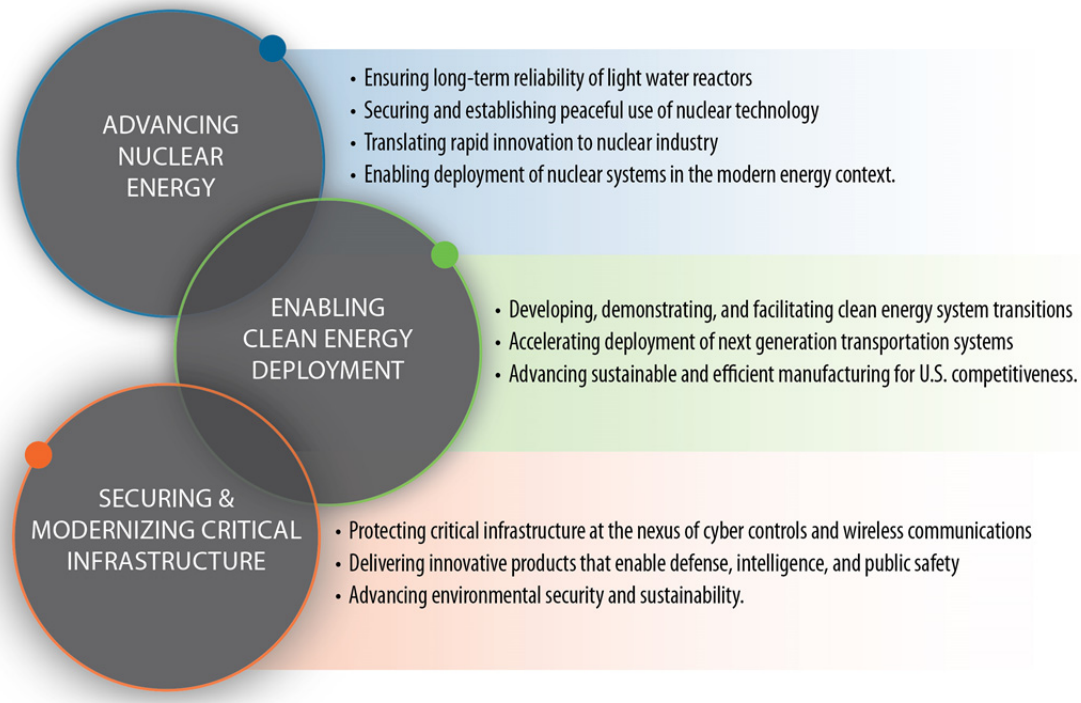

Figure 1. Idaho National Laboratory outcomes defined to meet mission objectives.

1.1 Nuclear Energy Mission

INL's primary mission is to advance nuclear energy by supporting DOE-NE in achieving its objectives. The DOE-NE Roadmap (DOE 2010) calls for increased coupling of theory with fundamental phenomenological testing and modeling and simulation to accomplish DOE research objectives. This approach does not obviate the need for future larger-scale testing; however, it enables exploration of various technology options before having to prepare and invest in larger-scale testing. DOE-NE requires access to many capabilities—from small-scale laboratory experiments to larger-scale prototypic demonstrations—to explore new technologies.

The four research objectives defined in the DOE-NE Roadmap (DOE 2010) continue to define the basis for INL's mission to advance nuclear energy:

- **Objective 1—Develop technologies and other solutions that can improve reliability, sustain safety, and extend the life of current reactors.** INL provides overall technical leadership to the Advanced Light Water Reactor (LWR) Sustainability Program; leads research for advanced LWR nuclear fuels (including fuel performance modeling), advanced instrumentation and control systems, and risk-informed safety margin characterization; and participates in all research pathways.
- **Objective 2—Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals.** INL performs fuel performance modeling, which supports advanced modeling applications for new and advanced reactor and fuel-cycle technologies. INL leads the development and qualification of fuel and graphite for an advanced high-temperature gas reactor and interacts with the NRC on developing a licensing framework for the Next Generation Nuclear Plant.
- **Objective 3—Manage nuclear waste and develop sustainable nuclear fuel cycles.** INL provides technical leadership to several focus areas, including fuel development, separations and waste form development, and systems analysis.

- **Objective 4—Understand and minimize the risks of nuclear proliferation and terrorism.** INL fuel-cycle facilities support the development of approaches and testing of process control instrumentation and new sampling systems that provide near real-time accountability.

The following four INL nuclear energy R&D outcomes focus on advancing nuclear energy by:

1. Ensuring long-term reliability of LWRs and spent fuel storage
2. Securing and establishing peaceful use of nuclear technology
3. Translating rapid innovation to nuclear industry
4. Enabling deployment of nuclear systems in the modern energy context.

1.2 National and Homeland Security Mission

By virtue of distinct geography and location, National and Homeland Security's (N&HS's) unique capabilities, facilities, and expertise often complement INL's nuclear mission. The following three INL N&HS R&D outcomes focus on securing and modernizing critical infrastructure:

1. Protecting critical infrastructure at the nexus of cyber controls and wireless communications
2. Delivering innovative products that enable defense, intelligence, and public safety
3. Advancing environmental security and sustainability.

1.3 Energy and Environment Mission

INL applies science and engineering to expand energy supply, improve energy efficiency, and address the environmental consequences of energy production and use. The following three INL Energy and Environment (E&E) R&D outcomes focus on enabling clean energy deployment by:

1. Developing, demonstrating, and facilitating clean energy system transitions
2. Accelerating deployment of next-generation transportation systems
3. Advancing sustainable and efficient manufacturing for U.S. competitiveness.

Table 1 summarizes how INL R&D functions and facilities support DOE-NE Roadmap Objectives and other customer outcomes.

1.4 Core Capabilities

In 2014, and in support of the DOE Laboratory Operations Board (LOB) infrastructure assessment, DOE-NE updated the list of core capabilities required to accomplish INL's multiprogram missions to the 11 capabilities discussed in this section and summarized in Table 2. Updating the core capabilities was integral to achieving the DOE LOB infrastructure assessment objective to provide DOE leadership with insight into the physical condition, functionality, and utilization of existing infrastructure across the Laboratory, with clear linkage to mission-enabling core capabilities.

1.4.1 Nuclear Fuels and Materials Research

The nuclear fuels and materials research capability includes conducting applied nuclear fuels and materials R&D for applications in electricity and/or process heat production, nuclear materials management (transmutation), research reactors, space technology, and radioisotope production. Expertise includes developing fabrication processes for new fuels; characterizing fuel samples; performing irradiation testing, PIE, out-of-pile testing, and modeling of fuel performance.

Nuclear fuels and materials R&D encompasses fuel performance during normal reactor operations, behavior and failure modes during off-normal and accident conditions, and performance during extended storage and transport.

R&D relies on an engineering-driven science-based approach, which includes multi-scale, multi-physics modeling of fuel performance with phenomenological models at different size and time scales.

The capability supports all four DOE-NE research objectives (described in Section 1.1) and N&HS R&D Outcome 2 (listed in Section 1.2).

Table 1. Summary of Idaho National Laboratory research and development functions and facilities linked to Department of Energy Office of Nuclear Energy Roadmap Objectives and other customer outcomes.

INL R&D Functions	INL Facilities[a]	DOE-NE Objectives (1–4)				Other Users[b]				
		1	2	3	4	NNSA	University	Other Federal	International Cooperation	Industry
Nuclear Fuels and Materials Research/Irradiation										
Thermal-spectrum irradiation	ATR/ATRC and NRAD (small test components)	●	●	●	●	●	●	●	●	●
Transient irradiation	TREAT	●	●		●	●	●	●	●	●
Neutron Radiography	NRAD	●	●	●	●	●	●	●	●	●
Nuclear Fuels and Materials Research/PIE and Fresh Fuel Characterization										
Receipt of irradiated fuels/materials	HFEF	●	●	●	●	●	●	●	●	●
Nondestructive examinations (physical dimensions, photography, gamma scanning, neutron radiography, eddy current evaluation, etc.)	HFEF	●	●	●	●	●	●	●	●	●
Destructive initial analysis (pin puncturing, gas pressure, fission gas sampling and analysis, and void volume)	HFEF	●	●	●		●	●	●	●	●
Destructive examinations (cutting/ sectioning, sample mounting, grinding/polishing/etching, and optical microscopy)	HFEF	●	●	●		●	●	●	●	●
Mechanical testing of highly radioactive materials (sample preparation/machining/punching; high temperature mechanical properties; fatigue and crack growth; tensile, hardness, impact testing, etc.)	HFEF and FASB	●	●	●	●	●	●	●	●	●
Destructive analyses (chemical and isotopic analysis, material characterization, fuel density, fission gas retention, crack-growth rate, electro-optical examination, including scanning electron microscope, transmission electron microscope, focused ion beam, etc.)	HFEF, AL, EML, FASB, CAES, IRC, EIL, and IMCL	●	●	●		●	●	●	●	●
Experimental Fuel Fabrication Capabilities (glovebox lines collocated with irradiation facilities)										
Fuel containing plutonium and minor actinides that can be contact handled (ceramic, metal); small rods and targets up to dose limits	FMF and ZPPR	●	●	●	●	Material storage[c]	●	●	●	●
Fuel that must be fabricated in a shielded facility, pin/rod scale	FCF and HFEF	●		●			●	●	●	●
Highly enriched uranium, low-enriched uranium, thorium in small quantities (pin/plate), and characterization (irradiation-assisted stress corrosion cracking capability)	FASB	●		●		●	●	●	●	●
Low-enriched uranium in larger quantities; larger scale fabrication equipment such as extrusion presses and rolling mills	EFF	●		●		●	●	●	●	●

Table 1. (continued).

INL R&D Functions	INL Facilities[a]	DOE-NE Objectives (1–4)				Other Users[b]				
		1	2	3	4	NNSA	University	Other Federal	International Cooperation	Industry
Advanced Separations and Waste Forms (hot cells and RCLs)										
Aqueous separations and pretreatment technologies	RCL, FASB, CFA, and BCTC			●	●	●	●		●	
Electrochemical separations and waste form (engineering scale)	FCF and HFEF			●	●	●	●		●	
Specialized Laboratory Facilities										
Radioisotope power system assembly and test	SSPSF							●		
Modeling and simulation, high performance computing, and visualization	CAES and EROB	●	●	●			●	●	●	●
Energy systems integration, research, and demonstration	ESL						●	●		●

a. Facilities are operational and DOE-NE-owned unless otherwise identified.
b. Capabilities related to fuel fabrication, irradiation, fresh fuel characterization, and PIE are also available to support industry users.
c. Reduced enrichment for research and test reactor program uses and FMF for storage of low-enriched uranium fuel.

AL Analytical Laboratory
ATR Advanced Test Reactor
ATRC Advanced Test Reactor Critical
BCTC Bonneville County Technology Center
CAES Center for Advanced Energy Studies
CFA Central Facilities Area
EIL Energy Innovation Laboratory
EML Electron Microscopy Laboratory
EROB Engineering Research Office Building
ESL Energy Systems Laboratory
FASB Fuels and Applied Science Building
FCF Fuel Conditioning Facility
FMF Fuel Manufacturing Facility
HFEF Hot Fuel Examination Facility
IMCL Irradiated Materials Characterization Laboratory
IRC Idaho National Laboratory Research Center
NNSA National Nuclear Security Administration
NRAD Neutron Radiography Reactor
PIE post-irradiation examination
RCL Radiochemistry Laboratory
SSPSF Space and Security Power Systems Facility
TREAT Transient Reactor Test Facility
ZPPR Zero Power Physics Reactor

Table 2. Summary of Idaho National Laboratory mission areas linked to Department of Energy Office of Nuclear Energy core capabilities.

INL Missions	1. Nuclear Fuels & Materials Research	2. Applied Materials Research & Processing	3. Applied Chemical Separations	4. Energy Systems Design & Analysis	5. Engineering Research, Performance, V&D	6. Critical Infrastructure Protection	7. Nuclear Nonproliferation	8. Industrial Control Systems	9. Environmental Systems Surveillance	10. Defense Systems	11. Enabling Infrastructure
Nuclear Energy Mission	●	●	●	●	●		●				●
Objective 1—Develop technologies and other solutions that can improve reliability, sustain safety, and extend the life of current reactors.	●		●	●	●		●				●
Objective 2—Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals.	●	●	●	●	●		●				●
Objective 3—Manage nuclear waste and develop sustainable nuclear fuel cycles.	●	●	●	●	●		●				●
Objective 4—Understand and minimize the risks of nuclear proliferation and terrorism.	●	●	●	●	●		●				●
N&HS Mission	●		●	●	●	●	●	●	●	●	●
E&E Mission		●		●	●						●

1.4.2 Applied Materials Research and Processing

The applied materials research and processing capability involves determining properties and performance of materials (metals and polymers) applied to next-generation energy systems, particularly those involving aggressive operating conditions (temperature and pressure). Specific research expertise is applied to corrosion of materials in gases, aqueous media and liquid metals, and adequate corrosion protection measures, as well as materials studies for reactor safety. Similar expertise is also applied to the processing of biomass feedstock to enable consistent materials availability to biorefineries or other bioenergy programs.

The capability supports DOE-NE Research Objectives 2, 3, and 4 (described in Section 1.1) and E&E R&D Outcome 1 (listed in Section 1.3).

1.4.3 Applied Chemical Separations

Research, development, and demonstration in aqueous and electrochemical processing for recycle of used nuclear fuel are the focus of the applied chemical separations capability. In addition, the capability enables the ability to conduct rare earth materials recovery and separation across the life cycle of production (ore processing to recovery from consumer products) and to process industrial and process water for recovery and reutilization.

The applied chemical separations capability includes expertise in radiochemistry, analytical chemistry, physical analysis, and actinide separations and specialty equipment such as inductively coupled plasma atomic emission spectrometry, ion chromatography, gamma spectroscopy, liquid scintillation, and alpha and beta counting equipment to analyze samples.

The capability supports all four DOE-NE research objectives (described in Section 1.1) and the N&HS R&D Outcome 2 (listed in Section 1.2).

1.4.4 Energy Systems Design and Analysis

The energy systems design and analysis capability includes developing hybrid energy systems that enable tightly coupled nuclear, renewable, and carbon-based energy systems, which feed next-generation grid systems that are resilient, robust, and flexible for both storage and delivery.

Capabilities use state-of-the-art computational methods and modeling and simulation to couple multiple physical processes at different scales. This multi-physics, multi-scale approach, in turn, enables the development of best-estimate predictive models applied to energy systems such as advanced transportation, advanced nuclear reactor and fuel cycles, natural gas, space nuclear, grid, wind, and geothermal.

Design and analyses capabilities extend to the fabrication and testing of radioisotope power sources used for space and homeland security applications.

The capability supports all four DOE-NE research objectives (described in Section 1.1) and all N&HS and E&E R&D outcomes (listed in Sections 1.2 and 1.3, respectively).

1.4.5 Engineering Research, Performance, Validation, and Demonstration

The engineering research, performance, V&D capability includes leading-edge specialty research facilities and expertise used by universities, national laboratories, and industry to carry out "at-scale" testing and demonstration of technology and conduct groundbreaking R&D activities that would otherwise not be possible. This often requires the scientific and research expertise of multiple scientific disciplines, offers researchers access to unique and expensive equipment and expertise, and facilitates the collaboration of scientists and engineers. It provides a rich field for scientific investigation through access to the world-class capabilities offered by ATR and PIE facilities and the variety of reactors, beam lines, and instruments at partner facilities. Combined, these hubs, centers, and national user assets form major centers for energy security technology development and demonstration.

The capability supports all four DOE-NE research objectives (described in Section 1.1) and all N&HS and E&E R&D outcomes (listed in Sections 1.2 and 1.3, respectively).

1.4.6 Critical Infrastructure Protection

The critical infrastructure protection capability focuses on conducting research, development, testing, and evaluation for the reliability and resilience of critical infrastructure systems. It integrates with industrial control systems, including wireless and cyber security, and includes vulnerability assessment and threat prevention.

The capability supports N&HS R&D Outcome 1 (listed in Section 1.2).

1.4.7 Nuclear Nonproliferation

The nuclear nonproliferation capability is composed of a full range of facilities, radiological and nuclear materials, and expertise in monitoring, evaluating, and preventing threats from nuclear proliferation. This includes the development of proliferation resistant fuels, technical support for reactor conversions, nuclear safeguards and security (S&S), nuclear cybersecurity, advanced detection and identification of nuclear and radiological materials and illicit activities, material signature identification, and method development for nuclear forensics and ultra-trace detection. Capabilities and expertise exist for demonstration and training in real-world environments using radiological and nuclear materials for emergency response. Test ranges exist that are permitted and support large-scale outdoor contamination exercises and testing.

The capability supports all four DOE-NE research objectives (described in Section 1.1) and N&HS R&D Outcome 2 (listed in Section 1.2).

1.4.8 Industrial Control Systems

The industrial control systems capability includes the ability to identify and reduce vulnerabilities in industrial control systems, including supervisory control and data acquisition systems, distributed control systems, and energy management systems. This capability includes expertise in the testing and R&D of industrial control systems cyber security.

The capability supports N&HS R&D Outcome 1 (listed in Section 1.2).

1.4.9 Environmental Systems Surveillance

The environmental systems surveillance capability utilizes unique expertise applied to understanding and mitigating the impact on environmental systems due to resource recovery and the consequence of energy production, as well as threats to domestic water supplies.

The capability supports N&HS R&D Outcome 3 (listed in Section 1.2).

1.4.10 Defense Systems

The defense systems capability includes independent technical evaluations and solutions to manufacturing, engineering, and material science challenges for a variety of non-nuclear weapons programs and customers in threat defeat and survivability solutions. This includes R&D of armor and physical protection of energy transmission and distribution systems using secure floor space complete with state-of-the-art equipment and a knowledgeable and security-cleared workforce.

The capability supports N&HS R&D Outcome 2 (listed in Section 1.2).

1.4.11 Enabling Infrastructure

The enabling infrastructure capability is composed of unique expertise, equipment, and systems applied to supporting critical mission capabilities and facilities, including heating, ventilating, and air conditioning; electrical; fire main; water; sewer; and access control.

The capability supports all DOE-NE research objectives (described in Section 1.1) and all N&HS and E&E R&D outcomes (listed in Sections 1.2 and 1.3).

1.5 User Facilities

INL maintains and operates the majority of DOE-NE's essential nuclear energy R&D capabilities, which represent the core of the federal government's national nuclear energy R&D infrastructure.

INL views these unique nuclear R&D capabilities and infrastructure as national assets and has implemented a user facility model to make them available to universities, industry, national laboratories, international research organizations, and other federal agencies. DOE-NE seeks to involve the foremost experts from across the nuclear energy community in its research, including national and international partners from the government, as well as private and education sectors. INL offers its capabilities and related nuclear science and engineering infrastructure to these experts to advance research goals.

1.5.1 Nuclear Science User Facilities

In 2007, DOE designated the ATR National Science User Facility to provide universities, national laboratories, industry, other federal agencies, and international research institutions with greater access to reactor, beam-line, and PIE capabilities. Recently renamed the Nuclear Science User Facilities, they are the nation's only designated nuclear energy user facilities and act as a hub that connects a broad range of exceptional nuclear research capabilities, expert mentors, and experimenters spanning the United States.

Through a peer-reviewed proposal process, the Nuclear Science User Facilities grant university-led and nonproprietary industry scientific groups access to capabilities at INL and at several partner facilities to work on projects. In addition, the Nuclear Science User Facilities grant access to researchers for small-scale, rapid-turnaround projects.

The research sponsored and funded by the Nuclear Science User Facilities links directly to DOE-NE mission accomplishments and the Nuclear Energy University Program, administered by CAES. INL is also working through a cooperative R&D agreement with the Electric Power Research Institute to enable industry use of INL facilities. The Nuclear Science User Facilities Program, located within the CAES building, is prototyping the laboratory of the future and expanding opportunities for broader access.

1.5.2 Wireless National User Facility

DOE designated the INL Wireless Test Bed as a national user facility in January 2013 to enable improved access for academic and industrial users of distinctive capabilities. The Wireless National User Facility allows government, industry, and academic researchers to address some of the nation's most pressing challenges in wireless communications,

spectrum sharing, and communications interoperability.

1.5.3 Biomass Feedstock National User Facility

The Biomass Feedstock National User Facility was also established in 2013. Researchers work with producers of biomass feedstock and bioproducts to reduce variability and produce high-quality feedstock from grass, wood, and agricultural residues. Conversion pathways, including biochemical, pyrolysis, gasification, and combustion via co-firing with coal, can be evaluated.

1.6 Strategic Sustainability

The Sustainable INL Program seeks to achieve measurable and verifiable energy, water, and greenhouse gas reductions; responsible use and disposal of materials and resources; and cost-effective facilities, services, and program management. Program elements are captured in the INL Site Sustainability Plan (DOE-ID 2014a) and summarized in Appendix D. INL continues to mature its comprehensive leadership strategy to address any execution gaps identified and to refine investments needed to meet its goals.

INL implements sustainable practices in facility design and operation, procurement, and program operations that meet the requirements of the following documents:

- Public Law 110–140, "Energy Independence and Security Act of 2007"
- DOE Order 436.1, "Departmental Sustainability"
- Executive Order (EO) 13423, "Strengthening Federal Environmental, Energy, and Transportation Management"
- EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance"
- EO 13653, "Preparing the United States for the Impacts of Climate Change"
- *2014 Strategic Sustainability Performance Plan* (DOE 2014)
- *FY 2015 INL Site Sustainability Plan with the FY 2014 Annual Report* (DOE-ID 2014a).

1.7 Other Programs

The INL Site includes Cognizant Secretarial Office and Program Secretarial Office programs and associated sites and non-DOE programs. These programs, while beyond the scope of this TYSP, are briefly described in the following sections. Additional information on these programs, which include the Idaho Cleanup Project (ICP), Advanced Mixed Waste Treatment Project (AMWTP), and Office of Naval Reactors (NR), is provided in Appendix C.

DOE is in the process of soliciting and awarding a new contract for the ICP to continue the $1.5-billion cleanup project. The current target for awarding a new contract is June 2016. Funding for this contract is through the DOE Office of Environmental Management (DOE-EM). This contract will combine the ICP and AMWTP work scope into one contract called the Idaho Core Cleanup Contract.

1.7.1 Idaho Cleanup Project

ICP ensures the safe, informed, and judicious use of the INL Site by multiple generations following remediation and cleanup of legacy wastes. The remediation process integrates decisions and actions that (1) protect human health and the environment from residual contamination; (2) conserve ecological and cultural resources; and (3) respond to regulatory, political, and technological changes.

ICP involves the safe environmental cleanup of the INL Site, which was contaminated by conventional weapons testing, government-owned research and defense reactors, laboratory research, and defense missions at other DOE sites.

ICP is currently managed and operated by CH2M-WG Idaho, LLC, and focuses on (1) reducing risks to workers, the public, and the environment; and (2) protecting the Snake River Plain Aquifer, the sole drinking water source for more than 300,000 residents of eastern Idaho.

1.7.2 Advanced Mixed Waste Treatment Project

AMWTP's mission is to retrieve, characterize, treat, and ship from Idaho, legacy transuranic waste and mixed low-level waste (LLW) stored at the Radioactive Waste Management Complex (RWMC) Transuranic Storage Area. AMWTP is a

DOE-EM-funded project managed and operated by the Idaho Treatment Group, LLC.

Beginning in 1970, approximately 65,000 m^3 of waste in 55-gal drums, boxes, and bins were placed on asphalt pads for interim storage at the RWMC Transuranic Storage Area. DOE is working to meet the requirements of the Idaho Settlement Agreement, which states that these wastes must be removed from Idaho by December 31, 2018 (State of Idaho 1995). To date, approximately 95% of the waste has been retrieved from long-term storage and approximately 51,000 m^3 of the original 65,000 m^3 target has been shipped from Idaho.

The Waste Isolation Pilot Plant facility in New Mexico is temporarily not receiving wastes following a February 2014 incident. Idaho Treatment Group, LLC, and DOE-EM are continuing to remove and treat waste at a rate to meet the December 2018 mandated completion. When the Waste Isolation Pilot Plant facility reopens, these processed wastes will be shipped offsite.

The AMWTP also focuses on (1) reducing risks to workers, the public, and the environment; and (2) protecting the Snake River Plain Aquifer.

1.7.3 Office of Naval Reactors

Established in 1950 to support the development of naval nuclear propulsion, the Naval Reactors Facility (NRF) continues to provide support to the U.S. Navy's nuclear powered fleet.

NRF is one of the INL Site's primary facility areas that will continue to fulfill its currently assigned missions for the foreseeable future. NRF is operated by Bechtel Marine Propulsion Corporation under contract with and direct supervision of the Naval Nuclear Propulsion Program. NR integrates the ATR's unique irradiation and test capabilities into its exclusive nuclear propulsion research program.

NRF is not under the purview of DOE-ID; therefore, NRF real property asset information is not provided in this TYSP.

1.8 Planning Assumptions

The following planning assumptions apply to this TYSP:

- Out-year budget profiles will remain relatively constant for all major INL entities (i.e., DOE-NE, DOE-EM, and NR).
- Infrastructure gaps will be analyzed based on mission requirements. As a first principle, DOE-NE and INL will reuse existing infrastructure, where feasible.

  The number of uncleared onsite visitors, and collaborative partners will grow, increasing the need for unrestricted access to experimental capabilities in an open campus environment as much as possible within the Research and Education Campus (REC) (e.g., CAES, ESL, and EIL), which may drive security and general infrastructure needs to accommodate increased use.

2. LAND, CAMPUS, AND SPACE PLANNING

The nuclear capabilities within INL campuses provide the foundation for national nuclear energy research at INL. These campuses provide irradiation and characterization capabilities, glovebox lines for experimental fuel development, and separations research facilities. With targeted investments, these campuses, along with other facilities supporting (or capable of supporting) future needs for scale-up testing and demonstrations, should meet the projected needs of DOE-NE and nuclear energy R&D for years to come. The national user facility model employed at INL will help assure the full use of and access to distinctive research capabilities.

2.1 Planning Principles and Priority Investments

INL land, campus, and space planning is a critical element in transforming INL to meet DOE national nuclear R&D goals. The major objective for land, campus, and space utilization is to consolidate and co-locate like activities and plan and prepare to support future mission needs. The guiding principles are to provide:

- A collaborative environment to foster scientific innovation
- Flexible and modern facilities that are reconfigurable to meet changing research needs
- Environmentally and operationally sustainable facilities
- Compliance with federal land use requirements.

INL continues to revitalize and enhance its enduring research capabilities to ensure achievement of mission objectives and outcomes. Planned investments in existing research capability (summarized in Appendix B) include:

- Implementing the ZPPR documented safety analysis upgrade
- Upgrading the Wireless Test Bed
- Expanding the N&HS grid.

INL is also preparing and positioning for the future by investing in build-out of energy systems demonstration capabilities and filling previously identified capability gaps by building the following new assets:

- Sample Preparation Laboratory (SPL)
- Remote-Handled LLW (RH-LLW) Disposal Facility
- DOE Laboratory Accreditation Program Facility
- Materials and Fuels Complex (MFC) Science and Engineering Facility
- N&HS UB-5 Building
- Collaboratory for Energy Transitions and Transformations (CETT).

INL plans additional investments to address base infrastructure needs (modernization, refurbishment, and major maintenance and repair and reduction of deferred maintenance). Priority investments in critical-enabling infrastructure are planned for:

- INL power distribution refurbishment
- MFC firewater upgrade
- Hot cell refurbishments and replacements at the HFEF, AL, and FCF
- ATR major infrastructure investments
- MFC electrical distribution Loop A
- REC power loop
- Land mobile radio upgrade
- Resurface and reconstruct primary roads
- Modernize essential communication infrastructure
- Replace deferred roofs
- Replace heating, ventilation, air conditioning, and diesel generators
- Revitalize INL Research Center laboratories and offices.

2.2 Idaho National Laboratory Campuses

Activities associated with nuclear energy security and other energy security missions take place at several INL locations. Nuclear energy R&D capabilities are consolidated around three main campuses: the ATR Complex, MFC, and REC (see Figure 2). Each campus supports specific missions based on capabilities and functions. At the ATR Complex, ATR is the primary location to conduct thermal irradiation; MFC provides shielded hot cells to handle highly irradiated materials and gloveboxes to handle special nuclear material (SNM); and REC provides nonradiological laboratories and

administrative facilities to support multiple Laboratory missions.

In addition to the campuses, five designated research areas are located on the INL Site, which occupies 890 squares miles of otherwise undeveloped, high-desert terrain. The Site research areas include CFA, Critical Infrastructure Test Range Complex (CITRC), Specific Manufacturing Capability (SMC), and TREAT. Buildings and structures are clustered within the campuses and research areas, which are typically less than a few square miles in size and separated by miles of open land.

Also located on the INL Site are three primary non-DOE-NE facility areas: Idaho Nuclear Technology and Engineering Center (INTEC), NRF, and RWMC.

INL depends on the DOE-EM-owned and -operated RWMC for disposal of RH-LLW from continuing operations. This is expected to continue until the Subsurface Disposal Area (SDA) at RWMC is full or it must be closed in preparation for final remediation. Restarted in fiscal year (FY) 2014, the RH-LLW Disposal Project will construct a facility to provide up to 20 years of additional storage capacity and is expected to be operational starting in 2019.

Sitewide area utilities and supporting infrastructure consist primarily of roads, railroads, power distribution systems, and communication systems that serve and connect facility areas.

The following sections briefly describe INL campuses, areas, and associated facilities linked to core capabilities (as documented in the Facility Information Management System).

2.3 Advanced Test Reactor Complex

Located 45 miles west of Idaho Falls, the ATR Complex houses ATR, one of the world's most versatile materials test reactors (see Figure 3). Other ATR Complex facilities include the associated ATRC, Test Train Assembly Facility, RCL, Safety and Tritium Applied Research Facility, and Radiation Measurements Laboratory.

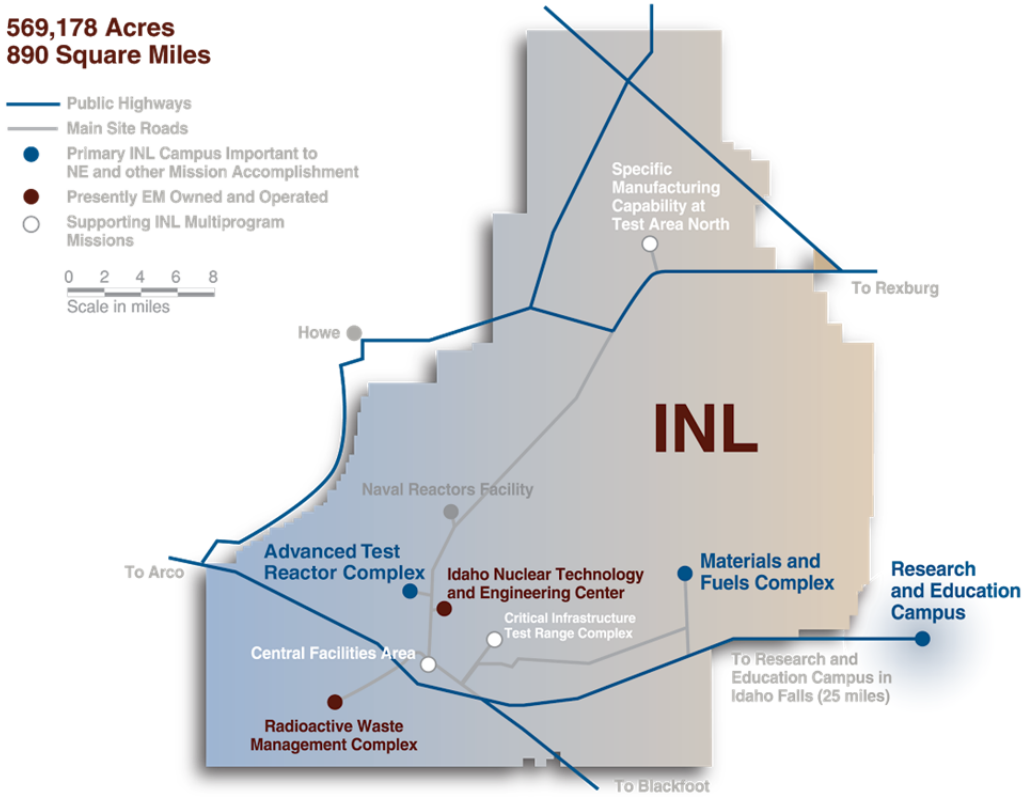

Figure 2. Idaho National Laboratory campuses.

2.3.1 Advanced Test Reactor

ATR is a materials and fuels test reactor with thermal neutron fluxes of 1×10^{15} neutron/cm^2-sec and maximum fast (E > 0.1 MeV) neutron fluxes of 5×10^{14} neutrons/cm^2-sec. These fluxes, combined with ATR's 77 irradiation positions, make ATR a mission-critical facility with a unique, versatile thermal irradiation capability. The reactor accommodates static, sealed capsule tests with passive instrumentation, tests with active instrumentation for measurement and control of specific testing parameters, and pressurized water loops that allow testing of materials and fuels under representative plant conditions (e.g., pressure, temperature, flow, and chemistry). A hydraulic shuttle irradiation system allows for short-duration irradiation tests. The Test Train Assembly Facility (4,200 ft^2) supports the precision work associated with experiment assembly for insertion in the reactor. A newly installed pressurized water reactor loop is currently in use by the Electric Power Research Institute for LWR sustainability research. A low-temperature, pressurized, water-cooled reactor for steady-state irradiation, ATR meets the irradiation testing needs of DOE-NE, NR, NNSA, and many other researchers.

A five-year funding strategy has been jointly developed by DOE-NE and NR to improve the availability and predictability of ATR. If implemented, this five-year plan will address a significant portion of the top 100 Plant Health Committee items and eliminate the majority of ATR deferred maintenance items by the completion of the next Core Internals Change-out. Addressing the items identified in this plan will also retire approximately $50M in deferred maintenance. These investments will help ensure the safe and efficient operations of ATR past 2050.

2.3.2 Advanced Test Reactor Critical

Located in an extension of the ATR canal, the ATRC is a full-size, low-power, pool-type nuclear replica of ATR used to evaluate prototypical experiments before they take place in ATR. There is increasing demand for its use by researchers, and the ATRC is running for longer periods to accommodate experiments. Its normal operating power level is approximately 100 W, with a maximum power rating of 5 kW. Modernization of the instrumentation and control systems will provide enduring support for research. ATRC equipment and system repair priorities are included in the ATR 5-year plan.

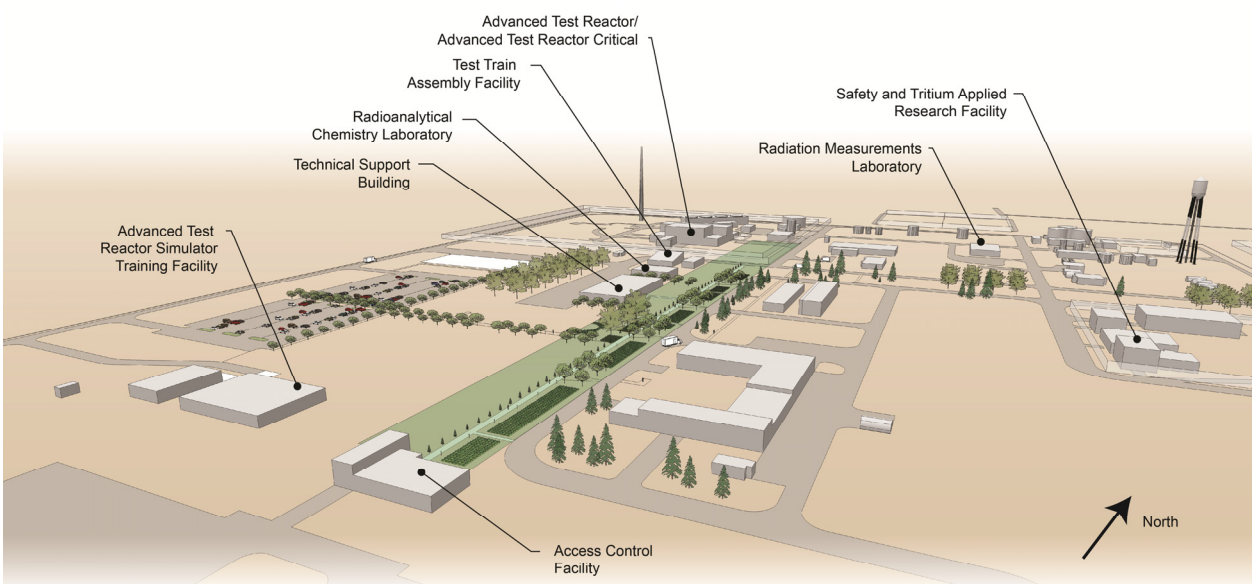

Figure 3. Advanced Test Reactor Complex.

2.4 Materials and Fuels Complex

MFC is located 28 miles west of Idaho Falls (see Figure 4). It houses one-of-a-kind hot cell capabilities within HFEF and FCF for conducting world-class nuclear research. Additional hot cell capabilities reside in the AL and FASB. Recent addition of the IMCL and ongoing installation of research equipment address a previously identified capability gap and allow for preparation of fuel samples for testing.

MFC facilities also include analytical laboratories, the EML for isotopic and nanometer-scale microstructural and microchemical analysis of material samples, and co-located fuel fabrication glovebox lines (e.g., FMF and FASB). In addition, MFC operates SSPSF for final assembly and testing of radioisotope power systems and provides capabilities supporting N&HS R&D.

Capital funds were requested in FY 2016 to proceed with constructing SPL at INL to satisfy near-term requirements of the mission need under the Advanced Post-Irradiation Examination (APIE) Capabilities Project. A recent update to the APIE Capabilities Project Mission Need was approved to align the project with the latest budget request. SPL will provide a new functionally focused laboratory with a smaller footprint at a reduced cost, which when coupled with existing facilities and recapitalization efforts, will achieve the suite of advanced PIE capabilities needed to improve understanding of nuclear fuels and material performance.

MFC is currently developing a five-year infrastructure plan and funding strategy to improve facility availability to support mission accomplishment. The plan will also address reduction of deferred maintenance.

2.4.1 Analytical Laboratory

AL focuses on chemical and isotopic characterization of unirradiated and irradiated fuels and materials. It receives small quantities of irradiated materials from HFEF, performs dissolution and dilution in a series of analytical hot cells, followed by analysis of the diluted materials using instrumentation equipped with hoods or gloveboxes for radiological control. AL houses advanced instruments, including a state-of-the-art inductively coupled plasma mass spectrometer, two thermal ionization mass spectrometers, and instruments for determining the fundamental thermodynamic properties of actinide-bearing materials. These activities support various INL research programs, including advanced nuclear fuel design, waste management, environmental science, and nuclear nonproliferation and security missions. A large percentage of INL research requires many of AL's capabilities.

2.4.2 Electron Microscopy Laboratory

EML houses a transmission electron microscope, dual-beam focused ion beam fitted with electron backscatter diffraction and microchemical analysis capabilities, and state-of-the-art scanning electron microscope fitted with a wavelength dispersive spectrometer with software that allows semi-quantitative analysis of heavy actinides. In addition to supporting DOE-NE programs, EML provides capability to support the High Performance Research Reactor Fuel Development Program.

2.4.3 Experimental Fuels Facility

The Experimental Fuels Facility is a nuclear fuel fabrication facility where oxides, nitrides, carbides, silicides, and composite fuels and materials samples are fabricated for irradiation in research reactors such as ATR. The samples provide forms that may offer advantages over current commercial fuel technologies.

2.4.4 Fuel Conditioning Facility

FCF has full capabilities for conducting engineering and pilot-scale electromechanical separations research and demonstrations and developing high-level hot fuel waste products. A mock-up area enables preparation, modification, and testing of sophisticated instruments prior to their installation in INL's hot cells to make sure they can be operated and maintained remotely. Its unique capabilities make FCF an ideal facility for its primary mission to support treatment of DOE-owned sodium-bonded metal fuel. In a secondary role, FCF also supports work to demonstrate the technical feasibility of pyro-processing technology for treating used nuclear fuel for the DOE Fuel Cycle R&D Program. FCF also supports NNSA Defense Nuclear Nonproliferation programs.

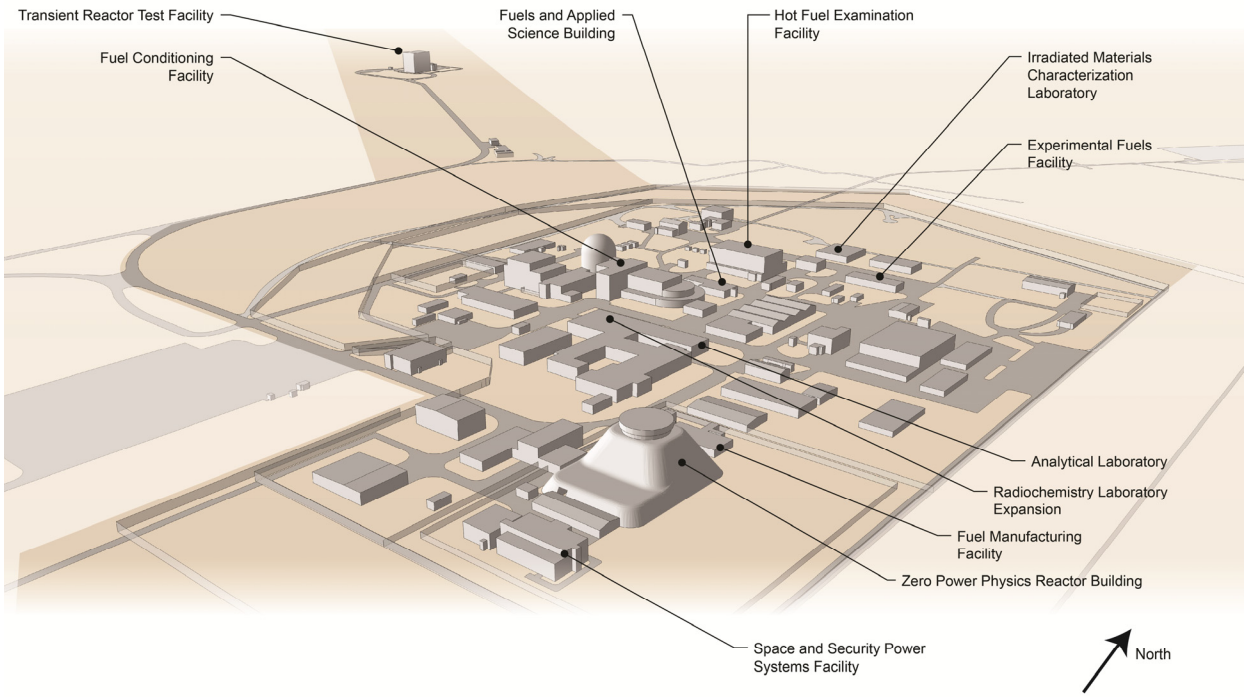

Figure 4. Materials and Fuels Complex.

2.4.5 Fuel Manufacturing Facility

FMF supports laboratory-scale development and assembly of transuranic metal and ceramic fuels for the Advanced Fuel Cycle Initiative. Americium distillation and americium oxide reduction are being developed in FMF.

2.4.6 Fuels and Applied Science Building

FASB provides the resources to perform fuel development, materials characterization, and irradiated materials testing. It houses a low-level, thermophysical properties laboratory outfitted with equipment for sample preparation, optical microscopy, electron microscopy, and thermodynamic properties determination. It is also equipped with a suite of lead-shielded gamma cells to conduct environmental crack-growth-rate and fracture-toughness testing on irradiated materials. This testing enables examination of larger specimens providing quantitative data on the effects of reactor environments upon which to build science-based determinations of reactor life extension. FASB houses unique uranium fabrication capabilities and is dedicated to characterization of fresh uranium fuel. It supports fuel R&D such as prototyping of transmutation fuel fabrication processes for fuel-cycle R&D. FASB also houses uranium glovebox lines for developing new fuel types for converting research and test reactors from highly enriched to low-enriched uranium fuel.

2.4.7 Hot Fuel Examination Facility

HFEF is a heavily shielded nuclear facility designed to be the front end of the PIE capability. It can receive and handle kilograms to hundreds of kilograms of nuclear fuel and material in almost any type of cask, including full-size commercial LWR fuel casks. The mission of HFEF is to receive material, conduct nondestructive and destructive examinations, and prepare material specimens for transfer to characterization laboratories for detailed analysis. HFEF also houses limited mechanical testing equipment and NRAD 250-kW Training, Research, Isotopes, General Atomics (TRIGA) reactor for neutron radiography, bench-scale electrochemical separations testing, and engineering-scale waste-form development to support operations in FCF. HFEF also provides support to a variety of programs including, but not limited to, the DOE Fuel Cycle R&D Program, Generation IV technologies, Space Nuclear, and N&HS programs.

2.4.8 Irradiated Materials Characterization Laboratory

IMCL is the newest nuclear energy research facility at MFC. It is a unique facility that incorporates many features designed to allow researchers to safely and efficiently prepare irradiated fuel and material samples for microstructural-level investigations. The many advanced capabilities slated for installation in the IMCL's reconfigurable 8,000-ft^2 research area will help INL continue research that provides a deeper understanding of fuel performance and behavior than ever before. IMCL's design incorporates vibration, environmental, and radiological isolation that enables advanced microscopy techniques requiring extremely sensitive equipment.

2.4.9 Radioanalytical Chemistry Laboratory

At RCL, researchers are working to convert used nuclear fuel into more manageable waste forms. Warm (radiotracers and glovebox work) laboratory/bench-scale testing and analytical capabilities to support aqueous separations research exist at RCL.

2.4.10 Space and Security Power Systems Facility

SSPSF provides one-of-a-kind capabilities for fueling, testing, and delivering radioisotope power systems. It houses three fueling glovebox lines, including one equipped to meet National Aeronautics and Space Administration planetary protection protocols. It also houses a vibration test apparatus to simulate launch pad scenarios, magnetic-moment measuring device, and mass-property-measuring device. Finally, there are two thermal vacuum chambers: one equipped to employ liquid nitrogen cooling for simulating space environments and one to assess power output. SSPSF's full delivery system is composed of two specially equipped trailers and three Type-B shipping containers for delivering final power systems to the customer's location.

2.4.11 Zero Power Physics Reactor Building

ZPPR building supports nuclear materials handling and packaging activities in the workroom and cell, and routine activities conducted in the ZPPR vault/workroom to monitor and maintain the integrity of the ZPPR fuel plates and other fissile materials in storage. The facility is also used to support the development, testing, and evaluation of nuclear material detectors and to train personnel.

2.4.12 Transient Reactor Test Facility

TREAT is adjacent to the MFC campus (see Figure 5). TREAT was specifically built to conduct transient reactor tests where the test material is subjected to neutron pulses that can simulate conditions ranging from mild upsets to severe reactor accidents. The reactor was constructed to test fast reactor fuels but has also been used for LWR fuel testing and other exotic special-purpose fuels (i.e., space reactors).

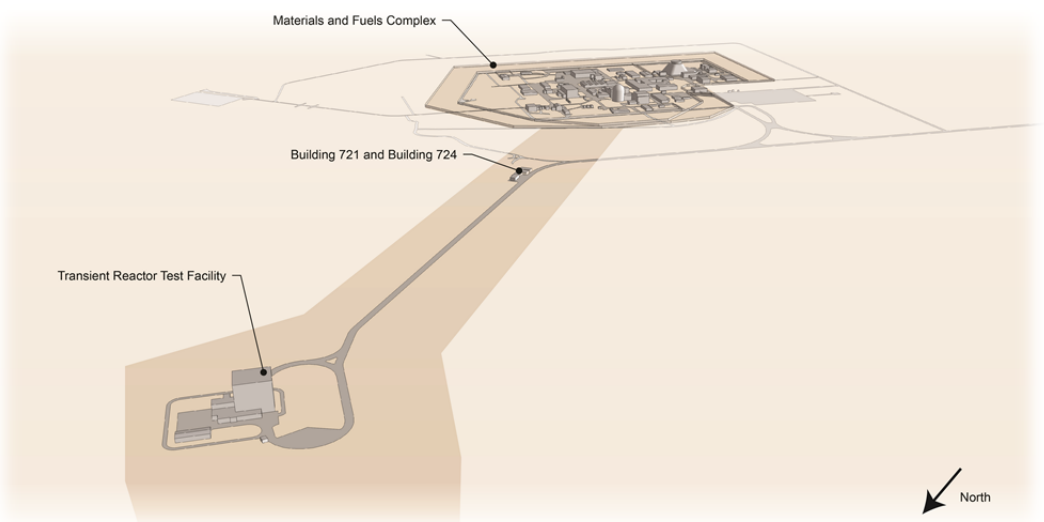

Figure 5. Transient Reactor Test Facility with Materials and Fuels Complex in background.

Given completion of the final *Environmental Assessment for the Resumption of Transient Testing of Nuclear Fuel and Materials* (DOE-ID 2014b) and a finding of no significant impact selecting Alternative 2, "Restart the Transient Reactor Test Facility (TREAT) at the Idaho National Laboratory (INL)," in February 2014, DOE directed INL to commence efforts to restart TREAT (DOE-ID 2014b). Refurbishment and replacement of TREAT facilities and infrastructure are planned from FY 2015 to FY 2017 in preparation for operational status.

Resumption of transient testing is anticipated to begin in FY 2018. Transient testing will screen advanced fuel concepts, including accident-tolerant fuels, by allowing for early identification of the limits of fuel performance. It will also focus on fuel development from various viable options, ultimately reducing the time and cost required to develop new fuels. TREAT is capable of conducting tests on full-size fast reactor fuel and 36-in. segments of LWR fuel. The NRC will use data from TREAT tests as part of the process for granting licenses for new fuel types.

2.5 Other Idaho National Laboratory Site Areas

2.5.1 Central Facilities Area

Centrally located on the INL Site, CFA is the main Sitewide services and support area for the two main DOE-NE R&D campuses: ATR Complex and MFC (see Figure 6). CFA also supports N&HS R&D, including the Wireless National User Facility with three independent network operations centers for testing, along with materials testing and development. The remoteness of CFA and other Site locations, together with the quiet radiofrequency spectrum, makes this area a unique and desirable location for a national user facility wireless test bed. In addition, the Scoville Power System is a critical resource for electric-grid power testing.

Support services provided from CFA include medical, emergency response, transportation, equipment maintenance, security, communications, electrical power, a supervisory control and data acquisition center, craft support, warehousing, and instrument calibration.

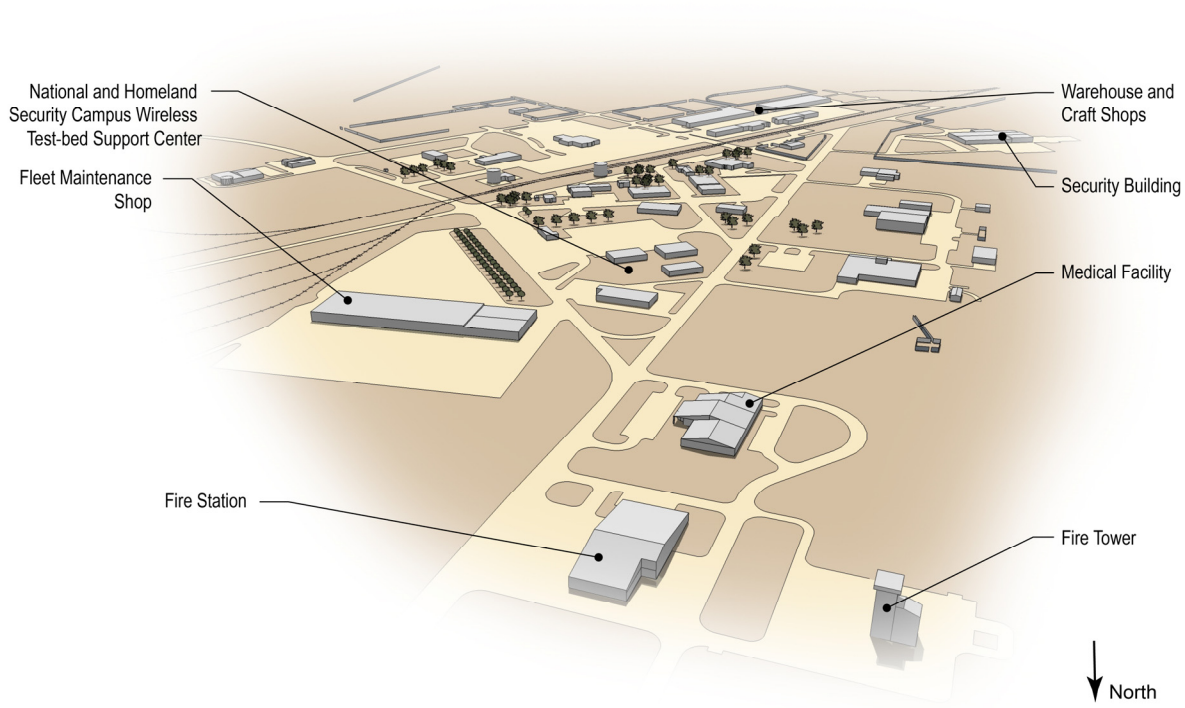

Figure 6. Central Facilities Area.

2.5.2 Critical Infrastructure Test Range Complex

CITRC serves the INL N&HS mission, including program and project testing (i.e., critical infrastructure resilience and nonproliferation testing and demonstration). CITRC activities include wireless test-bed operations, water security test-bed operations, power line and grid testing, unmanned aerial vehicle testing, accelerator testing, explosives detection, and radiological counter-terrorism emergency-response training. Upgrades to the wireless test bed will enhance the capability designated as the Wireless National User Facility, which provides industrial/commercial and academic users access to the full capacity of INL's wireless resources.

An electric-grid test bed is planned for installation at INL near the CFA/CITRC area that will provide a new reconfigurable test substation and several miles of transmission and distribution lines.

2.5.3 Idaho Nuclear Technology and Engineering Center

INTEC is currently owned and operated by DOE-EM (see Figure 7), INTEC operated until 1992 to recover highly enriched uranium from used nuclear fuel from government reactors and convert the resulting liquid high-level waste into a more stable, solid, granular material suitable for long-term storage. Today, with environmental cleanup of INTEC nearing completion, most of the INTEC facilities are, or will be, surplus to ICP and the DOE-EM mission.

INL utilizes the Material Security and Consolidation Facility and several surrounding buildings for the relocation of low-enriched uranium disposition product from a sodium-bonded spent nuclear fuel campaign.

Discussions continue regarding potential future transfer from DOE-EM to DOE-NE of several facilities, including the Remote Analytical Laboratory, a 13,000-ft^2 facility designed for a number of organic, inorganic, and radioanalytical capabilities.

2.5.4 Specific Manufacturing Capability

SMC has been manufacturing armor packages for the U.S. Army Abrams main battle tank since 1984. Located at the north end of the INL Site, this 25-acre armor-manufacturing complex provides 320,000 ft^2 of secure floor space and state-of-the-art equipment. SMC capabilities include light and heavy fabrication equipment and a modern metallurgical laboratory.

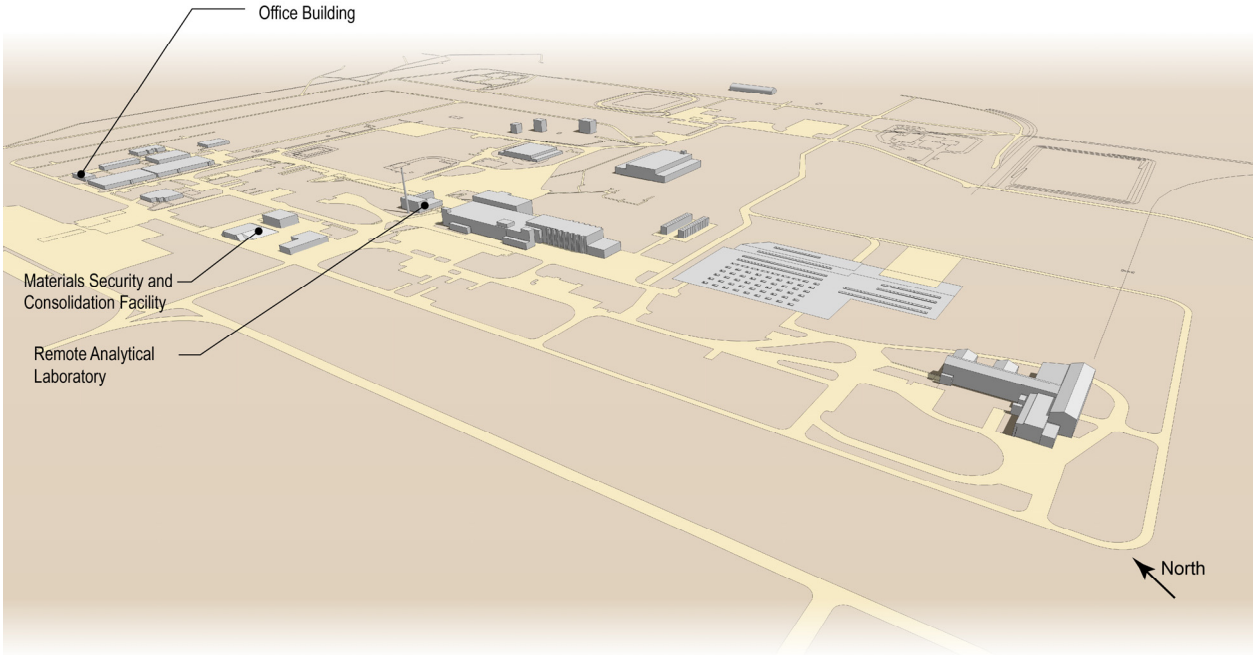

Figure 7. Idaho Nuclear Technology and Engineering Center.

2.6 Research and Education Campus

REC (see Figure 8), the gateway to INL, includes diverse laboratories supporting all INL research areas. INL has transformed REC to be more conducive to collaboration with business and university partners while providing the latest in laboratory and office efficiencies. Most recently, completion and beneficial occupancy of EIL has allowed for location of critical R&D in modern facilities through addition of state-of-the-art laboratories. INL has repurposed existing buildings to enable the consolidation and collocation of activities from outlying and substandard leased spaces to the main campus area in Idaho Falls. Several IRC laboratories vacated during moves to EIL have been repurposed and are now fully utilized in support of E&E and Nuclear Science and Technology research. Critical support functions (glass shop and environmental chambers) previously located in remote leased facilities were moved to REC and are now in closer proximity to researchers.

Consistent with INL's space utilization strategies (discussed in Appendix A), anticipated growth in N&HS missions indicates the need for an additional facility located on University Boulevard. Initial planning to understand scope and potential funding strategies has begun.

REC also houses INL administrative and research support functions. EROB (280,000 ft^2) houses the INL High-Performance Computing Data Center (3,700 ft^2). The data center provides essential support for modeling and simulation work and multiple program missions. Expanded in 2014, the center houses the newly installed current-generation supercomputer known as "Falcon." INL upgrades its computing capabilities approximately every 3 years and envisions development of the CETT, which will leverage next-generation supercomputing capabilities with advanced manufacturing and design capabilities in the 2019 timeframe. In addition, a multiyear strategy is being formulated to move and co-locate Information Management personnel and enterprise systems from the aging IORC to facilities centrally located at REC. Completion of the REC power loop will also occur to enable the planned growth/co-location.

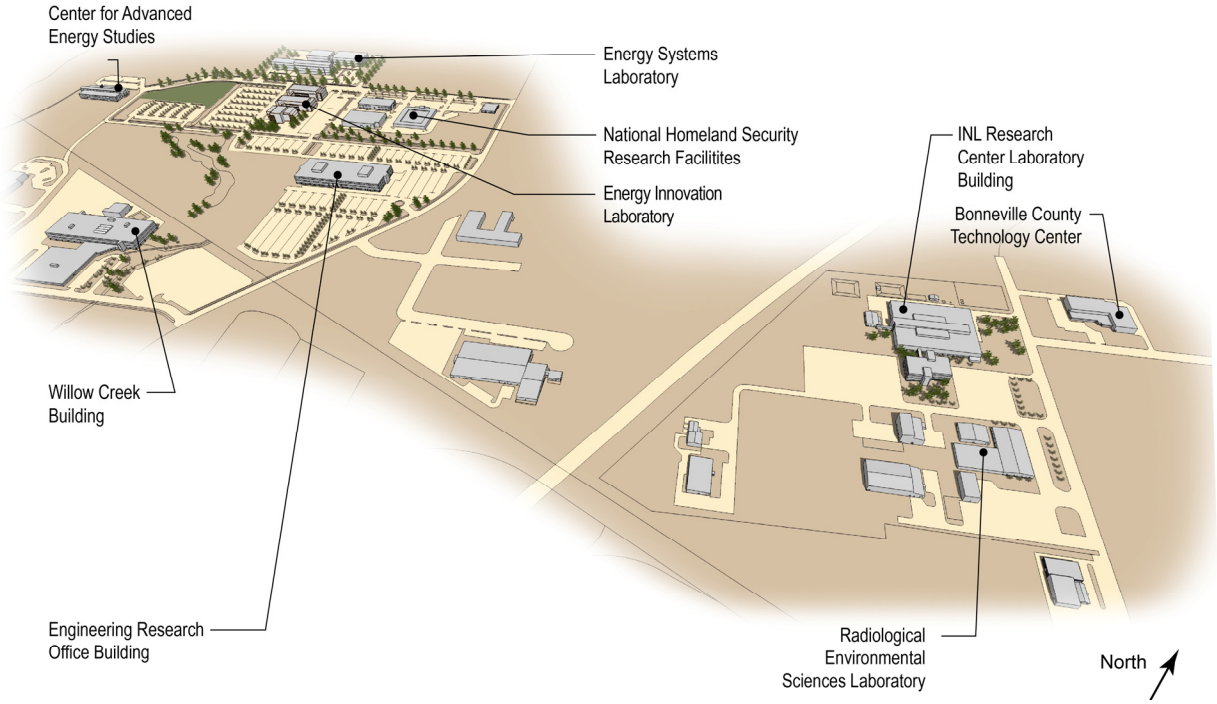

Figure 8. Research and Education Campus.

2.6.1 Center for Advanced Energy Studies

CAES (55,000 ft^2) fosters multi-institution, collaborative energy research programs important to the nation; attracts students and faculty to the Idaho universities; promotes informed energy policy dialogue across Idaho and the nation; and acts as a catalyst for technology-based economic development in Idaho. CAES houses modern materials science laboratories and imaging equipment featuring an atom probe. It also features a four-wall computer-assisted immersive virtual environment for advanced visualization and modeling. Other laboratories are dedicated to actinide sciences, analytical chemistry, and carbon management. These capabilities are made available to CAES partners through collaborative research activities in nuclear science and engineering, bioenergy, carbon management, energy efficiency, and advanced materials.

2.6.2 Energy Innovation Laboratory

EIL, a new 148,000-ft^2 laboratory, was commissioned in FY 2014 and is the R&D showcase for INL. An award-winning, Leadership in Energy and Environmental Design Platinum-certified facility, EIL provides state-of-the-art laboratory and office space and a meeting center. This facility consolidates laboratories needed for fundamental R&D activities and centralizes key research functions at REC. Specifically, EIL supports chemical sciences, nanotechnology, water chemistry, advanced microscopy, control systems, high-temperature testing, thermal hydraulics, materials testing and characterization, separations technology, and advanced instrument training.

2.6.3 Energy Systems Laboratory

ESL is a 91,000-ft^2 laboratory and office facility that began operations in FY 2013. It houses multiple research programs for advancing energy security and reducing risks that may be associated with new technologies. It expands current capabilities and provides state-of-the-art high bays and laboratory space for programs formerly housed in IRC and the BCTC. ESL enables research and demonstration in bioenergy feedstock processing, advanced battery testing, and hybrid energy systems integration.

2.6.4 Idaho National Laboratory Research Center Laboratory Building

IRC (280,000 ft^2) is a collection of laboratories that support advanced research, process development, and applied engineering in biology, chemistry, metallurgy, robotics, materials characterization, modeling and computational science, physics, and high-temperature electrolysis production of hydrogen for nuclear and non-nuclear energy applications. Its large footprint, including high bay areas for small-scale pilot plant research, enables advancement of basic research and bench-scale concepts into viable, integrated systems (e.g., hybrid energy systems). Recent addition of a unique accelerator mass spectrometer provides additional support for N&HS programs.

INL has evaluated utilization options and has developed a plan to repurpose space in IRC to meet nuclear energy, environmental, and energy security multiprogram R&D needs in the near term while planning for significant investment needed to upgrade critical utilities systems.

2.6.5 National and Homeland Security Facilities

Cyber Security and Intelligence; Security System Laboratory; Critical Infrastructure, Protection, and Resilience; and Homeland Protection facilities contain collaborative research and laboratory areas that support federal agencies, national and international programs, and the energy industry. Multidisciplinary R&D within these facilities focuses on materials analysis, energy systems resilience and reliability, industrial control systems cybersecurity, and critical infrastructure interdependencies.

2.6.6 Radiological and Environmental Sciences Laboratory

RESL is a critical resource for DOE and the Office of Environment, Health, Safety, and Security. RESL features analytical chemistry and radiation protection and serves as a reference laboratory for numerous performance evaluation programs. It provides technical support and quality assurance metrology, which is directly traceable to the National Institute of Standards and Technology. RESL also houses INL's whole-body counter.

2.7 Supporting Infrastructure

INL has five types of enabling infrastructure that support mission-driven core capabilities and allow them to function most effectively:

1. Utilities and supporting infrastructure
2. Nuclear materials management infrastructure
3. Waste management infrastructure
4. Information management infrastructure
5. Laboratory protection services and infrastructure.

2.7.1 Utilities and Supporting Infrastructure

Supporting infrastructure consists primarily of real property assets (e.g., buildings, trailers, utility systems, and roads) that enable INL's core R&D capabilities and mission accomplishment. INL real property infrastructure includes 493 DOE-NE-owned and operating real property assets, with a total Facility Information Management System replacement plant value of $3,260 million. These assets include 286 operating buildings[a] totaling 2.4 million gross ft^2 and 207 nonprogrammatic[b] other structures and facilities (OSFs). OSFs include real property assets that are (1) not buildings (e.g., three-walled shelters, bridges, communications towers, roads, and railroads), and (2) site utility systems that collect or distribute utility services (e.g., steam, electricity, compressed gases, liquid waste streams, natural gas, and water).

INL identifies and makes investments to maintain, upgrade, and improve support infrastructure through base, sustainment, and investment planning processes. The Five-Year Infrastructure Sustainment Needs Database contains the priority items for most utility and support infrastructure assets. The DOE LOB Infrastructure Assessment Team focused on identifying dire needs to support mission-critical assets. As a result, INL power distribution refurbishment funding was requested for 2016 to replace the INL power distribution system supervisory control and data acquisition system and select power transformers.

2.7.2 Nuclear Materials Management Infrastructure

The INL mission requires access to a variety of SNM. Responsible management of these materials is fundamental to ensuring the availability of nuclear materials, when needed. This requires appropriate facilities and the infrastructure capabilities to store and handle Safeguards Category I quantities of SNM. These unique assets enable INL to not only perform its missions but also to attract other R&D organizations.

The overall nuclear materials management strategy of INL is to obtain/retain and make accessible materials needed to support R&D, dispose of unneeded materials to reduce liabilities, and ensure the safe and efficient handling and storage of nuclear materials.

2.7.3 Waste Management Infrastructure

DOE-NE and DOE-EM have complementary infrastructure to support INL's waste management activities. Both organizations have waste storage pads and waste disposition infrastructures that directly support their individual missions, and both actively utilize each other's capabilities when needed to ensure minimal duplication of infrastructure. DOE-NE owns 11 waste management facilities that directly support the management or handling of newly generated waste from ongoing operations, including R&D programs. DOE-NE uses some of the 25 DOE-EM-owned waste management facilities where it is not cost effective to maintain duplicative capabilities or when DOE-NE's waste stream is small compared to DOE-EM's waste volumes.

DOE-NE, with NR, is currently constructing a replacement facility for onsite disposal of RH-LLW. DOE-EM will maintain the existing onsite RH-LLW disposal capability until the existing disposal facility is full. The RH-LLW Disposal Facility will be a Hazard Category 2 nuclear facility, consisting of below-grade precast concrete vaults, designed to emplace and dispose of a minimum of 673 RH-LLW waste canisters generated onsite.

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a. The term "operating buildings" includes all operating buildings and real property trailers that have a Facility Information Management System status of operating (Status Codes 1, 2, and 6).

b. Nonprogrammatic OSFs include all Facility Information Management System OSF assets except 3000-series programmatic OSFs like ATR, the ATR cooling tower, and TREAT.

Operation of the facility is anticipated to commence in 2019 with an initial operational period of 20 years.

2.7.4 Information Management Infrastructure

INL maintains significant information management infrastructure that enables execution of INL's missions. This infrastructure includes scientific and business computing centers, networking, a substantial fiber backbone, and telecommunication facilities. Information Management infrastructure supplies all internal and external network access, e-mail, forms, scientific and engineering data, as well as business applications, business data, communication data, safety alarms, and emergency systems data.

To meet INL mission needs, INL requires infrastructure technology that is sustainably agile, secure, reliable, and innovative in all aspects of information service delivery. Recent investments in land mobile radio infrastructure will substantially improve safety, emergency preparedness, and security at INL Site locations.

The Five-Year Infrastructure Sustainment Needs Database captures high-priority investment needs for relocating enterprise systems out of the IORC, upgrading the REC communication/information network, upgrading the MFC fiber optic backbone, and upgrading the MFC and ATR Complex communication infrastructure.

2.7.5 Laboratory Protection Services and Infrastructure

Laboratory Protection services and infrastructure protect Laboratory missions, personnel, property, and the environment and support all core capabilities.

Security infrastructure includes Protective Force posts and patrols, facilities for operations and training, live fire ranges, radio antennas and repeaters, security fencing, detection and assessment systems, alarm station monitoring facilities and communications, and personnel and vehicle inspection stations to protect INL's assets and people in a manner consistent with DOE regulations.

Emergency Management infrastructure includes the INL Emergency Operations Center in Idaho Falls and four emergency control centers located at INL Site facilities to coordinate INL's response to emergencies.

INL Fire Department functions are deployed through three fire stations at the INL Site that provide 24/7 fire, medical, rescue, and hazardous material emergency response services to all missions conducted at the Site and the transportation corridors that pass through the Site.

Emergency communications infrastructure includes the Warning Communications Center in Idaho Falls and Fire Alarm and Emergency Dispatch Center at the INL Site. This includes fire and security alarm monitoring, emergency phone line monitoring, dispatching capabilities, radio communications, antennas, and repeater stations. Emergency communication also includes the ability to communicate via cellular and text messaging.

Occupational Medicine operates five medical dispensaries: four at the INL Site and one at the Willow Creek Building in Idaho Falls. Services include drug screening, medical and psychological evaluations, and emergency medical and psychological care with advanced cardiac life support, 24/7 nursing services available at CFA, chelation therapy, a decontamination facility, and x-ray capability (at two dispensary locations).

3. INVESTMENT STRATEGIES

As part of the 10-year vision for sustainment, DOE-NE and INL are committed to implementing a proactive, mission-driven, risk-based approach to sustain readiness of mission-enabling infrastructure.

In 2014, the DOE LOB identified the need to focus on revitalizing general-purpose infrastructure across the DOE enterprise to better support mission activities today and in the future. To this end, the DOE LOB commissioned a qualitative assessment of general-purpose support infrastructure at the 17 DOE national laboratories, including INL, using common standards and an enterprise-wide approach. The assessment provided new insight into the condition of the infrastructure and formed the basis for development of a DOE strategic plan for general-purpose infrastructure to ensure a sustainable infrastructure for the future (currently in draft). Data show that DOE's infrastructure needs far exceed available funding. Without a comprehensive, strategic approach, the current declining state of DOE infrastructure will continue.

The objective was to assess how DOE infrastructure is meeting the mission-related needs of the DOE/NNSA laboratory complex. The assessment was designed to provide DOE leadership with insight into the actual condition, utilization, investment needs, and capabilities of infrastructure across the Laboratory. The results will be used in future decisions for best aligning mission needs and existing space, considering and identifying needs for new infrastructure, and providing greater visibility across DOE and with external partners about the existing capabilities and capacities across the Laboratory. INL data from the assessment have influenced INL strategy for managing and investing in INL infrastructure.

In addition, INL investment in infrastructure is aligned with DOE guidance that defines priorities and specific funding allocations consistent with the following expectations and established Idaho Facilities Management Program priorities:

- Base facility activities to maintain safe operating envelope, including regulatory compliance activities
- Specific activities to maintain/refurbish existing capabilities
- Specific activities to improve efficiencies and reduce overall operating costs
- Replacement capabilities
- New capabilities.

The key elements of the strategy for sustaining INL utilities and enabling infrastructure include:

- Effective management and sustainment of existing core capabilities provided by enduring assets
- Investment in new enabling infrastructure to continue to reliably support current missions and make new mission capabilities possible
- Implementation of sustainability concepts into enduring and new infrastructure assets to enhance energy and water efficiency and improve employee health and productivity and quality of work life
- Efficient and timely disposition of nonenduring assets
- Alignment of infrastructure investment priorities with INL strategic outcomes and maintenance of the associated core capabilities.

To maximize the value of available funding resources, DOE-NE and INL are revitalizing infrastructure with attributes that promote collaboration, modernization, flexibility, and sustainability. The investment strategy is to build upon existing infrastructure and acquire a few new real property assets. DOE-NE and INL base this strategy on a business case that recognizes the economy and efficiency of investing in existing resources relevant to DOE-NE and multiprogram nuclear and energy security missions.

Looking forward, DOE-NE and INL will continue to focus on sustaining and revitalizing core capabilities and establishing a financially realistic plan to use existing infrastructure efficiently, regardless of location.

DOE-NE and INL have recently made notable progress toward the infrastructure plan by completing several construction projects at REC. In 2013, ESL began operations enabling enhanced R&D capabilities for biomass feedstock process demonstration, hybrid energy systems testing, and battery testing. In 2014, EIL began operations further enabling research related to all INL mission areas.

3.1 Defining Investment Needs

As stated above, DOE-NE's goal is to utilize existing infrastructure to the extent practical to support mission activities before proceeding with new construction or additional lease facilities. DOE-NE and INL assess infrastructure needs through a closely linked process that focuses first on ascertaining mission requirements and then on assessing the existing infrastructure to identify gaps or excess capacity. As outlined in Section 1, the major real property holdings at INL are linked to DOE-NE programmatic mission needs. Consistent with DOE policy and before proceeding with surplus facility activities, DOE-NE and INL analyze any additional capacity to determine its potential for future use by customers within DOE or other federal agencies.

Some significant infrastructure gaps will develop within the next 10 years, three of which DOE is already actively addressing:

1. The anticipated closure of concrete vaults at the RWMC SDA, which provide onsite RH-LLW disposal capability. DOE expects that the vaults will reach capacity by 2020, which will have an impact on DOE-NE and NR missions. Therefore, DOE-NE, with NR, is constructing a replacement facility located adjacent to the ATR Complex to provide up to 20 years of additional storage capacity. Construction commenced in 2015 with operations commencing in 2019.
2. The lack of a domestic capability for transient testing of nuclear fuel. DOE-NE has identified a need to resume transient testing to support R&D missions. The final *Environmental Assessment for the Resumption of Transient Testing of Nuclear Fuel and Materials* (DOE-ID 2014b) was completed. Subsequently, a finding of no significant impact from Alternative 2, "Restart the Transient Reactor Test Facility (TREAT) at the Idaho National Laboratory (INL)," was made. As a result, in February 2014, DOE directed INL to commence efforts to restart TREAT (DOE-ID 2014b). Resumption of transient testing is anticipated to begin in 2018.
3. Near-term gaps relative to building an integrated capability for developing advanced nuclear fuel and materials. SPL will provide sample preparation and dedicated equipment for a broad range of mechanical testing capability for examining radioactive materials. Scope definition is nearing completion and construction is anticipated in the 2018–2020 timeframe.

Early stage planning to address implementation of new S&S requirements and to consider the next generation test and demonstration reactor is also underway. Table 3 summarizes these specific mission capability infrastructure gaps.

As new state-of-the art capabilities are being added to MFC (especially for nuclear fuels and materials characterization and post-irradiation examination), dedicated scientists and technical staff to use these capabilities will be working on site at INL. Because these capabilities are often unique in the nation and in the world, the plan is to increase access to these facilities to additional external users through the Nuclear Science User Facilities office. A materials and fuels research support facility is needed for user space and collaboration. The space will accommodate INL staff that collaborate and support, a research data visualization center, and laboratory space for engineering and development of experiments and analytical capabilities. The need for a similar user-based facility at ATR is being evaluated.

Additional infrastructure gaps exist relative to expanding classified space for cyber and control systems R&D to accommodate a public/private facility that engages industry in energy and advanced manufacturing innovation through collaborative computing, and to ensure adequate S&S are in place for appropriate material control and accountability.

Studies will continue to clarify associated needs, schedules, and potential solutions for these gaps.

In addition to closing capability gaps, INL needs to revitalize, sustain, and repair existing infrastructure. Many existing INL facilities are over 30 years old and require system and/or facility revitalization to maintain a safe, secure, and cost-effective operating environment.

Table 3. Idaho National Laboratory mission capability infrastructure gaps.

Infrastructure Gap	Projected Gap	Recommended Path Forward	Status
Onsite RH-LLW disposal capability	Anticipated closure of RWMC SDA will eliminate onsite disposal capability supporting DOE-NE and NR.	Construct replacement facility adjacent to ATR Complex to provide up to 20 years of disposal capacity. Critical Decision 2/3 approval was granted and Notice to Proceed was sent to subcontractor AREVA on July 18, 2014. Completion is scheduled to support uninterrupted onsite disposal capability.	Construction commenced in 2015 with operations scheduled for 2019.
Domestic transient testing	Ability to perform domestic transient testing of fuel was suspended in 1994.	DOE direction to restart TREAT was issued upon completion of a final environmental assessment and finding of no significant impact for "Restart of TREAT at INL." Transient testing could resume as early as 2018.	Major system and component testing and personnel training are underway to support 2018 restart date.
Radioactive experiment handling	Lack of facilities capable of housing next-generation PIE equipment.	Establish SPL at MFC.	Construction is anticipated to begin in FY 2018.
S&S infrastructure	Implementation of new/evolving S&S requirements may require modification to meet requirements.	Develop implementation plans for S&S requirements.	Studies are underway to assess the current infrastructure condition and identify potential gaps.
Next generation test and demonstration reactor	Rapid commercialization of innovative nuclear energy systems and technologies that cannot be developed using the existing test or research reactors (e.g., fast spectrum fuels and materials testing capability).	Complete a national study that involves the major stakeholders to define the functions and requirements for different test and demonstration options to be completed by the end of FY 2016.	National study was initiated in FY 2015 and is ongoing.

The DOE LOB infrastructure assessment identified the top FY 2016 investment priority and five general-purpose infrastructure investments needs for FY 2017 (listed in Table 4). These are important high-cost sustainment and revitalization investments needed to stop further degradation, reverse years of neglect brought on by limited funding availability, address safety issues, improve space utilization, assure current and future readiness and reliability, and achieve DOE's goal of zero growth of deferred maintenance backlog.

Appendix A contains an assessment of the INL real property infrastructure, an essential mission-enabling capability; it describes and discusses INL's strategy for managing utilities and enabling infrastructure, as well as a proactive approach to sustaining real property assets. It also discusses the deferred maintenance backlog; replacement plant value; and asset condition index for the mission-critical and mission-dependent buildings and OSFs. Appendix B outlines the investments needed toward addressing the infrastructure needs identified in Tables 3 and 4.

3.2 Investment Approach

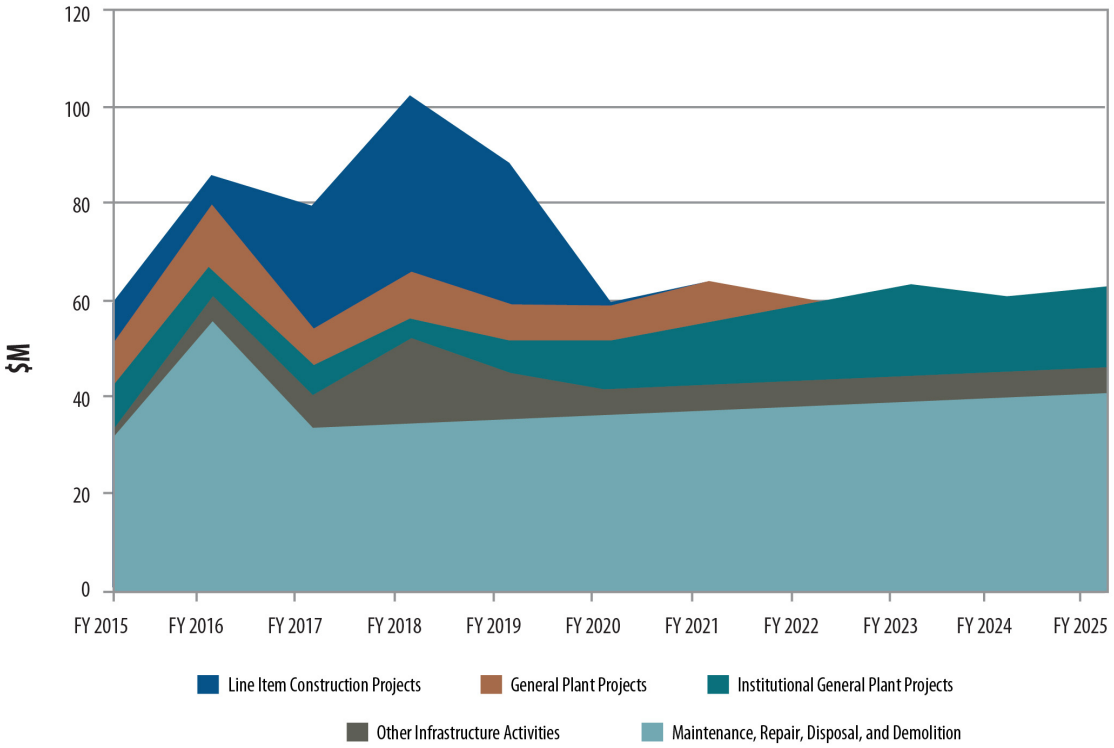
A multifaceted investment strategy leverages program, facility maintenance, strategic, and work-for-others investments to maintain and revitalize infrastructure at INL to the level allowed by anticipated funding. This integrated investment portfolio seeks to optimize available funding. DOE-NE and INL continue to investigate funding alternatives and pursue cost efficiencies through consolidation, laboratory integration, and footprint reduction to better utilize available resources. Figure 9 summarizes the INL real property investment resource requirements associated with TYSP implementation.

3.2.1 Program Investments

DOE-NE supports maintenance and repair of nuclear facilities and funds major maintenance and repair of nuclear infrastructure, disposition of non-nuclear facilities, and assessments for developing new or replacement capabilities. The real property investments identified in Appendix B for programmatic general plant projects and line-item construction projects are supported through DOE-NE programmatic investments.

Table 4. Idaho National Laboratory general-purpose infrastructure revitalization needs.

Project Title	Priority	Focus Area	Scope Description	Benefits	Cost Estimate ($M)
Power distribution refurbishment (FY 2016)	1	Utilities	Replace critical components of INL Sitewide high-voltage power grid and complete select upgrades of data communications, fire alarm signaling, and redundant power feed.	Enables mission-critical research and reduces risk of power interruptions or fire alarm failures impacting operations in mission-critical and -enabling buildings. Upgrade will also enable redundant supply of electrical power to all remote test site areas during electrical grid testing.	$23.0M
Resurface and reconstruct primary roads	2	Utilities	Resurface, reconstruct, and seal coat major areas of primary roads between R&D campuses. 1. Lincoln and Washington Blvd ($9.4M) 2. Monroe, Portland, Ogden, and Underpass ($7.2M) 3. MFC/TREAT access road ($5M) 4. RWMC/EBR-1 and CITRC access road ($8M) 5. Lincoln Blvd North ($9.4M) 6. Harrison Blvd ($2.6M).	Removes hazards and improves the safe egress for all vehicle traffic on primary two-lane, multi-direction roadways. Site roads are utilized by government, employee, public, and commercially owned vehicles including emergency response, heavy-duty haul vehicles, and light vehicles. Additionally, publicly accessible roadway hazards will also be reduced. Prevents continued degradation and failure of primary roads surfaces and roadbeds that have not received proper road treatments in over 15 years. Repairs will avoid forecasted accumulation of $40M of deferred maintenance over the next 5 years. Corrects rutting issues that impose the need for speed reduction to maintain vehicle control, thus impacting emergency response times. Reduces winter road hazards for all vehicles as snow/ice build-up in rutted roadways is reduced and more easily removed. Eliminates safety concerns associated with driver behavior to avoid ruts by hugging the centerline and or the median.	$41.6M
Modernize essential communications infrastructure	3	Utilities	Replace fiber optic cables that connect onsite infrastructure to the INL network ring, complete optical fiber backbone ring across the INL site and within the individual campuses, and upgrade in-building cabling in key buildings that support multiple customers and mission needs.	Provides reliable and redundant data and voice communications by replacing antiquated equipment and undersized capacity. Enhances worker safety by ensuring communication links to emergency systems and back up communication lines. Reduces the risk of work interruptions and outages due to failed communications equipment that is beyond service life and no longer supported by the vendor for spare parts and service.	$10.0M
Replace deferred roofs	4	Facility improvements	Replace approximately 180,000 ft^2 of failing roofs with cool roof technology to ensure continued support of INL missions. NE partners with NNSA to utilize the Roof Asset Management Program to adequately assess and prioritize roof repair and replacements at a reduced cost, allowing NE to improve reliability and safety of facilities, reduce operational costs, and support DOE's sustainability goals.	Restoration of roof integrity for INL facilities reduces employee exposure to hazards associated with water intrusion into electrical and electronic equipment, reduces the risk of work interruptions and damage to building structure and protects costly research equipment inside the buildings. Repairs will mitigate and avoid forecasted accumulation of $15M of deferred maintenance over the next 5 years.	$20.0M
Replace HVAC and diesel generators	5	Facility improvements	Replace obsolete and beyond-service-life HVAC and diesel generators.	Provides safe and reliable INL facilities, ensures continuous operation of safety systems, and minimizes unplanned work disruption and outages due to failed equipment that is beyond service life and no longer supported by the vendor for spare parts and service.	$20.0M
Revitalize INL Research Center laboratories and offices	6	Mission-enabling renovations	Revitalize and repurpose INL research laboratories that support multiple programs and customers; this includes electrical, communications, HVAC, and gas distribution systems and laboratory and office areas.	Revitalizes 30-year-old laboratories and office areas and provides flexible and easily reconfigurable space and services to satisfy current and future mission needs and R&D requirements.	$45.0M



	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	7.9	5.0	24.3	35.5	27.8	0.5	0.0	0.0	0.0	0.0	0.0
	8.6	14.1	7.3	9.4	7.6	7.3	7.7	0.0	0.0	0.0	0.0
	8.7	4.9	6.1	3.9	6.5	9.7	13.7	15.9	18.4	14.8	15.3
	2.0	5.4	7.5	18.5	10.2	6.1	5.5	5.6	5.5	5.6	6.1
	30.9	55.7	33.4	34.3	35.2	36.2	37.2	39.5	39.5	40.7	41.9
Total	**58.1**	**85.1**	**78.6**	**101.6**	**87.4**	**59.7**	**64.2**	**59.9**	**63.3**	**61.1**	**63.3**

Figure 9. Projected Idaho National Laboratory infrastructure investment needs.

DOE-EM, consistent with DOE-NE, provides funds to maintain existing infrastructure that supports the DOE-EM cleanup mission, identifies gaps, and constructs new facilities such as the Integrated Waste Treatment Unit. DOE-EM also invests in the decommissioning and demolition of unneeded footprint contributors, including radioactively contaminated facilities. Appendix C provides additional details regarding DOE-EM's real property investments at the INL Site.

NR provides funding for ATR and directly funds maintenance and operations of NRF as discussed in Appendix C. NR is also directly contributing to the replacement RH-LLW Disposal Facility that will replace the existing capability at RWMC.

3.2.2 Idaho National Laboratory Strategic Investments

INL strategic investments support institutional projects, both technical and support facilities and infrastructure, as required to advance the INL mission. This TYSP assumes an annual strategic investment of approximately $5 million today and will be ramping up to $10 million to $15 million over the next few years. In the next 3–5 years, these funds will go primarily to maintaining and

revitalizing institutional infrastructure that supports mission-critical and -enabling capabilities such as utility enhancements (e.g., electric power, roads, roofs, communication, and sewers). The real property investments identified in Appendix B for institutional general plant projects are supported through INL strategic investments. INL strategic investments also support sustainability improvements, as affordable.

3.2.3 Alternatively Funded Investments

Alternatively funded investments are the primary method to fund sustainability and efficiency projects, and savings are reinvested into new efficiency projects. This funding resource is utilized based on strict guidelines to ensure that the method is the most advantageous to the government in terms of cost savings and return on investment. Appendix D provides additional details on proposed and active alternatively funded projects underway at INL.

4. CHANGES FROM FISCAL YEAR 2013 TEN-YEAR SITE PLAN

The structure of this TYSP has been modified to incorporate DOE-NE's updated list of core capabilities. Section 1 identifies the core capabilities that support mission objectives. Section 2 describes how INL assets support the core capabilities. Updating the core capabilities was an integral step to achieving the DOE LOB infrastructure assessment objective to provide DOE leadership with insight into the physical condition, functionality, and utilization of existing infrastructure across the laboratory complex. INL fully participated in DOE LOB activities.

In response to the DOE LOB data call, INL identified its top five general-purpose infrastructure investments (listed in Table 4). These are important, high-cost sustainment and revitalization investments needed to stop further degradation, reverse years of neglect brought on by limited funding availability, address safety issues, improve space utilization, assure current and future readiness and reliability, and achieve DOE's goal of zero growth of the deferred maintenance backlog.

In FY 2014, a limited update to the TYSP was provided in accordance with DOE-NE guidance. The update identified the following significant changes:

- Achievement of beneficial occupancy for EIL (formerly the Research and Education Laboratory)
- Direction to resume TREAT operations following a finding of no significant impact on this preferred alternative
- Receipt of appropriated capital funds authorizing the RH-LLW Disposal Facility design, construction, and startup
- Update the mission need for the Sample Preparation Laboratory as the lead alternative to close the advanced PIE gap.

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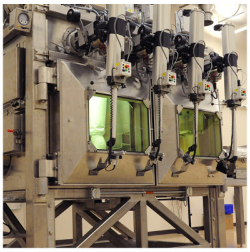
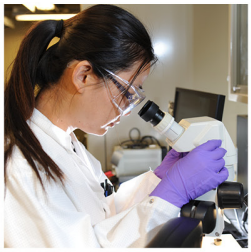
APPENDIX A

Real Property Asset Management

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ACRONYMS

ACI	asset condition index
ATR	Advanced Test Reactor
AUI	asset utilization index
DM	deferred maintenance
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOE-NE	Department of Energy Office of Nuclear Energy
EROB	Engineering Research Office Building
FIMS	Facility Information Management System
FY	fiscal year
INL	Idaho National Laboratory
LOB	Laboratory Operations Board
MFC	Materials and Fuels Complex
OSF	other structure and facility
R&D	research and development
REC	Research and Education Campus
RPV	replacement plant value
SMC	Specific Manufacturing Capability
TREAT	Transient Reactor Test Facility

A-1. SUMMARY OF REAL PROPERTY

While Idaho National Laboratory's (INL's) focus is on its vision established by the Department of Energy (DOE), INL's priority for real property asset management is to sustain, fully utilize, and obtain the most value from existing assets required to enable and advance the core capabilities of INL and the DOE Office of Nuclear Energy (DOE-NE) to meet DOE-NE mission requirements. The 2014 DOE National Laboratory Operations Board (LOB) infrastructure assessment supports this priority by linking DOE-NE core capabilities to the physical condition, functionality, and utilization status of INL real property assets (see Table A-1).

To this end, INL is focusing on:

- Establishing a solid baseline of real property asset condition, sustainment, and recapitalization requirements
- Identifying the risks to core capabilities and mission accomplishment associated with assets that are in less-than-adequate condition
- Mitigating the risk to the functionality of core capabilities and mission accomplishment that is posed by the maintenance backlog (Facility Information Management System [FIMS] repair needs, deferred maintenance [DM]), and less-than-adequate asset conditions
- Prioritizing sustainment and revitalization investments.

A-1.1 Department of Energy Office of Nuclear Energy-Owned and Operating Real Property Inventory

DOE-NE manages 492 nonprogrammatic[1] owned and operating real property assets. These assets have an estimated replacement plant value (RPV) of $3,260 million and include 286 owned and operating buildings and real property trailers totaling 2.4 million ft^2. The remaining 207 owned and operating assets are other structures and facilities (OSFs)[2] that support these buildings.

DOE-NE real property inventory also includes four "programmatic" real property assets that have a total FIMS RPV of $1,437 million. These four assets fall into the 3000-series FIMS OSFs usage code category and include the Advanced Test Reactor (ATR), its cooling tower and vent stack, and the Transient Reactor Test Facility (TREAT) reactor.

INL DOE-NE real property inventory includes the 27 mission-critical assets, OSFs, and land assets listed in Table A-2. Mission-critical assets are defined as those that conduct primary missions of the Site with defined, quantifiable output. All assets chosen have direct links to program sponsors, DOE-NE Roadmap (DOE 2010) research and development (R&D) objectives, or are part of other external commitments. They are unique and enable DOE-NE to make progress toward R&D objectives and its various program missions.

INL DOE-NE real property inventory also includes the five mission-unique facilities made of the16 individual DOE-owned real property assets listed in Table A-3. These facilities were designated as mission-unique as part of the 2014 DOE LOB infrastructure assessment. These assets were excluded from the 2014 DOE LOB infrastructure assessment, which focused on assessment of general-purpose support infrastructure.

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1. *Nonprogrammatic real property assets exclude assets with a FIMS usage code in the 3000-series of OSFs. At INL, 3000-series OSFs include ATR, its vent stack and cooling tower, and the TREAT reactor. Additionally, the 492 total does not include the four DOE-owned land assets.*

2. *OSFs include any fixed real property improvements to land that are not classified as a building (e.g., bridges, towers, roads, and fences). OSFs also include site utility systems used to generate, collect, or distribute any services such as heat, electricity, sewage, gas, and water.*

Table A-1. Idaho National Laboratory facilities and supported core capabilities.

	Facility	1. Nuclear Fuels & Materials Research	2. Applied Materials Research & Processing	3. Applied Chemical Separations	4. Energy Systems Design & Analysis	5. Engineering Research, Performance, V&D	6. Critical Infrastructure Protection	7. Nuclear Nonproliferation	8. Industrial Control Systems	9. Environmental Systems Surveillance	10. Defense Systems	11. Enabling Infrastructure
ATR Complex	ATR	●				●		●				
	ATR Critical	●				●		●				
Materials and Fuels Complex (MFC)	Analytical Laboratory	●	●	●								
	Electron Microscopy Laboratory	●			●							
	Experimental Fuels Facility	●	●			●						
	Fuel Conditioning Facility	●	●	●								
	Fuel Manufacturing Facility	●	●									
	Fuels and Applied Science Building	●		●		●						
	Hot Fuel Examination Facility	●		●		●						
	Irradiated Materials Characterization Laboratory	●	●									
	Radiochemistry Laboratory		●	●								
	Space and Security Power Systems Facility				●							
	TREAT	●	●									
	Zero Power Physics Reactor Building	●	●		●			●				
Research and Education Campus (REC)	Center for Advanced Energy Studies	●		●		●						
	Energy Innovation Laboratory		●	●	●							
	Engineering Research Office Building (EROB)	●			●	●						
	Energy Systems Laboratory				●	●						
	Information Operations and Research Center											●
	INL Research Center Laboratory Building	●	●	●								
	National & Homeland Security Facilities						●	●	●		●	
	Radiological and Environmental Sciences Laboratory							●		●		
	Willow Creek Building											●
Other INL Site Areas	Central Facilities Area	●	●	●		●	●				●	●
	Critical Infrastructure Test Range Complex						●	●	●			
	Idaho Nuclear Technology and Engineering Center	●	●	●	●			●				
	Specific Manufacturing Capability (SMC)										●	

Table A-2. Idaho National Laboratory mission-critical, real property inventory.

FIMS Property Identification	Property Name	FIMS Property Identification	Property Name
ATR Reactor (OSF)	ATR	MFC-787	Fuels and Applied Science Building
IF-603	INL Research Center Laboratory Building	MFC-792	Space and Security Power Systems Facility Control Room
IF-605	Energy Storage Technology Laboratory	MFC-792A	Space and Security Power Systems Facility Annex
IF-638	INL Research Center Physics Laboratory	MFC-1702	Radiochemistry Laboratory
IF-657	INL Engineering Demonstration Facility	MFC-1729	Irradiated Materials Characterization Laboratory
IF-683	Radiological and Environmental Sciences Laboratory	TAN-629	SMC Assembly Building
MFC-704	Fuel Manufacturing Facility	TRA-670	ATR Reactor Building
MFC-704A	Fuel Manufacturing Facility Compressor Building	TRA-770	ATR Vent Stack
MFC-709	Safety Equipment Building	TRA-771	ATR Cooling Tower
MFC-752	Analytical Laboratory and Office Building	IF-LAND-02	DOE-owned INL Research Center Land
MFC-765	Fuel Conditioning Facility	S-LAND-01	Withdrawn from Public Use INL Site Land
MFC-774	Environmental Measurements Laboratory	S-LAND-02	DOE-owned INL Site Land
MFC-785	Hot Fuel Examination Facility		

a. The asset condition index (ACI) is not applicable to land or FIMS 3000-series programmatic OSFs. Therefore, these OSFs are not included when discussing nonprogrammatic assets or in the ACI discussion in Section A-1.3 or Table A-3. FIMS 3000-series OSFs at INL are ATR, the ATR cooling tower, ATR vent stack, and TREAT reactor.

Table A-3. Idaho National Laboratory mission-unique facilities.

ATR Complex		
ATR	ATR/ATR Critical Facility	3000-Series Programmatic OSF
TRA-670	ATR/ATR Critical Reactor Building	Building
TRA-770	ATR Vent Stack	3000-Series Programmatic OSF
TRA-771	ATR Cooling Tower	3000-Series Programmatic OSF
TREAT		
MFC-720	TREAT Reactor Building	Building
MFC-724	TREAT Control Building	Building
MFC-726	TREAT Reactor	3000-Series Programmatic OSF
MFC		
MFC-704	Fuel Manufacturing Facility	Building
MFC-765	Fuel Conditioning Facility	Building
MFC-775	Zero Power Physics Reactor Vault-Workroom Equipment Room	Building
MFC-776	Zero Power Physics Reactor Cell	Building
MFC-785	Hot Fuel Examination Facility	Building
MFC-792A	Space and Security Power Systems Facility Annex	Building
SMC		
TAN-629	SMC Assembly Building	Building
TAN-679	Manufacturing and Assembly Building	Building
TAN-679A	Manufacturing and Assembly Annex	Building

A-1.2 Deferred Maintenance

In 2014, INL reported $63 million in DM backlog associated with non-programmatic real property assets. Of this total, 56% is associated with many relatively minor and lower risk individual maintenance tasks such as painting and replacement of aging building components (carpet; heating, ventilation, and air conditioning units; etc.). However, the remaining 44% includes $10 million for aging roofs and $28 million for replacement of major components in the INL high-voltage transmission and distribution system and substations (INL power grid).

Additionally, major sustainment and restoration of aging INL pavement assets (roads and parking lots) and the INL railroad represent significant risk of performance degradation and DM growth that are also beyond base maintenance budgets and historically limited strategic investment funding.

INL management recognizes the significant investment needed to mitigate the near-term risk posed to DM growth and the potential for unacceptable safety and mission impacts associated with these aging assets and is taking action to elevate the priority of these strategic sustainment investments. Therefore, investment in the INL power grid and pavement are the top two strategic investment priorities for general-purpose infrastructure.

Investment of $23 million for the INL power distribution refurbishment (see Appendix B, Table B-4) is included in DOE's fiscal year (FY) 2016 budget request for funding within the Idaho Facilities Management Program. This investment will reduce DM by about $13 million.

A-1.3 Asset Condition Index

ACI for DOE-NE-owned and operating nonprogrammatic assets has been above the DOE target (0.950) and essentially stable at around 0.980 for the last several years. This trend is also true for mission-critical assets (ACI = 0.997), all of which have an individual ACI that is above the 0.970 DOE target for mission-critical assets (Table A-2).

Table A-4 breaks down the DOE-NE building square footage, DM, and RPV for owned and operating assets (those with a FIMS Status Code of 1, 2, or 6) in each of the three mission dependency categories.

Figure A-1 presents additional details concerning the ACI for owned and operating nonprogrammatic DOE-NE assets by property type (e.g., building, trailer, or OSF). It provides a breakdown of the ACI target, average ACI for all assets (buildings, trailers, and OSFs), average ACI for buildings and trailers, and average ACI for OSFs in each mission dependency category.

Table A-4. Summary of Department of Energy Office of Nuclear Energy-owned and operating nonprogrammatic asset data.[a]

FIMS Mission Dependency Category	Number of Assets	DM ($M)	RPV ($M)	Gross Square Feet	Average ACI	ACI Target[b]
Mission Critical	21	5.7	1,795	805,854	0.997	0.970
Mission Dependent	317	49.3	1,289	1,159,565	0.962	0.925
Not Mission Dependent	154	8.4	170	400,455	0.951	0.900
Total	**492**	**63.4**	**3,254**	**2,365,874**	**0.981**	**0.950**

a. Data in this table excludes 3000-series programmatic OSFs and land assets for which ACI, DM, and gross square feet do not apply.

b. The ACI targets are from the DOE Three-Year Rolling Timeline (FY 2013 Update, DOE 2013).

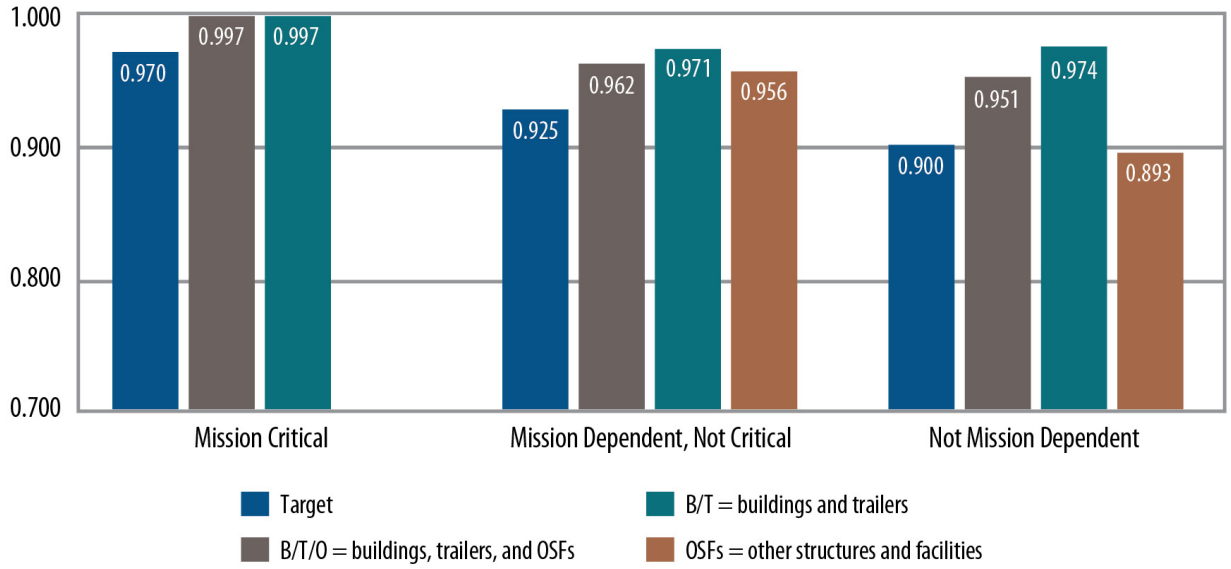


Figure A-1. Nonprogrammatic asset condition index by mission dependency and property type.

A-1.4 Asset Utilization Index

Table A-5 summarizes the asset utilization index (AUI) for DOE-NE-owned INL buildings and trailers. Overall, the INL AUI increased by 2.4% from the end of FY 2013 (10/10/2013). The AUI for MFC, the ATR Complex, Research and Education Campus (REC), and balance of INL facilities followed the overall trend as well—rising 2.0, 1.0, 0.8, and 1.8%, respectively.

The increased AUI is the result of hiring associated with increased program work, as well as efforts in 2013 and 2014 to consolidate staff and work into larger, less-utilized buildings, allowing the leases for several small buildings in Idaho Falls to be terminated.

A-2. REAL PROPERTY ASSET MANAGEMENT

The key elements of INL real property asset management include condition assessment surveys, capital investments in new and revitalized infrastructure, space utilization, sustainment of enduring assets, and disposition of excess real property assets. Each of these key elements is discussed in greater detail in the following sections.

A-2.1 Condition Assessment Surveys

INL condition assessment survey activities fulfill the requirements of DOE Order 430.1B, "Real Property Asset Management." INL employs facility managers, engineers, and third-party contractors to inspect DOE-NE real property assets at least every 5 years. Primary roads are inspected under contract with the Idaho Transportation Department every 3 years using their state-of-the-art inspection equipment and experienced pavement engineers and asset managers. Bridge inspections are performed under subcontract with a qualified bridge inspector. Roof assets are inspected by the National Nuclear Security Administration Roof Asset Management Program roof management contractor.

INL bases its DM backlog on the deficiencies identified during these condition assessment surveys. Condition information from facility professionals, which is based on feedback from building occupants and their own operating and maintenance experience, also contributes to identification of DM. These deficiencies are recorded in the DOE Condition Assessment Information System Database.

Table A-5. Idaho National Laboratory asset utilization index.

Site Area	DOE-owned Facilities (gross square feet)[a]	FIMS AUI	AUI Rating Level[b]
ATR Complex	418,531	96%	Good
MFC	665,630	96%	Good
REC	297,611	95%	Good
Balance of INL	1,100,335	87%	Fair
All INL Facilities	**2,482,107**	**92%**	**Adequate**

a.- Based on end of FY 2014 (10/10/2014) data.
b.- AUI rating levels (DOE Order 430.1B, Section 4.g(1)):
1.00 ≥ 0.98 = Excellent 0.98 ≥ 0.95 = Good 0.95 ≥ 0.90 = Adequate 0.90 ≥ 0.75 = Fair < 0.75 = Poor

Additionally, in FY 2014, INL conducted a qualitative assessment of the physical condition, functionality, and utilization of DOE-NE-owned and INL contractor-leased real property assets as part of the general-purpose infrastructure assessment commissioned by the DOE LOB. The results of this assessment have been entered into new FIMS data elements for future analysis and planning at the DOE enterprise level.

A-2.2 Capital Investments in Revitalized Infrastructure

Ongoing capital investment in new construction, expansion, and recapitalization is providing needed R&D capability, space, and support infrastructure capacity and reliability.

A-2.3 Space Utilization

A-2.3.1 Space Planning Principles, Standards, and Criteria

INL's goal is to ensure employees are provided a modern, collaborative, and sustainable work environment that is flexible by design so that it can be configured to meet specific program and/or project needs without major renovation and investment. INL has implemented office standards and provides a variety of office and workspace types and sizes based on job code and function, privacy, and work style needs.

Consistent with industry practices, these spaces are trending to a smaller individual footprint within well laid-out neighborhoods that provide open, multiuse areas and invite groups together for team-based work.

These spaces include the traditional conference rooms plus huddle areas that allow small groups to find convenient private locations for impromptu meetings and open areas that include space for casual meetings, shared storage, equipment areas, and break rooms. This open office environment encourages team collaboration, supporting the work styles of today's researchers and staff members utilizing modern technology options.

The combination of assigned office space, office support areas, and collaboration space results in an average total workspace allocation of 200 ft^2 per person. This standard is being applied to new buildings and the modernization of existing buildings.

In addition to application of the space standards, INL continues to implement a REC space consolidation strategy by defining a phased approach for modernizing existing space to meet the standards and to co-locate support personnel. Led by mission priority, support organizations will develop and agree to space utilization plans with an emphasis on defining organizational zones. Modernization of existing spaces, acquisition of new space (if needed), and accompanying personnel moves will be integrated into a master space consolidation schedule.

A-2.3.2 Department of Energy Laboratory Operations Board Functionality and Utilization Assessment

The 2014 DOE LOB infrastructure assessment documented the utilization of INL space in each of the seven space functionality types listed in Table A-6. The results of the functionality and utilization assessment have been entered into new data elements in FIMS for each building and are summarized in Table A-6.

Implementation of the space standards and REC space consolidation strategy coupled with the anticipated growth will result in positive impact to the office space utilization rate over the next several years.

A-2.4 Sustainment of Enduring Assets

INL maintenance budgets are expected to remain relatively flat or increase slightly over the 5-year sustainment planning horizon. Therefore, the INL sustainment strategy will continue to focus on corrective maintenance, cost-effective preventive maintenance, and predictive monitoring based on the principles of reliability-centered maintenance. As cost savings are achieved throughout the year, those savings are invested in revitalization and sustainment activities when possible.

Base-sustainment funding levels are expected to increase slightly in the future as the Laboratory's business volume and associated indirect recovery increases. This increase will allow INL to implement a risk-based, proactive approach to sustaining assets and allow investment in higher cost activities like roof and road sustainment and high-priority revitalization projects.

A-2.5 Disposition of Excess Real Property Assets

INL has demolished 383,208 ft^2 of excess buildings since the inception of the Battelle Energy Alliance, LLC, contract in February 2005.

INL real property inventory includes 35 excess real property assets that are managed in a safe and stable condition until funding is allocated to accomplish planning and disposition. Excess assets include those with shutdown-related FIMS status codes for buildings, trailers, and OSFs (FIMS Status Codes 3, 4, 5, 11, and 12). Table A-7 summarizes the INL real property inventory.

Of these shutdown assets, 33 assets and other operating assets that are projected to be inactivated over the period of this Ten-Year Site Plan have been included in the review of the Department's excess contaminated facilities. The INL excess building disposition plan was developed to meet the following needs:

- Reduce the cost, hazards, risk of continued asset deterioration, and visual impact associated with maintaining an excess asset in the inventory for an extended period
- Improve the work environment and operational efficiency as part of campus planning activities
- Demolish excess facilities to provide for expansion or construction of new buildings
- "Bank" demolished square footage to offset expansion or construction of new square footage.
- Propose dispositioning for excess INL buildings is listed in Appendix B, Table B-4.

The actual investment and disposition square-foot profile will depend on the amount of funding that is ultimately allocated to this effort.

Table A-6. 2014 Department of Energy Laboratory Operations Board functionality and utilization assessment summary.

DOE LOB Infrastructure Assessment Space Function Type[a]	Usable Square Feet	Utilized (%)	Utilization Level
High bay	237,017	87.0	Fully utilized
Electric power intensive	114,532	90.7	Fully utilized
Ventilation intensive	121,587	84.5	Fully utilized
General wet	72,740	85.9	Fully utilized
General dry	185,979	97.8	Fully utilized
Office	528,998	71.8	Under utilized
Storage	406,748	95.5	Over utilized
All DOE LOB Space Types	**1,667,601**	**84.5**	**Fully utilized**

a. Definitions of each DOE LOB infrastructure assessment space type are available in LOB infrastructure assessment guidance.

Table A-7. Summary of shutdown and excess property inventory.

Excess Property Type	Inventory	Gross Square Feet
Buildings		
National Register Eligible	10	112,671
Non-historic	3	3,679
OSFs		
National Register Eligible	1	Not applicable
Non-historic	21	Not applicable
Total	**35**	**116,350**

A-3. LEASING OF FACILITIES

INL leases 17 buildings and one small office trailer (Table A-8) totaling approximately 1,040,447 gross square feet with a FY 2015 annual rent totaling $15.7 million. All but two of these buildings (the Boise Outreach Office No. 2 and trailer MFC-TR-58) are located at REC.

The lease rates for the two primary INL office buildings in Idaho Falls (Willow Creek Building and EROB) are extremely favorable. These two buildings provide 500,000 ft^2 at an average rate of $5.25/$ft^2$ annually.

On the INL Site, leasing of building space is practiced only as an option for temporary structures (e.g., construction and short-term office trailers). Capital investment (line-item capital projects, general plant projects, and institutional general plant projects) is preferred for satisfying long-term space needs.

Although INL intends to occupy government-owned buildings whenever possible, facility leasing will continue to be an important and cost-effective component in INL's facility management and campus planning strategy.

This strategy is centralized around INL's REC leases for general-purpose office and laboratory buildings when it is in the best interest of the government and INL mission. Leased buildings will be obtained that provide the best value to government; maximize employee comfort, health, and productivity; and minimize operating and utility costs. Certification to the Leadership in Energy and Environmental Design Gold for New Construction is the INL standard for design and construction of new building leases or build-to-suit leases. New leases of existing buildings will include provisions to evaluate the facility for energy efficiency and the ability to provide the appropriate indoor environmental quality prior to occupancy. Cost-effective updates that implement guiding principles for high-performance sustainable buildings are incorporated into new/renegotiated leases of existing buildings to maximize energy efficiency and employee productivity.

INL took occupancy of Energy Innovation Laboratory on University Boulevard, a new long-term contractor-leased laboratory building, in FY 2014. The role and importance of Energy Innovation Laboratory in space consolidation and accomplishing INL missions is described in Section 2.6.2 of this Ten-Year Site Plan.

Additionally, certification of the Energy Innovation Laboratory to the Leadership in Energy and Environmental Design Platinum standard contributes to achieving DOE targets for high-performance sustainable buildings.

Vacating the two remaining "outlying" leased facilities (Portable Isotopic Neutron Spectroscopy Laboratory and North Holmes Laboratory) will require acquisition of new facilities to consolidate them into REC. Relocating these activities to the recently constructed and leased Energy Innovation Laboratory or Energy Systems Laboratory is not appropriate due to laboratory size, floor loading, adjacency of other nonrelated activities, vibration, and several other factors.

For leases intended to be very short-term, temporary occupancies, the buildings will be evaluated and updated on a case-by-case basis with a preference for a facility that demonstrates better energy efficiency and indoor environmental quality. This allows enhancement of R&D capabilities and, at the same time, provides the most cost-effective alternative to construction of new DOE-owned buildings as a tool to optimize the facility inventory. Additionally, this strategy provides the ability to consolidate and collocate into a more enduring centralized campus area, which allows for termination of outlying and substandard leased facilities.

Table A-8. Current Idaho National Laboratory/Department of Energy Office of Nuclear Energy leased building information.

FIMS Property Identification	Property Name	Usage Code Description	Leased Square Feet	Lease Expiration Date	FY 2015 Annual Rent ($)	FY 2014 Other Costs ($)	Total Occupancy[a]	Planned Action Year (FY)	Planned Action
B60-606	Boise Outreach Office No. 2	Office	1,520	6/30/2018	28,120	0	2	2018	Renew
IF-606	INL Administration Building	Office	65,494	7/31/2021	492,754	535,622	149	2021	Renew
IF-606A	Radiological Assessment Program Addition at INL Administration Building	Programmatic general storage	2,176	7/31/2021	1,572	0	0	2021	Renew
IF-616	Willow Creek Building	Office	278,988	9/30/2015	1,132,880	1,731,076	648	2015	Renew
IF-617	Willow Creek Mechanical Building	Other service buildings	7,767	9/30/2015	1	121,298	1	2015	Renew
IF-639	North Holmes Laboratory	Machine shops	22,030	10/31/2015	183,793	98,917	24	2015	Renew
IF-654	EROB	Office	244,979	1/31/2018	1,467,983	1,291,704	656	2018	Renew
IF-654A	EROB Mechanical Building Annex	Other service buildings	1,083	1/31/2018	1	1,069	0	2018	Renew
IF-665	Center for Advanced Energy Studies	Other support labs	39,030	9/30/2028	850,104	219,432	61	2028	Renew
IF-670	Bonneville County Technology Center Bays 1—9	Laboratories, general (non-nuclear)	20,470	9/30/2017	152,763	89,970	2	2017	Renew
IF-675	Portable Isotopic Neutron Spectroscopy Laboratory	Laboratories, general (nuclear)	6,500	9/30/2017	50,375	23,470	1	2017	Renew
IF-680	Homeland Protection	Office	7,649	8/31/2018	185,673	72,543	26	2018	Renew
IF-681	Cyber Security and Intelligence	Office	33,565	7/31/2018	1,338,289	206,160	64	2018	Renew
IF-682	Security Systems Laboratory	Fabrication facility	54,816	7/31/2018	790,873	173,482	10	2018	Renew
IF-684	Critical Infrastructure Protection and Resilience Laboratory	Electrical/electronics laboratory	32,103	2/28/2020	566,335	232,096	73	2020	Renew
IF-685	Energy Systems Laboratory	Multifunction research/lab building	90,430	8/30/2021	2,544,808	0	73	2021	Renew
IF-688	Energy Innovation Laboratory	Chemistry laboratory (non-nuclear)	130,407	9/18/2023	5,898,432	8,276,080	44	2023	Renew
MFC-TR-58	MFC Facility Upgrades Office Trailer	Office	1,440	6/30/2016	17,832	1	5	2016	Expire
		Total	**1,040,447**		**15,702,588**	**13,072,920**	**1,839**		

a. Total occupant data date: February 2015.

A-4. MANAGEMENT AND PRESERVATION OF HISTORIC REAL PROPERTY AT IDAHO NATIONAL LABORATORY

Cultural resources found within INL boundaries represent over 13,000 years of human land use. They include an estimated 70,000 prehistoric archaeological sites dating from the early prehistoric period, thousands of historic archaeological sites dating back to the early 1800s, and historic real property buildings and OSFs related to World War II and the early pioneering era of nuclear energy in the United States.

The management of INL cultural resources is driven and guided by various federal laws, regulations, executive orders, DOE directives, supplementary State of Idaho statutes, and an agreement-in-principle between the DOE Idaho Operations Office (DOE-ID) and the Shoshone-Bannock Tribes. These requirements have been tailored to the unique needs of INL through the *INL Cultural Resource Management Plan* (DOE-ID 2013), as legitimized through a programmatic agreement between DOE-ID, the Idaho State Historic Preservation Office, and the Advisory Council on Historic Preservation.

A-4.1 Idaho National Laboratory Historic Real Property

Experimental Breeder Reactor I (Figure A-2) is a national historic landmark open to the public for self-guided tours during the summer months.

Figure A-2. Experimental Breeder Reactor I.

FIMS assets associated with the reactor are the reactor building (EBR-I-601) and the small guardhouse (EBR-I-602)—a National Register-eligible DOE signature property.

Nine other National Register-eligible INL real property assets have been classified as "DOE Signature Properties," a term coined by DOE Headquarters that denotes the most historically significant properties across the complex and/or those that have tourism potential. These nine real property assets include the following:

- Four buildings (CF-606, CF-607, CF-613, and CF-632); two water pump houses (CF-642 and CF-651); and the concussion wall (CF-704), gun emplacements, and gantry crane located near CF-633 that remain from the Arco Naval Proving Ground. The two pump houses are operating and are the primary source of potable and fire suppression water to the Central Facilities Area. The remaining Naval Proving Ground-related assets are not operating and have a FIMS status of shutdown pending decontamination and decommissioning.
- A hanger (TAN-629), now used by SMC, formerly used for development of a nuclear-powered airplane.

In July 2014, a memorandum of agreement was signed between DOE-ID, the Advisory Council on Historic Preservation, and the Idaho State Historic Preservation Office. This agreement identified mitigating activities whereby, if completed, the Idaho State Historic Preservation Office would agree that CF-606, CF-607, CF-613, CF-632, and portions of CF-633 could be demolished. One of the mitigating activities specified was the development and installation of a Naval Proving Ground informational kiosk to convey the historical relevance of the buildings being demolished. In January 2015, the kiosk was installed at a public area on the INL Site. The remaining memorandum of agreement mitigation activity being worked is the development of the Historic American Landscape report. Once the report is approved, funding for demolition of the Naval Proving Ground buildings will be requested.

A-5. REFERENCES

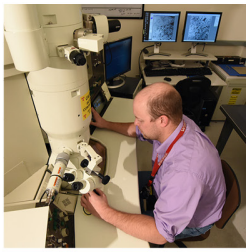
DOE 2010, *Nuclear Energy Research and Development Roadmap*, Report to Congress, U.S. Department of Energy, April 2010.

DOE 2013, *Three Year Rolling Timeline; Implementing the Goals and Objectives of DOE's Asset Management Plan*, U.S. Department of Energy, March 2013.

DOE-ID 2013, *INL Cultural Resource Management Plan*, DOE/ID-10997, Rev. 5, Department of Energy Idaho Operations Office, February 2013.

DOE Order 430.1B, 2011, "Real Property Asset Management," Chg. 2, U.S. Department of Energy, April 2011.

APPENDIX B



Prioritized Resource Needs

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ACRONYMS

ATR	Advanced Test Reactor
CITRC	Critical Infrastructure Test Range Complex
D&D	disposal and demolition
DOE-NE	Department of Energy Office of Nuclear Energy
FY	fiscal year
GSF	gross square feet
INL	Idaho National Laboratory
MFC	Materials and Fuels Complex
REC	Research and Education Campus
SMC	Specific Manufacturing Capability
SW	Sitewide

B-1. INTRODUCTION

Achieving the 10-year infrastructure vision requires Idaho National Laboratory (INL) to align its infrastructure priorities with both its critical mission goals and a reasonably forecasted funding profile. INL has refined its planning for major capital improvements, both acquisitions and enhancements, by prioritizing its core capabilities and outlining an approach for capital improvements based on program strategies and recognition of current funding outlooks. This appendix outlines the investments directed toward addressing the gaps identified in Table 3 of this Ten-Year Site Plan.

B-2. INSTITUTIONAL GENERAL PLANT PROJECTS

Small, general-purpose construction efforts are primarily accomplished via INL's Institutional General Plant Project process. INL prioritizes qualifying infrastructure needs for this strategic investment at the executive leadership level and implements projects according to funding availability. If planned acquisitions lag behind identified need dates due to constrained strategic investments, INL actively seeks appropriate funding alternatives (i.e., program investment). Institutional General Plant Project plans are delineated in Table B-1.

B-3. PROGRAMMATIC GENERAL PLANT PROJECTS

INL identifies program-funded infrastructure projects through the annual program planning and budget formulation process. General Plant Project infrastructure acquisition and recapitalization plans are listed in Table B-2. The table reflects the interval addressed by the Laboratory's annual program planning process.

B-4. LINE ITEM CONSTRUCTION PROJECTS

Congressional line item funding is used to accomplish construction projects that have a total project cost in excess of $10 million. INL is currently executing two line item construction projects listed in Table B-3.

B-5. OTHER INFRASTRUCTURE ACTIVITIES

Additional infrastructure activities necessary to support continued execution of mission objectives are presented in Table B-4. The investment needs include operating and indirect-funded building modifications and sustainment activities, lease-hold build-outs, and needs with undetermined sponsors and/or funding mechanisms.

B-6. MAINTENANCE, REPAIR, DISPOSAL, AND DEMOLITION

INL utilizes direct and indirect operating funds from multiple sources to accomplish infrastructure maintenance, repair, disposal, and demolition (D&D). Table B-5 identifies the funding planned to address these needs for the Laboratory's owned, non-programmatic real property assets.

Table B-1. Institutional General Plant Projects (actual or planned budget [$K]).

Area	Title	Added or Eliminated GSF	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
SW	Wireless Test Bed Upgrade	—	1,235	—	—	—	—	—	—	—	—	—	—
MFC	MFC Fire Water System Upgrade	1,400	5,765	2,930	—	—	—	—	—	—	—	—	—
SW	Land Mobile Radio Upgrade	—	1,737	1,996	809	822	835	848	585	—	—	—	—
REC	REC Electric Power Loop Upgrade	—	—	—	2,122	—	—	—	—	—	—	—	—
MFC	MFC Electrical Distribution Loop A	—	—	—	3,214	—	—	—	—	—	—	—	—
REC	Obsolete REC Fire Alarm System Replacement	—	—	—	—	950	—	—	—	—	—	—	—
MFC	MFC Fiber Optic Backbone Capacity and Reliability Upgrade (Manhole 50 Reconfiguration)	—	—	—	—	1,331	—	—	—	—	—	—	—
MFC	MFC-782 Machine Shop Fire Sprinkler System Installation	—	—	—	—	826	—	—	—	—	—	—	—
CITRC	National Security Test Range Enhancements	—	—	—	—	—	5,700	—	—	—	—	—	—
SMC	SMC Dial Room Replacement	1,841	—	—	—	—	—	8,852	—	—	—	—	—
ATR Complex	ATR Dial Room Replacement	1,841	—	—	—	—	—	—	9,719	—	—	—	—
MFC	MFC Communication Duct Bank Extension (Manhole 5 to Manhole 1)	—	—	—	—	—	—	—	1,419	—	—	—	—
CITRC	Upgrade Site Roads to Support National and Homeland Security Range	—	—	—	—	—	—	—	2,016	—	—	—	—
REC	INL Archives Center	5,500	—	—	—	—	—	—	—	6,176	—	—	—
CITRC	INL Test Range Multi-Use Facility	10,000	—	—	—	—	—	—	—	9,750	—	—	—
REC	INL Visitor Center	TBD	—	—	—	—	—	—	—	—	9,500	—	—
MFC	MFC Communication Duct Bank Reroute (around MFC-752)	—	—	—	—	—	—	—	—	—	8,859	—	—
CITRC	Non-Proliferation Test and Evaluation Center	20,000	—	—	—	—	—	—	—	—	—	9,500	—
MFC	MFC Non-Nuclear Operations Support Facilities Cable Upgrades	—	—	—	—	—	—	—	—	—	—	5,304	—
REC	REC Transportation Connectors	—	—	—	—	—	—	—	—	—	—	—	9,000
MFC	MFC Nuclear Operations Support Facilities Cable Upgrades	—	—	—	—	—	—	—	—	—	—	—	6,291
		Totals	**8,737**	**4,926**	**6,145**	**3,929**	**6,535**	**9,700**	**13,739**	**15,926**	**18,359**	**14,804**	**15,291**

ATR = Advanced Test Reactor
CITRC = Critical Infrastructure Test Range Complex
FY = fiscal year
GSF = gross square feet
MFC = Materials and Fuels Complex
REC = Research and Education Campus
SMC = Special Manufacturing Capability
SW = Sitewide

Table B-2. Programmatic General Plant Projects (actual or planned budget [$K]).

Area	Title	Added or Eliminated GSF	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
MFC	Zero Power Physics Reactor Documented Safety Analysis Implementation Upgrade	—	394	2,393	—	—	—	—	—	—	—	—	—
CITRC	National and Homeland Security Power Grid Test Bed - Power Line Construction Project	—	3,820	—	—	—	—	—	—	—	—	—	—
REC	DOE Laboratory Accreditation Program Facility (DOE-NE Program Direction)	6,032	4,380	—	—	—	—	—	—	—	—	—	—
MFC	MFC Perimeter Intrusion Detection and Assessment System (PIDAS) Upgrade	—	—	8,281	—	—	—	—	—	—	—	—	—
MFC	MFC Central Alarm System Upgrade	—	—	3,400	—	—	—	—	—	—	—	—	—
SW	Live Fire Shoot House Enhancements	2,000	—	—	2,906	—	—	—	—	—	—	—	—
MFC	MFC Intrusion Detection System Redundancy	—	—	—	4,350	—	—	—	—	—	—	—	—
SW	Tactical Training Facility	8,000	—	—	—	4,875	—	—	—	—	—	—	—
MFC	MFC Perimeter Protection Area Boundary Upgrade	—	—	—	—	900	—	—	—	—	—	—	—
MFC	MFC Firing Range Upgrade	160	—	—	—	1,125	—	—	—	—	—	—	—
MFC	Space and Security Power Systems Facility Addition	3,000	—	—	—	2,468	508	—	—	—	—	—	—
MFC	MFC ProForce Exercise Facility	2,368	—	—	—	—	3,375	—	—	—	—	—	—
REC	Cyber Security Data Center Upgrade	—	—	—	—	—	3,750	—	—	—	—	—	—
MFC	MFC-714 Replacement for Special Response Team	6,000	—	—	—	—	—	4,125	—	—	—	—	—
INTEC	CPP-651 Material Security and Consolidation Facility Perimeter Upgrade	—	—	—	—	—	—	3,183	—	—	—	—	—
ATR Complex	ATR ProForce Building	2,368	—	—	—	—	—	—	3,375	—	—	—	—
SW	Firing Range Fire Water System Upgrade	—	—	—	—	—	—	—	4,297	—	—	—	—
		Totals	**8,594**	**14,074**	**7,256**	**9,368**	**7,633**	**7,308**	**7,672**	—	—	—	—

Table B-3. Line item construction projects (actual or planned budget authority [$K]).

Area	Title	Added or Eliminated GSF	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
SW	Remote Handled Low-Level Waste Disposal Project (DOE-NE/EM) 13-D-905	8,940	7,922	1,504	2,940	—	—	—	—	—	—	—	—
MFC	Sample Preparation Laboratory 16-E-200	TBD	—	3,500	21,360	35,469	27,800	500	—	—	—	—	—
		Totals	**7,922**	**5,004**	**24,300**	**35,469**	**27,800**	**500**	—	—	—	—	—

Table B-4. Other infrastructure activities (actual or planned budget [$K]).

Area	Title	Added or Eliminated GSF	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
REC	UB-5 (National and Homeland Security Facility)	—	200	—	5,000	—	—	—	—	—	—	—	—
REC	Collaboratory for Energy Transitions and Transformations	—	—	—	—	—	5,000	—	—	—	—	—	—
REC	Information Operations and Research Center Relocation	TBD	1,778	2,532	TBD	—	—	—	—	—	—	—	—
SW	Multi-year investment to sustain existing infrastructure (e.g., roads, roofs, communications infrastructure)	—	—	2,320	2,000	2,000	4,678	5,050	4,540	4,595	4,500	4,595	5,100
REC	INL Research Center Laboratory Repurposing	—	—	500	500	500	500	1,000	1,000	1,000	1,000	1,000	1,000
SW	Resurface and Reconstruct Primary Roads	—	—	—	—	16,000	—	—	—	—	—	—	—
		Totals	**1,978**	**5,352**	**7,500**	**18,500**	**10,178**	**6,050**	**5,540**	**5,595**	**5,500**	**5,595**	**6,100**

Table B-5. Maintenance (actual or planned budget [$K]).

Area	Title	Funding Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
SMC	Specific Manufacturing Capability Maintenance (Department of Defense Funded)	Direct	911	1,217	1,244	1,274	1,304	1,339	1,369	1,402	1,436	1,470	1,505
ATR Complex	Advanced Test Reactor Maintenance (NR portion — NE/NR Funded)	Direct	883	891	912	898	917	940	968	992	1,017	1,042	1,068
ATR Complex	Advanced Test Reactor Maintenance (NE portion — NE/NR Funded)	Direct	2,979	3,067	3,145	3,260	3,346	3,429	3,532	3,634	3,740	3,848	3,960
MFC	Materials and Fuels Complex Maintenance	Direct	8,750	9,013	9,283	9,561	9,848	10,144	10,488	10,813	11,148	11,494	11,850
INTEC	INTEC Maintenance	Direct	205	210	215	221	226	232	238	244	250	256	263
SW	Sitewide Maintenance	Direct	573	23,200									
MFC	Space Battery Maintenance (NASA Funded)	Direct	464	477	492	507	522	537	553	570	587	604	622
ATR Complex	Advanced Test Reactor Complex Balance of Plant Maintenance	Indirect	604	619	635	651	667	683	703	721	740	759	779
SW	Sitewide Indirect Maintenance	Indirect	10,931	11,910	12,247	12,595	12,952	13,321	13,700	14,084	14,478	14,883	15,300
MFC	MFR Radiological Facilities	Indirect	410	872	898	925	953	981	1,011	1,041	1,073	1,105	1,138
MFC	Materials and Fuels Complex Balance of Plant Maintenance	Indirect	3,332	3,416	3,501	3,589	3,678	3,770	3,845	3,937	4,032	4,129	4,228
SW	Telephony Maintenance	Indirect	50	50	50	54	56	59	62	65	69	73	77
SW	D&D Program (pre-D&D planning, facility characterization, and hazard remediation)	Direct	779	798	750	750	750	750	750	750	750	750	750
		Totals	**30,871**	**55,740**	**33,372**	**34,285**	**35,219**	**36,185**	**37,219**	**38,254**	**39,319**	**40,414**	**41,540**

APPENDIX C

Cognizant Secretarial Offices, Program Secretarial Offices, and Non-DOE Site Programs

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ACRONYMS

AMWTP	Advanced Mixed Waste Treatment Project
ARP	Accelerated Retrieval Project
ATR	Advanced Test Reactor
ATRC	Advanced Test Reactor Critical (Facility)
BEA	Battelle Energy Alliance, LLC
CAES	Center for Advanced Energy Studies
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CITRC	Critical Infrastructure Test Range Complex
CRADA	Cooperative Research and Development Agreement
CSO	cognizant secretarial office
CWI	CH2M-WG Idaho, LLC
D&D	decommissioning and demolition
DM	deferred maintenance
DOD	Department of Defense
DOE	Department of Energy
DOE-EM	Department of Energy Office of Environmental Management
DOE-HQ	Department of Energy Headquarters
DOE-ID	Department of Energy Idaho Operations Office
DOE-NE	Department of Energy Office of Nuclear Energy
DRR	Domestic Research Reactors
EFF	Experimental Fuels Facility
EIL	Energy Innovation Laboratory
EO	Executive Order
EMS	environmental management system
ESL	Energy Systems Laboratory
FASB	Fuels and Applied Science Building
FAST	Fluorinel Dissolution Process and Fuel Storage
FCF	Fuel Conditioning Facility
FIMS	Facility Information Management System
FRR	foreign research reactors
FSV	Fort Saint Vrain
FY	Fiscal Year
GSA	General Services Administration
HEPA	high-efficiency particulate air
HFEF	Hot Fuel Examination Facility
HPC	High-Performance Computing
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
IMCL	Irradiated Materials Characterization Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	Idaho National Laboratory Research Center
ISFF	Idaho Spent Fuel Facility
ISFSI	Independent Spent Fuel Storage Installation
ITG	Idaho Treatment Group, LLC
IWTU	Integrated Waste Treatment Unit
LCB	life-cycle baseline
LLW	low-level waste
MFC	Materials and Fuels Complex
MLLW	mixed low-level waste
N&HS	National and Homeland Security
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NR	Naval Reactors
NRC	Nuclear Regulatory Commission
NRF	Naval Reactors Facility
O&M	operation and maintenance
PAR	programmable and remote
PIE	post-irradiation examination
PSO	program secretarial office
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RD&D	research, development, and demonstration
REC	Research and Education Campus
RESL	Radiological and Environmental Science Laboratory
RH-TRU	remote-handled transuranic
RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SBW	sodium-bearing waste
SDA	subsurface disposal area
SMC	Specific Manufacturing Capability
SNF	spent nuclear fuel
SNM	special nuclear material
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
SSPSF	Space and Security Power Systems Facility
TAN	Test Area North
TMI	Three Mile Island
TREAT	Transient Reactor Test Facility
TRU	transuranic
TSA	Transuranic Storage Area
TSCA	Toxic Substances Control Act
TYSP	ten-year site plan
UNF	used nuclear fuel
WAG	Waste Area Group
WIPP	Waste Isolation Pilot Plant

C-1. INTRODUCTION

Under Department of Energy (DOE) Order 430.1B, Chg. 2, *Real Property Asset Management*, the site landlord is responsible to act as a host landlord for its resident cognizant secretarial offices (CSOs) or program secretarial offices (PSOs). With this responsibility, DOE Office of Nuclear Energy (DOE-NE), the landlord for the Idaho National Laboratory (INL) Site, coordinates all CSO/lead PSO programmatic needs and prepares and presents a single coordinated and comprehensive ten-year site plan (TYSP). The site landlord is also responsible for ensuring the TYSP reflects infrastructure agreements between the CSOs and lead PSOs, that projected programmatic needs and potential growth are analyzed and reviewed with the programs, and that their infrastructure support requirements are integrated into the planning process.

DOE Office of Environmental Management (DOE-EM) and Office of Naval Reactors are the two largest, non-DOE-NE entities at the INL Site. DOE-EM, which is a CSO, owns most facilities at the Idaho Nuclear Technology and Engineering Center (INTEC) and Radioactive Waste Management Complex (RWMC), and manages the Idaho Cleanup Project (ICP) and the Advanced Mixed Waste Treatment Project (AMWTP). The DOE Office of Naval Reactors owns Naval Reactors Facility (NRF).

This appendix provides an overview of the facilities occupied, work performed, and recapitalization projects planned for implementation by DOE-EM. This appendix also provides a brief overview of INL's support service interactions with NRF.

C-2. IDAHO CLEANUP PROJECT AND ADVANCED MIXED WASTE TREATMENT PROJECT OVERVIEW

The DOE Idaho Operations Office (DOE-ID)/INL mission is to develop and deliver cost-effective solutions to both fundamental and advanced challenges in nuclear energy (and other energy resources), national security, and environmental management. ICP and AMWTP are funded through DOE-EM and focus on safely accomplishing as much of the INL Site cleanup as possible, while meeting regulatory requirements.

C-2.1 Idaho Cleanup Project Mission

Consistent with DOE-EM's mission to complete the safe cleanup of the environmental legacy brought about from five decades of nuclear weapons development and government-sponsored nuclear energy research, the DOE-ID Office of Environmental Management mission is to complete the environmental cleanup in a safe, cost-effective manner, consistent with DOE-EM objectives and regulatory agreements. The cleanup objectives include:

- **Objective DOE-EM 1:** Complete efforts to safely accelerate risk reduction, footprint reduction, and continued protection of the Snake River Aquifer
- **Objective DOE-EM 2**: Complete shipment of transuranic (TRU) waste offsite and meet commitments in the Idaho Settlement Agreement
- **Objective DOE-EM 3**: Identify innovative approaches to post-FY 2015 work scope, such as calcine and spent fuel management, decommissioning and demolition (D&D), and institutional control
- **Objective DOE-EM 4**: Maintain federal baseline management and government-furnished services and items-delivery systems, as applied to the administration of new contracts.

DOE-ID currently accomplishes the cleanup mission through two primary contractors: CH2M-WG Idaho, LLC (CWI), executing the ICP and Idaho Treatment Group, LLC (ITG), operating the AMWTP. The contracts of these two contractors are nearing the end and solicitations for new contracts are underway, with projected award in Fiscal Year (FY) 2016. The CWI and ITG contracts will be combined into one contract called the Idaho Core Cleanup Contract, which will continue the DOE-EM mission in 2016 through 2021.

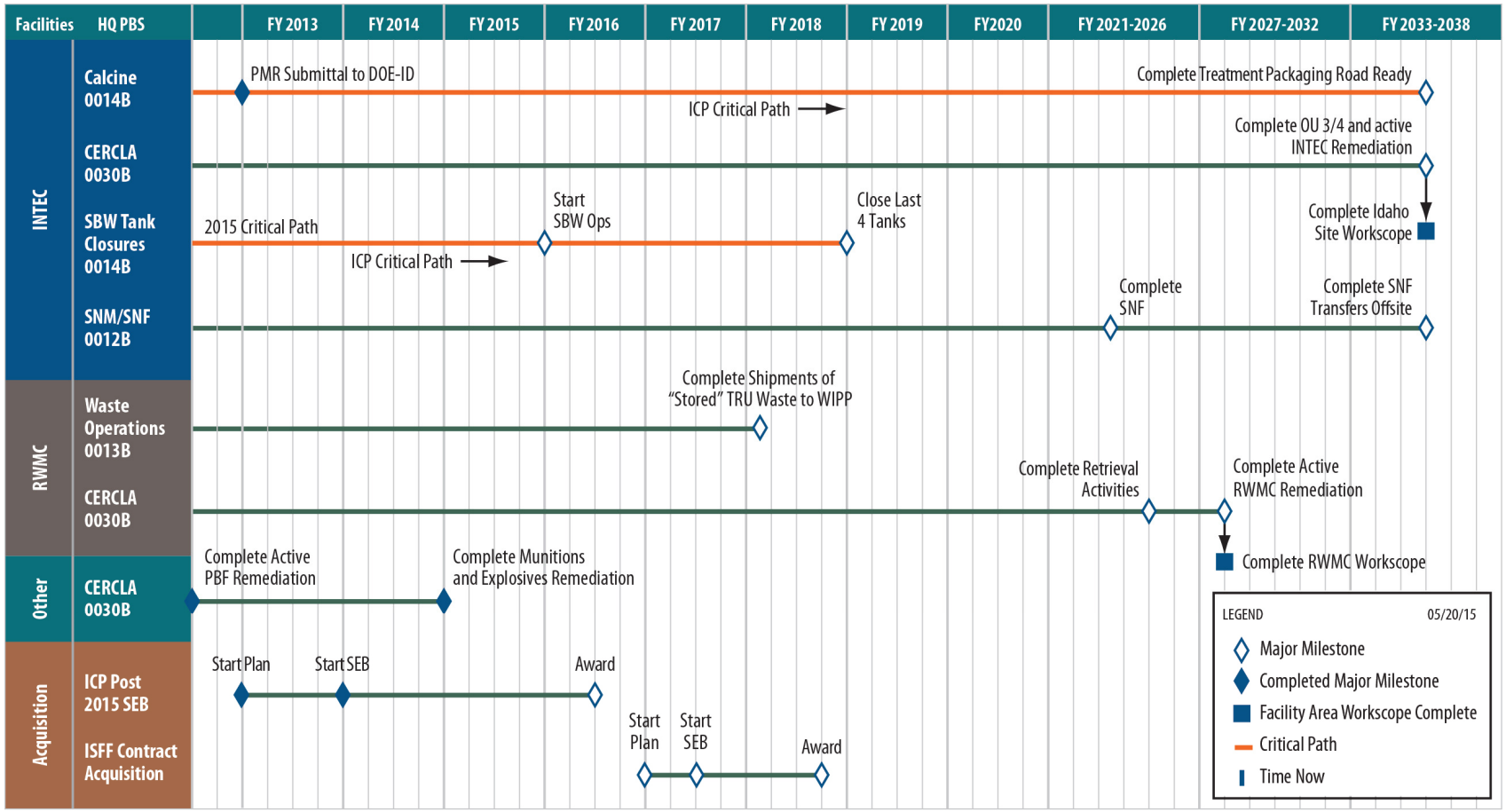
The DOE-ID/ICP planned work activities for the next 10 years, supporting the INL DOE-NE mission, are structured to meet the Idaho-specific milestones identified in the Idaho Settlement

Agreement, Site Treatment Plan (INL-STP 2014), and Federal Facility Agreement and Consent Order (DOE, DEQ, and EPA 1991). DOE-ID/ICP implements a life-cycle baseline (LCB) planning process designed to implement DOE-ID/ICP's cleanup mission while satisfying regulatory commitments. The LCB describes the programmatic objectives and necessary resources to complete the ICP mission. The TYSP is updated as the LCB matures and near-term programmatic objectives are accomplished. The DOE-ID/ICP DOE-EM funding profile for FY 2015 through FY 2026 is shown in Table C-1. The significant work activities and milestones for the ICP mission are as follows:

- Complete closure of the four remaining high-level waste tanks at INTEC, FY 2018.
- Complete transfer of used nuclear fuel (UNF) from wet storage facilities by December 31, 2023. The UNF storage pool at INTEC CPP-666 is the only remaining DOE-managed wet storage facility on the INL Site.
- Complete removal of 65,000 m^3 of TRU waste from Idaho to the Waste Isolation Pilot Plant (WIPP) no later than December 31, 2018.
- Complete exhumation of 5.69 acres of targeted TRU waste in the subsurface disposal area (SDA) at RWMC; completion is anticipated by FY 2024.
- Complete treatment (steam reforming treatment) of sodium-bearing waste (SBW) by the end of calendar year 2018.
- Continue remediation of contaminated groundwater at Test Area North (TAN).
- Position DOE-ID/ICP for repackaging and disposition of UNF by 2035.
- Complete design and initiate construction of a calcine treatment facility to support retrieving, treating, packaging, and storing approximately 4,400 m^3 of calcine.
- Continue receipt of domestic research reactor, foreign research reactor, and Advanced Test Reactor fuels at INTEC.
- Maintain remote-handled TRU (RH-TRU) waste characterization, treatment, packaging, and shipment activities supporting Idaho Settlement Agreement requirements.
- Maintain safe and compliant storage of UNF at INL and Fort Saint Vrain in Colorado.
- Renew the Nuclear Regulatory Commission (NRC) license for the Three-Mile Island (TMI) Independent Spent Fuel Storage Installation (ISFSI).
- Continue with decommissioning, deactivation, and demolition of nuclear, radiological, and industrial facilities that no longer have a DOE-EM mission.
- Maintain and implement the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program and associated institutional controls.
- A high-level summary schedule forecast (as of April 2015) for completion of this scope of work is shown in Figure C-1. Specific near-term work activities projected in the ICP and AMWTP contracts are summarized in the following sections.

Table C-1. Department of Energy Idaho Operations Office of Environmental Management funding profile for Idaho Cleanup Project and Advanced Mixed Waste Treatment Project work scope (Fiscal Year 2015 to 2026).

FY	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Funding ($M)	$370	$370	$370	$370	$370	$398	$408	$418	$428	$439	$450	$461



OU = Operable Unit
PBF = Power Burst Facility
PBS = Performance Baseline Summary
PMR = Project Management Review
SBW = sodium bearing waste
SEB = Source Evaluation Board
SNF = Spent Nuclear Fuel
TRU = transuranic

Figure C-1. Idaho Cleanup Project life-cycle schedule.

C-2.1.1 Scope and Schedule

The ICP contract, as amended by contract modifications, defines the "target" scope of work planned for completion by September 30, 2015 (Contract, Section C-8). Additional work scope, not included in the target cost, is also being performed (Contract, Section B-16). The projected work scope to be completed by the ICP contractor under the current contract is summarized as follows.

SNF (PBS ID-0012)

- Maintain all ICP-assigned UNF, UNF facilities, and UNF records
- Maintain the CPP-666 fuel storage basin and non-DOE-EM-assigned UNF currently stored in the basin
- Complete CPP-666 fuel storage basin ion exchange resin bed disposal and replacement
- Complete transport of the two West Valley UNF casks from the railroad siding to CPP-2707, Dry Spent Fuel Cask Storage Pad
- Manage NRC-licensed facilities in accordance with the license basis documents and commitments made to the NRC for the TMI ISFSI, Idaho Spent Fuel Facility (ISFF) at INTEC, and Fort Saint Vrain ISFSI in Colorado
- Support DOE in actions with NRC, such as preparation of technical evidence to support license renewal and an aging management program for the TMI ISFSI, NRC inspections, and resolution to requests for information
- Provide surveillance and monitoring, and implement a comprehensive preventive maintenance program for all INTEC UNF storage facilities through the duration of the contract
- Maintain capability to receive Domestic Research Reactor/Foreign Research Reactor Program UNF.

Solid Waste Disposition (PBS ID-0013)

- Perform all work necessary to complete the Idaho Settlement Agreement for RH-TRU waste and contact-handled TRU waste, and to place waste into a configuration meeting the WIPP waste acceptance criteria and complete final disposition.

General Waste Management

- Comply with Resource Conservation and Recovery Act (RCRA) (42 USC 1976) post-closure requirements for CPP-601/627/640 and the Waste Calcine Facility
- Perform sampling and report results for drinking water systems at INTEC and RWMC
- Dispose of solid waste generated as a result of cleanup activities
- Prepare and package DOE-EM-owned and generated hazardous waste and ship to an appropriate treatment or disposal facility
- Safely manage and disposition remote-handled and contact-handled low-level waste (LLW) waste generated by on-Site DOE-EM generators
- Dispose of DOE-EM-owned mixed LLW (MLLW) that is stored on-Site and/or generated by DOE-EM activities at a commercial or government disposal facility
- Dispose out of the state of Idaho all targeted waste retrieved and packaged from the RWMC SDA that is assayed as LLW or MLLW.

RWMC Infrastructure

- Maintain buildings and physical and utility interfaces to support RWMC and AMWTP missions.

Liquid Waste Disposition (PBS ID-0014) INTEC Programs

- Provide RCRA closure of the entire INTEC Tank Farm per the approved RCRA closure plan
- Maintain INTEC facilities and infrastructure systems
- Maintain calcine bin sets and RCRA storage permits.

Integrated Waste Treatment Unit (IWTU) Operations/SBW Disposition

- Complete necessary facility testing and achieve "cease use" milestone for SBW

- Remove and treat residual liquids (i.e., heel, rinse, and newly-generated liquid waste) and support transition of the IWTU to a safe and secure configuration after SBW treatment is complete; perform final turnover to the Calcine Disposition Project.

Non-Target (B.16) Scope

- Transfer United States Navy fuel stored at INTEC to dry storage at NRF
- Prepare to receive and store a shipment of SNF from Sandia National Laboratory located in Albuquerque, New Mexico
- Develop advanced techniques to characterize material aging conditions and extend the life of several SNF dry storage facilities
- Perform initial assessment and prepare a conceptual design report for opening large UNF rail casks and removing assemblies and rods for post-irradiation examination
- Design, fabricate, and install certain interim measures as NRC facility enhancements.

Soil and Groundwater Remediation (PBS ID-0030)

- Maintain compliance with CERCLA signed Records of Decision for Waste Area Groups, as listed in the ICP contract statement of work
- Complete exhumation of 5.69 acres of target TRU waste at the RWMC SDA
- Dispose of contact-handled TRU waste generated by packaging and delivering the waste to AMWTP
- Maintain existing Accelerated Retrieval Project (ARP) structures
- Perform groundwater monitoring and operation and maintenance of the monitoring wells
- Maintain functions of the existing vacuum vapor extraction system to remove organic contaminants from the vadose zone
- Maintain current CERCLA well monitoring network
- Maintain CERCLA institutional controls and operation and maintenance for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 9, and 10 and the Idaho CERCLA Disposal Facility (ICDF) in accordance with the *INEEL Sitewide Institutional Controls Plan* (DOE-ID 2004).

C-2.1.2 Facilities and Infrastructure

The Facility Information Management System (FIMS) Database identifies DOE-EM-owned buildings assigned to ICP versus DOE-NE-owned buildings. As of March 2015, the FIMS Database showed 138 DOE-EM-owned buildings and trailers assigned to ICP, with a total area of 1,463,020 ft^2. Excess DOE-EM facilities available for transfer to DOE-NE's multiprogram mission needs have been identified and discussions are ongoing.

Figure C-2 illustrates the current condition of ICP DOE-EM buildings/trailers. Table C-2 lists and describes the buildings/trailers assigned to ICP, providing the overall operating status, size, age, usage, and hazard description.

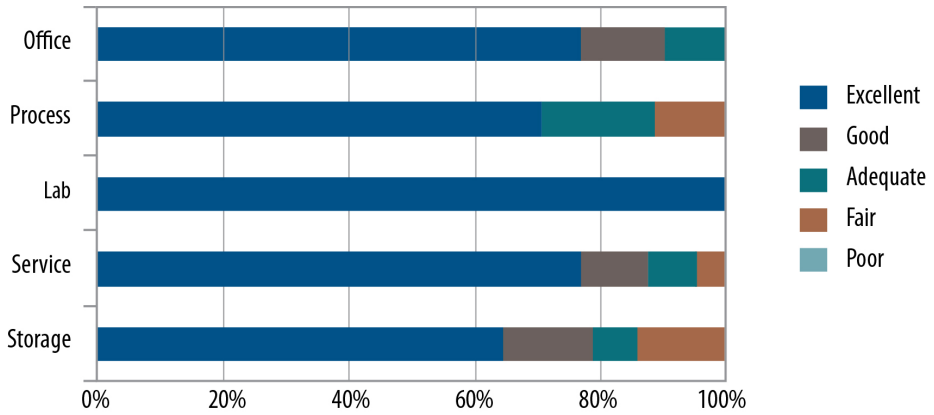


Figure C-2. Fiscal Year 2015 Facility Information Management System condition of Department of Energy Office of Environmental Management buildings/trailers assigned to Idaho Cleanup Project.

Table C-2. Idaho Cleanup Project building/trailer data.

Identification	Name	Type	Gross Square Feet	Year Built	Usage Code	Hazard Category
ICP Operating Facilities with Future Mission (no D&D planned)						
CF-TR-01	Central Facilities Area CERCLA Staging Office	Trailer	400	1990	101 Office	12 Not Applicable
CPP-603	Wet and Dry Fuel Storage Facility	Building	40,758	1953	412 SNM Storage	02 Nuclear Facility Category 2
CPP-604	Rare Gas Plant/Waste Building	Building	21,175	1953	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
CPP-605	Blower Building	Building	3,436	1953	593 Nuclear Waste Processing and/or Handling Building	04 Radiological Facility
CPP-606	Service Building Powerhouse	Building	14,920	1953	694 Other Service Buildings	12 Not Applicable
CPP-611	Water Well No. 1 Pump House	Building	216	1953	694 Other Service Buildings	12 Not Applicable
CPP-612	Water Well No. 2 Pump House	Building	216	1953	694 Other Service Buildings	12 Not Applicable
CPP-613	Substation No. 10	Building	1,822	1953	694 Other Service Buildings	12 Not Applicable
CPP-614	Diesel Engine Pump House	Building	625	1984	694 Other Service Buildings	12 Not Applicable
CPP-615	Waste Water Treatment Plant	Building	170	1982	694 Other Service Buildings	12 Not Applicable
CPP-616	Emergency Air Compressor	Building	423	1979	694 Other Service Buildings	12 Not Applicable
CPP-626	Office/Change Room	Building	2,068	1953	101 Office	12 Not Applicable
CPP-639	Instrumentation Building Bin Set 1	Building	168	1978	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
CPP-644	Substation No. 20 Emergency Power	Building	1,804	1960	694 Other Service Buildings	12 Not Applicable
CPP-646	Instrument Building Second Bin Set	Building	90	1966	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-647	Instrument Building Third Bin set	Building	90	1966	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-649	Atmospheric Protection System	Building	4,824	1976	591 Materials Handling or Processing Facilities	04 Radiological Facility
CPP-652	Cafeteria/Offices	Building	8,857	1976	291 Cafeteria	12 Not Applicable
CPP-655	Craft Shop/Warehouse	Building	16,757	1977	601 Maintenance Shops, General	12 Not Applicable
CPP-658	Instrument Building Fourth Bin Set	Building	80	1980	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-659	New Waste Calcine Facility	Building	84,079	1981	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
CPP-662	Maintenance/Fabrication Shop	Building	4,000	1979	601 Maintenance Shops, General	12 Not Applicable
CPP-663	Maintenance/Crafts/Warehouse. Building	Building	64,196	1980	601 Maintenance Shops, General	04 Radiological Facility
CPP-666	Fluorinel Dissolution Process/Fluorinel Dissolution Process and Fuel Storage Facility	Building	152,388	1983	412 SNM Storage	02 Nuclear Facility Category 2
CPP-671	Service Building Fifth Bin Set	Building	240	1981	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-673	Service Building Sixth Bin Set	Building	256	1986	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-677	Utilities Replacement Enhancement Project Load Center No. 2	Building	512	1983	694 Other Service Buildings	12 Not Applicable
CPP-679	Tent Fabrication Facility	Building	2,022	1983	605 Carpentry Shops	12 Not Applicable
CPP-684	Remote Analytical Laboratory	Building	13,101	1985	712 Chemical Laboratory (Nuclear)	03 Nuclear Facility Category 3
CPP-692	Waste Stack Monitor System	Building	662	1983	591 Materials Handling or Processing Facilities	04 Radiological Facility
CPP-697	East Guardhouse and Vehicle Monitoring Facility	Building	4,081	1986	296 Security Headquarters/Badge Issuance/Gate Houses	12 Not Applicable

Table C-2. (continued).

Identification	Name	Type	Gross Square Feet	Year Built	Usage Code	Hazard Category
CPP-1604	Office Building	Building	22,632	1986	101 Office	12 Not Applicable
CPP-1606	Plant Support Warehouse	Building	16,266	1986	400 General Storage	12 Not Applicable
CPP-1608	Contaminated Equipment Storage	Building	4,000	1987	607 Other Buildings Trades Shops	04 Radiological Facility
CPP-1615	Equipment Building Seventh Bin Set	Building	262	1989	593 Nuclear Waste Processing and/or Handling Building	04 Radiological Facility
CPP-1617	Waste Staging Facility	Building	1,044	1986	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
CPP-1618	Liquid Effluent Treatment Disposal Building	Building	5,845	1990	593 Nuclear Waste Processing and/or Handling Building	04 Radiological Facility
CPP-1631	Production Computer Support	Building	12,000	1988	297 Data Center	12 Not Applicable
CPP-1642	Fire Pump House	Building	655	1992	694 Other Service Buildings	12 Not Applicable
CPP-1643	Fire Pump House	Building	655	1992	694 Other Service Buildings	12 Not Applicable
CPP-1647	Water Treatment Facility	Building	2,879	1991	694 Other Service Buildings	12 Not Applicable
CPP-1650	Training Support Facility	Building	6,989	1992	230 Traditional Classroom Buildings	12 Not Applicable
CPP-1659	Contaminated Equipment Maintenance Building	Building	1,846	1986	601 Maintenance Shops, General	02 Nuclear Facility Category 2
CPP-1663	Security and Fire Protection Support	Building	4,891	1992	101 Office	12 Not Applicable
CPP-1671	Protective Force Support Facility	Building	3,106	1993	296 Security Headquarters/Badge Issuance/Gate Houses	12 Not Applicable
CPP-1673	Utility Control Center	Building	1,600	1993	615 Electrical/Motor Repair Shops	12 Not Applicable
CPP-1676	Oil Hazardous Materials Building	Building	113	1994	410 Hazardous/Flammable Storage	05 Chemical Hazard Facility
CPP-1681	Box Staging Area	Building	5,100	1994	401 Programmatic General Storage	04 Radiological Facility
CPP-1683	Waste Operations Control Room	Building	2,018	1996	642 Communications/Control Centers	02 Nuclear Facility Category 2
CPP-1684	Standby Generator Facility	Building	3,760	2000	694 Other Service Buildings	12 Not Applicable
CPP-1686	Access Control Facility	Building	7,469	2000	296 Security Headquarters/Badge Issuance/Gate Houses	04 Radiological Facility
CPP-1688	Staging, Storing, Sizing, and Treatment Facility Decontamination Building	Building	6,266	2003	593 Nuclear Waste Processing and/or Handling Building	12 Not Applicable
CPP-1689	Staging, Storing, Sizing, and Treatment Facility Administration Building	Building	1,960	2003	101 Office	12 Not Applicable
CPP-1696	Integrated Waste Treatment Unit	Building	73,040	2012	593 Nuclear Waste Processing and/or Handling Building	07 Nuclear Category 2 and Chemical Hazard Facility
CPP-1697	Washington Group International, Inc. Yurt Tent	Building	3,000	2008	400 General Storage	12 Not Applicable
CPP-1769	Potable Water Storage Shed	Building	90	1992	450 Shed Storage	12 Not Applicable
CPP-TB-1	Carpenter Shop	Building	1,261	1980	601 Maintenance Shops, General	12 Not Applicable
CPP-TB-3	TB-3 Fuel Processing Restoration Eastside Guardhouse	Building	176	1986	641 Guard Houses	12 Not Applicable
CPP-TR-19	Office Trailer	Trailer	300	1974	101 Office	12 Not Applicable
CPP-TR-54	Control Trailer	Trailer	400	2001	101 Office	12 Not Applicable
CPP-TR-55	ICDF Administrative/Operations Trailer	Trailer	1,440	2011	101 Office	12 Not Applicable
CPP-TR-56	TF Wash-down Support Office	Trailer	317	2001	101 Office	12 Not Applicable
CPP-TR-57	ICDF Rad Con Trailer	Trailer	638	2003	694 Other Service Buildings	04 Radiological Facility

Table C-2. (continued).

Identification	Name	Type	Gross Square Feet	Year Built	Usage Code	Hazard Category
CPP-TR-79	RWDP Operations Office No. 2	Trailer	3,250	2010	101 Office	12 Not Applicable
CPP-TR-80	Men's Comfort Station	Trailer	480	2010	298 Comfort Station/Restrooms	12 Not Applicable
CPP-TR-81	Laboratory/Comfort Station	Trailer	673	2010	769 Other Environmental Research and Development Test Buildings	12 Not Applicable
FSV-ISFSI	Independent Spent Fuel Storage Installation	Building	13,586	1991	412 SNM Storage	02 Nuclear Facility Category 2
FSV-MOF	Modular Office Facility	Trailer	3,360	1997	101 Office	12 Not Applicable
TAN-1611	Pump and Treatment Facility	Building	1,500	2000	591 Materials Handling or Processing Facilities	12 Not Applicable
TAN-1614	In Situ Bioremediation Facility	Building	1,482	2003	591 Materials Handling or Processing Facilities	12 Not Applicable
WMF-653	Office Annex 2, Trailer	Trailer	1,512	1993	101 Office	12 Not Applicable
WMF-698	ARP Storage Enclosure	Building	20,800	2005	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-1615	Retrieval Enclosure IV	Building	63,450	2011	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-1617	Retrieval Enclosure V	Building	62,700	2011	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-1619	Retrieval Enclosure VII	Building	42,000	2012	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-1621	Retrieval Enclosure VIII	Building	156,787	2013	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-TR-1	ARP Sample Support Trailer	Trailer	1,680	2004	694 Other Service Buildings	02 Nuclear Facility Category 2
WMF-TR-2	ARP Operations Support Trailer	Trailer	1,420	2003	694 Other Service Buildings	12 Not Applicable
WMF-TR-3	ARP Non-destructive Assay (NDA) East Trailer	Trailer	317	2006	101 Office	12 Not Applicable
WMF-TR-4	ARP Office Trailer	Trailer	317	2004	101 Office	12 Not Applicable
WMF-TR-6	ARP Men's Change Trailer	Trailer	660	2003	631 Change Houses	12 Not Applicable
WMF-TR-7	ARP Women's Change Trailer	Trailer	400	2003	631 Change Houses	12 Not Applicable
WMF-TR-8	637 West Office Trailer	Trailer	1,432	2005	101 Office	12 Not Applicable
WMF-TR-9	637 East Office Trailer	Trailer	1,432	2005	101 Office	12 Not Applicable
WMF-TR-13	ARP Restroom/Change Room	Trailer	1,106	2006	298 Comfort Station/Restrooms	12 Not Applicable
WMF-TR-14	Sample Analysis Trailer	Trailer	2,153	2009	712 Chemical Laboratory (Nuclear)	
WMF-TR-16	ARP Operations Trailer	Trailer	1,440	2009	101 Office	12 Not Applicable
WMF-TR-17	ARP Engineering Trailer	Trailer	1,440	2009	101 Office	12 Not Applicable
WMF-TR-23	ARP Radiological Control Trailer No. 2	Trailer	2,880	2010	101 Office	12 Not Applicable
WMF-TR-24	ARP Office Trailer No. 2	Trailer	2,880	2010	101 Office	12 Not Applicable
ICP Operating Facilities Pending D&D						
CPP-TR-19	Office Trailer	Trailer	300	1974	101 Office	12 Not Applicable
CPP-618	Tank Farm Measure/Control Building	Building	248	1955	694 Other Service Buildings	04 Radiological Facility
CPP-623	Tank Farm Instrument House	Building	63	1960	694 Other Service Buildings	04 Radiological Facility
CPP-628	Tank Farm Control House	Building	1,551	1953	694 Other Service Buildings	04 Radiological Facility
CPP-632	Instrument House Tank Farm Area	Building	66	1960	694 Other Service Buildings	04 Radiological Facility
CPP-635	Waste Station WM-187-188	Building	330	1960	694 Other Service Buildings	02 Nuclear Facility Category 2

Table C-2. (continued).

Identification	Name	Type	Gross Square Feet	Year Built	Usage Code	Hazard Category
CPP-636	Waste Station WM-189-190	Building	363	1965	694 Other Service Buildings	02 Nuclear Facility Category 2
CPP-674	Utilities Replacement Enhancement Project Substation No. 40	Building	425	1983	694 Other Service Buildings	12 Not Applicable
CPP-698	MK Offices/Warehouse	Building	23,957	1984	101 Office	12 Not Applicable
CPP-1636	Warehouse	Building	4,799	1989	400 General Storage	12 Not Applicable
CPP-1646	Anti-contamination Safety Handling	Building	3,707	1991	411 Nuclear Contaminated Storage	12 Not Applicable
CPP-1662	Remote Inspection Engineering Facility	Building	3,173	1992	781 Large Scale Demonstration/Research Building	12 Not Applicable
CPP-1666	Engineering Support Office	Trailer	7,168	1993	101 Office	12 Not Applicable
CPP-1678	Contractors Lunch Room	Building	2,044	1994	631 Change Houses	12 Not Applicable
WMF-601	Radiological Control Field Office	Building	5,044	1976	101 Office	04 Radiological Facility
WMF-603	Pump House	Building	1,434	1977	694 Other Service Buildings	12 Not Applicable
WMF-604	Instrument Shop	Building	1,271	1977	601 Maintenance Shops, General	12 Not Applicable
WMF-609	Heavy Equipment Storage Shed	Building	11,133	1979	450 Shed Storage	12 Not Applicable
WMF-619	Communication Building	Building	945	1989	642 Communications/Control Centers	12 Not Applicable
WMF-620	Work Control Center Trailer	Trailer	1,577	1988	101 Office	12 Not Applicable
WMF-621	Work Control Support Trailer	Trailer	1,538	1988	101 Office	12 Not Applicable
WMF-622	Office Annex, Trailer	Trailer	1,604	1985	101 Office	12 Not Applicable
WMF-637	Operations Control Building	Building	24,262	1995	101 Office	12 Not Applicable
WMF-639	Firewater Pump House No. 2	Building	1,811	1995	694 Other Service Buildings	12 Not Applicable
WMF-645	Operations Support Trailer	Trailer	1,568	1991	101 Office	12 Not Applicable
WMF-646	Operations Support Trailer	Trailer	1,568	1991	101 Office	12 Not Applicable
WMF-653	Office Annex No. 2, Trailer	Trailer	1,512	1993	101 Office	12 Not Applicable
WMF-655	Material Handling Facility	Building	5,482	1995	400 General Storage	12 Not Applicable
WMF-656	Maintenance Facility	Building	4,998	1995	601 Maintenance Shops, General	12 Not Applicable
WMF-657	Operations Support Trailer	Trailer	1,568	1960	101 Office	12 Not Applicable
WMF-658	DOE Office	Building	4,518	1995	101 Office	12 Not Applicable
WMF-661	Hazardous Material Storage	Building	128	1996	410 Hazardous/Flammable Storage	12 Not Applicable
WMF-680	Construction Trailer	Trailer	720	2001	101 Office	12 Not Applicable
WMF-681	Construction Support Trailer	Trailer	720	2001	101 Office	12 Not Applicable
ICP Facilities Shut Down Pending D&D						
CPP-1651	Operations Training Facility	Building	6,241	1992	231 Specialized Training Buildings	12 Not Applicable
MFC-766	Sodium Boiler Building	Building	14,546	1962	792 Laboratories, General (Nuclear)	04 Radiological Facility
MFC-767	Experiment Breeder Reactor-II Reactor Plant Building	Building	18,967	1963	783 Research Reactor	04 Radiological Facility
MFC-770C	Nuclear Calibration Laboratory	Building	240	1963	614 Equipment Calibration Shops	12 Not Applicable
MFC-799	Sodium Process Facility	Building	7,329	1986	792 Laboratories, General (Nuclear)	04 Radiological Facility

Table C-2. (continued).

Identification	Name	Type	Gross Square Feet	Year Built	Usage Code	Hazard Category
ICP Facilities Pending Disposal						
CPP-691	Fuel Processing Restoration Facility	Building	160,611	1992	400 General Storage	12 Not Applicable
CPP-1605	Engineering Support Building	Building	17,104	1986	101 Office	12 Not Applicable
CPP-1651	Operations Training Facility	Building	6,241	1992	231 Specialized Training Buildings	12 Not Applicable
WMF-1612	Retrieval Enclosure II	Building	46,038	2007	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-1614	Retrieval Enclosure III	Building	35,040	2007	593 Nuclear Waste Processing and/or Handling Building	02 Nuclear Facility Category 2
WMF-681A	Construction Break Trailer	Trailer	720	1984	607 Other Buildings Trades Shops	12 Not Applicable
WMF-TR-31	Guard Station	Trailer	336	2004	641 Guard House	12 Not Applicable
WMF-TR-32	Comfort Station	Trailer	192	2005	298 Comfort Station/Restrooms	12 Not Applicable
WMF-TR-5	Radiological Control Trailer	Trailer	229	2004	101 Office	12 Not Applicable

C-2.1.2.1 Maintenance. ICP continues to maintain mission essential facilities/utility systems in accordance with DOE Order 430.1B, Chg. 2. Facility/utility systems that no longer have a defined mission and are considered candidates for decommissioning will continue to undergo surveillance and maintenance, applying a graded approach and adjustment in accordance with DOE Guide 430.1-2, *Implementation Guide for Surveillance and Maintenance during Facility Transition and Disposition*. The graded approach in use is commensurate with the facility/utility system's condition, mission need, and schedule for demolition.

Preventive, predictive, and corrective maintenance is performed to sustain the property in a condition suitable to be used for its designated purpose.

Surveillances are scheduled as periodic inspections of facilities, utility systems, equipment, or structures. The surveillances demonstrate compliance, identify problems requiring corrective action, and ascertain the facility's present environmental, radiological, and physical condition. Surveillances are performed such that protection of workers, the public, and the environment is ensured. The facility/utility system condition, established by the scheduled surveillances and estimated remaining mission duration, is the basis for considering a recommendation of a facility recapitalization.

Table C-3 lists the proposed ICP recapitalization projects for facilities, structures, systems, and equipment. Recapitalization recommendations are described in the Condition Assessment Information System Database for the identified facility/utility system.

Facility management identifies facility-specific surveillance and maintenance activities, with support and assistance from designated experts. The surveillance requirements and criteria to apply a graded approach to termination for facilities slated for D&D are also listed in Table C-3. Surveillance and maintenance reduction is justified and documented in accordance with company procedures.

ICP also is responsible for over 115 small support structures (e.g., septic tanks, fuel storage tanks, and concrete pads). These structures are identified in the FIMS Database as other structures and facilities (one of four FIMS categories of real property) and are not specifically addressed in this discussion. They include facilities such as CPP-749 (underground storage vaults for Peach Bottom fuel), CPP-1774 (TMI-2 dry storage modules), and CPP-2707 (dry UNF cask storage pad).

C-2.1.2.2 Utilities. DOE-EM directly funds utilities and operations supporting Site area missions. Utility services and operations outside the Site areas are maintained and operated by the lead PSO (DOE-NE). The ICP mission covers four areas: INTEC, RWMC, TAN, and Materials and Fuels Complex. The INTEC electrical distribution system received a major upgrade as part of a line-item construction project (completed in FY 2003). The underground water supply systems are aged (i.e., over 40 years of service) and may require future upgrades. Utility systems considered part of the vital safety systems are maintained as priorities. The remaining utility system maintenance and recapitalization projects are listed in Table C-3. To ensure successful completion of the ICP mission, utility maintenance and potential upgrades are continually assessed and evaluated. Utility deficiencies are evaluated in conjunction with facility mission needs, sustainability objectives, D&D plans, and transfer potential to DOE-NE.

RWMC utility systems are structurally sound and expected to sustain operations until mission completion without major upgrades.

TAN and Materials and Fuels Complex utilities are maintained through DOE-NE funding.

Recommendation for utility system recapitalization is based on the utility condition and status, which is established by surveillances/inspections and the estimated remaining mission duration. Recapitalization recommendations are described in the Condition Assessment Information System Database for each identified utility system.

Table C-3. Idaho Cleanup Project proposed recapitalization projects.

Facility/ Building	System	Description	Justification	Rough Order of Magnitude (ROM) Estimate	Risk Ranking (H,M,L)	Hazard Ranking (H,M,L)
INTEC	Emergency communication system	Upgrade emergency communication system	Correct deficiencies	$5,639K	H	H
CPP-666	Utility piping	Replace new west utility interface	End of service life	$1,615K	H	H
INTEC	Utility control system	Replace electrical distribution system	End of service life (obsolete)	$3,183K	H	H
CPP-666	FAST distributed control system	Upgrade water treatment and heating, ventilation, and air conditioning controls	Modernization (obsolete)	$1,598K	H	M
CPP-606	Air compressors	Replace air compressors COM-UTI-614 and COM-UTI-617 and relocate to FAST	End of service life (replace)	$1,305K	M	M
INTEC	INTEC power distribution PM recovery Phase III	Electrical distribution maintenance recovery	End of service life	$4,528K	M	H
CPP-666	Roof	Replace roof	End of service life	$2,386K	M	M
CPP-603	Doghouse entry platform/roof access	Install platform to allow radiological personnel more room to don radiological equipment	Safety	$1,000K	M	M
CPP-603	Shield door	Upgrade shield door drive system; work only on east side of shield door	End of service life (upgrade)	$500K	M	M
INTEC	Master-slave manipulators	Replace all	Electronic parts obsolete	$3,500K	M	M
INTEC	Programmable and remote (PAR) manipulators	Replace with new	End of service life (obsolete)	$5,000K	M	M
CPP-1769	Potable water	Replace chlorinator (CL-UTI-901)	End of service life	$150K	M	L
INTEC	Continuous air monitors and air samplers	Replace continuous air monitors and air samplers	End of service life	$862K	M	H
ICP Wide	Electronic dosimeter systems and readers	Replace electronic dosimeter systems and readers	End of service life	$320K	M	H
INTEC	Filter counters	Replace filter counters	End of service life	$160K	M	H
ICP Wide	Portable instruments	Replace portable instruments	End of service life	$370K	M	H
INTEC	Radiation air monitors	Radiation air monitors	End of service life	$370K	M	H
ICP Wide	Sentinel	Sentinel	Software upgrade	$265K	M	H
ICP Wide	Thermoluminescent dosimeters	Thermoluminescent dosimeters	End of service life	$212K	M	H
ICP Wide	Whole-body counters	Whole-body counters	End of service life	$320K	M	H
INTEC	Personnel contamination monitors	Personnel contamination monitors	End of service life	$880K	M	L
INTEC	Roads/sidewalks	Roads/sidewalks	Safety	$2,000K	M	H
CPP-1683	DCS-WN-900	Liquid/gaseous waste distributed control system console replacement	Modernization	$1,000K	L	M
CPP-603	Abandoned roof duct	Remove contaminated ductwork	Risk reduction	$1,000K	L	M
CPP-603	In-cell cranes and PAR upgrade	B5 previously funded project; only funded for CRN-GSF-401/PAR crane	Cranes need refurbished and installed	$610K	L	M
CPP-603	Crane	CRN-SF-001 crane only	End of service life (upgrade)	$300K	L	M
CPP-666	Basin area communication	Upgrade public announcement system upgrade to improve clarity	Compensatory measure required, system volume not sufficient	$500K	L	M

Table C-3. (continued).

Facility/ Building	System	Description	Justification	Rough Order of Magnitude (ROM) Estimate	Risk Ranking (H,M,L)	Hazard Ranking (H,M,L)
CPP-666	Cranes	Spare parts, inventory, and warehousing of existing spare parts	End of service life (upgrade)	$500K	L	M
CPP-666	FO-905 cranes	Upgrade and replace parts	End of service life (obsolete)	$500K	M	M
CPP-666	FO-960 cranes	Upgrade to new crane	End of service life (upgrade)	$1,500K	L	M
CPP-606	Out of service equipment and building	D&D out-of-service equipment and partial building	Reclaim footprint of building no longer in use	$2,000K	L	L
CPP-659	Lights	Replace mercury vapor lights	Replacements unavailable (obsolete)	$1,000K	L	L
CPP-603	Roof	Reslope roof	Risk reduction	$1,000K	L	H
INTEC	Outdoor lighting	Outdoor lighting	Inadequate area lighting	$1,000K	L	H
CPP-666	Basin water treatment	VACCO filter replacement	End of service life	$1,000K	L	M
INTEC	Fire water	Plant-wide fire main replacement	End of service life	$35,000K	M	H
INTEC	Utility piping	Plant-wide water/steam/condensate underground piping replacement	End of service life	$15,000K	M	H

Ranking Key:

Risk:
High (H) — On borrowed time
Medium (M) — Significant issues/failure likely
Low (L) — Improvement/nice to have

Hazard:
High (H) — Direct impact to safety/mission
Medium (M) — Potential impact to safety/mission
Low (L) — No impact to safety/mission

C-2.1.2.3 Sustainability Management. ICP sustainability management is focusing on strategies and activities leading to continual efficiencies in reducing greenhouse gases, and optimizing energy, water, and transportation fuels efficiency. These efficiencies and optimizations aid the INL Site to meet the goals and requirements of the *DOE Strategic Sustainability Performance Plan* (DOE 2012); EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance"; and DOE Order 436.1, *Departmental Sustainability,* before the end of FY 2020. ICP utilizes the INL Site Sustainability Plan (DOE-ID 2012), which identifies the company environmental management system (EMS) as the process to identify and review associated company-level sustainability goals, objectives, and actions to aid DOE in meeting the sustainability goals. ICP EMS activities supporting the INL Site in achieving these currently funded goals are:

- Continuing pre-existing work scope sustainability tracking/reporting activities
- Establishing new annual energy and water conservation objectives and targets at INTEC
- Continuing ICP existing practices to optimize the use of alternative fuel vehicles and hybrids using General Services Administration vehicle sources
- Continuing ICP existing practices for electronic stewardship, chemical substitution, and sustainable material acquisition
- Continuing waste diversion practices to reduce nonhazardous/nonradioactive solid waste (excluding construction and demolition debris) and construction and demolition debris from disposal in landfills.

Additional ICP EMS sustainability activities may be addressed, subject to equitable adjustment approvals and priority funding availability. The source of these activities are the addition of DOE Order 436.1, five federal and DOE acquisition clauses, specific sustainability directions provided in the ICP contract extension, and related proposed DOE-ID sustainability directions currently under contract discussion. These additional sustainability activities include:

- Implementing additional sustainability-related acquisition tracking/reporting actions.
- Implementing additional electronic equipment power reduction actions (e.g., default duplex copy/printing, workstation power down mode).
- Implementing additional General Services Administration-directed practices for disposition of excess/surplus electronic equipment.
- Providing facility support for DOE-ID direct subcontract activities for advanced energy/water/steam meter installation at up to 12 INTEC buildings.
- Evaluating potential cool roof installation at CPP-666.
- Performing building energy surveys of ICP-managed enduring (active, post 2020) buildings.
- For waste diversion, tracking/reporting of waste quantity diversion rates for nonhazardous/nonradioactive solid waste. This includes identifying and implementing actions to support increased diversion rates toward the goal of 50% diversion or providing DOE-ID analysis to demonstrate unsatisfactory cost-benefit impact on accomplishing scope or non-availability of diversion.

C-2.1.2.4 Operating Facilities with Ongoing Missions (no Decommissioning and Demolition Planned Under Idaho Cleanup Project Contract). ICP is responsible for 117 facilities (87 buildings and 30 trailers) with ongoing missions (i.e., facilities needed to complete the cleanup mission that are currently operating and not scheduled for D&D under the ICP contract). These include facilities for UNF storage, waste storage and processing, and fire protection and security installations.

C-2.1.2.5 Facilities Scheduled for Decommissioning and Demolition. The ICP extension contract work scope involving D&D of excess facilities is reserved as additional work scope to be added pending availability of funding. RCRA closure completion and deactivation of MFC-799 is determined by future availability of funding. Longer-term D&D planning of ICP facilities beyond 2015 considers

mission completion at Site areas (e.g., RWMC), future use of significant infrastructure assets (e.g., INTEC boilers), potential transfer to DOE-NE, and deliberate planning to avoid a large number of facilities undergoing D&D in a short period of time.

C-2.1.2.6 Deactivated Facilities. As noted above, MFC-799 is in the deactivation stage. Following operational shutdown and transition, the first disposition activity for this type of facility is usually to deactivate the facility. The purpose of deactivation is to place a facility in a safe shutdown condition that is cost effective to monitor and maintain for an extended period until the eventual decommissioning of the facility. Deactivation places the facility in a low-risk state with minimum surveillance and maintenance requirements.

C-2.1.2.7 Deferred Maintenance. Deferred maintenance (DM) is reported in FIMS for those DOE-EM buildings with a designation of "Operating" (i.e., no D&D under the ICP contract). Reported DM is based on existing values for DM and information resulting from scheduled facility-condition-assessment survey inspections. If facility inspections or surveillance activities identify the need to perform DM, ICP engineering and cost estimating will establish a cost and report it accordingly. However, because the ICP life-cycle baseline does not include any specific capital projects for the reduction of DM, baseline changes will be pursued as necessary to address the issue.

C-2.1.3 Conclusions

By the completion of the ICP extension contract, the following ICP achievements will result in significant risk reduction at the INL Site:

- Shipping all legacy TRU waste to WIPP for final disposition
- Performing treatment of the liquid SBW
- Exhuming 5.69 acres of the targeted waste at the RWMC SDA
- Continuing operation of the vapor vacuum extraction units at RWMC
- Performing cleanup of soils under INTEC buildings
- Completing closure and placement of impermeable barrier for the INTEC Tank Farm area
- Continuing the packaging and final disposition of UNF
- Capping of the SDA at RWMC
- Continuing the Calcine Disposition Project.

While the ICP core contract ends in 2021, there will be substantial DOE-EM work scope to complete beyond that date. By FY 2035, the DOE-EM cleanup mission at the INL Site should be complete.

C-2.2 Advanced Mixed Waste Treatment Project Mission

The AMWTP mission is to retrieve, characterize, and treat legacy TRU waste and MLLW waste stored at the RWMC TRU Storage Area (TSA) and then to certify and ship these wastes from Idaho. AMWTP is a DOE-EM-funded project managed and operated by ITG. AMWTP and the ICP scope of work will be combined into the Idaho Core Cleanup Contract, starting 2016 and continuing through 2021.

Beginning in 1970, approximately 65,000 m^3 of legacy waste packaged in 55-gal drums, boxes, and bins was placed on asphalt pads for interim storage at the RWMC TSA. The waste consists of solid debris, paper, cloth, plastic, rubber, glass, graphite, bricks, concrete, metals, nitrate salts, process sludges, miscellaneous equipment, and residual liquids. Approximately 91% of the stored waste came from the Rocky Flats Plant, 5% from the Mound site, and 3% from Argonne National Laboratories. Nearly all of the stored waste is contact-handled waste. Waste containers on the pads were eventually covered with tarps and an earthen berm.

Under the Idaho Settlement Agreement (State of Idaho 1995), DOE is required to ship TSA-stored waste out of the state of Idaho by a target date of December 31, 2015, but no later than December 31, 2018. However, on February 14, 2014, the WIPP underground storage facility incurred a radioactive release, temporarily shutting down the facility. The projected WIPP reopening is sometime in FY 2016. This closure is impacting the shipment of INL TRU

waste for offsite disposal. DOE and ITG are continuing to work to meet the agreement schedule of completion by December 31, 2018.

Retrieved waste is undergoing characterization, treatment, certification, and payload assembly for shipping. Characterization is performed using a number of informational sources. Acceptable sources and characterization activities include an acceptable knowledge evaluation; an investigation of waste container contents using available documentation; various sampling techniques; real-time radiography (RTR) producing a two-dimensional image of a container's contents; and NDA to determine the waste isotopic content. Waste includes both radioactive and RCRA hazardous constituents such as lead and mercury. Some waste also contains Toxic Substances Control Act (15 USC 1976) regulated constituents such as polychlorinated biphenyls and asbestos.

Several waste treatment processes are conducted at AMWTP. These processes include drum liquids draining and over-packing and manual sludge solidification and repackaging. In the WMF-676 treatment facility, boxed waste is remotely segregated, size-reduced, and super-compacted. Qualifying drums are directly fed into the super-compactor for size-reduction. Compacted drums are collectively loaded into 100-gal drums for certification, payload assembly, and shipping.

The remaining waste containers being retrieved in WMF-636 include fiberglass-reinforced plywood boxes, deteriorated plywood boxes, and 55-gal drums. These materials were among the first containers placed in storage at the TSA, complicating retrieval due to age degradation. Approximately 95% of the waste stored in the TSA has been removed; 75% of the total 65,000 m^3 of the waste has been shipped from Idaho.

C-2.2.1 Advanced Mixed Waste Treatment Project Facility Status

In the mid-1990s, DOE-ID constructed WMF-636 over the TSA. This 315,000-ft^2 enclosure is a hard-walled steel structure for containment and is equipped with a ventilation system. Seven 29,000-ft^2 storage facilities were also constructed to stage and characterize retrieved waste from WMF-636. WMF-676, a remote-operated waste treatment facility, combined with a super-compaction facility, was constructed and commissioned in December 2002. These facilities and buildings are utilized to remove, treat, package, and ship waste from the INL Site for final disposition and constitute the AMWTP.

WMF-676 functional design requirements include the ability to treat multiple waste streams from both INL and other DOE sites. AMWTP features a robust and advanced, remotely operated waste sorting, size-reduction, and super-compaction facility that can safely process various waste streams, which satisfies the design requirements. DOE is currently evaluating options for future AMWTP missions of processing new waste streams, while continuing to process and ship waste offsite meeting the Idaho Settlement Agreement and working to complete the task ahead of the December 2018 commitment.

C-2.2.2 Facilities and Infrastructure

AMWTP facilities are currently operational, requiring normal maintenance and repairs. A breakdown of building ownership showing DOE-EM-owned buildings assigned to AMWTP versus DOE-NE-owned buildings is available in the FIMS Database. As of March 2015, the FIMS Database showed 53 DOE-EM-owned buildings and trailers at INL assigned to AMWTP, with a total area of 813,150 ft^2. Table C-4 lists and describes the buildings/trailers assigned to AMWTP, providing the overall operating status, size, age, usage, and hazard description. DOE-EM-owned facilities that are candidates for transfer to support DOE-NE's multiprogram mission needs have been identified and discussions are ongoing.

Some facility upgrades may be required through FY 2018 to accommodate the more difficult waste streams. Routine upgrades and facility modifications are expected to continue. Table C-5 lists proposed AMWTP recapitalization projects.

Table C-4. Advanced Mixed Waste Treatment Project operating facilities with future mission (no D&D planned) building data.

Identification	Name	Type	GSF	Year Built	Usage Code	Hazard Category
WMF-602	RWMC High Bay (AMWTP)	Building	2,389	1974	412 SNM Storage	02 Nuclear Facility Category 2
WMF-610	Waste Examination Plant (AMWTP)	Building	18,411	1985	571 Manufacturing Inspection Building	02 Nuclear Facility Category 2
WMF-611	Operations Support Facility	Building	400	1982	101 Office	12 Not Applicable
WMF-613	Office Building and Operational	Building	6,903	1986	101 Office	12 Not Applicable
WMF-614	Propane Vaporizer Housing	Building	280	1985	694 Other Service Buildings	12 Not Applicable
WMF-615	Drum Venting System Building	Building	1,344	1986	571 Manufacturing Inspection Building	02 Nuclear Facility Category 2
WMF-617	Shipping Breakroom	Building	1,580	1987	299 Other Institutional Buildings	12 Not Applicable
WMF-618	TRUPACT-II Loading Facility	Building	4,700	1988	551 Assembly Facilities	02 Nuclear Facility Category 2
WMF-624	Fire Riser Enclosure	Building	64	1995	694 Other Service Buildings	12 Not Applicable
WMF-627	Propane Pump Enclosure	Building	143	1995	694 Other Service Buildings	12 Not Applicable
WMF-628	Type II Storage Module No. 1	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-629	Type II Storage Module No. 2	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-630	Type II Storage Module No. 3	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-631	Type II Storage Module No. 4	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-632	Type II Storage Module No. 5	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-633	Type II Storage Module No. 6	Building	28,800	1995	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-634	Type II Storage Module No. 6	Building	28,800	1995	571 Manufacturing Inspection Building	02 Nuclear Facility Category 2
WMF-635	Type I Storage Module	Building	40,954	1995	551 Assembly Facilities	02 Nuclear Facility Category 2
WMF-636	TSA Retrieval Enclosure	Building	314,224	1996	415 Nuclear Waste Storage Facility	02 Nuclear Facility Category 2
WMF-659	Vehicle Repair Shop	Building	5,000	2008	621 Vehicle Repair Shop	12 Not Applicable
WMF-660	Automatic Transfer Switch Building	Building	106	1995	694 Other Service Buildings	12 Not Applicable
WMF-676	Advanced Mixed Waste Treatment Facility	Building	176,642	2002	541 Fabrication Facility	04 Radiological Facility 05 Chemical Hazard Facility
WMF-679	AMWTP Workshop	Building	1,800	1985	601 Maintenance Shops, General	12 Not Applicable
WMF-689	Landlord Shop	Building	648	2001	607 Other Buildings Trades Shops	12 Not Applicable
WMF-690	Carpenter Shop	Building	1,565	2001	412 SNM Storage	02 Nuclear Facility Category 2
WMF-693	Consumable Storage (AMWTP)	Building			4009 Other, Storage	12 Not Applicable
WMF-696	Storage Facility (AMWTP)	Building			4009 Other, Storage	12 Not Applicable

Table C-4. (continued).

Identification	Name	Type	GSF	Year Built	Usage Code	Hazard Category
WMF-1601	Radiological Office Trailer (AMWTP)	Trailer	663	2004	101 Office	12 Not Applicable
WMF-1602	Tool Crib (AMWTP)	Trailer	300	2004	400 General Storage	12 Not Applicable
WMF-1603	Tool Crib (AMWTP)	Trailer	300	2004	400 General Storage	12 Not Applicable
WMF-1604	Tool Crib (AMWTP)	Trailer	300	2004	400 General Storage	12 Not Applicable
WMF-1613	Shipping/Transportation Office (AMWTP)	Trailer	1,773	2005	101 Office	12 Not Applicable
WMF-1620	AMWTP Training Complex (AMWTP)	Trailer	3,541	2005	101 Office	12 Not Applicable
WMF-1623	Security Turnstile (AMWTP)	Trailer	320	2012	296 Security Headquarters/Badge Issuance/Gate Houses	12 Not Applicable
WMF-652	Subcontractor Field Office (AMWTP)	Trailer	160	1993	101 Office	12 Not Applicable
WMF-669	Radiological Control Trailer (AMWTP)	Trailer	400	1979	792 Laboratories, General (Nuclear)	12 Not Applicable
WMF-670	Retrieval Operations Trailer (AMWTP)	Trailer	1,440	1979	299 Other Institutional Buildings	12 Not Applicable
WMF-677	AMWTP Office Trailer (AMWTP)	Trailer	4,161	1985	101 Office	12 Not Applicable
WMF-678	AMWTP Office Trailer (AMWTP)	Trailer	9,467	1985	101 Office	12 Not Applicable
WMF-684	Assembly Trailer (AMWTP)	Trailer	3,380	2004	299 Other Institutional Buildings	12 Not Applicable
WMF-685	Accountability Trailer (AMWTP)	Trailer	1,222	2004	296 Security Headquarters/Badge Issuance/Gate Houses	12 Not Applicable
WMF-686	AMWTP Shower Trailer (AMWTP)	Trailer	1,368	2002	631 Change Houses	12 Not Applicable
WMF-687	Office Trailer—Retrieval Staff (AMWTP)	Trailer	310	2003	101 Office	12 Not Applicable
WMF-688	Break Trailer (AMWTP)	Trailer	300	2003	299 Other Institutional Buildings	12 Not Applicable
WMF-691	Characterization Office Trailer (AMWTP)	Trailer	480	2001	101 Office	12 Not Applicable
WMF-692	Site Warehouse (AMWTP)	Trailer	1,392	2001	400 General Storage	12 Not Applicable
WMF-694	Break Room Facility (AMWTP)	Trailer	1,377	2003	230 Traditional Classroom Buildings	12 Not Applicable
WMF-699	Assembly Trailer Restroom (AMWTP)	Trailer	243	2004	631 Change Houses	12 Not Applicable
WMF-CT-1	Trailer No. 1 (AMWTP)	Trailer	300	2003	101 Office	12 Not Applicable
WMF-CT-2	Trailer No. 2 (AMWTP)	Trailer	300	2003	400 General Storage	12 Not Applicable
WMF-CT-5	Trailer No. 5 (AMWTP)	Trailer	300	2003	101 Office	12 Not Applicable
WMF-CT-7	Trailer No. 7 (AMWTP)	Trailer	300	2003	101 Office	12 Not Applicable
WMF-CT-8	Trailer No. 8 (AMWTP)	Trailer	300	2003	101 Office	12 Not Applicable

Table C-5. Advanced Mixed Waste Treatment Project proposed recapitalization projects.

Facility	System	Description/Repair	Justification	ROM Estimated Cost	Comments
WMF-618 WMF-635	Spare crane install	Installed overhead gantry crane is potentially a single point failure.	This risk has been recognized and a spare crane acquired. There is no planned replacement that would lessen the impact on production should a failure occur.	$100,000	Install the spare crane, make electrical modification, and test/train.
WMF-634	RTR 101/106 and NDA 102/103	RTR table movement and rotators fail frequently. Cameras fail frequently and it is very difficult to find spares. Shutters and image intensifiers require frequent repair. NDA software is obsolete and should be replaced. Detector (older) cooling systems show a higher failure rate and should be updated. One RTR unit will be replaced with a new system.	RTR units require overhaul and adequate spare parts. NDA software is available and should be installed. There are 18 detectors to support 8 installed, 12 have an old style cooling system that is showing a higher than normal failure rate. When one detector fails, the entire assay machine must be taken out of service, which cuts production to 50% of normal with two assay units in service.	$4,270,00	RTR Item 1. Replace software and test. Item 2. Update cooling systems on spares and install when failures occur. Item 3. Engineer a backup, modify the facility as necessary, test, train, and place in service. NDA estimate is based on one assay machine in service and one able to keep up with production; cost is less because modification made in the treatment facility would apply here in part. Obtain spare parts, update equipment to modern for which spares exist, install, and train. These can be done individually, helping to minimize production impact.
WMF-676	Various boxline and super-compactor hardware and software upgrades	Replace cell cameras, box opening gantry robot, bagless transport port, super-compactor spare parts, 352 LLW slide gaskets, drum movement robot software updates, 350 shredder upgrades, integrated control system/fissile tracking system/waste tracking system hardware, north and south box lifts, box import conveyor/lift, variable geometry doors, and integrated control system sensors.	Mechanical wear, debris binding operation, lack of guarding, historic periodic rebuild, and preventive maintenance upgrades.	$1,500,000	To process some of the most difficult waste, the box lifts and clamping frames need to be overhauled or replaced.
WMF-676	Utilities (boilers, air compressors, breathing air, heating, etc.)	Air conditioning capacity is not adequate to keep cell temperatures low during hot summer months.	Human comfort issues for people making cell entries require low cell air temperatures. Current cooling coil capacities are insufficient.	$500,000	Engineering, equipment, and installation.

Table C-5. (continued).

Facility	System	Description/Repair	Justification	ROM Estimated Cost	Comments
WMF-676	330/340 Brokk waste processing remote arms/hydraulics	Numerous hydraulic failures in cell, multiple tools have failed and are stored in cell, and numerous mechanical/structural failures; design not reflected in current configuration, operator stations are ergonomically deficient.	Downtime is excessive, usually at least one Brokk at all times.	$4,000,000	Reconstruct the design basis, design backup systems, and install and clean out the debris and broken equipment. Install a second Brokk arm in each box with ability to shift hydraulic systems. Replace one of the three Brokks.
WMF-676	Assay 100/101	Software is obsolete and should be replaced. Detector (older) cooling systems show a higher failure rate and should be updated. Lack of redundancy of installed detectors causes loss of production for each failure.	Software is available and should be installed. There are 18 detectors total to support 8 fixed installed in assay systems; 12 have an old style cooling system which is showing a higher than normal failure rate. When one detector fails, the entire assay machine must be taken out of service, which cuts production to 50% of normal with two assay units in service.	$1,810,000	Replace software and test. Update cooling systems on spares and install when failures occur. The approach to this is currently unknown. Engineer a backup, modify the facility as necessary, test, train, and place in service.
WMF-676	Heating, ventilation, and air conditioning	System will not shift reliably from operating to standby units. Installed system control relays are unreliable and cause numerous losses of ventilation. Electrical equipment is dirty and fails due to previous incident where drive belts burned. Replacement high-efficiency particulate air (HEPA) filters are not yet available and there is insufficient assurance they will be delivered in time to prevent shutdown. Manual dampers have failed or are in very poor material condition. HEPA radial filters do not meet American Society of Mechanical Engineers code requirements for face velocity.	System in general needs extensive engineering and repair. Major design deficiencies exist in relays and condensate collection. Current system design results in HEPA filter face velocities in excess of that allowed by American Society of Mechanical Engineers code (5 ft/min). This issue requires resolution and if not accepted as is, could result in a huge treatment facility modification.	$6,600,000	Implementation of WMF-676 ventilation system redesign and upgrade would impact treatment facility production for 3 to 4 months.
			Total	**$18,780,000**	

C-3. NAVAL REACTORS FACILITY OVERVIEW

Established in 1950 to support development of naval nuclear propulsion, NRF continues to provide support to the United States Navy's nuclear-powered fleet.

NRF is one of the INL Site's primary facility areas that will continue to fulfill its currently assigned missions for the foreseeable future. NRF is operated by Bechtel Marine Propulsion Corporation, under contract with and direct supervision of the Naval Nuclear Propulsion Program. NRF is not under the purview of DOE-ID; therefore, NRF real property assets information is not available in this appendix.

INL provides support services to NRF, including, but not limited to, bus transportation, motor vehicle and equipment use, electrical power, electrical distribution system management, fire department services and training, telephone and other communications services, roads and grounds maintenance (outside NRF boundaries), medical support services, railroad operations, and specialized machine shop services.

Additionally, ICP routinely dispositions MLLW generated at NRF and has contract instruments in place to treat RH-TRU waste and disposition hazardous waste. Remote-handled LLW (via 55-ton scrap casks) is dispositioned at RWMC for NRF. NRF disposes some of its CERCLA waste at ICDF.

C-4. REFERENCES

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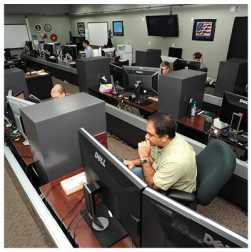
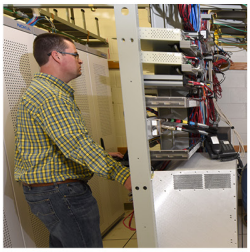
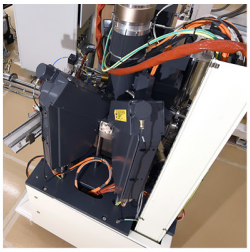
APPENDIX D

Strategic Sustainability Program

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ACRONYMS

DOE	Department of Energy	GHG	greenhouse gas
DOE-ID	Department of Energy Idaho Operations Office	INL	Idaho National Laboratory
DOE-NE	Department of Energy Office of Nuclear Energy	LEED	Leadership in Energy and Environmental Design
EO	Executive Order	SSP	Site Sustainability Plan
FY	fiscal year	SSPP	Strategic Sustainability Performance Plan

D-1. IDAHO NATIONAL LABORATORY'S STRATEGY FOR GLOBAL SUSTAINABILITY LEADERSHIP

The United States Department of Energy (DOE) Office of Nuclear Energy (DOE-NE), DOE Idaho Operations Office (DOE-ID), and DOE Sustainability Performance Office identified sustainability as a high-priority initiative with an emphasis on meeting federal energy, water, and greenhouse gas (GHG) reduction goals. Accordingly, Idaho National Laboratory (INL) institutionalized a strategy to implement sustainable practices in facility design and operation, procurement, and program operations. The strategy incorporates information from the following documents:

- Public Law 110–140, "Energy Independence and Security Act of 2007"Executive Order (EO) 13693, "Planning for Federal Sustainability in the Next Decade"
- EO 13653, "Preparing the United States for the Impacts of Climate Change"
- DOE Order 436.1, "Departmental Sustainability"
- *2014 Strategic Sustainability Performance Plan* (DOE 2014)
- *FY 2015 INL Site Sustainability Plan* (DOE-ID 2014).

The *INL Site Sustainability Plan* is the driving document used to direct and implement all sustainability activities at INL.

The new EO 13693, "Planning for Federal Sustainability in the Next Decade," was signed on March 19, 2015. The "Implementing Instructions for Executive Order 13693…" was signed and distributed on June 10, 2015. These implementing instructions will be used to update the INL Site Sustainability Plan for FY 2016.

Sustainable INL

INL will carry out its mission of ensuring the nation's energy security with safe, competitive, and sustainable energy systems without compromising the ability of future generations to meet their own needs.

INL's vision for fiscal year (FY) 2025 is to be a leading laboratory for sustainability performance in the United States and globally. Achieving sustainability means simultaneous consideration of economic prosperity, environmental quality, and social equity.

The sustainability strategy supports the long-term objective of ensuring efficient and appropriate use of laboratory lands, energy, water, and materials, as well as the services that rely upon them. INL will move beyond compliance-oriented initiatives toward sustainability as the key strategy for achieving both a competitive advantage and meaningful change. This transformation sharpens INL's focus on new designs, building upgrades, and scientific research.

Sustainability principles (Figure D-1) are consistent with Battelle Energy Alliance, LLC's, Strategy Roadmap approach to laboratory management, which is found in *Idaho National Laboratory Policies and Standards of Performance* (POL-111).

Figure D-1. Simultaneous excellence and sustainability principles.

The challenge of implementing sustainability is minimizing the impact to operations while increasing the health and viability of the laboratory. INL is integrating sustainability performance improvements in the areas that matter most to its stakeholders, including minimizing the environmental footprint, taking a progressive approach to mitigating climate change, and championing energy conservation.

The first step toward sustainability is to educate managers and staff about the physical, cultural, socioeconomic, and ethical dimensions of sustainability. The second step is to empower INL employees to understand and apply sustainable practices in their work activities. To achieve this, INL is fully incorporating sustainability in its culture through thoughtful consideration of all aspects of sustainable design, facility operation, and process modifications to establish sustainability as central to the ongoing success of a premier national laboratory.

To meet the sustainability challenges, INL has formulated the following comprehensive strategy to address the immediate needs of its staff and facility users:

- Employ new business models to fund sustainability projects
- Ensure that flexible facility designs and operations meet the needs of a world-class sustainable laboratory
- Advance GHG emissions reduction efforts and adopt comprehensive policies for reducing INL's carbon footprint
- Leverage planning teams to identify and recommend strategies for maintaining sustainable reliability at minimum cost
- Synchronize world-class vehicle fueling infrastructure for government and private fueling
- Fully implement the FY 2015 INL Site Sustainability Plan (SSP) (DOE-ID 2014)
- Establish realistic sustainability goals and metrics that are based on legal requirements and adapted to our geographic region
- Maintain quality workplaces for employees and users through rehabilitating, renovating, and upgrading the enduring buildings that can readily support current and future missions
- Improve the energy and resource efficiency of new and existing leased facilities
- Integrate campus development with responsible regional and local planning.

The Sustainable INL Program will continue to promote economic, environmental, and social sustainability for INL, helping to ensure its long-term success and viability. The Sustainable INL Program seeks to achieve measurable and verifiable energy, water, and GHG reductions. The program is also responsible for providing strategic leadership for the entire INL Site; advancing sustainable building designs; exploring the potential use of renewable energy; reducing utility costs across INL; and supporting cost-effective facilities, services, and program management.

D-1.1 Idaho National Laboratory Site Sustainability Plan

The DOE Strategic Sustainability Performance Plan (SSPP) (DOE 2014a) addresses how DOE will meet the goals of the applicable "greening the government" EOs and statutes. The SSP (DOE-ID 2014) outlines how INL will implement continual efficiency improvements that are directed at meeting the goals and requirements included in the SSPP. The SSP also summarizes energy and fuel use reporting requirements and references criteria for performing sustainable design. As the primary INL contractor, Battelle Energy Alliance, LLC, annually updates the SSP, adding specificity as projects are developed and requirements change.

The SSP encompasses all contractors and activities at the INL Site under control of DOE-ID, including the DOE Office of Environmental Management. Naval Reactors Facility operations are excluded because Naval Reactors Facility planning and reporting occur through the Department of Defense. This appendix focuses on DOE-NE/INL activities and plans from the SSP.

The SSP provides the strategy and tactics for achieving progress toward meeting the required sustainability program goals, but it does not guarantee success on its own. As noted in the SSP, the goals for fleet fuel use and GHG emissions reductions should be met or exceeded; however,

additional significant resources will still be needed to develop and implement energy and water reduction projects and to increase waste diversion activities to secure success for INL in meeting all of its sustainability program goals.

D-1.2 Funding

Realistic funding strategies reflect the following four main sources:

1. Alternative Funding Source—Energy Savings Performance Contracts
2. Alternative Funding Source—Utility Energy Savings Contracts and utility incentive programs
3. Direct and indirect funding and reinvesting cost savings from sustainable actions
4. Special funding requests (i.e., third party, DOE-NE, and line item).

A practical hybrid approach where all stakeholders participate in funding is achievable. Each of the four sources has merits and drawbacks. For example, Energy Savings Performance Contracts projects can provide significant upgrades at a lower initial cost to the agency but are comprehensive and time-consuming to develop. Typically, an Energy Savings Performance Contracts project can take more than 12 months for project development, followed by 18 months or more for design and construction.

D-1.3 Sustainability Goals

INL adopted the major programmatic sustainability goals contained in EOs, DOE orders, and the SSPP. Sustainability is a performance improvement strategy that is readily validated through performance measurement and reporting. The following subsections discuss in greater detail the primary energy, water, and fuels usage goals that are the basis for validating the performance of INL sustainability.

D-1.3.1 Energy Reduction

The INL goal for energy efficiency is a 30% reduction in energy intensity by FY 2015 as compared to the FY 2003 energy intensity baseline. On average, an annual energy use reduction goal of 3% supports efforts to meet the overall goal and provides a means for measuring and trending progress. Energy sources affected by this goal include electricity, natural gas, fuel oil, liquefied natural gas, and propane. Energy-intensive loads that are mission-specific, including the Advanced Test Reactor and its support facilities, are excluded from the goal; however, they are not exempted from the responsibility to reduce energy use where practicable. In some cases, planned facility removal has resulted in an increase in energy intensity by decreasing the total building square footage while only minimally impacting the overall energy use. INL expects this trend to diminish as facility removal efforts end and as Energy Savings Performance Contracts and strategic investment projects are completed.

Methods for reducing energy use include capital project upgrades, operational modifications, major repair and replacement activities that incorporate energy efficiency enhancements, and behavior changes by the INL workforce.

A critical constraint to goal accomplishment is how well INL is able to create sustained change in behavior. The strategy for behavior change was adapted from private industry and includes the following:

- Elevating sustainability in company governance, including Leadership Management Team oversight and accountability over environmental and social issues, and linking executive and other employee compensation to sustainability goals
- Holding robust regular dialogues with key laboratory stakeholders on sustainability challenges, including employees, managers, and suppliers
- Continuing open reporting on sustainability strategies, goals, and accomplishments
- Completing systematic operations and performance improvements to achieve environmental neutrality and other sustainability goals across the entire INL portfolio.

D-1.3.2 Water Reduction

By FY 2020, INL's goal for water usage is a 26% reduction of usage intensity, or 2% each year as

Major Goals for the INL Sustainability Program

- *Energy usage reduced 30% by FY 2015 compared to FY 2003*
- *Water usage reduced 26% by FY 2020 compared to FY 2007*
- *Petroleum fuels usage reduced 2% per year through FY 2020 relative to FY 2005*
- *Alternative fuels usage increased 10% per year through FY 2015 relative to FY 2005*
- *GHG emissions reduced 28% by FY 2020 compared to FY 2008.*

compared to the FY 2007 water-usage intensity baseline measured in gallons per square foot.

INL reports water consumption as all water pumped from the ground onsite and all water procured from the city of Idaho Falls. Water reduction opportunities are continually evaluated on a complex-by-complex basis each FY. Additionally, water reduction opportunities will continue to be evaluated to increase water efficiency while addressing ongoing water waste processing issues.

D-1.3.3 Fleet Fuels Reduction

INL is developing diversified strategies for reducing fossil fuel use and carbon emissions associated with light- and heavy-duty vehicles. The DOE sustainability goals for transportation fuels include a 2% annual reduction of petroleum fuel through FY 2020 and a 10% annual increase of alternative fuels through FY 2015, both relative to the FY 2005 usage baseline.

There are many opportunities to affect DOE's petroleum fuel usage by implementing fuel reduction and fuel switching activities at INL. INL continues to meet and exceed the transportation fuel goals by actively pursuing increased E-85 and biodiesel fuel usage. These increases are facilitated by mandating use of alternative fuels in all flex-fuel vehicles and by increasing the quality of biodiesel fuel while implementing the use of the B20 biodiesel blend in the INL bus fleet throughout the winter season. Other strategies include continuing to right-size the INL fleet, obtaining higher-efficiency hybrid and flex-fuel vehicles, and implementing a dual-fuel (liquefied natural gas/biodiesel) capability for the INL bus fleet.

D-1.3.4 Planned Energy, Water, and Fuels Reduction Projects

INL has completed facility energy evaluations and retro-commissioning on approximately 50% of the covered facility inventory. Energy evaluations will continue to be simultaneously performed by an external engineering subcontractor with required Condition Assessment Surveys (CAS inspections) with the end state of 100% of all covered facilities evaluated every 4 years. These evaluations along with previous energy audits and internal project identification and development have provided numerous opportunities to develop upgrade projects that will reduce energy and water usage along with subsequent reductions in GHG emissions. These projects were identified for completion through FY 2019 in support of existing and new EO goals and are outlined on Table D-1.

D-1.4 Carbon Footprint

In addition to sustainability goals for energy, water, and fleet fuel reduction, DOE has committed to reduce Scope 1 (direct emissions from sources owned or controlled by INL) and Scope 2 (indirect emissions from consumption of purchased electricity, heat, or steam) GHG emissions by 28% before the end of FY 2020 as compared to the FY 2008 baseline. INL has calculated the initial FY 2008 carbon footprint and FY 2014 GHG inventory annual update. Both of these calculations are found in *Idaho National Laboratory's FY 2014 Greenhouse Gas Report* (INL 2014). The GHG inventory and report support INL's initiative to lead GHG emissions-reduction efforts and are the accepted methods of identifying environmental impacts and finding ways to reduce them. INL will continue to implement projects that reduce electricity and fuel usage while also reducing corresponding GHG emissions which include increasing infrastructure efficiency and switching to fuel with less GHG-intensive emissions.

Table D-1. Idaho National Laboratory sustainability upgrade projects.

Project Description	Goal	Funding Source	Cost ($k)	Savings ($k)	Planned Completion (FY)
IF-682 High Bay LED Lighting Upgrade	Energy / ES&H	INL	54	1.5	2015
MFC-701 / MFC-710 Occupancy Sensors	GP	INL	11	1.0	2015
MFC-710 Envelope Upgrade	GP	INL	33	1.6	2015
INL 2015 GP Upgrades for Idaho Falls Facilities (5 Facilities)	GP	INL	125	3.1	2015
2014 Energy Audits – HVAC Adjustments (47 Facilities)	Energy	INL	54	332.0	2015
INL Bus Dual-Fuel Conversions (2)	Fleet Fuel	SPO	74	20.5	2015
CFA Fire Station High Bay Lighting to LED Upgrade	Energy	INL	22	4.2	2016
INL Project Option 1: Achieve GP for (9) Buildings	GP	SPOFOA	314	7.1	2016
INL Project Option 2 Exterior Lighting for Idaho Falls Facilities	Energy	SPOFOA	370	15.5	2016
INL Project Option 3: Electric Meter Installations	GP	SPOFOA	320	21.0	2016
INL Project Option 4: Duel-Fuel Conversion for (10) INL Buses	Fleet Fuel	SPOFOA	959	102.6	2017
INL Project Option 5: Xeriscape Landscaping for ATR Complex	Water	SPOFOA	1,112	.7	2016
INL Project Option 6: Occupancy Sensor Installations	Energy	SPOFOA	296	26.8	2016
INL Project Option 7: Solar Walkway Lighting	Energy/RE	SPOFOA	224	0	2015
INL Project Option 8: HVAC Upgrades (2004 RCx/Energy Audits)	Energy	SPOFOA	2,972	192.4	2017
MFC Lighting Controls (500 Occupancy Sensors)	Energy	TBD	91	9.1	2018
IF-603 IRC Motors and Controllers	Energy	TBD	210	30.9	2018
2014 Energy Audits – Occupancy Sensor Project (32 Facilities)	Energy	TBD	296	26.8	2018
2014 Energy Audits – Restroom Fixture Project (27 Facilities)	Water	TBD	125	0.7	2019
2014 Energy Audits – Exterior Lighting to LED Project (41 Facilities)	Energy	TBD	224	4.7	2019
Totals			7,885	802.2	

The INL strategy to reduce GHG emissions also includes the following:

- Reduce mobile combustion from INL fleet vehicles and equipment
- Identify increased waste diversion opportunities
- Evaluate and support potential onsite renewable energy construction opportunities
- Purchase locally generated renewable energy, while purchasing renewable energy credits to support the growth and success of renewable energy generation industries
- Reduce the amount of direct-purchased electricity
- Reduce or eliminate fuel oil use for onsite stationary electricity and heat generation.
- Achieve carbon neutrality for all infrastructure activities by FY 2025.

D-1.5 High Performance Sustainable Buildings

The INL strategy for new construction is certification as Leadership in Energy and Environmental Design (LEED) Gold for New Construction to document equivalency to the Guiding Principles for High Performance Sustainable Buildings. INL has developed a high-performance building strategy to assist with achieving certification in both DOE-owned and -leased facilities.

At least 15% of the INL building inventory over 5,000 ft² must meet the Guiding Principles and be documented by FY 2015. The Environmental Protection Agency's Portfolio Manager Database is the accepted tool for documenting and demonstrating compliance with the guiding principles. INL has identified 23 buildings that are best positioned to meet the guiding principles and is targeting these facilities for metering and efficiency

upgrades that will help to document and meet the associated requirements. The FY 2015 SSP (DOE-ID 2014) identifies these facilities.

D-1.5.1 Sustainability in Owned Facilities

INL addresses sustainability in both their new and existing facilities by ensuring that the Guiding Principles are implemented through new building designs and evaluation of existing buildings for physical and operational modifications to meet the requirements.

All new building projects are designed to meet the Guiding Principles. INL's strategy is to achieve LEED Gold certification for New Construction to document equivalency to the guiding principles. INL uses DOE's Metering Guidance (DOE 2014b) to determine the best candidates for building-level, advanced metering installation in the existing building inventory. Buildings meeting the criteria will have advanced meters installed and be further evaluated for updates to meet the Guiding Principles by FY 2015 and beyond. The Guiding Principles will be primarily met through documenting INL supporting processes and procedures, and planned facility upgrades.

D-1.5.2 Sustainability in Leased Facilities

Leased buildings will be obtained that provide the best value to government; maximize employee comfort, health, and productivity; and minimize operating and utility costs. LEED Gold certification for New Construction is the INL standard for design and construction of new building leases or build-to-suit leases. New leases on existing buildings will include provisions to evaluate the facility prior to occupancy for energy efficiency and the ability of the building systems to provide appropriate indoor environmental quality. When the leases on existing buildings are renewed, negotiations will include energy updates to maximize energy efficiency and employee productivity by incorporating the Guiding Principles. For leases intended to be very short-term temporary occupancies, the buildings will be evaluated and updated on a case-by-case basis with preference for a facility that demonstrates better energy efficiency and indoor environmental quality.

INL has demonstrated its commitment to these essential goals through recent building space acquisitions, including the build-to-suit Energy Systems Laboratory and Energy Innovation Laboratory. The Energy Systems Laboratory obtained LEED Gold certification in early FY 2013 and the Energy Innovation Laboratory attained LEED Platinum certification in FY 2014.

D-1.6 Regional and Local Integrated Planning

INL will seek to advance regional and local integrated planning by incorporating LEED for New Construction into all new building designs and seeking certification credits in areas associated with site selection and transportation planning. In addition, INL will continue active involvement with local planning organizations, including the following:

- Idaho Strategic Energy Alliance
- Yellowstone-Teton Clean Cities Coalition
- Bonneville County Transportation Committee
- City of Idaho Falls
- Targhee Regional Public Transportation Authority.

D-1.7 Additional Activities Focused on 2025

INL will continue to support energy and water efficiency reductions, transportation fuel efficiency, and GHG reductions through creative and proactive sustainable activities, which include, but are not limited to, building standards, behavior modifications, and GHG reductions.

D-1.7.1 Building Standards

INL will meet its building standards by:

- Incorporating new EO requirements for net-zero facilities into the design and construction of all new facility projects by FY 2020
- Providing INL campus development and planning to address effective space management, facility utilization and disposal, and operations consolidation through trending and analyzing facility utilization and utility usage data
- Incorporating cool roof principles and technologies into all roof replacement and new construction projects.

D-1.7.2 Behavior Modifications

INL will incorporate the following behavior modifications by:

- Evaluating and updating INL engineering standards; the INL high-performance building strategy; and other internal plans, goals, and documentation of sustainability-related activities to remain current with federal requirements and to provide engineers with practical tools to implement sustainability
- Reviewing and analyzing new building designs, proposed changes to existing buildings, and requests for new-leased facilities to ensure acceptance and integration of sustainable concepts
- Actively leading and contributing to federal, Battelle Corporate, and INL working groups and communities of practice to influence future goals and requirements that will lead to increased efficiency, reduced emissions, and more productive infrastructure environments
- Actively pursuing advanced metering to provide central "real-time" energy and water usage evaluation, utility-level demand-side management, and measurement tools to assist with facility management, process operation, and employee involvement.

D-1.8 Goal Status

Through FY 2014, INL has reduced Scopes 1 and 2 GHG by 26%, Scope 3 GHG (other indirect emissions not included in Scope 2) by 34%, energy intensity by nearly 11%, water intensity by nearly 15%, and petroleum usage by nearly 40%. Conversely, alternative fuel usage is up over 118%.

D-2. REFERENCES

DOE 2014a, *2014 Strategic Sustainability Performance Plan (SSPP)*, Department of Energy, June 2014.

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DOE Order 436.1, "Departmental Sustainability," U.S. Department of Energy, May 2011.

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EO 13653, "Preparing the United States for the Impacts of Climate Change," November 1, 2013.

INL 2014*, Idaho National Laboratory's FY 2014 Greenhouse Gas Report*, Idaho National Laboratory, March 2014.

POL-111, 2012, *Idaho National Laboratory Policies and Standards of Performance*, Rev. 7, Idaho National Laboratory, December 7, 2012.

Public Law 110–140, 2007, "Energy Independence and Security Act of 2007," United States Congress, December 19, 2007.

The Energy Systems Laboratory is home to INL's Biomass Feedstock National User Facility and supports infrastructure to enhance the nation's global competitiveness through integration of clean energy systems, energy storage technologies and biomass design and analysis.

INL is transforming infrastructure at the Research and Education Campus to support its mission by providing robust science and engineering capabilities. The Research and Education Campus is the collective name for INL's administrative, educational, laboratory, technical support, and computer facilities in Idaho Falls.

The 148,000-square-foot Energy Innovation Laboratory offers three stories of modern, open-floor laboratory space and flexible, state-of-the-art lab tools, equipment and resources. INL's first LEED Platinum building was named 2014 "Best Green Project in the nation" by a prominent engineering-construction magazine.

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