DOE/ID - 11427

Idaho National Laboratory

# 2012-2021 TEN-YEAR SITE PLAN






## DOE-NE's National Nuclear Capability—Developing and Maintaining the INL Infrastructure

*June 2010*

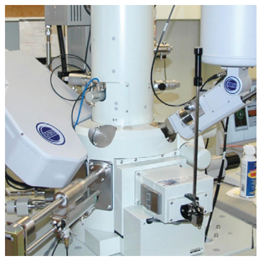
Idaho National Laboratory

DOE/ID - 11427

Idaho National Laboratory

# 2012-2021 TEN-YEAR SITE PLAN






## DOE-NE's National Nuclear Capability—Developing and Maintaining the INL Infrastructure

*June 2010*

Idaho National Laboratory

# APPROVALS

## Idaho National Laboratory

John J. Grossenbacher
Laboratory Director
Idaho National Laboratory
President and Chief Executive Officer
Battelle Energy Alliance, LLC

## U.S. Department of Energy, Idaho Operations Office

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

## U.S. Department of Energy

Dennis M. Miotla
Deputy Assistant Secretary
for Nuclear Facility Operations
U.S. Department of Energy

## MESSAGE FROM THE DEPUTY LABORATORY DIRECTOR

*The Idaho National Laboratory (INL) Ten-Year Site Plan (TYSP) for Fiscal Year (FY) 2012 outlines our vision and strategy to transform the INL to deliver world-leading capabilities that will enable the Department of Energy Office of Nuclear Energy (DOE-NE) to accomplish its mission. The result is a laboratory that is the core of DOE-NE's national nuclear capability and a laboratory-wide "national user facility," accessible to researchers and experimentalists from national laboratories, universities, industry, other federal agencies, and collaborators from international institutions.*

*This transformation began in 2007 when DOE designated the Advanced Test Reactor (ATR) and post irradiation examination (PIE) capabilities a National Scientific User Facility (NSUF). The NSUF is prototyping the laboratory of the future, sharing resources among universities and national laboratories and preparing a new generation of nuclear energy professionals.*

*INL offers unique core capabilities and infrastructure that support development of nuclear fuels, reactors, and fuel cycle technologies. These capabilities center on the ATR – a highly flexible materials test reactor that has successfully served the fuel and materials irradiation testing needs of DOE-NE, Naval Reactors, National Nuclear Security Administration (NNSA), and others for decades – and co-located fuel development capabilities including fabrication, characterization, and PIE capabilities. The Laboratory retains other resources to support fuel development including transient testing and second-generation capabilities for developing and testing both wet and dry separations technologies. They complement specialized capabilities in the DOE complex and at universities that are also needed for nuclear energy research and development. A multipurpose laboratory, INL also provides energy integration, environmental integrity, and national and homeland security capabilities to DOE and other customers.*

*The Laboratory has consolidated capabilities around three main campuses. Going forward, INL will continue to make targeted investments that will deliver additional capacity and facilitate user access and collaboration. An integrated nuclear energy research enterprise is much stronger than the sum of the individual parts. Over $50M has been invested in new capabilities over the last 5 years. INL seeks to build on existing capabilities and underlying infrastructure as well as the economy of resource co-location over the next decade to establish the capabilities that will be needed over the next 20 years.*

*The TYSP identifies the Line Item and General Plant Projects that are proposed, in design, or under construction and required to provide new capabilities, revitalize aging existing capabilities, and upgrade related utility and supporting infrastructure. The TYSP also identifies required General Purpose Capital Equipment to support mission accomplishment. Together, these world-leading capabilities will provide:*

- *Significant improvement in fabrication, characterization, testing, and PIE of nuclear fuels and materials*
- *A basic scientific understanding of fabrication processes and irradiation performance of fuels and materials at the microstructural level needed to support development and deployment of high-performance fuels*
- *Improvements in the ability to conduct research, development, and demonstration of advanced separation technologies – from an understanding of the fundamental science to integrated laboratory testing and planning for engineering-scale demonstration*
- *New reactor and fuel-cycle technologies that meet U.S. goals for improved economics, reduced waste intensity, improved proliferation-resistance, and sustainability.*

*David Hill*

*Deputy Laboratory Director,*
*Science and Technology*

# CONTENTS

## Figures



## Tables



## Appendices

## ACRONYMS

| | |
|---|---|
| AFCF | Advanced Fuel Cycle Facility |
| AL | Analytical Laboratory |
| ATR | Advanced Test Reactor |
| ATR-C | Advanced Test Reactor Critical Facility |
| CAES | Center for Advanced Energy Studies |
| CESB | Contaminated Equipment Storage Building |
| CFA | Central Facilities Area |
| CITRC | Critical Infrastructure Test Range Complex |
| CRADA | Cooperative Research and Development Agreement |
| CTF | Component Test Facility |
| D&D | decontamination and decommissioning |
| DHS | Department of Homeland Security |
| DOD | Department of Defense |
| DOE | Department of Energy |
| DOE-EE | Department of Energy Office of Energy Efficiency and Renewable Energy |
| DOE-EM | Department of Energy Office of Environmental Management |
| DOE-ID | U.S. Department of Energy, Idaho Operations Office |
| DOE-NE | Department of Energy Office of Nuclear Energy |
| DOE-OE | Department of Energy Office of Electricity Delivery and Energy Reliability |
| DOE-SC | Department of Energy Office of Science |
| EBR-II | Experimental Breeder Reactor-II |
| EML | Electron Microscopy Laboratory |
| ENG & SPT O&M | Engineering and Support Faciilities Operations and Maintenance |
| EPRI | Energy Power Research Institute |
| EROB | Engineering Research Office Building |
| ESL | Energy Systems Laboratory |
| FASB | Fuels and Applied Science Building |
| FAST | Fluorinel Dissolution Process and Fuel Storage |
| FCF | Fuel Conditioning Facility |
| FDP | Fuel Dissolution Process |
| FFTF | Fast Flux Test Facility |
| FIB | Focused-Ion Beam |
| FMF | Fuel Manufacturing Facility |
| FY | fiscal year |
| GIS | Geographical Information System |
| GPCE | General Purpose Capital Equipment |
| GPS | global positioning system |
| HFEF | Hot Fuel Examination Facility |
| HTGR | High-Temperature Gas Reactor |
| HYTEST | Hybrid Energy Systems Testing |
| ICP-MS | Inductively Coupled Plasma Mass Spectrometer |
| IFIRP | Idaho Facilities and Infrastructure Revitalization Program |
| IFM | Idaho Facilities Management |
| IMCL | Irradiated Materials Characterization Laboratory |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| IRC | INL Research Center |
| LEAP | Local Electron Atom Probe |
| LEP | Life Extension Program |
| LWR | Light-Water Reactor |
| M&O | Management and Operating |
| MFC | Materials and Fuels Complex |
| NAS | National Academy of Sciences |
| NASA | National Aeronautics and Space Administration |
| NEI | Nuclear Energy Institute |
| NEPA | National Environmental Policy Act |
| NGNP | Next Generation Nuclear Plant |
| NNSA | National Nuclear Security Administration |
| NRAD | Neutron Radiography Reactor |

| | |
|---|---|
| NRC | Nuclear Regulatory Commission |
| NRF | Naval Reactors Facility |
| NSUF | National Scientific User Facility |
| PIE | Post-Irradiation Examination |
| Pu | plutonium |
| R&D | research and development |
| RAL | Remote Analytical Laboratory |
| REC | Research and Education Campus |
| REL | Research and Education Laboratory |
| RERTR | Reduced Enrichment for Research and Test Reactor |
| RWMC | Radioactive Waste Management Complex |
| SIMS | Secondary Ion Mass Spectrometry |
| SMC | Specific Manufacturing Capability |
| SNM | special nuclear material |
| SSPSF | Space and Security Power Systems Facility |
| TAN | Test Area North |
| TIMS | Thermal Ionization Mass Spectrometer |
| TRIGA | Training, Research, Isotope, General Atomic |
| TREAT | Transient Reactor Experiment and Test Facility |
| TYSP | Ten-Year Site Plan |
| UNF | used nuclear fuel |
| VCO | Voluntary Consent Order |
| WFO | work-for-others |

# 1. INTRODUCTION

## 1.1 Overview

This Ten-Year Site Plan (TYSP) describes the strategy for accomplishing the long-term objective of transforming the Idaho National Laboratory (INL) to meet Department of Energy (DOE) national nuclear research and development (R&D) goals, as outlined in DOE strategic plans. These plans include the *Nuclear Energy Research and Development Roadmap* (DOE 2010) (DOE Office of Nuclear Energy [DOE-NE] Roadmap) and reports such as the *Facilities for the Future of Nuclear Energy Research: A Twenty-Year Outlook* (DOE-NE 2009). In addition, the TYSP is responsive to the 2008 recommendations of the National Academy of Sciences (NAS 2008), which recognized the need for DOE to invest in research capabilities and to develop a process for prioritizing, evaluating, and obtaining capabilities.

The goal of the INL TYSP is to provide a long-term vision that clearly links R&D mission goals and infrastructure requirements (single- and multi-program) to INL core capabilities; establishes the 10-year end-state vision for the three primary INL campuses; and identifies and prioritizes capability gaps, as well as proposes efficient and economic approaches to closing those gaps.

### 1.1.1 Nuclear Energy Roadmap

In the 2010 DOE-NE Roadmap, the DOE-NE established its principal mission as advancing nuclear power as a resource capable of making major contributions in meeting the nation's energy supply, environmental, and energy security needs. To accomplish this mission, DOE-NE identified four research objectives that it is pursuing:

1. Develop technologies and other solutions that can improve reliability, sustain the safety, and extend the life of current reactors
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
3. Develop sustainable nuclear fuel cycles
4. Understand and minimize the risks of nuclear proliferation and terrorism.

The DOE-NE Roadmap calls for increased coupling of theory with fundamental, phenomenological testing and modeling and simulation to accomplish DOE research objectives. Having the capability to perform key experiments requires that DOE-NE have access to a broad range of capabilities from small-scale laboratories up to, potentially, full prototype demonstrations.

### 1.1.2 National Nuclear Capabilities

As the DOE-NE national laboratory, the INL serves a unique role in civilian nuclear energy research. With a 60-year history in nuclear energy technology development, the INL assists DOE-NE by leading, coordinating, and participating in R&D conducted by national laboratories, U.S. universities, and international research institutions, and by providing its nuclear energy research infrastructure as a shared resource for the entire nuclear energy enterprise.

The INL maintains and operates the majority of DOE-NE's essential nuclear energy R&D capabilities, representing and retaining the core of the federal government's national nuclear energy R&D infrastructure. It is also one of a few national laboratories that will sustain the capability to handle Safeguards Category I materials; as the DOE-NE laboratory, it retains the unique ability to support research using highly radioactive fuels and materials.

To support this mission, the INL operates core capabilities that are unique to nuclear energy R&D, including the following:

- Neutron irradiation
- Post-irradiation examination (PIE) and characterization
- Experimental fuel development (fabrication process development)
- Separations and waste form development
- Other specialized testing capabilities (e.g., nuclear facilities and hot cells dedicated to radioisotope power source assembly and testing).

Test reactors and hot cells are at the top of this hierarchy of facilities in degree of complexity, offering the ability to handle highly radioactivity materials; they are followed by smaller-scale radiological facilities, specialty engineering facilities, and nonradiological laboratories. Table 1-1 depicts the core capabilities that are operational, in progress, or planned at the INL and the DOE-NE Roadmap objectives that would require these capabilities, including current or potential other customers for these services. The DOE-NE Roadmap objectives are summarized in Section 1.3. Core capabilities are those that are unique to DOE-NE R&D, typically enable handling of highly radioactive materials, or expensive to build/operate. The table crosswalks from capabilities to INL facilities and identifies whether the facility is operating, being modified/under construction, or is in cold standby. Section 3 provides additional discussion of these capabilities and plans to upgrade them.

These core capabilities are owned, retained, and/or operated by DOE-NE for its mission accomplishment. They complement specialized laboratories and glove-box lines in the DOE complex and at universities that are capable of handling relatively lower-hazard materials as well as supporting activities such as integral scale testing, severe accidents, thermal hydraulics, and seismic analyses.

To support the DOE-NE mission, the INL offers its facilities, not only to laboratories and to universities participating in research but also as a user facility, to the broader nuclear energy research enterprise. The specialized capabilities that qualify the INL to conduct nuclear energy R&D are also available to help other federal agencies, industry, and regional partners meet their mission needs. These include core competencies in reactor technologies, fuel cycle development, and systems engineering as well as a remote location with the safeguards, security, and safety infrastructure to manage radiological and nuclear materials and testing under normal and abnormal conditions.

In addition, the INL is a multi-program laboratory, delivering scientific and engineering solutions to meet national needs in energy integration, environmental integrity, and national and homeland security. National and Homeland Security missions take place predominately at the Research and Education Campus (REC) and Central Facilities Area (CFA), while clean energy systems development and integration and synergistic environment research is concentrated at the REC. With continuing investments to revitalize the existing infrastructure and fill mission-related capability gaps, the INL can continue to provide a national nuclear energy capability and serve as a multi-program laboratory for many years to come.

Table 1-1. Idaho National Laboratory nuclear energy research and development core capabilities - operational, in progress, or planned.

| Core Capabilities/Functionality[a] | INL Facilities[b] | DOE NE Objectives (1-4) | | | | Other Users[c] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | NNSA | Univ. | Other Fed. | Intl. Coop |
| **Irradiation/Capabilities (Reactors)** | | | | | | | | | |
| Thermal | ATR/ATR-C | ● | ● | ● | | ● | ● | ● | ● |
| Transient | TREAT (cold standby) | ● | ● | ● | | | ● | ● | ● |
| Fast | None (limited international capabilities) | | ● | ● | | | | ● | ● |
| **Post-Irradiation Examination and Fresh Fuel Characterization Capabilities** | | | | | | | | | |
| Receipt of irradiated fuels/materials | HFEF | ● | ● | ● | | ● | ● | ● | ● |
| Non-Destructive 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, void volume) | HFEF | ● | ● | ● | | ● | ● | ● | ● |
| Destructive examinations (cutting/sectioning, sample mounting, grinding/polishing/etching, 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/FASB | ● | ● | ● | | ● | ● | ● | ● |
| Destructive analyses (chemical and isotopic analysis, material characterization, fuel density, fission gas retention, crack growth rate, electro-optical examination including SEM, TEM, FIB, EPMA, etc.) | HFEF/AL/EML/FASB/ IMCL (In progress) | ● | ● | ● | | ● | ● | ● | ● |
| Thermal testing and micro- and nano-analysis | Planned | ● | ● | ● | | ● | ● | ● | ● |
| Separate-effects and out-of-pile testing of fuels and materials | Planned | ● | ● | ● | | | ● | | ● |
| **Experimental Fuel Fabrication Capabilities (Glovebox lines co-located with irradiation facilities)** | | | | | | | | | |
| Fuel containing Pu and minor actinides that can be contact handled (ceramic, metal). Small rods and targets up to dose limits | FMF (modifications underway) | ● | ● | ● | | Matl Storage[d] | ● | ● | ● |
| Fuel that must be fabricated in a shielded facility, pin/rod scale | FCF/HFEF | ● | | ● | | | ● | ● | ● |
| HEU, LEU, thorium in small quantities (pin/plate), and characterization | FASB | ● | | ● | | ● | ● | ● | ● |
| LEU in larger quantities. Larger scale fabrication equipment such as extrusion presses and rolling mills | CESB (modifications planned) | ● | | ● | | ● | ● | ● | ● |

Table 1-1. Idaho National Laboratory nuclear energy research and development core capabilities - operational, in progress, or planned.

| Core Capabilities/Functionality[a] | INL Facilities[b] | DOE NE Objectives (1-4) | | | | Other Users[c] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | NNSA | Univ. | Other Fed. | Intl. Coop |
| **Advanced Separations and Waste Forms (Hot cells and radiochemistry laboratories)** | | | | | | | | | |
| Aqueous separations and pre-treatment technologies | RAL[e], RCL | | | ● | ● | | ● | | ● |
| Electrochemical separations and waste form (Eng. Scale) | FCF/HFEF | | | ● | ● | | ● | | ● |
| **Specialized Laboratory Facilities** | | | | | | | | | |
| Radioisotope power system assembly and test | SSPSF | | | | | | | ● | |

*a. Section 1.3 provides more information about INL capabilities supporting DOE-NE's mission.*
*b. Facilities are operational and DOE-NE-owned unless otherwise identified.*
*c. Capabilities related to fuel fabrication, irradiation, fresh fuel characterization, and PIE are also available to support industry users.*
*d. RERTR Program uses FMF for storage of LEU fuel.*
*e. Request to Transfer RAL from DOE-EM to DOE-NE, Correspondence, Hill and Clark to DOE-ID Interim Manager Miotla, March 3, 2010.*
*ATR = Advanced Test Reactor*
*CESB = Contaminated Equipment Storage Building*
*FASB = Fuels and Applied Science Building*
*FCF = Fuel Conditioning Facility*
*FIB = focused ion beam*
*FMF = Fuel Manufacturing Facility*
*HEU = high enriched uranium*
*HFEF = Hot Fuel Examination Facility*
*IMCL = Irradiated Materials Characterization Laboratory*
*LEU = low enriched uranium*
*NNSA = National Nuclear Security Administration*
*RAL = Remote Analytical Laboratory*
*RCL = Radiochemistry Laboratory*
*SEM = scanning electron microscope*
*SSPSF = Space and Security Power Systems Facility*
*TEM = transmission electron microscope*

### 1.1.3 User Facility Model

The INL views its unique nuclear R&D capabilities and infrastructure as national assets to be available to universities, industry, national laboratories, international research organizations, and other federal agencies. DOE-NE seeks to involve the best 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. The INL seeks to offer its capabilities and related nuclear science and engineering infrastructure to these experts to advance DOE-NE research goals.

Through the National Scientific User Facility (NSUF), the INL offers outstanding irradiation and PIE capabilities to help researchers explore and understand the complex behavior of fuels and materials. In 2007, DOE designated the Advanced Test Reactor (ATR) and associated PIE capabilities at the Materials and Fuels Complex (MFC) as user facilities, providing universities, national laboratories, industry, other federal agencies, and international research institutions with greater access to them.

The NSUF grants university-led scientific groups access to ATR and/or PIE capabilities and provides competitive pricing for industry groups and other federal agencies. The program expanded within the last year to offer irradiation and PIE capabilities at partner universities, including the Massachusetts Institute of Technology, North Carolina State University, University of Michigan, University of Wisconsin, University of Nevada at Las Vegas, and Illinois Institute of Technology (which provides access to Argonne National Laboratory's Advanced Photon Source). The NSUF includes educational initiatives aimed at preparing nuclear science and engineering students to conduct nuclear energy research and experimentation. As a program, it also encourages teaming among universities and national laboratories.

The research sponsored and funded by the NSUF links directly to DOE-NE mission accomplishment; there is also a link between the NSUF and the Nuclear Energy University Program, administered by the Center for Advanced Energy Studies (CAES). In addition, working through a Cooperative Research and Development Agreement (CRADA) with the Electric Power Research Institute (EPRI), the NSUF is enabling industry to use INL capabilities. The NSUF Program, located within the CAES building, is prototyping the laboratory of the future, serving as a gateway to the INL and expanding opportunities for access to its broader capabilities.

To achieve this vision of a laboratory-wide user facility, INL proposes taking specific steps that will enhance the accessibility of INL capabilities to outside users. These changes include relocating and managing special nuclear material (SNM) away from MFC as much as possible and creating laboratory space within the in-town REC, where visiting researchers can connect remotely to the MFC equipment and collaborate with research underway at MFC. Targeted enhancements will also build on existing capabilities to create world-leading nuclear energy R&D infrastructure.

### 1.1.4 Program-Driven Ten-Year Site Planning Process

This INL TYSP links DOE-NE's R&D mission goals to INL core capabilities and infrastructure, evaluates their current condition, and identifies and prioritizes infrastructure and capability gaps, as well as the most efficient and economic approaches to closing those gaps. The TYSP proposes an infrastructure that can be maintained within projected funding levels, and builds on the existing infrastructure, where possible, before building new, stand-alone facilities and capabilities.

## 1.2 Assumptions

To better understand the desired end-state in 2020, INL has based its master planning effort on capabilities necessary to support the DOE-NE Roadmap. The following underlying assumptions also apply to this TYSP:

1. The INL will continue to manage its infrastructure as a shared national resource and expand the user facility concept to encompass broader capabilities of the Laboratory beyond fuels and materials.
2. The number of uncleared, on-site visitors and collaborative partners will grow, increasing the need for unrestricted access to experimental capabilities and data visualization in an open campus environment as much as possible

within the REC (e.g., CAES, a proposed new NSUF Building, the Energy Systems Laboratory, and the planned Research Education Laboratory [REL]).

3. Safeguards and Security requirements will continue to be more restrictive, with direct impact on management of SNM and access requirements for uncleared personnel.
4. Unneeded SNM will be dispositioned. Remaining mission-essential SNM will be consolidated and stored at a central location. The SNM inventory and associated Safeguards and Security capabilities are unique assets that will attract other R&D organizations.
5. Expeditious completion of disposition of fast reactor fuel using electrochemical processing will enable the Fuel Conditioning Facility (FCF) and the Hot Fuel Examination Facility (HFEF) to be more fully utilized for DOE-NE R&D.
6. The INL plans to continue operating the Space and Security Power Systems Facility (SSPSF) for final assembly and testing of radioisotope power systems.
7. Multi-program synergy and capabilities stewardship is key to developing effective nuclear energy solutions. R&D capabilities that serve multiple DOE-NE programs are developed using Idaho Facilities Management (IFM) Program funding. Dedicated, program-specific capabilities are developed and maintained using program funding.
8. The ongoing National Environmental Policy Act (NEPA) process will determine the future role of the INL in Pu-238 production. The INL will not advance-reserve facility capabilities for this purpose.
9. The Next Generation Nuclear Plant (NGNP) R&D program will continue at the INL, and its infrastructure needs are considered in this TYSP. However, the INL will not plan for capabilities associated with the NGNP Project (e.g., engineering and regulatory) until a DOE decision is made on its future.
10. The INL's workforce, facilities, and infrastructure will be sized, within budgetary constraints, to meet its nuclear energy, national and homeland security, and environment and energy mission and programmatic objectives.
11. The TYSP is informed by the budget resources specified in DOE-NE's 5-year budget guidance. The funding projections do not include funding for large, program-specific capital projects such as the NGNP, Component Test Facility (CTF), and a possible fast spectrum test reactor.

## 1.3 Mission Description

The INL is furthering the DOE-NE mission to advance nuclear power as a resource capable of making major contributions in meeting the nation's needs for energy supply, emissions reduction, and energy security, as articulated in the four DOE-NE Roadmap objectives. These pressing challenges set the context for the INL's strategy.

As a multi-program national laboratory, the INL also supports the needs of the National Nuclear Security Administration (NNSA); the DOE Offices of Energy Efficiency and Renewable Energy (DOE-EE), Science (DOE-SC), Environmental Management (DOE-EM), and Electricity Delivery and Energy Reliability (DOE-OE); and numerous work-for-others (WFO) customers, as described by its missions in National and Homeland Security and Energy and Environment. The INL undertakes WFO for other federal agencies, including National Aeronautics and Space Administration (NASA), the Department of Defense (DOD), the Nuclear Regulatory Commission (NRC), and the Interior Department. Infrastructure improvements needed to provide unique support to non-DOE-NE customers are funded through direct investment from the customer or cost recovery. Included in these WFO missions are the Specific Manufacturing Capability (SMC) Program conducted at the Test Area North (TAN) area of the INL Site. Additional information on INL missions is provided in the Management and Operating (M&O) Contract (No. DE-AC07-05ID14517) with Battelle Energy Alliance, Inc.

The INL seeks to meet the needs of DOE-NE cost effectively and efficiently, and to offer its capabilities to the national and international nuclear energy enterprise. Science-based research primarily supporting the DOE-NE mission is the focus of INL nuclear capabilities. Capabilities brought to the INL from the other mission areas offer an even more robust R&D environment, enhancing the value of the INL as a national resource.

### 1.3.1 Nuclear Energy

Building on its legacy responsibilities, infrastructure, and expertise, the INL's nuclear energy mission is to perform science-based R&D focused on advanced nuclear technologies that address objectives of the DOE-NE Roadmap and promote revitalization of the nation's nuclear power industry. The INL coordinates and/or participates with the DOE-NE, providing assistance to all four of the following NE Roadmap objectives.

#### *1.3.1.1 Objective 1—Develop Technologies and Other Solutions That Can Improve the Reliability, Sustain the Safety, and Extend the Life of Current Reactors*

This objective is accomplished by supporting and conducting the long-term research needed to inform component refurbishment and replacement strategies, performance enhancements, plant license extensions, and age-related regulatory oversight decisions. The R&D focus is on aging phenomena and issues that require long-term research and are generic to reactor type.

#### *1.3.1.2 Objective 2—Develop Improvements in the Affordability of New Reactors to Enable Nuclear Energy to Help Meet Energy Security and Climate Change Goals*

These improvements will address barriers associated with the deployment of new nuclear power plants, including advanced designs such as small modular reactors, fast spectrum, and high-temperature reactors with advanced technologies that could support electric and nonelectric applications of nuclear energy. This objective comprises R&D in fundamental nuclear phenomena and development of advanced fuels to improve the economic and safety performance of these reactors. In addition, it includes development of interfacing heat transport systems and tools that improve the understanding of the interaction between kinetics of various reactor systems and chemical plants or refineries as well as the long-term performance of catalysts and solid-oxide cells at the atomistic level.

The NGNP is a government-sponsored project (PL 109-58) focused on the development, early design, and licensing of an advanced high-temperature gas reactor (HTGR) as well as associated advanced technologies to transport high-temperature process heat. This provides the opportunity for nuclear energy to displace the use of fossil fuels in many industrial applications and provide a low-emission energy supply. In support of the commercialization of this technology, the federal government is sponsoring research to develop and qualify the fuel, high-temperature graphite and metals, and analytical methods for the HTGR. A component of this initiative is the demonstration of high-temperature steam electrolysis for nuclear assisted production of hydrogen.

#### *1.3.1.3 Objective 3—Develop Sustainable Fuel Cycles*

R&D focuses on domestic nuclear-fuel recycling and waste management technologies as well as optimized solutions to reduce proliferation risks under the following fuel-cycle management scenarios:

- Once-Through Fuel Cycle – Optimize the fuel cycle to minimize costs and environmental impacts and maximize safety and proliferation resistance.
- Modified Open Cycle – Develop nuclear fuel that better utilizes the fuel resource and reduces the quantity of actinides in used fuel, as well as separations and fuel-processing technologies for used light water reactor (LWR) fuel to extract more energy from the same mass of material.
- Full Recycle – Recycle all of the actinides in thermal or fast-spectrum systems to reduce radiotoxicity of the waste, while more fully utilizing uranium resources.

Unlike R&D Objectives 1 and 2, management of used nuclear fuel (UNF) and development of fuel cycle technologies are primarily the government's responsibilities because the government is legally responsible for UNF. Thus, the necessary research and development, if appropriate, are led primarily by the government. However, early and continuous industry collaboration is important because any technologies that are developed will ultimately be implemented by the commercial entities.

#### *1.3.1.4 Objective 4—Understand and Minimize Risk of Nuclear Proliferation and Terrorism*

This objective will assure that access to the benefits of nuclear energy can be enabled without increasing nuclear proliferation and security risks. It incorporates simultaneous development of nuclear fuel cycle technology, safeguards and security approaches, technologies and systems, new proliferation risk assessment tools, and nonproliferation frameworks and protocols. While R&D associated with safeguards by design are led by the NNSA laboratories, the INL fuel cycle facilities (i.e., the FCF) will support development of approaches and testing of process control instrumentation and new sampling systems that provide near real-time accountability.

### 1.3.2 National and Homeland Security Programs (Department of Defense, Department of Homeland Security, National Nuclear Security Administration)

The INL provides unique capabilities, facilities, and expertise in national and homeland security that are synergistic with the Laboratory's nuclear mission. The National and Homeland Security mission is aligned with Presidential priorities and is focused in two primary areas: critical infrastructure protection and nuclear nonproliferation, which includes the key areas of safeguards and security and signatures, detection, and response.

#### *1.3.2.1 Critical Infrastructure Protection*

The Critical Infrastructure Protection mission focuses on reducing the cyber and physical security risks across the nation's 18 critical infrastructure sectors (NIPP 2009). The INL has established unique capabilities in industrial control systems cyber security, wireless communications, electric power, infrastructure modeling, and armor and explosives technologies. Each of these areas − and the control systems cyber security area in particular − is relevant to advancing nuclear power as a resource capable of meeting energy, environmental, and national security needs. The nuclear power industry is poised to take a significant technological step from legacy analog technology to resilient digital systems in both new reactors and upgrades to the existing fleet. This migration will require significant R&D to resolve technical barriers and provide high assurance that the digital technologies employed are adequately protected against cyber attacks. The INL has extensive experience working with the nonnuclear energy sector and is engaging the Nuclear Energy Institute (NEI) and the NRC in security issues related to nuclear plants. Critical infrastructure protection efforts at the INL have had a direct impact on the nation's energy security and will become increasingly important in the future.

#### *1.3.2.2 Nuclear Nonproliferation Safeguards and Security*

Nuclear Nonproliferation Safeguards and Security provides capabilities that support multiple U.S. government organizations, including DOE-NE and NNSA, with direct relevance to DOE-NE Roadmap Research Objective 4 (Understand and Minimize Proliferation Risk). INL capabilities support or can support research and development in a number of nonproliferation areas such as:

- Fuels that reduce the proliferation risk
- Safeguards approaches and technologies using fuel cycle expertise and facilities such as FCF
- Risk management approaches to security that are of growing interest to NRC.

The INL provides lead program assistance and nuclear fuels expertise in support of the Global Threat Reduction Initiative. This program involves the removal of nuclear materials from less secure locations in the former Soviet Union, and the conversion of reactor fuels from highly enriched uranium to low-enriched uranium. Fuel fabrication and post-irradiation capabilities at MFC and the irradiation capabilities of the ATR have been central to the success of this initiative.

#### *1.3.2.3 Signatures, Detection, and Response*

Differentiating capabilities make the INL a laboratory of choice for the DOD, the Department of Homeland Security, and NNSA in many facets of defense against weapons of mass destruction. The INL has world-leading capabilities in detection of and response to threats involving chemicals, nuclear and radiological materials, and explosives. These capabilities include:

- Research quantities of nuclear and radiological materials that are increasingly difficult to access elsewhere in the nation
- Facilities and equipment that support nuclear and radiological forensics, such as the HFEF, Analytical Laboratory (AL), and the mass spectrometers capable of ultra-trace detection
- A large-scale explosive test range
- An expansive site that supports testing, evaluation, training ,and exercises for many of the nation's weapons of mass destruction response teams
- Accelerator-based technologies developed at INL enable the detection of illicit transport of shielded nuclear materials, and are being developed to support new safeguards and treaty verification efforts that will be essential to enabling the safe and secure global growth of nuclear energy.

### 1.3.3 Specific Manufacturing Capability

The mission of the SMC Program is to provide facilities, equipment, and trained personnel to manufacture armor packages for the U.S. Army's M1A2 main battle tank. The SMC Program continues to achieve an exceptional safety record, production excellence, and customer satisfaction reports. Current plans call for the program to end in Fiscal Year (FY) 2013. With Army and DOE approval, the INL is considering expanding its armor-related capabilities in the future to support the needs of other National and Homeland Security missions.

### 1.3.4 Energy and Environment

The energy and environment mission of the Laboratory is derived from engineering and research capabilities in specific areas of energy supply (i.e., biomass assembly, testing of advanced vehicles, and development of catalysts) and in developing engineering solutions for the integration of energy systems. As affirmed in the 1995 Settlement Agreement between DOE, the U.S. Navy, and the State of Idaho (DOE 1995) the INL is the lead Laboratory for the DOE's used (spent) nuclear fuel management. Under this role, the INL conducts the research, development, and testing of treatment, shipment, and disposal technologies for all DOE-owned UNF. This role was later expanded to include DOE-produced high-level waste. In addition, the Laboratory provides technical assistance in the area of water resource management to federal, state, and local governments.

#### *1.3.4.1 Used Nuclear Fuel and High-Level Waste Leadership*

As the DOE lead laboratory for UNF and high-level waste, the INL works with commercial nuclear generating companies, cask vendors, the EPRI, M&O contractors at other DOE sites, other federal offices, and the international research community to solve technical issues associated with packaging, storage, transportation, and disposition of these materials. Activities performed include designing and constructing large-scale demonstrations of repository, waste processing, and storage systems. This includes research to establish the technical foundation for acceptance of materials at future repository or storage systems, developing disposition pathways for challenging materials, total system performance modeling for repository systems, materials testing, and nondestructive evaluation of cask and system performance.

From 2002-2009, the INL designed and demonstrated a full-scale system to close the large waste packages for placement into the repository. A current demonstration system is the cold crucible melter that is unique and has some advantages compared to the current generation of joule-heated melters used for treating radioactive waste. A one-of-a-kind system, the technology is being used successfully to demonstrate vitrifying high-level waste streams and low-activity waste streams produced at the Savannah River Site and the Hanford Reservation. This system may also be used in the future to demonstrate vitrification of radioactive waste streams at the INL. A cold crucible vitrification model is being developed at the INL to validate the results from this test bed.

This expertise and associated capabilities are also applicable to the emerging area of used fuel management within DOE-NE (NE Roadmap Objective 3).

#### *1.3.4.2 Biomass Feedstock Assembly*

The goal of INL's Bioenergy Program is to overcome key technical barriers facing the U.S. bioenergy industry by systematically researching, characterizing, modeling, demonstrating, and harnessing the physical and chemical characteristics of the nation's diverse lignocellulosic biomass resources to produce biofuels and other value-added products more cost-effectively. Realizing national biofuel production goals requires development of feedstock supply systems that can provide biomass to biorefineries sustainably and cost-effectively. The INL's Bioenergy Program developed an engineering design, analysis model, and conceptual strategy for a feedstock supply system that can sustainably provide uniform-format lignocellulosic biomass at a commodity scale within national cost targets. Four major INL research laboratories are employed to research, develop, and demonstrate the systems and technologies needed to meet DOE's biomass program requirements: (1) Biomaterials Deconstruction and Flowability, (2) Computational Engineering and Simulation, (3) Biomass Stabilizing and Upgrading, and (4) the Feedstock Process Demonstration Unit.

#### *1.3.4.3 Energy Storage and Vehicles*

The INL is the lead DOE laboratory for field performance and life testing of advanced technology vehicles. The Laboratory provides benchmark data for DOE technology modeling, simulations, and R&D, as well as to fleet managers and other vehicle purchasers for informed purchase, operations, and infrastructure decisions.

The transition to hybrid electrical and all-electrical light duty vehicles for personal transportation has the potential to shape the demand curve for electricity in the U.S. However, realization of this advanced technology will require improvements in batteries, energy conversion, and electrical infrastructure − all of which are established areas of INL expertise. The INL is coordinating plug-in demonstration projects with private companies and city, county, port, and environmental agencies. Onboard data-loggers, cellular modems, and global positioning system (GPS) units will transmit information from these vehicles to INL researchers for analysis. The INL's integrated vehicle, energy storage, and grid demonstration and testing laboratory is a regional and national testing and demonstration resource for DOE, DOD, other federal agencies, and industry. The applied battery research and diagnostic testing includes thermodynamic life analysis of advanced battery chemistries under development and advanced physical and materials modeling. The program is also developing roadway and vehicle electrification systems and smart grid integration concepts.

#### *1.3.4.4 Hybrid Energy Systems*

Hybrid energy systems are those that integrate two or more primary energy and carbon sources to produce a suite of energy products in an optimal way. Hybrid energy systems can be envisioned as five major interconnected platforms: (1) feedstock extraction and processing; (2) energy transfer; (3) energy storage; (4) byproduct management; and (5) system integration, monitoring, and control. An emerging area of research within the Laboratory, hybrid energy (including nuclear-assisted hybrid systems) is growing to meet the energy integration needs of the DOD and other federal, state, and international customers and partners. Examples of research underway in this area include:

- Developing methods to improve the efficiency of feedstock processing and reduce carbon emissions
- Conducting research to understand reaction phenomena and heat disposition requirements
- Exploring methods for converting surplus power to stored energy
- Conducting research to convert syngas and pyrolysis products into energy products
- Researching gas separation and management of by-products
- Supporting technology development for tar and oils upgrading
- Conducting research to optimize energy and material integration of hybrid energy systems
- Developing design criteria for monitoring and control systems for hybrid energy solutions.

#### *1.3.4.5 Systems Integration of Natural Resource, Energy, and Ecosystem Utilization*

Energy production and distribution require the development and use of multiple natural resources (e.g., water, land, minerals, and biomass) and often compete with other important resource uses such as food production, residential development, recreation, and other industrial applications. Ecosystem and regional-level analysis tools based on Geospatial Information Systems (GIS) and system-dynamics modeling techniques are being developed to analyze energy and natural resource development and use. They also identify systems that address fluctuations in demand and availability of resources and energy in the short and long term. Finally, researchers are developing advanced environmental forensics capabilities to detect trace levels of specific chemicals and other small changes in the environment.

### 1.3.5 Idaho Cleanup Project

The Idaho Cleanup Project ensures the safe, informed, and judicious use of the INL Site by multiple generations following remediation through 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.

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

The 7-year, $2.9B cleanup project, funded through DOE-EM, 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. This project is discussed in detail in Appendix C.

# 2. TEN-YEAR END-STATE VISION

The proximity of irradiation capabilities such as the ATR and the Transient Reactor Experiment and Test Facility (TREAT) to the Laboratory's PIE and characterization capabilities and to co-located glovebox lines for experimental fuel provides the foundation for the national nuclear energy capability at the INL. Along with facilities capable of supporting future need for scale-up demonstrations, these facilities – with targeted investments – should be able to meet the needs of DOE-NE and nuclear energy R&D in general for many years to come.

Over the last 5 years, the INL has significantly upgraded research capabilities at the Laboratory beginning with ATR and continuing today with the MFC, including a major emphasis on the purchase of state-of-the-art PIE and fresh fuel characterization equipment and modifications to the Fuel Manufacturing Facility (FMF) for ceramic fuel fabrication work. The resulting suite of capabilities will provide industry, universities, national laboratories, and other federal agencies with the tools required to support the sustainable use of nuclear energy as a critical baseload power source.

**INL: The National Nuclear Laboratory Ten-Year End-State Vision**

- *ATR meeting the neutron irradiation needs of the nation*
- *World-class fuel fabrication and characterization capabilities*
- *World-leading PIE capabilities*
- *TREAT meeting transient testing needs of U.S. and international research community*
- *Laboratory and integrated-laboratory scale testing of other advanced separations technologies, with planning for engineering scale demonstration*
- *Continued engineering scale electrochemical separations and waste form development*
- *Optimized infrastructure to support resident and visiting researchers.*

## 2.1 Consolidation Around Three Main Campuses

Work associated with nuclear energy and other missions takes place at several locations at the INL. Currently, nuclear energy R&D capabilities are consolidated around three main campuses — the REC, the ATR Complex, and the MFC (Figure 2-1). Though located in separate areas of the INL Site, these campuses are connected by capability and function; in the future, an existing road will be improved to ease transport of experiments from ATR to MFC. Advanced planning for construction of the road has begun, and the INL expects to complete it in 1 year.

The strategic vision for the INL builds on the current strength of each campus; investments to modernize each area are designed to create the form, aesthetics, and function of a campus environment that will attract and retain researchers and foster collaboration, communication, and connectivity both internally and with outside experts. A cooperative research environment in town will be facilitated by contemporary office space integrated with modeling and simulation capabilities, lower-hazard laboratory space acquired under lease arrangements, and data links between nuclear energy R&D capabilities in town and those at the MFC. In addition, relocation of SNM away from the MFC will enable easier access to MFC facilities, when needed.

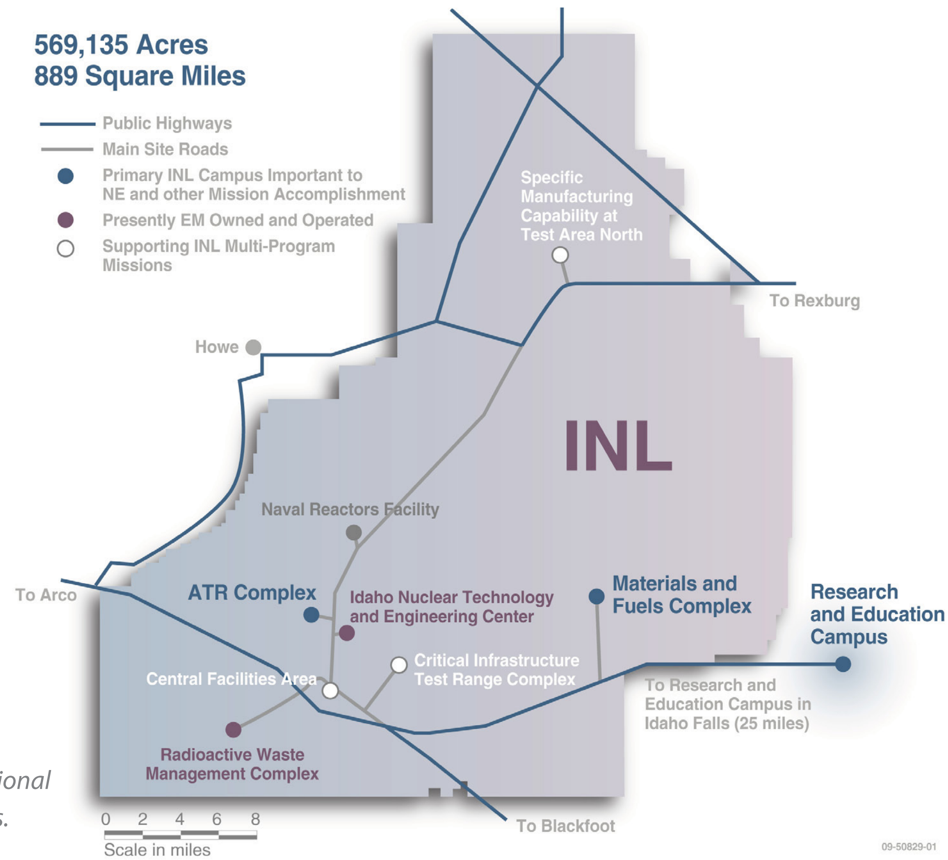



*Figure 2-1. Idaho National Laboratory campuses.*

### 2.1.1 Research and Education Campus

Since 2005, INL's in-town capabilities have been consolidated into the REC (Figure 2-2), which serves as the "front door" to the INL and comprises diverse laboratories supporting research in nuclear energy, national and homeland security, and energy and environment. REC research often supports research underway in higher-hazard or larger-scale facilities at the other campuses as well as at U.S. universities and other national laboratories.

The campus is home to a range of research capabilities and facilities as well as INL administrative functions. The Engineering Research Office Building (EROB) is one of the main office buildings for INL staff. In the future, this facility will be augmented by a new REL (2012), with both laboratory and office space for the INL scientists and engineers as well as an auditorium. An REC Office and Cafeteria Expansion, near EROB, is planned for 2014.

The INL Research Center (IRC) (280,000 ft$^2$), located within the REC, is a collection of laboratories that support advanced research and applied engineering in robotics, biology, chemistry, metallurgy, modeling and computational science, physics, and high-temperature electrolysis production of hydrogen for nuclear and nonnuclear applications. Its large footprint, including high bay areas for small scale pilot plant research, enables the INL to advance bench scale and basic research concepts into viable, integrated systems for DOE-NE and other customers.

The CAES (55,000 ft$^2$), a $17M research facility partially funded by the State of Idaho, opened in 2008. A collaborative partnership between Idaho's public universities and the INL, the CAES (along with the NSUF Program) serves as a gateway to research capabilities of the INL and a center for cross-organizational and peer-to-peer technical collaboration.

The REC also includes three facilities dedicated to INL's National and Homeland Security mission, acquired since 2005 to house researchers and program capabilities requiring secure locations for machining, fabricating, assembly, and systems operations. A new R&D support facility will be acquired this year under lease arrangement to support the National and Homeland Security mission.

Other key facilities underway or planned at the REC under lease arrangements to support the diverse INL energy and environment missions include an Energy Systems Laboratory (ESL) to be operational by 2011 and the REL to be operational by 2012, which will also support separations research. The ESL will provide laboratories and high-bay areas for developing and demonstrating bioenergy feedstock processing, energy storage, a hybrid-energy systems testing program (HYTEST), and a visualization cave. These facilities are being co-located to better integrate the research components of synergistic, comprehensive energy systems. A new building is proposed for the NSUF, to be built by mid-decade.

The INL is also considering expanding its hybrid energy system demonstration capabilities in the 2015 time frame to emphasize nuclear power as part of a to-be-established larger scale component testing and integration capability. Equipment requirements associated with each stage of facility/technology development are currently being developed.

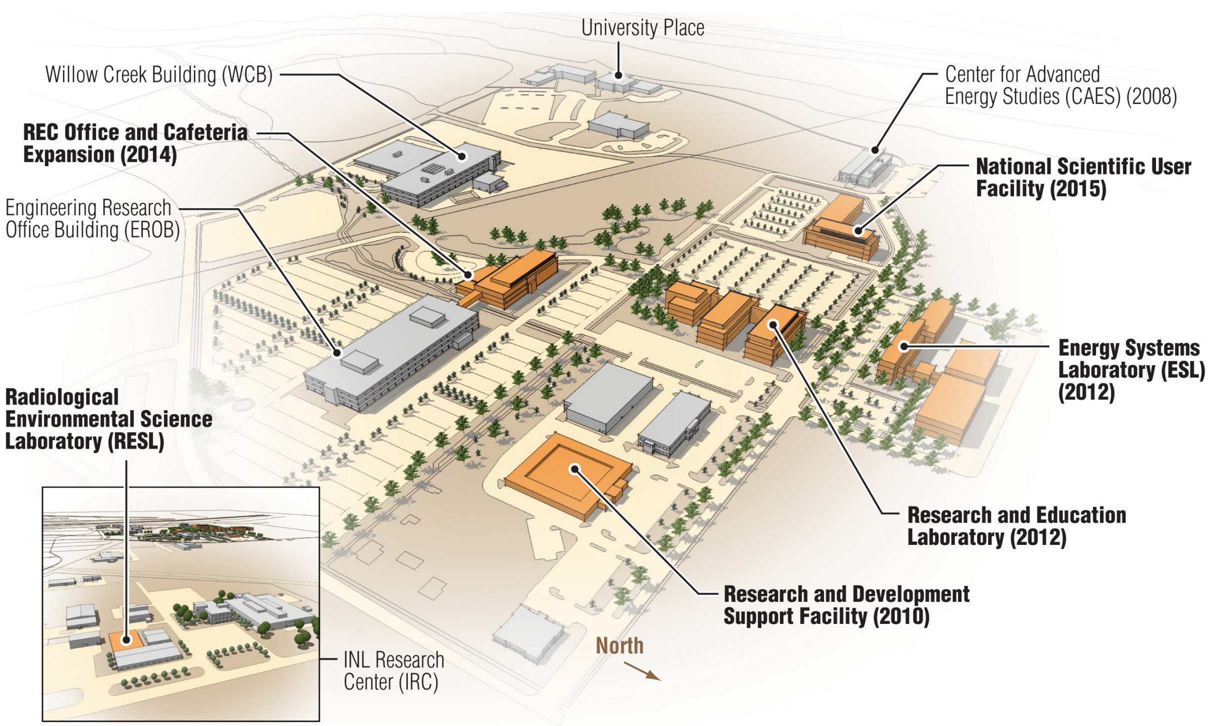



*Figure 2-2. Research and Education Campus.*

The DOE is also constructing a new Radiological Environmental Science Laboratory.

### 2.1.2 Advanced Test Reactor Complex

Located 45 miles west of Idaho Falls, this complex is home to the ATR, the world's most advanced materials test reactor (Figure 2-3). A low-temperature pressurized water-cooled reactor for steady-state irradiation, the ATR is fully subscribed meeting the needs of DOE-NE, Naval Reactors, NNSA, and many other research users. Other facilities in the complex include the associated ATR Critical Facility (ATR-C), a test-train assembly facility, and a supporting radio-analytical laboratory that will begin operation this fiscal year.

The ATR has historically supported fuel development for the Navy's nuclear propulsion program. Over the last decade, its use has expanded into other mission areas that include particle fuel development for the high-temperature gas reactor, minor actinide-bearing fuel development, and low-enriched fuel for NNSA's Reduced Enrichment for Research and Test Reactor (RERTR) Program, which is part of the Global Threat Reduction Initiative. The ATR is also one of two test reactors designated by a DOE Record of Decision as suitable for future production of Pu-238.

The recent decontamination and decommissioning (D&D) of the Material Test Reactor helped facilitate the transformation of the ATR Complex. With the shutdown reactor and ancillary facilities removed, the INL completed a new Technical Support Building (16,400 $ft^2$) in 2009 that provides essential office space for ATR engineers and operators. In addition, in 2009, INL completed both a Test Train Assembly Facility (4,483 $ft^2$) containing high precision equipment for experiment test train assembly and the Radiation Measurement Laboratory (6,929 $ft^2$). As indicated above, a new radiochemistry laboratory (4,600 $ft^2$) necessary to support ATR will begin operation this fiscal year. A second support facility is proposed for 2015.

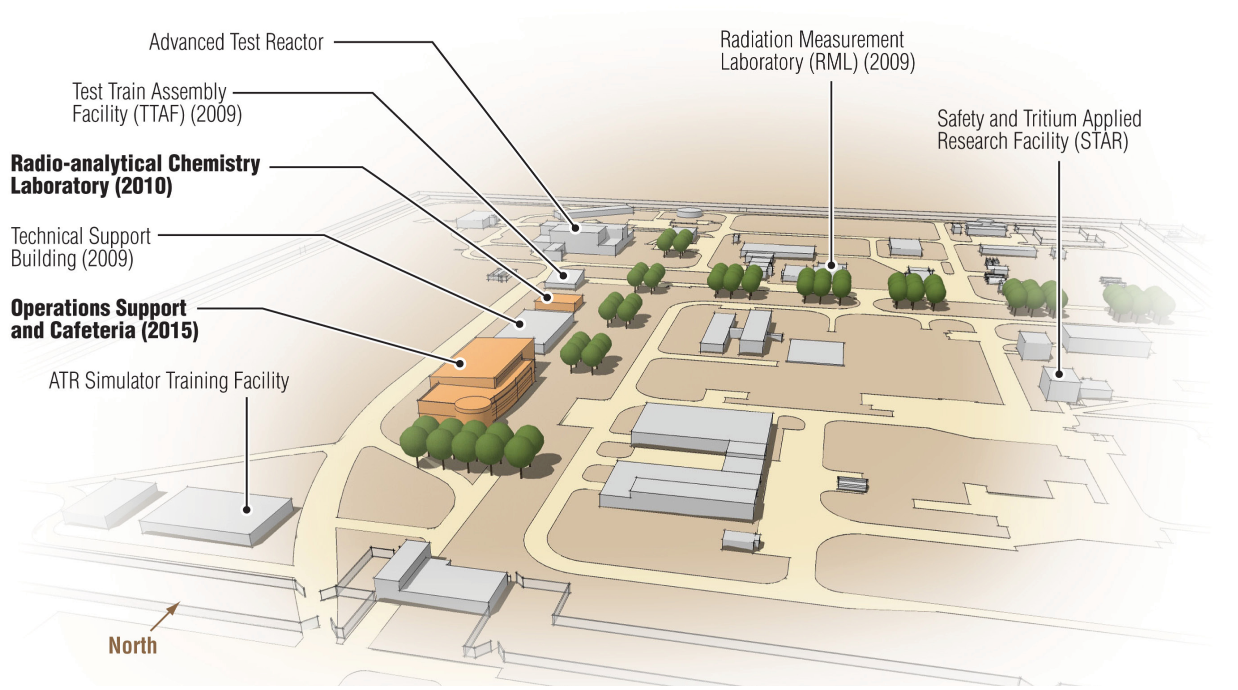



*Figure 2-3. Advanced Test Reactor Complex.*

### 2.1.3 Materials and Fuels Complex

The MFC, located 28 miles west of Idaho Falls, is the center of fuel fabrication, transient testing, and post-irradiation testing at the laboratory (Figure 2-4). The MFC is home to the TREAT facility, currently inactive but in cold standby the Neutron Radiography Reactor (NRAD) TRIGA reactor used for neutron radiography, and hot cell facilities used for PIE and advanced separations and waste form research such as HFEF, FCF, and the Fuels and Applied Science Building (FASB). It also houses analytical laboratories and an Electron Microscopy Laboratory (EML) for isotopic and chemical analyses and nanometer-scale analysis of material samples from MFC research facilities and co-located fuel fabrication glovebox lines (e.g., FMF and FASB). The MFC operates a facility for final assembly and testing of radioisotope power systems (SSPSF).

Last year, the INL completed construction of a new Radiochemistry Laboratory (8,200 $ft^2$) at MFC, and modifications are underway to convert an existing facility to provide additional radiological space for fuel development. MFC plans include construction of an Irradiated Materials Characterization Laboratory (IMCL) for fuels and materials characterization, a proposed new PIE line item facility, ceramic fuel fabrication capability, and new office buildings for INL and visiting researchers.

Efforts are underway to procure modular office space to provide interim space for employees while new office buildings are constructed over the next 5 to 10 years. A Technical Support Building is proposed for construction and operation by 2012, followed by future office space.  New office space will provide the facility functionality needed to respond to the evolving needs of the DOE-NE missions.

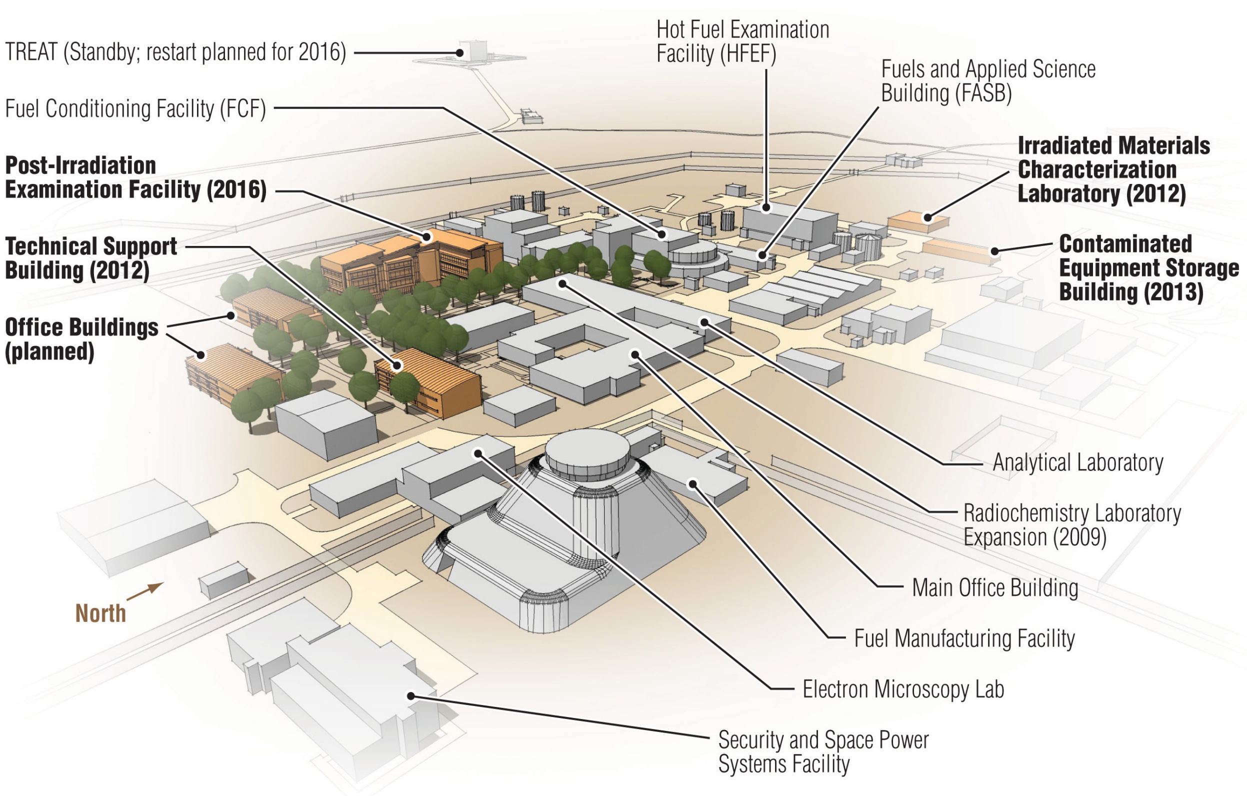



*Figure 2-4. Materials and Fuels Complex.*

## 2.2 Balance of Site Capabilities

There are eight facility areas located on the INL Site, which occupies a 569,135-acre expanse of otherwise undeveloped, high-desert terrain. Buildings and structures are clustered within these areas, which are typically less than a few square miles in size and separated by miles of open land. The CFA, located centrally on the INL Site, is the main services and support area for the two main DOE-NE R&D campuses located on the desert. The primary non-DOE-NE facility areas include the Idaho Nuclear Technology and Engineering Center (INTEC), Radioactive Waste Management Complex (RWMC), and Naval Reactors Facility (NRF). Other, smaller site areas include the Critical Infrastructure Test Range Complex (CITRC) and TAN.

INL currently depends on the DOE-EM owned and operated RWMC for disposal of remote-handled low-level waste from continuing operations. This is expected to continue until the Subsurface Disposal Area facility at RWMC is full or until it must be closed in preparation for final remediation, approximately at the end of FY 2017. INL has proposed, and DOE has approved mission need for construction of a new remote-handled low-level waste disposal facility, consisting of approximately 250 precast concrete vaults. Current startup of this facility is currently planned for FY 2018. Contact-handled low-level waste is disposed of offsite.

Site-wide area infrastructure consists primarily of roads, railroads, power distribution systems, communication systems, and utility systems that serve and connect facility areas. Support services provided from CFA include medical, fire suppression, transportation, security, communications, electrical power, craft support, warehousing, and instrument calibration. Only a small amount of space at CFA is used for R&D. Capabilities being established at CFA for national and homeland security work will house wireless test-beds in three or four existing buildings and a proposed new facility near the bus depot. The schedule for constructing this facility will depend on review by the INL Executive Committee. While the National and Homeland Security missions are conducted largely within the REC, there are capabilities at CFA and other locations on the INL Site that utilize the remoteness and desirable, quiet radiofrequency spectrums that exist.

The CITRC Area supports National and Homeland Security missions of the Laboratory, including program and project testing (i.e., critical infrastructure resilience and nonproliferation testing and demonstration). Wireless test-bed operations, power line and grid testing, unmanned aerial vehicle testing, accelerator testing, explosives detection, and radiological counter-terrorism emergency response training are done at the CITRC area. A future Electric Grid Test Bed is planned to begin operation in 2013 at the INL near the CFA/CITRC area including a new reconfigurable test substation and several miles of transmission and distribution lines. An area north of TAN is being developed for a future accelerator experiment to detect illicit transport of shielded nuclear materials.

Currently owned and operated by DOE-EM, the INTEC operated until 1992 to recover highly enriched uranium from government reactors' UNF and convert liquid high-level waste into a more stable, solid granular material suitable for long-term storage. During its 40-year production mission, INTEC recovered uranium from a diverse set of UNFs including metals, aluminum, stainless steel, zirconium, Navy fuels, and graphite fuel. In the 1980s, second-generation facilities that housed advanced fuel storage and dissolution, remote maintenance capabilities, and sampling and analytical technologies replaced the earlier facilities. Construction of a facility (CPP-691) to house second-generation chemical separation/ uranium extraction capabilities was started but not completed. The facility is approximately 70% complete. Today, with environmental cleanup of INTEC nearing completion, most of its facilities are or will be surplus to the Idaho Cleanup Project and the DOE-EM mission.

Several INTEC facilities currently support INL operations and will be needed to support ongoing operations after the DOE-EM cleanup mission ends. The INL plans to use the Unirradiated Fuel Storage Building (CPP-651) for relocation of SNM from MFC. Other INTEC facilities are under consideration for future use to support DOE-NE R&D or INL operations. For example, the UNF pool at the Fluorinel Dissolution Process and Fuel Storage (FAST; CPP-666) facility is necessary for storage of ATR used fuel. Along with the fuel storage capabilities of FAST is the Fuel Dissolution Process (FDP) cell, which provides shielded capabilities with manipulators that could be used in the future to investigate and test advanced separations technologies, conduct extended used fuel storage studies, and develop unique monitoring and inspection systems for used fuel storage.

Additionally, the Remote Analytical Laboratory (RAL) is a 13,000-$ft^2$ facility designed for a wide range of organic, inorganic, and radio-analytical capabilities and one of the most modern hot cells in the DOE complex. RAL offers versatility to meet near-term and continuing needs for radiochemistry capabilities and longer-term needs for laboratory and bench-scale testing of separations technologies. It previously served as a test bed for high-level waste centrifugal technology development. The RAL is a conventional chemical laboratory with an air atmosphere and contains an analytical hot cell with a waste load-out cell. A request has been submitted to transfer RAL to DOE-NE (Clark and Hill 2010).

## 2.3 Land-Use and Campus Planning

The INL has institutionalized a planning effort that has identified the needs for additional facilities in each of these campuses over the next 20 years. In some instances, activities to establish these capabilities are well underway, have been approved by DOE-NE, or are proposed within the 10-year window of this document. In other instances, a potential need for capabilities and facilities has been identified; however, the data are not mature enough to include in the TYSP. All proposed projects are subject to NEPA documentation.

## 2.4 Idaho National Laboratory Sustainability Program

The INL has institutionalized a program to implement sustainable practices in facility design and operation, procurement, and program operations that meet the requirements of Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* and DOE Order 430.2B, *Departmental Energy, Renewable Energy, and Transportation Management.*

The INL Sustainability 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. The goal of the INL Sustainability Program is to promote economic, environmental, and social sustainability for the INL, helping to ensure its long-term success and viability as a premier DOE national laboratory.

For additional details on how the INL plans to implement the Sustainability Program, see Appendix D.

# 3. IDAHO NATIONAL LABORATORY CORE CAPABILITIES

The INL retains core nuclear energy R&D capabilities in irradiation testing, PIE, fuel fabrication, advanced separations, waste form development, and final assembly and testing of radioisotope power systems. These capabilities require the use of reactors, hot cells, and other specialized laboratory facilities that are able to support research using highly radioactive materials. Because these capabilities are essential to DOE-NE research and accessible to the broader nuclear energy R&D research community, the INL is proposing a strategy of incremental investments to address current capability gaps and bring them to world-leading levels. Part of this strategy is to establish capabilities through the CAES and a new in-town NSUF building that will enable INL and visiting researchers to collaborate more effectively, with research taking place at the MFC.

Table 5-1 in Section 5 summarizes the strategy for establishing world-leading capabilities at the Laboratory and integrating them to support the development of fuel, reactor, and fuel-cycle technologies.

## 3.1 Thermal Irradiation

The ATR is a thermal material test reactor with thermal neutron fluxes of $1 \times 10^{15}$ neutron/cm$^2$-sec and maximum fast (E>0.1 MeV) neutron fluxes of $5 \times 10^{14}$ neutrons/cm$^2$-sec. These fluxes, combined with its 77 irradiation positions, make the ATR a versatile and unique thermal irradiation facility.

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. A new hydraulic shuttle irradiation system was installed in 2008 to allow for short-duration irradiation tests, and a new Test Train Assembly Facility (4,200 ft$^2$) opened in 2009 to support the precision work associated with experiment assembly for insertion in the reactor.

The purpose of the ATR-C facility, located in an extension of the ATR canal, is to evaluate prototypical experiments before they take place so that researchers can understand the effects on ATR core reactivity. The ATR-C is a full-size, low-power, pool-type nuclear replica of the ATR. Its normal operating power level is approximately 100 W with a maximum power rating of 5 kW.

Improving ATR capabilities and operational reliability has been an INL priority since the beginning of the current M&O contract. Establishing the ATR NSUF brought about a sustained focus on enabling high-quality experiments through improved experiment design, control, and instrumentation to achieve capabilities that are on par with top test reactors worldwide. An improved instrumentation capability is under development for installation in the ATR that will enable researchers to pursue better control for important scientific investigations such as embrittlement behavior of pressure vessel steels; irradiation effects on the degradation of core structural materials; and, eventually, demanding tests on fuel performance limits. Instrumentation capabilities are being developed in conjunction with new test capabilities such as an additional pressurized water loop.

The current phase of in-core instrumentation work will be completed within a 5-year timeframe, at which point instrumentation research will evolve to a more innovative program based on remote sensing and using microstructural markers to track radiation conditions. Reactivation of PWR Loop 2A, necessary for supporting research to understand life extension in water-cooled reactors, is proceeding, and it should be operational by fall 2011.

By the end of this decade, these capabilities should be in use by DOE-NE, universities, other national laboratories and federal agencies, and industry. In addition, the ATR Life Extension Program (LEP) will have been completed and the safety margin improvements and related systems should be upgraded to ensure continued long-term availability of ATR. Follow-on activities to enable long-term sustainment will be necessary through the Idaho Facilities and Infrastructure Recapitalization Program. Because ATR's internal components are periodically replaced, it remains a valuable research and test machine capable of decades of service.

## 3.2 Transient Irradiation

The DOE-NE has indicated the need to establish a transient testing capability by the 2015-2016 timeframe to accomplish its mission. This capability is needed to elucidate an understanding of fuel performance phenomenology at the millisecond-to-second time scales. Testing fuel behavior in prototypic, time-resolved conditions is essential to guiding the development and validation of time resolved computer models of fuel and core behavior across atomistic, meso-, and integrated-behavior scales.

Transient testing capabilities are also needed to screen advanced fuel concepts, allowing for early identification of the limits of fuel performance. Transient testing will help focus fuel development on a range of viable options, ultimately reducing the time and cost that it takes to develop new fuels. Transient testing will be needed to support Research Objectives 1 through 3 of the DOE-NE Roadmap, which involve understanding and predicting LWR performance, developing innovative fuel designs for existing LWRs and advanced reactors, and developing advanced transuranic-bearing fuels for the Fuel Cycle Research and Development Program.

The United States has not performed transient testing for over a decade but has retained a capability: the Transient Test Reactor (TREAT), the only transient test facility in the world that can conduct tests on full size fast reactor fuel and 36-in. segments of LWR fuel. During prior missions, TREAT performed 6,604 startups and 2,884 transient irradiations. The capabilities of TREAT and collocation of PIE capabilities at the INL make restart of TREAT an attractive option for meeting U.S. transient testing needs. In addition to domestic users from national laboratories, international entities as well as U.S. universities and industry have expressed interest in using TREAT to meet their transient-testing needs.

The INL estimates TREAT restart to support U.S. and international research is possible in 3 to 5 years. The DOE-NE has proposed funding in FY 2011 for continued surveillance and preservation of its essential systems. DOE-NE is currently developing a Mission Need Statement (Critical Decision-0) for TREAT restart and is initiating further reviews of alternatives under NEPA. Given the slower nature of transients in gas reactors, transient testing of gas reactor fuel will be accomplished beginning in 2010 using furnaces installed in the HFEF and in a furnace at Oak Ridge National Laboratory.

## 3.3 Fresh Fuel Characterization and Post-Irradiation Examination

### 3.3.1 Existing Capabilities

Current characterization and PIE capabilities at the MFC include equipment in the HFEF, the AL, the EML, and the FASB. These capabilities are adequate to serve basic needs for fuel examination, material handling, and waste disposal and provide the foundation upon which world-leading PIE capabilities can be established.

Handling large quantities of irradiated fuel at the assembly scale presents a significant radiological hazard. This work must be carefully controlled and conducted in heavily shielded hot cell facilities on a protected site, which is the case with capabilities in place and proposed for the MFC. On the other end of the spectrum, it can be beneficial to conduct basic studies on small, low-hazard radiological specimens in a radiological laboratory environment rather than in a nuclear facility; results allow for prediction of fuel performance based on sound scientific principles, and collaboration with visiting scientists is more productive in terms of discovery. The most effective research capability couples heavily shielded nuclear facilities with radiological characterization laboratories that contain high-end research equipment. To provide this capability, the INL proposes to equip the CAES facility and the NSUF (located at the REC) with high-end research equipment for use on radiological materials. As identified in Section 1.2, the INL is proposing a new leased, NSUF facility for this purpose.

Sustaining world-leading capabilities for the next 40 to 60 years will require full utilization and life extension of current facilities, and construction of two new facilities.

The following sections describe the PIE capabilities at MFC, as well as plans to upgrade them through equipment purchases and receipts and establish new advanced capabilities by constructing two new PIE facilities. Over the last several years, more than $20M has been expended on new state-of-the-art fresh fuel characterization and PIE equipment, some of which will be relocated and/or installed in the IMCL.

#### 3.3.1.1 Hot Fuel Examination Facility

The HFEF is a heavily shielded nuclear facility designed to be the front-end of the PIE capability. It has the ability to receive and handle kilograms to hundreds of kilograms of nuclear fuel and material in almost any cask, including full-size commercial LWR fuel. 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, as well as the NRAD 250-kW TRIGA reactor for neutron radiography.

Examples of material preparation for further examination include sectioning fuel rods to produce cross-section specimens on the pellet scale; preparing cladding sections for mechanical testing and micro structural analysis; sorting, packaging, and cataloging hundreds to thousands of material test specimens from test reactor irradiations; and machining large pieces of in-core structural materials mined from decommissioned power reactors into test specimens.

Current HFEF characterization equipment will be upgraded for continued nondestructive and destructive examination of a variety of fuel specimens required for DOE-NE, NNSA, and industry programs. In addition, specialized capabilities (i.e., a consolidated fuel-examination machine and a fuel-rod refabrication rig) will be pursued to support ongoing DOE-NE research.

#### 3.3.1.2 Electron Microscopy Laboratory

The EML houses a transmission electron microscope, a dual-beam Focused-Ion Beam (FIB) fitted with electron backscatter diffraction and microchemical analysis capabilities, and a state-of-the-art Scanning Electron Microscope fitted with a Wavelength Dispersive Spectrometer with software that allows semiquantitative analysis of heavy actinides. The EML will continue to function in this capacity until the IMCL and a new imaging suite – a microscopy laboratory recently installed at the CAES – are fully functional. Existing equipment at the EML will either be moved to the

IMCL or retired, and EML will continue to provide general-purpose capabilities to meet ever-increasing needs for radiological laboratory space.

#### 3.3.1.3 Analytical Laboratory

The AL focuses on chemical and isotopic characterization of unirradiated and irradiated fuels and materials. It receives small quantities of irradiated material from the HFEF, performing 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. The AL houses many advanced instruments including an Inductively Coupled Plasma Mass Spectrometer (ICP-MS), two Thermal Ionization Mass Spectrometers (TIMS), and instruments for determining the fundamental thermodynamic properties of actinide-bearing materials. The AL will continue its current mission with regular upgrades.

#### 3.3.1.4 Fuels and Applied Science Building

The FASB has three missions: (1) fuel development, (2) materials characterization, and (3) irradiated materials testing. Its east wing has been redeveloped as a low-level, thermophysical properties laboratory, outfitted with equipment for sample preparation, optical microscopy, electron microscopy, and thermodynamic properties determination. A laboratory in the west wing is being equipped with a suite of lead-shielded gamma cells to conduct environmental crack-growth-rate and fracture-toughness testing on irradiated materials. Some of the fuel development equipment will be moved to the Contaminated Equipment Storage Building (CESB) to enable more PIE work at FASB.

### 3.3.2 Ten-Year End-State Capabilities

As articulated in the INL Strategic Plan for World-Leading PIE Capabilities (INL 2009a), the INL will establish two modern facilities, each of which would be unique in the world with respect to comprehensive characterization and analytical capabilities of nuclear fuels and materials – more specifically, nuclear fuels and high-dose (highly activated) non-fuel materials such as cladding. These facilities will provide operational flexibility and streamlined work-flow processes that can be reconfigured to meet evolving mission requirements. Facility design will incorporate modularization to facilitate equipment-specific shielding and flexibility for future equipment development, configuration alteration, and ease of replacement.

#### 3.3.2.1 Irradiated Materials Characterization Laboratory

The IMCL will be the first facility of its type in the U.S. designed specifically for advanced instrumentation and equipment. Non-reactor nuclear facilities in the U.S. were state-of-the-art when they were constructed; these facilities, however, were not designed to accommodate advanced microstructural characterization equipment, rendering them obsolete for this purpose. The IMCL will contain space for installation of instruments and equipment within shielding structures that can be redesigned and refitted whenever necessary. The IMCL will have mechanical systems that tightly control temperature, electrical and magnetic noise, and vibration to the standards required for advanced analytical equipment.

Designed as a multipurpose facility suitable for many different missions over its projected 40-year life, the IMCL will have as its first mission the task of housing modern, state-of-the-art PIE instrumentation. The IMCL will be used to routinely handle and perform micro- and nano-scale characterization of material specimens and irradiated fuel samples in the mass range of tens of grams down to micrograms. Its capabilities will include an Electron Probe Micro Analyzer, micro-x-ray diffraction, dual beam FIB, field-emission gun scanning-transmission electron microscopy, scanning electron microscopy, scanning laser thermal diffusivity, limited mechanical testing capability, and sample preparation capability. The facility will be designed to allow easy routine maintenance of the instruments.

Coupled with the CAES, this suite of instruments will provide DOE-NE with some of the powerful, state-of-the-art characterization tools used successfully to overcome material performance limitations in other branches of materials science. The IMCL will also serve as a test-bed for developing the infrastructure and protocols required for remote operation of advanced research equipment by INL and its research partners, in preparation for constructing and operating a line-item PIE facility, which will further expand U.S. nuclear energy research capabilities.

The IMCL is a General Plant Project for which the DOE Idaho Operations Office (DOE-ID) approved Critical Decision-0 in August 2009 (PLN-3128); it is expected to come online in 2012.

#### 3.3.2.2 *Post-Irradiation Examination Facility*

Although the IMCL represents a significant advance over current U.S. nuclear energy research and development capability, the transition to a full-spectrum nuclear research capability will require further expansion into a new multi-program line-item facility, capable of handling much larger samples. As the project matures and the facility is built over the next 6 to 10 years, some of the capability demonstrated in IMCL may transition to the new facility. This would be consistent with the useful lifetime of such research equipment and would provide the newer facility with state-of-the-art instrumentation. The line-item facility will be a third-generation, PIE analytical laboratory that will further consolidate and expand capabilities that function on the micro, nano, and atomic scale. Options for locating this facility within MFC are currently under review.

The facility will be designed with cooperative R&D at the core of its mission, with information technology infrastructure that allows remote operation and monitoring of equipment from in-town and off-site locations. As IMCL micro-structural characterization capabilities transition to the new facility, the IMCL will be used to consolidate mechanical testing capabilities at the FASB, HFEF, and IMCL into one location. Critical Decision-0 for the proposed new PIE facility is planned for FY 2010, with Critical Decision-1 developed during FY 2011.

In addition, optimum use of MFC radiological facilities requires modifications to their missions. The pilot-scale fabrication capabilities currently in the FASB will be moved to the CESB in FY 2011 through FY 2012. Before the move, the CESB must undergo electrical power and other utility upgrades. During FY 2011 through FY 2013, the mission of FASB will continue to transition to radiological characterization and mechanical testing. Remaining capabilities in the EML will transition to FASB, and the EML will be used as a general-purpose radiological facility.

#### 3.3.2.3 *National Scientific User Facility*

In conjunction with the current CAES building, the proposed new, leased NSUF building would house high-end PIE instruments that parallel capabilities at the MFC for use by visiting researchers, enabling them to collaborate in DOE-NE research programs.

By design, the CAES research facility operates in the same manner as universities do; in the case of low risk radiological research, this approach provides a cost-effective, innovative, and productive environment for exploring fundamental science questions and executing basic research complementary to research at INL Site facilities. The NRC license that the CAES holds through Idaho State University has material quantity limits sufficient for handling low-activity specimens. These factors make the CAES an ideal location for state-of-the-art research equipment. These research tools will be of sufficient quality to position CAES as a major regional center for materials characterization that can support innovative material science studies related to many technical areas − including, but not limited to, nuclear energy.

CAES and NSUF capabilities will focus on nanoscale and atomic-level characterization, where examinations can be completed using micrograms or nanograms of irradiated specimens prepared at the MFC. The CAES analytical capabilities will include an atom probe (Local Electron Atom Probe [LEAP]), aberration-corrected Field Emission Gun Scanning Transmission Electron Microscope, dual-beam FIB, and scanning electron microscopy, as well as a Nano Secondary Ion Mass Spectrometry (Nano-SIMS), and a chemical characterization tool with parts-per-billion detection limits and 30-nanometer spatial resolution. Other capabilities will include small-sample testing, nano-indentation, Raman spectroscopy, and atomic force microscopy. As noted, a data link between the CAES and the new NSUF facility will be needed. As new capability is created by the scientific community, the CAES and NSUF will be the entry point for bringing new analysis technologies to the INL.

In partnership with the NSUF, the INL is also exploring establishment of an unprecedented separate-effects irradiation capability that could provide the foundation for obtaining real-time physical data about the early dynamics of fuels, materials, and instrumentation in an environment similar to, but far less complex than, a typical reactor core and with an ability to create more controlled irradiation conditions. In addition to exploring the behavior of materials during the first few hours of irradiation, it would provide the opportunity to test in-core instrumentation before its use in ATR experiments. The proposed capability, to be offered as a user facility, would contain a number of direct line-of-sight experimental channels capable of delivering tailored neutron spectra with fast fluxes that approach $10^{12}$ $cm^2$ per second. Several location options are under consideration, including within the CAES and within existing facilities at the MFC.

The proposal results from a year-long study by INL reactor physicists. A strategic plan and functional requirements, including pre-conceptual design studies, will be completed in FY 2010, which will inform a decision on when and how this capability would be established.

## 3.4 Experimental Fuel Fabrication and Process Development

The INL has extensive metallic-fuel fabrication expertise, and the Laboratory is completing the capabilities needed for basic ceramic-fuel development. Additional capacity is needed to produce larger batch sizes of experimental ceramic fuel and develop ceramic fuel fabrication processes that use various combinations of uranium, plutonium, neptunium, americium, and potentially, thorium.

Much of the existing MFC equipment and supporting infrastructure for metal fuel development is applicable and is used for fabricating and characterizing ceramic fuels, including glovebox lines at the FMF, AL, and EML. Building on existing infrastructure to establish a fabrication capability for multiple fuel forms creates the best synergy with current characterization capabilities and eliminates increased duplication cost. The incremental cost of establishing this capability, a modification to existing facilities, is approximately $22M over 4 years.

Implementing complete capabilities for ceramic fuel fabrication involves three independent but coordinated projects: a one-to-one replacement of a glovebox and fume hood to support near-term activities; installation of a new glovebox line for powder processing, pellet pressing, sintering, and pellet encapsulation and welding into fuel pins; and installation of a glovebox support line. The support line will allow multi-function and multi-program research through flexible "plug and play architecture" that can be readily changed out, replaced, and reused. The plug and play architecture will enable extending the fabrication process to composite fuels.

In addition, the INL operates uranium glovebox lines in the FASB, primarily to develop new fuel types that will be used to convert research and test reactors from HEU to LEU fuel. The facility also supports development of fuel for other programs like prototyping of transmutation fuel fabrication processes for fuel cycle R&D. The FASB houses unique uranium fabrication capabilities such as a hot isostatic press, friction stir welding systems, rolling mills, annealing furnaces, inert welding, and uranium machining capabilities. The FASB also has a suite of instrumentation and testing equipment dedicated to characterization of fresh uranium fuel. The FASB is at capacity, and CESB is being modified to house some of the larger fuel fabrication equipment.

## 3.5 Separations and Waste Form Research

The DOE-NE approach to science-based research incorporates theory, small-scale experimentation, and modeling and simulation. Fuel cycle research focuses on addressing the challenges associated with three fuel cycle strategies – an open, modified-open, or fully closed fuel cycle.

Implementation of two of these fuel cycle strategies – modified open and fully closed– would range from some fuel conditioning to more extensive separations. This could range from conditioning of high burn-up fuel after discharge to remove fertile materials and deep burn of non-fertile materials to a fully closed fuel cycle using advanced separations technologies.

Over the last decade, DOE sponsored research on two broad categories of technologies for group separation of actinides – advanced aqueous processes and molten salt electrochemical techniques. For aqueous processes, a suite of advanced flow sheets was demonstrated at the laboratory and bench scale. Electrochemical processing is currently used to disposition fast reactor fuels and for research on group separation of actinides. Waste form R&D is also conducted in close coordination with the separations processes at bench and laboratory-scale, and in the case of electrochemical processing, at the engineering scale.

Some separations research will explore technologies that offer the potential for high payoff in terms of economics or performance, but much of it will focus on developing a science-based understanding of separations technologies. This will be accomplished through tools and models that will be developed over the next few years and validated with small-scale experiments. The specific suite of technologies explored will depend on, and must be integrated with, fuel development, as well as an understanding of potential waste form requirements. After 2020, DOE-NE expects to focus on continued development of specific technologies, including conceptual design for engineering scale-testing of operations and integrated processes – an essential step toward full-scale industrialization.

### 3.5.1 Existing Capabilities for Wet and Dry Separations

The INL has extensive research and operations experience with processing technologies at all scales. In the 1980s, the INL built and operated the only U.S. second-generation aqueous reprocessing plant, and the Laboratory has broad experience processing various used nuclear fuel types, including aluminum, zirconium, stainless steel, and graphite fuels. The INL operates engineering-scale electrochemical separations and conducts related R&D. Existing capabilities are discussed below.

#### 3.5.1.1 *Aqueous Separations*

Cold testing for aqueous systems takes place at the IRC with warm bench-scale testing at the CFA and MFC analytical lab and radiological laboratories. The DOE's progression to integrated laboratory-scale testing will require a larger hot cell facility, waste management support systems, and enhanced safeguards and security measures. The RAL at INTEC is one of the newest hot cells in the nation and retains the design features needed to house these transitioning, early development programs. It is suitable in the near term to provide radiochemistry capabilities to support laboratory scale testing and prepare for future integrated laboratory-scale testing of advanced aqueous processes. Radiochemistry capabilities are limited; the number of onsite facilities available for conducting this kind of work has shrunk from 12 to 6 over the last several years. The RAL could also serve a role in receiving experiments from ATR and parsing out samples to NSUF customers.

The INL has requested that DOE-NE ask DOE-EM to remove the facility from the D&D list (Clark and Hill 2010). It can be held in standby for minimal cost until it is needed next year to support separations, experiment disassembly, and several other projects for non-DOE-NE customers.

#### 3.5.1.2 *Electrochemical Capabilities*

The electrochemical separations process was originally designed to recycle short-cooled, high-fissile content fuel in a compact, remotely operated facility adjacent to reactors in a tightly coupled system, thereby avoiding extensive storage and off-site transportation. The process, often described as pyro-processing, uses electrochemical and metallurgical techniques at elevated temperature in the absence of water and other neutron-moderators, enabling processing of highly fissile materials without extreme dilution. The intent is recovery of uranium and group actinides, and conditioning of the fission products into stable waste forms.

Used sodium-bonded Experimental Breeder Reactor-II (EBR-II) and Fast Flux Test Facility (FFTF) fuel is currently being prepared for disposal in engineering-scale equipment installed in the FCF at the MFC, with additional waste form equipment planned for installation in the HFEF.

Three small cells are available in inert atmosphere gloveboxes for experiments with a range of materials; one in a non-radiological laboratory for investigations with surrogate materials, one in FASB for experiments with low-activity materials (i.e., depleted uranium or thorium), and a third in the HFEF for electrochemical experiments with irradiated materials. Capabilities for research beyond simple gram-scale electrochemistry, such as the other process operations in electrochemical recycling, are not available. Improving and adapting this process requires more than simple, stand-alone electrochemical experiments at the gram scale.

#### 3.5.1.3 *Transformational Technologies*

Potentially transformational technologies, as well as those applicable to a modified open fuel cycle, can generally be classified into a similar family with either aqueous or electrochemical techniques, which utilize similar facilities and equipment. Examples include carbonate-based aqueous processes, which could offer interesting advantages, and high-temperature conditioning of used fuel to drive out and capture neutron-poisoning fission products. These investigations can be performed in the existing laboratory-scale aqueous capabilities and planned laboratory-scale electrochemical capabilities.

### 3.5.2 Ten-Year End-State Capabilities

#### *3.5.2.1 Aqueous Separations*

The DOE's eventual progression to integrated laboratory-scale testing will require a larger hot cell facility such as the RAL; however, the ability to conduct integrated engineering-scale aqueous separations and waste treatment programs does not currently exist anywhere in the DOE complex. Future options for addressing this need are to build on/modify existing capabilities such as those in second-generation separations facilities at INTEC. Another option would be to establish a smaller version of the Advanced Fuel Cycle Facility (AFCF) that was previously analyzed by DOE-NE in the FY 2008 AFCF Alternatives Study (Yde et al. 2008).

INTEC offers a suite of facilities whose capabilities have been extensively evaluated. They could be brought online in a phased manner to conduct fully integrated hot bench-scale operations and then transitioned to hot-phased engineering scale, and finally fully integrated engineering scale. These operations would enable receipt, storage, and processing of full-scale fuel elements to recover the desired byproducts and the treatment of waste to conform to the acceptance criteria of the intended disposal site. The facilities are capable of supporting various stages of processing (e.g., kilograms to tens of metric tons to hundreds of metric tons of feedstock, depending on specific flow sheet). These facilities currently fall under the management of DOE-EM and are surplus to their mission; however, they are potential national assets for nuclear energy development programs. It is recommended that any decision to decontaminate and decommission the facilities be approved by the Secretary of Energy with the concurrence of the INL lead PSO, DOE-NE.

#### *3.5.2.2 Electrochemical Separations*

Strategic to the future success of the electrochemical separations technology is an ability to investigate processes and phenomena at laboratory-scale, both individually and as an integrated process, first with unirradiated materials and then with irradiated materials. This capability exists internationally but does not currently exist in the DOE complex. It is somewhat unusual that the INL possesses an operating engineering-scale facility, with significant operations and infrastructure costs, but not the laboratory-scale support structure to develop improvements. The result is that process improvements can only be investigated in the larger scale facility and are, thus, expensive and implemented only in minor increments to limit risk to operations.

A world-leading research capability in electrochemical recycling requires the capability to test the range of fundamental and applied science associated with the entire process, and the ability to validate the development of fundamental and integrated process models. This suite of tools would include laboratory-scale versions of the set of process operations in beginning-to-end integrated process testing with uranium and small quantities of transuranics. It would also include a parallel, laboratory-scale capability in a hot cell, allowing research and demonstration with used fuel and irradiated materials.

These capabilities are necessary to improve the knowledge of individual process steps and to understand the coupled, dependent effects between process operations, which are generally the dominant technical limitations. These capabilities are necessary to develop and demonstrate an adaptation to the process for aluminum-clad fuels and to develop the process modifications to recycle uranium product to the commercial market. Pre-conceptual design studies will be initiated within the next fiscal year to evaluate options for modifications needed to establish these capabilities in an existing radiological-capable location such as available rooms on the main floor of the FCF, the third floor of the HFEF, or other location.

## 3.6 Radioisotope Power Systems

The SSPSF was commissioned in 2004 by the DOE-NE for final assembly and testing of radioisotope power systems. Existing equipment pertaining to fueling and testing was transferred from the shutdown Mound Site in Ohio to the INL. With regular upgrades, this mission can continue to be supported by the SSPSF. The DOE-NE is currently evaluating how Pu-238 production can be reestablished, and Idaho is among the sites considered.

## 3.7 National and Homeland Security

The core capabilities described in Sections 3.1, 3.3, 3.4, and 3.5 also support National and Homeland Security Programs to develop nonproliferation approaches and technologies, proliferation-resistant fuel cycle processes, methods to detect and characterize nuclear and radiological materials, and responses to potential threats from weapons of mass destruction.

## 3.8 Supporting Capabilities

Advances in scientific computing over the last 40 years have made it possible to simulate scientific systems at a scale from smallest to largest, and to a much greater degree of fidelity than previously possible. Modeling and simulation is a powerful tool that can be combined with experimental data to reduce design and testing time, uncertainties associated with models, and the burden on infrastructure.

U.S. capabilities in high-performance computing are evolving rapidly, and numerous computers are available within the Laboratory to support modeling and simulation. The INL would seek access to additional, leading-edge capabilities as needed.

The INL's strategy is to continue to apply and invest in trailing-edge scientific computing capabilities, that is, computers that are among the top 100 in the world in computational speed for modeling, simulation, and visualization. For example, the INL's high performance computing center currently supports INL fuel development and other reactor development needs, including those of other national laboratories and users.

The INL also provides access to a variety of used fuel types, both commercial and DOE-owned, as well as both NRC-licensed and DOE-regulated storage configurations/systems. These capabilities make it possible to evaluate storage systems and fuel conditions after storage, and to contribute to the technical bases necessary for extended storage.

# 4. IDAHO NATIONAL LABORATORY ENABLING CAPABILITIES

The INL maintains two enabling capabilities – utilities and supporting infrastructure, and nuclear-materials management – that support mission-driven core capabilities and allow them to function most effectively and maintain their mission-related focus.

## 4.1 Utilities and Supporting Infrastructure Capabilities

INL has some facilities and supporting infrastructure that are in substandard condition because of reduced levels of prior investment and the focus on environmental cleanup over the past 20 years. These assets consist mainly of the buildings and utilities that support mission-critical facilities and core capabilities. As part of the 10-year vision, INL is committed to taking a positive approach to maintaining utilities and infrastructure, upgrading them to a mission-ready state, and extending their useful life to support the mission needs defined in the DOE-NE Roadmap. The objectives of this approach are:

- Effectively managing enduring assets
- Efficiently dispositioning non-enduring assets
- Investing in new supporting infrastructure and utilities to make new mission capabilities possible.

### 4.1.1 Enduring Assets

Enduring assets are mainly support buildings and utilities that serve the long-term needs of INL missions. The INL evaluates and prioritizes investment decisions based on the role and importance of each asset in achieving missions and on operational risk-management needs. The strategy for managing enduring assets is to:

- Sustain assets in good working order by performing regularly scheduled maintenance
- Revitalize assets so that they remain modern and relevant to mission needs
- Enhance existing assets to support expansion of existing capabilities.

### 4.1.2 Non-Enduring Assets

Non-enduring assets are buildings that are no longer needed, no longer capable of performing their intended function, or no longer economically justifiable to support current and/or future INL mission needs. The strategy for managing them is to minimize long-term cost liabilities, optimize space utilization, and reduce the overall INL footprint. The disposition process for these buildings is to:

- Close and vacate
- Declare as excess
- Demolish nonradioactively contaminated buildings
- Transfer radioactively contaminated buildings to the DOE-EM Program for final disposition.

### 4.1.3 New Infrastructure to Support New Capabilities

The INL 10-year vision includes proposals for several investments in significant new capabilities, which will affect the underlying utilities and supporting infrastructure. During the planning process, the supporting infrastructure (e.g., office and service buildings, roadways, and parking lots) and utilities (e.g., electrical substations, transformers, switches, communications and data links, and water and sewer systems) are being identified and included as part of the investment strategy.

Appendix A contains additional details on how INL plans to manage real property assets effectively, including the following:

- A capability assessment that evaluates the current conditions of the supporting infrastructure and utilities at the INL complexes, identifies the infrastructure assets needed to support the 10-year end state vision, and defines investment and implementation strategies
- A description of the maintenance strategy
- Plans for managing enduring assets, non-enduring assets, and new supporting assets.

## 4.2 Nuclear Material Management Capability

Because the availability and use of nuclear materials are fundamental to INL missions, responsible nuclear material management is essential. The INL's overall nuclear material management strategy, in summary, is to obtain/retain and make accessible materials needed to support R&D, disposition unneeded materials to reduce liabilities, and ensure all materials are safely and efficiently stored and handled.

Although the DOE is working to reduce the number of Safeguards Category I storage facilities throughout the DOE Complex, it is accepted that the INL mission requires access to a variety of SNM, as well as facilities and Safeguards and Security capabilities to store and handle Safeguards Category I quantities of SNM. These facilities and capabilities are unique assets that not only enable the INL to perform its missions, but also to attract other R&D organizations that need to use them.

The INL is also proposing to establish glovebox capabilities to disposition and treat a significant portion of its surplus unirradiated enriched uranium materials, including sodium-containing materials for reuse or recycle.

# 5. INVESTMENT STRATEGIES

Budget realities necessitate a strategy that enhances existing capabilities, builds upon existing infrastructure, and limits major new builds to those investments needed to achieve world-leading capability. The INL bases its investment strategy on a business case that recognizes the economy and efficiency of investing in existing concentrations of capabilities that are relevant to the DOE-NE mission.

The INL has developed several strategic plans that focus investments on needed DOE-NE capabilities. They are described in the *Post-Irradiation Examination Strategic Plan* (INL 2009a) and *Ceramic Fuels Strategic Plan* (INL 2009b) issued in 2009. The strategies entail building PIE and ceramic-fuel fabrication capabilities in a few smaller facilities over the next 10 years, as well as limiting the size and number of new line-item facilities proposed to round out the capabilities. The INL is also developing a strategy for the potential restart of TREAT. These strategies will enable the Laboratory to focus its investments on establishing capabilities to support the DOE-NE mission.

The INL is preparing a set of capability assessments that describe the overall strategy for developing the world-leading capabilities needed to support the NE Roadmap and INL 10-year end-state vision. These capability assessments provide detailed descriptions (i.e., current, future, and gaps), schedules, preliminary cost estimates, and implementation strategies. Table 5-1 summarizes the capability strategies and briefly describes gaps between current conditions and the world-leading capability that the INL is working to achieve.

Appendix A contains an assessment of the INL's Real Property Infrastructure, which is considered an enabling capability to accomplish the INL 10-year vision. The appendix provides a detailed description and discussion of the INL's strategy for managing utilities and supporting infrastructure capabilities, and the INL's approach to proactive sustainment of real property assets. The assessment evaluates the deferred maintenance backlog and asset condition index for the mission-critical and mission dependent buildings and other structures and facilities, and identifies the funding needed to meet the DOE goals for the asset condition index and enable the INL mission.

Figure 5-1 depicts a planning basis of $170M for the IFM Program, which includes a $20M line-item construction wedge for the IFM Program over the next 10 years with 2.5% escalation after FY 2012. It also shows how over-target funding (10% over target) would be utilized if available to meet IFM Program requirements. The IFM Program is the DOE-NE budget account established to maintain the INL infrastructure in a minimum safe condition − that is, to maintain the facilities in a condition that will support program-funded research. It provides direct funding for people, facilities, equipment, and nuclear materials necessary to enable programmatic research at the INL.

Table 5-1. Idaho National Laboratory mission-critical project and equipment acquisition strategy.

| Capabilities | Current | Future | Gaps |
|---|---|---|---|
| **Irradiation-Thermal** | **ATR** – Steady-state irradiation facilities within ATR:<br>- Static capsule<br>- Flux trap<br>- Instrumented-lead test capability. | **World-leading, Irradiation Capabilities –** Comprehensive fuels and materials irradiation utilizing a number of irradiation capabilities, including additional in-pile tubes, high-fast-to-thermal neutron ratios, and instruments capabilities extended to both simpler and more complex irradiation facilities.<br><br>Full-loop test capability with transient testing, sophisticated in-pile instrumentation. | **Reactivation of Loop 2A** – Additional resources, personnel, and material (e.g., reactor fuel) to operate and maintain new capabilities.<br><br>Additional loops that can simulate boiling-water reactor and fast reactor operating conditions (if needed).<br><br>Additional sophisticated instrumentation that can be applied to a wider variety of tests. |
| | **Plant Reliability Improvements - ATR Availability** – ATR availability at risk. | **Sustainment of ATR Reliability Through Maintaining Material Condition –** Replacement maintenance activities are ongoing. Continuous improvement through condition-based maintenance program. | **Enhancements for Improving Reliability –**<br>– Modification of the current emergency fire water injection system to provide a source of reactor-grade cooling water<br>– Perform state-of-the-art-structural analysis of the ATR primary cooling system and implement modifications as needed<br>– Install new electrical distribution system components<br>– Provide primary coolant system modifications. |
| | **Test Train Assembly Capability** – Encapsulation of test specimens, and assembly of test train components into fully instrumented test trains, including welding and brazing activities. | **World Class, Laboratory-scale, Integrated Process Irradiation Capabilities** – The ability to irradiate and analyze tests; test assembly capabilities to reconfigure tests following analysis and re-introduce into the ATR in a comprehensive process for irradiation and testing. | None at this time. |
| **Irradiation-Transient** | **TREAT** – Air-cooled, thermal, heterogeneous test facility, with a 1.2-m core height, designed to subject reactor fuels and structural materials to conditions simulating various types of transient over-power and under-cooling representative reactor situations; currently in standby mode. | **Transient Testing** – Transient testing capabilities to establish the U.S. as the world leader in nuclear fuel testing and experimentation under transient conditions: including the capability to test a variety of fuel systems in prototypic transient conditions using advanced testing and diagnostic methods. Includes full service transient experiment services, including loops for multiple test configurations and state-of the-art instrumentation and in-situ characterization. | **Operation** – Refurbish and restart TREAT systems, including HFEF support infrastructure, and R&D on advanced in-situ measurements. |

Table 5-1. Idaho National Laboratory mission-critical project and equipment acquisition strategy.

| Capabilities | Current | Future | Gaps |
|---|---|---|---|
| **Irradiation-Transient** | **HFEF** – Nuclear facility, cask receipt, front- end PIE, NDE (NRAD), size reduction, mechanical testing, and disassembly. | **World-leading, Consolidated PIE Capabilities** – Comprehensive fuel and material post-irradiation characterization and analytical capabilities, including nuclear, radiological, and non-radiological environments. | **Obtain equipment** needed to handle pre- and post-test assembly and disassembly of transient experiments in HFEF.<br>**Other PIE services**, as discussed under PIE Capability. |
| **Irradiation-Fast Spectrum** | **Fast Test Reactor** - None. | **Fast Test Reactor Capabilities** (Potential test capability). | If needed, fast test reactor capabilities. |
| **PIE** | **HFEF Nuclear Facility** – Cask receipt, experiment disassembly, non-destructive examination, size reduction for shipment to satellite facilities, and mechanical testing.<br>**EML** – Radiological characterization facility housing basic sample preparation capability and three electron-beam microscopes.<br>**AL** – Hazard Category 3 nuclear facility, chemical and isotopic analysis, and thermal characterization of irradiated and unirradiated materials.<br>**FASB** – Fuels fabrication laboratory that also houses basic characterization and testing tools.<br>**CESB** – Radiological storage warehouse.<br>**CAES** – High-end equipment for characterization of low-level and non-radioactive materials.<br>**PIE instruments** – Aging and need to be replaced. | **World-Leading, Consolidated National PIE Capabilities** – Complete macroscopic, microscopic, nano-structural, thermal, chemical, and mechanical characterization comparable to a major research university, but for use on irradiated fuels and materials. Facilities that house modern analytical equipment and allow efficient use of this equipment by a wide range of users from national laboratories, academia, NRC, and industry. | **New facilities** that are purpose-built to house sensitive analytical instrumentation are required:<br>**IMCL** – Micro and nano-scale R&D with limited mechanical testing (final location is new PIE Line item and then mechanical equipment from HFEF installed in IMCL).<br>**PIE Line-Item Building** –Expands and further consolidates advanced PIE capability. Reconfigurable facility meets DOE needs for the next 40 years.<br>**DOE-NE NSUF** – Provides front-end for the NSUF gateway. Expands CAES ability to house high-end PIE instruments that mimic capabilities at MFC, and will link to MFC facilities to allow remote analysis. Accessible to visiting researchers.<br>**FASB** – Transition to a lab-scale radiological characterization and testing laboratory.<br>**CESB** – Transition to a bench-scale radiological characterization and testing laboratory.<br>Replace old characterization equipment with state-of-the-art characterization equipment. |

Table 5-1. Idaho National Laboratory mission-critical project and equipment acquisition strategy.

| Capabilities | Current | Future | Gaps |
|---|---|---|---|
| **Nuclear Fuel Development** | **FASB** – Radiological facility, basic DU and EU metallic and dispersion fuel fabrication, and characterization at lab and bench scale (mostly plate design).<br>**FMF** – Radiological facility, basic contact-handled transuranic metallic and ceramic fuel fabrication at lab scale (pin design).<br>**AL** – Nuclear facility, interim contact-handled transuranic metallic fuel fabrication (pin design) within the casting lab glovebox.<br>**CAES** – DU ceramic fuel fabrication at lab and bench scale (in development). | **World-leading, Complete, and Consolidated Fuel Fabrication Capabilities** – Comprehensive fuel development capabilities spanning most types, scales, and hazard levels of nuclear fuel.<br>**CESB** – Fundamental process testing and fabrication of uranium fuels. | **Enriched Uranium Capability for All Fuel Types** – Consolidate and expand EU and DU comprehensive fabrication and characterization capabilities in FASB (lab scale) and CESB (bench scale) for all fuel types.<br>**Contact-handled Transuranic Ceramic and Metallic Fuel Types** – Expand FMF flexible and reconfigurable shielded glovebox capabilities to include lab and bench-scale for ceramic and metallic. Expand AL bench-scale characterization capabilities.<br>**Remote-handled and Contact-handled Transuranic Ceramic and Metallic Fuel Types** – Hot cells with capabilities to remotely fabricate and characterize ceramic and metallic fuels at lab and bench scale, including the capability to refabricate fuel specimens for continued irradiation experiments.<br>**Remote-handled and Contact-handled Transuranic Ceramic and Metallic Fuel Types** – Hot cells with capabilities to remotely fabricate and characterize ceramic and metallic fuels at engineering and lead test assemblies. |
| **Separations/ Waste Form** | **Electrochemical Processing** –<br>**FCF (engineering scale separations)** – First generation electrochemical equipment for treatment of used sodium-bonded EBR-II and FFTF fuel.<br>**HFEF (up to production-scale waste form research)** – Metal waste form equipment and some ceramic waste form equipment for treatment of used sodium-bonded fuel.<br>**TREAT Warehouse** – Recovered uranium product is currently stored pending resolution of issues related to return to commercial uranium market. | **Complete Treatment Capability for Multiple Fuel Types** – The ability to completely disposition used EBR-II and FFTF fuel, as well as the ability to disposition limited quantities of other fuel types–such as small quantities of fuel brought in for PIE and other programs. The ability to return recovered uranium to the commercial market is also a key future capability.<br>**Electrochemical** – To support R&D, laboratory-scale capabilities within a hot cell will be needed in the future to study adaptations to the process. Acceleration of EBR-II treatment will allow greater utilization of FCF capabilities. | **Ceramic Waste Form Equipment** – Installation of ceramic waste form equipment for disposition of halide- and oxide-based wastes.<br>**Electrochemical Technology Development Capabilities** – Additional warm and hot laboratory scale testing capabilities are needed within the next 10 years for research on new fuel types and adapting the operating engineering-scale process to new missions and fuel cycles.<br>**Improved Uranium Product** – Modifications to the existing process equipment are necessary to achieve form and purity required for commercial uranium market. |

Table 5-1. Idaho National Laboratory mission-critical project and equipment acquisition strategy.

| Capabilities | Current | Future | Gaps |
|---|---|---|---|
| **Separations/ Waste Form** | **Electrochemical Technology Development** –<br><br>**HFEF** – Single, small electrochemical cell with limited access.<br><br>**FASB** – Single, small electrochemical cell for radiological testing with limited quantities of radioactive materials.<br><br>**Engineering Development Laboratory** – Single, small electrochemical cell for nonradioactive surrogates. | **World Class, Laboratory-Scale, Integrated Process Test Capabilities** – The ability to test the complete electrochemical recycling process for optimized fuel cycles, comparable to capabilities in other nations. The capability to support testing of recycling additional types of used fuel, in collaboration with fuels research and PIE, as well as NNSA and safeguards programmatic objectives. | **Radiological Integrated Testing Laboratory** – Ability to test integrated full recycle loop with depleted uranium or thorium and limited quantities of other radioactive materials.<br><br>**Irradiated Integrated Testing Capability** – Ability to test integrated full recycle loop with irradiated materials. |
| | **Aqueous Processing** –<br><br>Cold Testing at **AL** and **Radiochemistry Laboratory, REC**, and **CAES.** | **Aqueous Capabilities** – Expanded laboratory and engineering (if needed) scale via nuclear facilities dedicated to separations and waste form science. | **Shielded wet chemistry capability** at bench scale and engineering scale, using RAL for expanded hot bench scale and early transition to initial engineering scale that could continue to expand in a phased manner via CPP-666 and CPP-691 at INTEC. The RAL will also be used for separations research when it comes online in 2012. |
| **Nuclear Energy Science & Technology Gateway** | **CAES** – Provides office space and laboratory space for visiting scientists with primary focus on the Idaho universities. | **World-leading Nuclear Technology R&D Capabilities** – Comprehensive fuel and material characterization and analytical capabilities, including nuclear, radiological, and non-radiological environments. Unique facilities for conducting nuclear physics experiments. Space for high-energy experiments.<br><br>**Gateway for Visitors** – Portal for hosting visitors, providing space for collaboration, analyzing nonradioactive and lightly radioactive materials, and conducting nuclear physics measurements. | **NSUF Building** – High-end PIE instruments that parallel capabilities at MFC; add unique space for nuclear physics and high-energy experiments; accessible to visiting researchers. Collaboration space. |
| **Infrastructure Revitalization and Enhancements** | Ongoing as funding is available. | Focused and prioritized to support the above capability strategies. | Revitalization strategy focused on supporting above capabilities. |

Table 5-1. Idaho National Laboratory mission-critical project and equipment acquisition strategy.

| Capabilities | Current | Future | Gaps |
|---|---|---|---|

*AL = Analytical Laboratory*
*ATR = Advanced Test Reactor*
*CAES = Center for Advanced Energy Studies*
*CESB = Contaminated Equipment Storage Building*
*DOE = Department of Energy*
*DU = depleted uranium*
*EBR-II = Experimental Breeder Reactor-II*
*EML = Electron Microscopy Laboratory*
*EU = enriched uranium*
*FASB = Fuels and Applied Science Building*
*FCF = Fuel Conditioning Facility*
*FFTF = Fast Flux Test Facility*
*FMF = Fuel Manufacturing Facility*
*HFEF = Hot Fuel Examination Facility*
*IMCL = Irradiated Materials Characterization Laboratory*
*INL = Idaho National Laboratory*
*INTEC = Idaho Nuclear Technology and Engineering Center*
*MFC = Materials and Fuels Complex*
*NDE = nondestructive examination*
*NNSA = National Nuclear Security Administration*
*NRAD = Neutron Radiography Reactor*
*NRC = Nuclear Regulatory Commission*
*NSUF = National Scientific User Facility*
*PIE = post-irradiation examination*
*R&D = research and development*
*RAL = Remote Analytical Laboratory*
*REC = Research and Education Campus*
*TREAT = Transient Reactor Experiment and Test Facility*

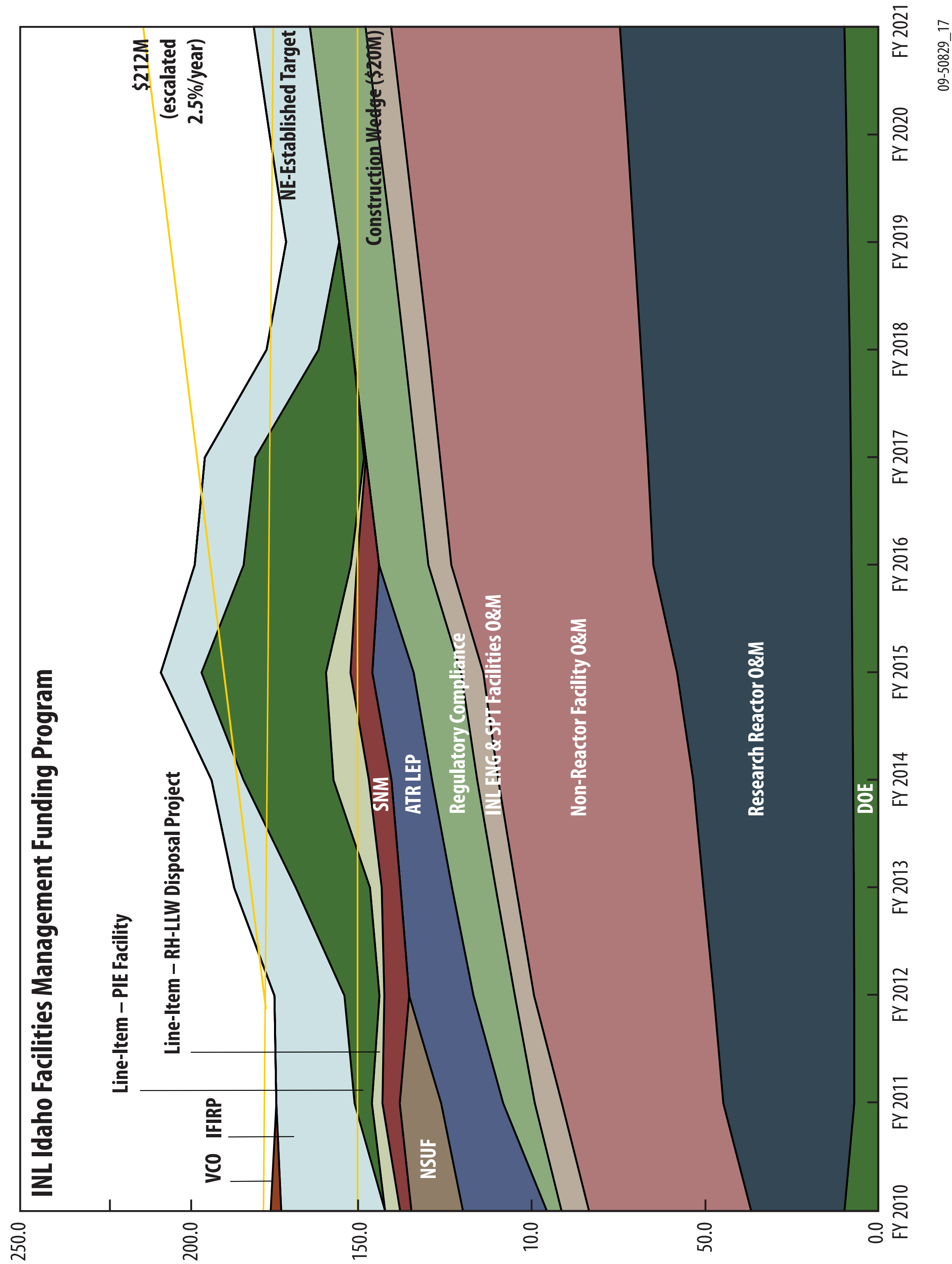



*Figure 5-1. Idaho Facilities Management base operations target and target plus 10% budget request.*

The IFM Program base operations include the following essential functions:

- **Research Reactor Operations and Maintenance** – ATR reactor operations to maintain compliant operations and provide maintenance and technical support for the ATR reactor and support facilities, compliance-level readiness of NRAD, and compliant state of standby of TREAT.
- **Non-Reactor Facility Operations and Maintenance** – MFC compliance-level operations and maintenance within the MFC nuclear facilities (excluding TREAT and NRAD).
- **INL Engineering and Support Facility Operation and Maintenance** – Site-wide compliance-level base operations, and IFM Program and project planning and support.
- **Regulatory Compliance** – Regulatory compliance and disposition of DOE-NE newly generated and legacy waste at all INL facilities.
- **ATR LEP and Safety Margin Improvement** – ATR LEP and Safety Margin Improvement Program execution.
- **NSUF –** To promote the use of INL nuclear facilities for active collaboration in relevant nuclear science research. In the future, this program is assumed to shift to another DOE-NE account (the total estimated cost over 10 years is $336M).
- **SNM –** Management and operations supporting nuclear material management and disposition.
- **Line Item Construction Projects** – Other project costs, such as advanced planning.
- **General Purpose Capital Equipment.**
- **Idaho Facility Infrastructure Revitalization Program** – A modest facility and infrastructure revitalization program, consisting mainly of General Plant Projects.
- **Voluntary Consent Order** – Provide funding to DOE-EM Idaho Cleanup Project for the ATR Complex environmental removal actions.

The majority of the IFM base operations budget is required for continued safe nuclear operations, leaving less discretionary funding for upgrades and new starts. As such, the current IFM target budget is not sufficient to fund the desired new end-state capabilities, which are essential to fulfilling the DOE-NE Roadmap goals and the INL 10-year vision.

Table 5-2 shows the preliminary cost estimates (rough order of magnitude) for the new core and enabling capabilities that are not contained within the IFM target funding profile ($170M). The INL will continue to work with DOE to explore funding options to meet these needs (e.g., program-specific, indirect funding, and partnerships). Table 5-2 does not include funding needed to revitalize the underlying infrastructure or potential increases in cost for minimum safe operations. Finally, Figure 5-2 provides a proposed timeline for establishing the new end-state core capabilities.

Table 5-2. Core and enabling capabilities needed to support the Idaho National Laboratory 10-year end-state vision.

| New Core and Enabling Capabilities | Preliminary 10-Year Cost Estimate ($M) |
|---|---|
| Thermal Irradiation – ATR Enhancements | |
| Capability Enhancements | 178 |
| Life Extension Program/Safety Margin Improvement/Replacement Maintenance | 195 |
| Transient Irradiation – TREAT Restart | |
| Restart TREAT | 66 |
| TREAT Operations | 45 |
| Fresh Fuels Characterization and PIE[a] | 227 |
| Experimental Fuel Fabrication and Process Development | 75 |
| Separations and Waste Form Research | 24 |
| Nuclear Materials Management | |
| Materials Disposition and Consolidation | 142 |
| Legacy Sodium-Bonded Spent Fuel Treatment | 306 |
| Infrastructure Sustainment and Revitalization | 180 |
| **Total** | **1,438** |

*a. Does not include the PIE Line Item.*

*PIE = Post-Irradiation Examination*

*TREAT = Transient Reactor Experiment and Test Facility*

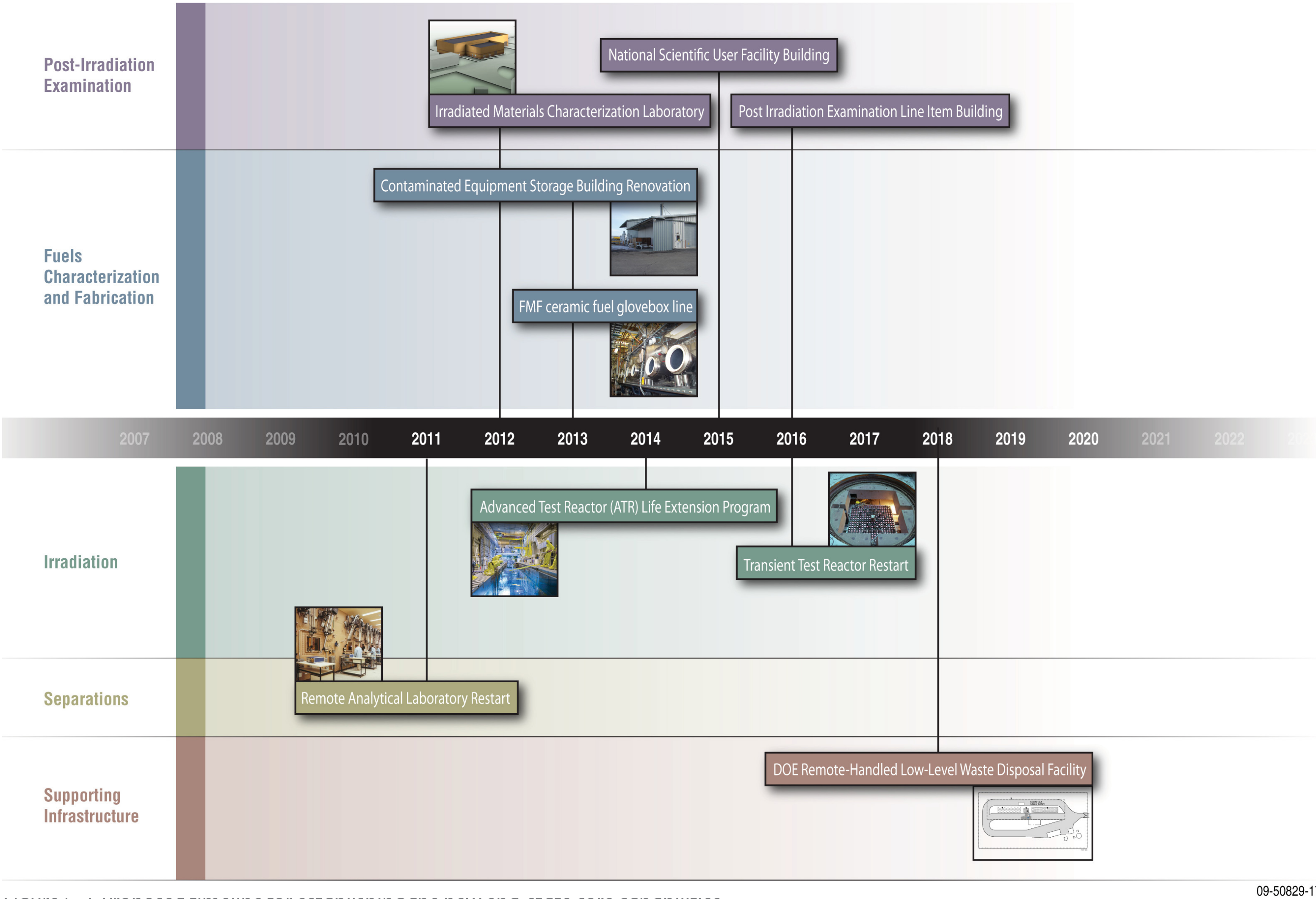



Figure 5-2. Proposed timeline for establishing the new end-state core capabilities.

# 6. CONCLUSION

The INL TYSP provides the 10-year vision for investment in INL core capabilities and supporting infrastructure. The end-state vision for the Laboratory can be summarized as follows:

- **INL is DOE-NE's national nuclear capability.** The INL's world-leading core capabilities provide the majority of DOE's unique nuclear R&D capabilities and are viewed as a shared national resource.
- **INL is the DOE-NE NSUF.** The INL serves as DOE-NE's user facility and provides access to the broad nuclear energy R&D enterprise, which includes universities, industry, national laboratories, international research organizations, and other federal agencies.
- **INL is a multi-program laboratory.** Core capabilities are used for government and private sector customers in nuclear energy, national and homeland security, and energy and environmental research.

The strategy and details outlined in this plan are based on a laboratory-wide analysis linking missions to existing capabilities, needed capabilities, and recommended approaches to filling the gaps. As depicted in Figure 6-1, significant progress occurred over the last 5 years implementing the vision. In the next decade, the INL will continue to develop advanced tools and instruments, replace retiring equipment and instrumentation, and upgrade existing systems, including, for example, the utility services at the MFC.

The appendices to the TYSP provide additional detail on the prioritization of capital projects and equipment needed to sustain existing capabilities and bring new capabilities online, as follows:

- **Appendix A**, **Real Property Asset Management,** is an assessment of the INL's real property infrastructure, considered an enabling capability to accomplish the INL 10-year vision. This appendix provides a detailed description and discussion of INL's strategy for managing utilities and supporting infrastructure capabilities, and INL's approach to proactive sustainment of real property assets.

  The assessment evaluates the deferred maintenance backlog, replacement plant value, and asset condition index for the mission-critical and mission-dependent buildings and other structures and facilities, and identifies the funding needed to meet the DOE goals for asset condition index and enable the INL mission. The appendix describes and discusses the INL real property inventory, asset and space utilization, and facility leasing.

- **Appendix B**, **Prioritized Resource Needs,** contains the prioritized lists of direct-funded General Plant Projects, Operating Funded Projects, and General Purpose Capital Equipment for the current and subsequent 10 fiscal years. These lists are developed each year using a systematic criteria definition and prioritization process.

  For the first time, the INL also initiated a process for developing and analyzing lists of indirect-funded Institutional General Purpose Capital Equipment and program-funded capital projects and equipment for the current and two subsequent fiscal years. The INL is currently in the process of developing an indirect-funded Institutional General Plant Projects program and anticipates implementing an approved program by October 2010. As such, there are no identified Institutional General Plant Projects. Appendix B also contains a section on the INL Facility Disposition Plan that discusses INL's Footprint Reduction Plan and provides a detailed list of the facilities that are being deactivated, demolished, or transferred.

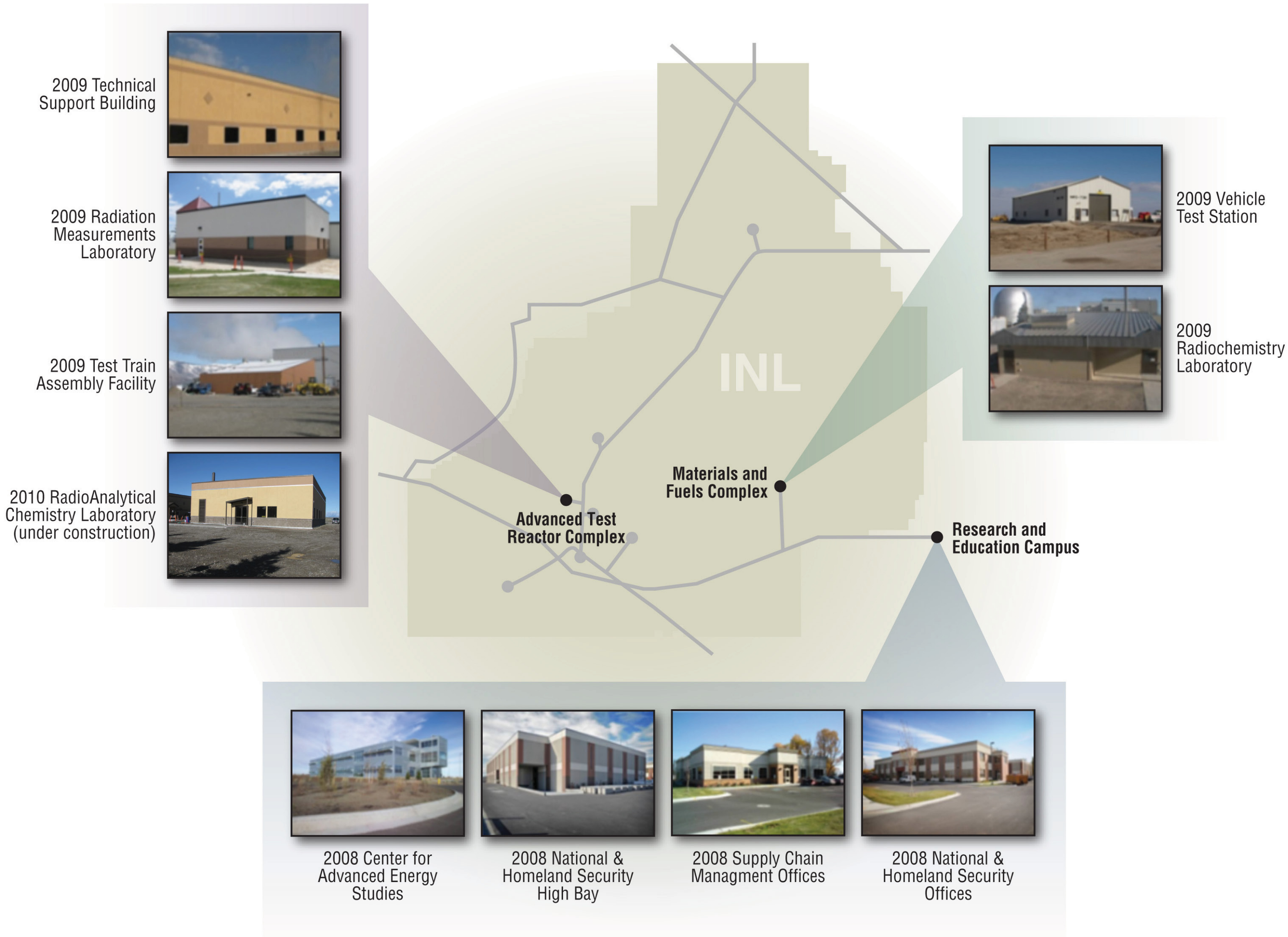



*Figure 6-1. Recent progress and accomplishments at the Idaho National Laboratory.*

09-GA50829-10

- **Appendix C**, **Cognizant Secretarial Offices (CSOs), Program Secretarial Offices (PSOs), and Non-DOE Site Programs,** identifies the other tenant organizations that reside at the INL and describes the facilities they occupy and/or the work they perform. The tenants include the DOE-EM-funded projects such as the Idaho Cleanup Project and the Advanced Mixed Waste Treatment Project, the Office of Naval Reactors-funded NRF, and the DOD-funded SMC Project. The Idaho Cleanup Project provided their tenant-specific TYSP, which is included in this appendix in its entirety.

- **Appendix D, Sustainability Program,** provides an overview of the INL Sustainability Program strategy and goals and discusses implementation of the sustainability requirements and INL's Executable Plan. It also provides a gap analysis of INL's progress toward meeting sustainability goals contained in Executive Order 13514.

# 7. REFERENCES

Clark, Art and Dave Hill, 2010, letter to Dennis Miotla (Interim Manager, DOE-ID), “Need for RAL as Part of the INL Facilities,” March 2, 2010.

DOE, 1995, *Settlement Agreement*, U. S. Department of Energy, Environmental Management; U.S. Department of the Navy, Naval Nuclear Propulsion Program; and the State of Idaho, October 17, 1995.

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

DOE-NE, 2009, “Facilities for the Future of Nuclear Energy Research: A Twenty-Year Outlook (Draft),” Department of Energy Office of Nuclear Energy, February 2009.

DOE Order 430.2B, *Departmental Energy, Renewable Energy, and Transportation Management*, U.S. Department of Energy, February 2008.

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, October 2009.

INL, 2009a, *Consolidated World-Class Post-Irradiation Strategic Plan*, INL/EXT-09-16831, Idaho National Laboratory, September 2009.

INL, 2009b, *World-Class Fuel Research and Development Capability Strategic Plan*, INL/EXT-09-16832, Idaho National Laboratory, September 2009.

NAS, 2008, “Review of DOE’s Nuclear Energy Research and Development Program,” Committee on Review of DOE’s Nuclear Energy Research and Development Program, Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences, National Research Council of the National Academies, 2008, page 7.

NIPP, 2009, DHS National Infrastructure Protection Plan.

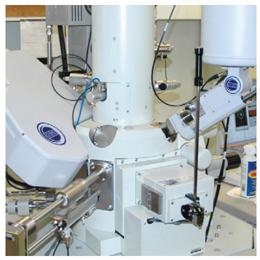
PL 109-58, “Energy Policy Act of 2005,” *Public Law*.

PLN-3128, 2009, “*Mission Need Statement for the Irradiated Materials Characterization Laboratory*,” IS 09-025, Rev. 0, April 2009.

Yde, E., P. Schwab, A. Griffith, 2008, *Evaluation of Existing Department of Energy Facilities to Support the Advanced Fuel Cycle Mission*, September 30, 2008 (GNEP-AFCF-PMO-AI-EA-2008-000271, Rev. 0).

# APPENDIX A






## Real Property Asset Management

# CONTENTS



## Figures



## Tables

## Lists

## ACRONYMS

| | |
|---|---|
| ACI | Asset Condition Index |
| ATR | Advanced Test Reactor |
| AUI | asset utilization index |
| BEA | Battelle Energy Alliance |
| CFA | Central Facilities Area |
| CITRC | Critical Infrastructure Test Range Complex |
| DM | deferred maintenance |
| DOE | Department of Energy |
| DOE-ID | Department of Energy Idaho Operations Office |
| DOE-NE | Department of Energy Office of Nuclear Energy |
| FCF | Fuel Conditioning Facility |
| FIMS | Facility Information Management System |
| FY | fiscal year |
| HFEF | Hot Fuel Examination Facility |
| IFM | Idaho Facilities Management |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| MC | mission critical (One of three FIMS Mission Dependency categories) |
| MD | mission dependent, not critical (One of three FIMS Mission Dependency categories) |
| MFC | Materials and Fuels Complex |
| NRF | Naval Reactors Facility |
| OSF | other structure and facility (One of the four FIMS categories of real property) |
| PIE | post-irradiation examination |
| R&D | research and development |
| REC | Research and Education Campus |
| RPV | replacement plant value |
| RWMC | Radioactive Waste Management Complex |
| SMC | Specific Manufacturing Capability |
| TAN | Test Area North |
| TYSP | Ten-Year Site Plan |

# APPENDIX A
# REAL PROPERTY ASSET MANAGEMENT

## A-1 ASSESSMENT OF INL REAL PROPERTY INFRASTRUCTURE

### A-1.1 Strategy for Management of Utilities and Supporting Infrastructure Capabilities

Idaho National Laboratory (INL) real property infrastructure includes 289 Department of Energy (DOE) owned and operating buildings[1] totaling 2.3 million ft$^2$. The INL infrastructure also includes 241 other structures and facilities (OSFs), which are real property assets that are not operating buildings such as bridges, communications towers, roads, fences, and site utility systems that are used to generate or distribute any services such as heat, electricity, sewage, gas, and water.

Like other DOE sites, the INL has many facilities and supporting infrastructure that have suffered from a lack of revitalization investment over the last few decades. As a result, the INL focused maintenance dollars on routine preventive/predictive maintenance and reactive corrective maintenance/repair when equipment failures occurred. Proactive replacement of equipment at the optimum time to balance maintenance cost with equipment reliability was generally not a component of the INL's maintenance strategy.

As part of the 10-year vision for maintenance, INL is committed to implementing a proactive, mission-driven, and risk-based approach to ensure that mission-supporting infrastructure is maintained in a mission-ready state. The maintenance strategy is focused on (1) maximizing asset service life, (2) revitalizing assets at the optimum time in their life cycle, and (3) upgrading assets to support the mission needs of the research and development (R&D) programs.

Supporting infrastructure consists primarily of buildings, including equipment (e.g., telecommunications; heating, ventilation, and air conditioning; and lighting) and utilities (e.g., electrical power distribution, sewer, water, and emergency utilities) that support the laboratory's core R&D capabilities and mission critical facilities. The key elements of the INL's real property management strategy, which are discussed in detail below, are:

- Effective management of enduring assets
- Efficient and timely disposition of non-enduring assets
- Investment in new supporting infrastructure, equipment, and utilities to continue to reliably support current missions and make new mission capabilities possible.

#### A-1.1.1 Enduring Assets

Enduring assets are mainly support buildings and utilities that serve the long-term needs of INL missions. The INL applies a risk-based approach to evaluate and prioritize investments based on the role and importance of each asset in achieving INL missions. Also critical to successful and efficient implementation of this approach is the application of engineering and facility management principles toward assuring a full understanding and mitigation of the risk that an unplanned equipment failure could have on worker safety, environmental protection, and mission accomplishment. The strategy for managing enduring assets is to:

---

[1] *The term "Operating Buildings" includes all buildings and trailers that have a FIMS status of operating or operational standby. Unless indicated otherwise, reference to "Buildings" should be understood to include trailer assets, and the term "Operating" should be understood to include operational standby assets.*

- **Sustain** assets in good working order by performing periodic condition assessments, regularly scheduled preventive/predictive maintenance, and timely repair if an unexpected failure occurs
- **Revitalize** assets so that they remain reliable, modern, cost-effective to operate and maintain throughout their life cycle, and relevant to mission needs
- **Enhance** existing assets to support expansion of existing, and development of new capabilities.

#### A-1.1.2 Non-Enduring Assets

Non-enduring assets are primarily buildings that are no longer needed, no longer capable of performing their intended function, or no longer economically justifiable to support current and/or future INL mission needs. The strategy for managing non-enduring assets is to minimize long-term cost liabilities, optimize space utilization, and reduce the overall INL footprint. The process for disposition of these buildings is comprised of the following:

- Declare non-enduring assets as excess
- Vacate the asset, stabilize hazards and hazardous materials, and take steps to minimize the risk and cost of long-term stewardship activities
- Control access and monitor the asset for degradation and/or changing hazardous conditions
- Demolish non-radioactively contaminated buildings
- Transfer radioactively contaminated buildings to the Department of Energy Office of Environmental Management Program for final disposition.

INL's plans for disposition of non-enduring assets are discussed in detail in Appendix B, Section B-3.

#### A-1.1.3 New Infrastructure to Support New Capabilities

This Ten-Year Site Plan (TYSP) identifies the new mission-driven capabilities that will accomplish the INL 10-year vision and the supporting infrastructure resources required to enable the new capabilities. For example, new world-leading post-irradiation examination (PIE) capabilities will require revitalization and expansion of the underlying utilities (e.g., electrical supply and data transmission) and supporting infrastructure (e.g., expanded laboratory and office space).

As part of the overall strategic planning process, the costs for both the new capabilities and the supporting infrastructure need to be included in the investment strategy. Once the capability and supporting infrastructure needs are defined and cost-estimated, the resulting equipment and project funding requests will be submitted into the budget planning process, and listed in Appendix B, Prioritized Resource Needs.

### A-1.2 Implementation of Proactive Sustainment Approach for INL Real Property Assets

#### A-1.2.1 Current Maintenance Strategy

The INL maintenance approach has historically been limited to:

- The application of time-based preventive maintenance activities designed to maximize the service life of real property and included equipment
- Reactive corrective maintenance to restore failed equipment to service in a timely manner.

#### A-1.2.2 Proactive Sustainment

The preferred maintenance strategy is a more proactive approach that replaces aging equipment based on actual condition degradation information. This approach applies the results of condition monitoring and assessment activities to provide actual condition information to adjust the industry-based remaining service life projections tracked by a maintenance forecasting tool such as the Whitestone Research MARS tool used by the INL. Application of a proactive maintenance strategy reduces the risk of unplanned failure; allows elimination of costly, intrusive, and ineffective reactive maintenance; and reduces life-cycle costs by forecasting replacement of equipment before incurring the high cost of repeated corrective maintenance required to keep worn out equipment running.

The INL began developing plans and processes for implementing a proactive maintenance strategy in 2009, and these efforts continue in 2010. Current implementation efforts are focused on INL mission critical (MC) and mission dependent, not critical (MD) buildings and:

- Developing strategies to segregate equipment that can be run to failure from the equipment that should be proactively replaced
- Refining the cost factors and estimating models used to provide planning estimates for forecasting the cost of proactive replacement activities
- Understanding the impact to maintenance, project, and construction management staffing levels of implementation of proactive sustainment
- Quantifying the annual cost of maintenance under a proactive sustainment approach for planning future budgets.

The current estimate for executing proactive sustainment for INL MC and MD buildings is approximately $20M annually, $10M each for direct- and indirect-funded buildings. Some portion of this would come from existing budgets. However, it is projected that the early years of implementation, before the reduction in reactive corrective maintenance cost expected due to replacement of more and more old equipment is fully realized, will require increases in maintenance funding.

Sustainment planning for INL OSF assets is currently limited by the lack of sustainment models, the need for OSF system definition, and the need to populate the Whitestone MARS tool with OSF component inventory. However, development of multi-year plans for sustainment of INL primary roads is underway.

### A-1.3 Infrastructure Capability Assessment

#### A-1.3.1 Assessment Approach

This infrastructure capability assessment takes a broader and deeper approach than previous assessments by analyzing not only the average Asset Condition Index (ACI)[2] for all groups of assets but also the ACI for individual, high priority assets. Shifting the focus to individual asset level ACI more clearly identifies asset condition issues and facilitates identification and targeting specific, high priority infrastructure areas that need improvement. This approach also includes an analysis of data quality with specific emphasis on deferred maintenance (DM) and replacement plant value (RPV), which are the underlying Facility Information Management System (FIMS) data elements that determine the ACI.

[2] *Asset Condition Index is the standard indicator of asset condition used by the Federal Real Property Council and DOE FIMS. It is equal to 1 minus the ratio of DM to RPV.*

**INL Building ACI Summary**

*The average ACI for INL buildings exceeds the ACI goal of 0.95, and is trending toward a slight positive increase.*

An important component of this assessment is the bottom-up review of the FIMS mission dependency classification for each of the 530 operating INL real property assets. This review was conducted by a joint Battelle Energy Alliance (BEA)/ Department of Energy Idaho Operations Office (DOE-ID) working group, including involvement of INL R&D program staff. The review resulted in the reclassification of 289 assets and a 67% reduction in the total number of assets classified as MC. The recommended asset classification list was submitted to DOE-NE for approval. The results of this assessment are based on INL's recommended asset classification list. The INL will continue to work with DOE-ID and DOE-NE to further establish the set of mission critical facilities.

### A-1.3.2 Assessment Results

The following assessment results represent the current condition of INL infrastructure; they are based on the DM and RPV data currently available in the FIMS database. Using the results of this assessment, INL and DOE-NE will jointly develop an overall strategy for managing the INL's real property assets. Initial steps toward defining this strategy will include revising the MC Building and OSF lists to reflect mission needs, and improving the DM and RPV data. Once these initial steps are completed, INL will develop a maintenance strategy that is linked to mission dependency and supports the site missions.

Section A-1.4 discusses opportunities for improving the data quality that were identified during the assessment.

### A-1.3.3 Total INL MC and MD Buildings[3]

Of the 530 operating INL property assets, 352 are MC or MD. On average, the ACI for MC and MD building assets has historically met or exceeded the ACI goal of 0.95 or better (0.95 = "GOOD" FIMS Summary Condition). However, as shown in the three columns on the right in Table A-1.1, analysis of ACI at the individual asset level shows 55 (29%) of the 190 MC/MD buildings have ACIs below the 0.95 goal. This total includes 15 (28%) of the 53 MC buildings that have ACIs below the 0.95 goal. For example, the ACI for the Fuel Conditioning Facility (FCF), a 51,000-ft$^2$ MC nuclear facility at the Materials and Fuels Complex (MFC), is 0.86, with a DM backlog of $8.4M against a $59M RPV.

As part of the ongoing maintenance planning process, the INL is evaluating the DM backlog for MC and MD buildings and prioritizing the planned DM reduction activities based on risk to worker safety, environmental protection, and mission accomplishment. DM reduction needs to be accompanied by investment in proactive sustainment to prevent the creation of new DM, which would reduce the impact of reduction investments.

Infrastructure maintenance at the INL is generally divided into three categories/funding sources: (1) nuclear facility maintenance (Idaho Facilities Management [IFM] Program direct funding), (2) non-nuclear facility maintenance (INL indirect funding), and (3) Specific Manufacturing Capability (SMC) facility maintenance (Army direct funding). The following three sections address the assessment results for each of the infrastructure maintenance categories/funding sources.

[3] *ACI statistics and related data for buildings and OSFs categorized as not mission dependent are not included in this assessment report but are available on request.*

#### A-1.3.3.1 IFM Program Direct-Funded MC and MD Buildings

Table A-1.1 shows the average ACI is 0.96 for IFM Program direct-funded MC/MD buildings. It also indicates that 15 (33%) of the 45 IFM-funded MC/MD buildings have ACIs that are less than the 0.95 goal.

#### A-1.3.3.2 SMC Direct-Funded MC and MD Buildings

The average ACI is 1.00 for SMC direct-funded MC/MD buildings. The ACI for all individual buildings exceeds the ACI goal because of ongoing maintenance investments. Only $600K of DM is reported against the $151M of RPV for the 10 MC/MD SMC buildings.

#### A-1.3.3.3 Indirect-Funded MC and MD Buildings

Table A-1.1 shows the average ACI is 0.95 for indirect-funded MC/MD buildings. It also indicates that 40 (30%) of the 135 indirect-funded MC/MD buildings have ACIs that are less than the goal of 0.95.

### A-1.3.4 INL MC and MD OSFs

Table A-1.1 shows the average ACI is 0.81 for INL MC/MD OSFs. It also indicates that 38 (23%) of the 162 MC/MD OSFs have ACIs that are less than the goal of 0.95. The INL is evaluating the DM backlog for MC and MD OSFs and prioritizing the planned DM reduction activities based on overall risk reduction, in addition to investment in proactive sustainment to prevent further growth of DM. The INL plans to use a risk-based portfolio approach to proactively manage the overall reduction of deferred maintenance backlog and improvement in ACI.

Table A-1.1. Idaho National Laboratory buildings Asset Condition Index.

| Operating and Operational Standby Buildings | # of Assets | $SF_{Gross}$ (ksf) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | # of MC Bldgs < $ACI_{Goal}$ | # of MD Bldgs < $ACI_{Goal}$ |
|---|---|---|---|---|---|---|---|---|
| All MC and MD Buildings | 190 | 1,864 | 40 | 989 | 0.96 | 55 | 15 | 40 |
| IFM Funded | 45 | 446 | 18 | 418 | 0.96 | 15 | 8 | 7 |
| SMC Funded | 10 | 311 | 0.6 | 151 | 1.00 | 0 | 0 | 0 |
| Indirect Funded | 135 | 1,107 | 21 | 421 | 0.95 | 40 | 7 | 33 |
| All MC and MD OSFs | 162 | | 95 | 502 | 0.81 | 38 | 11 | 27 |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*IFM = Idaho Facilities Management*
*MC = mission critical*
*MD = mission dependent*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*
*SMC = Specific Manufacturing Capability*

## A-1.4 Asset Condition Data Opportunities for Improvement

The following sections discuss opportunities for improving the INL DM and RPV data that were identified during the preparation of this TYSP.

### A-1.4.1 RPV Improvements

#### *A-1.4.1.1 Building RPV*

Review of FIMS RPV, DM, and annual actual maintenance cost data has identified 16 assets that have ACIs that are less than 0.50, and annual actual maintenance costs that exceed 50% of the asset RPV. These assets are candidates for closer review of the asset RPV and DM as well as maintenance activities that are being charged against the asset. If determined necessary, engineering and cost estimator resources will need to adjust the FIMS models or generate new RPV estimates using estimating techniques authorized by FIMS requirements.

Reviews of the equipment and materials that make up the FIMS RPV models for hot cell buildings found them lacking in components related to thick concrete walls, hot cell windows, manipulators, and atmosphere control equipment associated with the MFC hot cell buildings (e.g., Hot Fuel Examination Facility [HFEF] and the FCF).

The RPV site factor calculation for the INL is more than 6 years old and should be updated.

#### *A-1.4.1.2 OSF RPV*

Review of asset level OSF ACI has identified 23 MC and MD OSFs that have ACIs less than 0.75, including eight OSFs that have negative ACIs caused when DM inventory exceeds the asset RPV. The DM and RPV for these assets are candidates for a closer review. This condition exists partially because FIMS does not provide RPV models for OSFs like those provided for buildings. Although RPV estimation methods that are authorized within FIMS requirements were used to estimate OSF RPVs, the OSF information used may not have been complete enough to result in an RPV that represents the entire asset.

#### *A-1.4.1.3 Plans to Improve RPV Data*

The INL is developing a resource-loaded improvement plan by the end of Calendar Year 2010 to further refine the data associated with building and OSF RPVs. This plan will focus on MC and MD assets and include:

- Further investigating FIMS data and FIMS RPV model assignment to confirm RPV data
- Training INL estimators on the use of the CostWorks software, which is approved and specifically designed for modification of FIMS RPV models and generation of unique RPVs
- Continuing current efforts to (1) compile accurate equipment inventories and descriptions for INL OSFs, (2) improve system inventories that can be used to improve the accuracy of OSF RPVs, (3) improve the likelihood that maintenance charges will be captured against the correct asset, and (4) identify appropriate condition assessment strategies, methods, and tools to improve condition information and DM inventory for INL OSFs.

### A-1.4.2 DM Data Improvement

#### *A-1.4.2.1 Classification of Maintenance Activities as DM*

Recent review of the DM activities reported against INL assets indicates that some replacement maintenance for equipment is being classified as DM. For example, a $117K activity for removal of an abandoned steam system in a MC facility was reported as DM. Removing this activity from the DM inventory will restore the ACI for this asset to above the ACI goal.

#### *A-1.4.2.2 OSF Deferred Maintenance Includes Large Capital Replacement Projects*

A review of the DM associated with OSFs identified that $91M (96%) of the $95M of DM reported against MC and MD OSFs is only associated with 18 (11%) of the 162 MC and MD OSFs. Additionally, these 18 OSFs account for only $254M (51%) of the $502M in MC and MD OSF RPVs. This concentration of DM against only 51% of the applicable RPV significantly distorts the average ACI statistics for OSFs. Investigation of this situation determined that the large DM against so few assets is largely the result of incorrectly including the total estimated cost of capital projects to replace and upgrade eight utility systems as DM.

#### *A-1.4.2.3 Plans to Improve DM Data*

In the fall of 2009, INL identified that the DM being reported against the nuclear facilities at the MFC did not include all DM activities.

This situation necessitates a review of the maintenance requirements for INL building and OSF. This review will be initiated in the fourth quarter of FY 2010 and is expected to result in a more accurate depiction of DM. Independent but knowledgeable BEA and DOE-ID staff will be recruited to provide oversight of this review to assure that any reduction in DM is truly justified by actual asset condition. The corrected DM inventory will be entered into the FIMS during the 2010 FIMS DM annual update cycle that will be completed by September 30, 2010.

## A-1.5 Detailed ACI and Infrastructure Condition Information Tables

### A-1.5.1 All Infrastructure

**Buildings:** The average ACI for the 190 INL MC and MD buildings (0.96) is better than the ACI goal (0.95) (see Table A-1.2).

**OSFs:** The average ACI for the 162 INL MC and MD OSFs (0.81) is below the ACI goal (0.95) (see Table A-1.2). The uncertainties associated with OSF ACI data discussed in Section A-1.4.1 should be considered when reviewing this data.

### A-1.5.2 All IFM Program-Funded Infrastructure

**Buildings:** The average ACI for the 45 IFM Program-funded MC and MD buildings (0.96) is better than the ACI goal (0.95) (see Table A-1.3). However, eight MC and seven MD buildings have sufficient DM backlog to drive their ACI below the ACI goal.

**OSFs:** The average ACI for the 36 IFM Program-funded INL MC and MD OSFs (0.66) is below the ACI goal (0.95) (see Table A-1.3). The uncertainties associated with OSF ACI data discussed in Section A-1.4.1 should be considered when reviewing this data.

### A-1.5.3 ATR Complex, IFM Program-Funded Infrastructure

**Buildings:** The average ACI for the 24 IFM Program-funded MC and MD buildings at the Advanced Test Reactor (ATR) Complex (0.99) is better than the ACI goal (0.95) (see Table A-1.4).

**OSFs:** The average ACI for the 33 IFM Program-funded MC and MD OSFs at the ATR Complex (0.55) is below the ACI goal (0.95) (see Table A-1.4). The uncertainties associated with OSF ACI data discussed in Section A-1.4.1 should be considered when reviewing this data.

Table A-1.2. Total Mission Critical and Mission Dependent infrastructure Asset Condition Index.

| DOE-Owned Operating and Operational Standby MC and MD Assets | Msn. Dep. Category | # of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | $ to $ACI_{Goal}$ ($M) | 3-Year Plan ($M/yr) | 5-Year Plan ($M/yr) | 10-Year Plan ($M/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Buildings | MC | 53 | 1,070 | 27 | 738 | 0.96 | 15 | 13 | 4 | 3 | 1 |
| | MD | 137 | 794 | 13 | 251 | 0.95 | 40 | 6 | 2 | 1 | 1 |
| | **Total** | **190** | **1,864** | **40** | **989** | **0.96** | **55** | **19** | **6** | **4** | **2** |
| OSFs (Except the ATR) | MC | 26 | - | 9 | 55 | 0.84 | 11 | 7 | 2 | 1 | 1 |
| | MD | 136 | - | 86 | 448 | 0.81 | 27 | 77 | 26 | 16 | 8 |
| | **Total** | **162** | **-** | **95** | **502** | **0.81** | **38** | **84** | **28** | **17** | **9** |
| | **Grand Total** | **352** | **1,864** | **135** | **1,491** | **0.91** | **93** | **102** | **34** | **21** | **11** |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*DOE = Department of Energy*
*MC = mission critical*
*MD = mission dependent, not critical*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*

Table A-1.3. Idaho Facilities Management program-funded for Mission Critical and Mission Dependent infrastructure Asset Condition Index.

| IFM Program Funded Assets | Msn. Dep. Category | # of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | $ to $ACI_{Goal}$ ($M) | 3-Year Plan ($M/yr) | 5-Year Plan ($M/yr) | 10-Year Plan ($M/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IFM Program Funded Buildings | MC | 21 | 314 | 16 | 372 | 0.96 | 8 | 8 | 3 | 2 | 1 |
| | MD | 24 | 132 | 2 | 46 | 0.95 | 7 | 1 | <1 | <1 | <1 |
| | **Total** | **45** | **446** | **18** | **418** | **0.96** | **15** | **9** | **3** | **2** | **1** |
| IFM Program Funded OSFs (Except the ATR) | MC | 18 | - | 7 | 43 | 0.83 | 9 | 6 | 2 | 1 | 1 |
| | MD | 18 | - | 32 | 75 | 0.57 | 10 | 30 | 10 | 6 | 3 |
| | **Total** | **36** | **-** | **39** | **117** | **0.66** | **19** | **36** | **12** | **7** | **4** |
| | **Grand Total** | **81** | **446** | **57** | **535** | **0.89** | **34** | **45** | **15** | **9** | **5** |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*IFM = Idaho Facilities Management*
*MC = mission critical*
*MD = mission dependent, not critical*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*

**Infrastructure Projects:** List A-1.1 summarizes the direct-funded ATR Complex projects that are included in the prioritized project list contained in Table B-1.1 of Appendix B.

**LIST A-1.1**

**ATR Complex Infrastructure Revitalization Projects**
(does not include ATR Life Extension Projects):

***Projects scheduled for execution in the TYSP window (From Appendix B Table B-2.1):***

- *ATR Complex dial room replacement*
- *ATR Complex Operations Support Facility*
- *ATR Complex Nuclear Training Center.*

### A-1.5.4 MFC, IFM Program-Funded Infrastructure

**NOTE:** Department of Energy Office of Nuclear Energy (DOE-NE) buildings located at the Idaho Nuclear Technology and Engineering Center (INTEC) are funded under the IFM Program and managed by the MFC Nuclear Operations Division. Therefore, these INTEC buildings are included in the MFC infrastructure discussion.

**Buildings:** The average ACI for the 21 IFM Program-funded MC and MD buildings at the MFC and INTEC (0.91) (see Table A-1.5) is less than the ACI goal (0.95). The sub-goal average ACI is driven by four MC and four MD buildings that have sufficient DM backlog to drive their ACI below the ACI goal.

**NOTE:** The uncertainties associated with the DM reported against MFC IFM Program-funded buildings that was discovered in 2009 should be considered when reviewing the building ACI data in Table A-1.5.

**OSFs:** The ACI for MFC IFM Program-funded OSFs is 1.00 (see Table A-1.5) because there is no DM reported against these four OSFs.

**Infrastructure Projects:** List A-1.2 summarizes the direct-funded MFC projects that are included in the prioritized project list contained in Table B-1.1 of Appendix B.

### A-1.5.5 SMC Direct-Funded Infrastructure

**Buildings and OSFs:** The relatively small amount of DM ($597K) reported against the SMC infrastructure assets results in an ACI that is greater than 0.99 (see Table A-1.6), indicating that SMC infrastructure is being proactively maintained and kept in excellent condition.

**Infrastructure Projects:** List A-1.3 summarizes the direct-funded SMC projects that are included in the prioritized project list contained in Table B-1.1 of Appendix B.

**LIST A-1.2**

**MFC Infrastructure Revitalization Projects**

*Projects scheduled for execution in the TYSP window (From Appendix B, Table B-2.1):*

- *FMF Stack Monitoring System Modernization*
- *FCF Exhaust Stack Monitoring System Upgrades*
- *FCF Automatic Transfer Switch*
- *HFEF Crane and EM Controls Systems Upgrade*
- *MFC Water Tank Replacement*
- *MFC Maintenance Shop Refurbishment*
- *MFC Sewage Lagoon Capacity Upgrade*
- *MFC Modular Office*
- *MFC Dial Room Replacement*
- *CESB Conversion*
- *MFC High-Voltage Electrical System Transformer Upgrade*
- *MFC Technical Support Facility*
- *NRAD Pneumatic Transfer System Installation*
- *Replacement of HFEF Hot Cell Periscopes*
- *New Transfer Port for HFEF Main Hot Cell*
- *HFEF Pneumatic Transfer System Repair/ Rebuild*
- *Add Computer Network Capabilities in the HFEF*
- *NRAD Elevator Control System*
- *FCF SERA Crane*
- *HFEF Main Hot Cell Pressure and Temperature Control System*
- *HFEF/NRAD Cooling Tower*
- *EML Negative Pressure Control*
- *New Nuclear Operations Maintenance Shop.*

**LIST A-1.3**

**SMC Infrastructure Revitalization Projects**

*Projects scheduled for execution in the TYSP window (From Appendix B, Table B-2.1):*

- *Relocate TAN Dial Room*
- *Extend Electrical Power Feeder to TAN-679A.*

Table A-1.4. Advanced Test Reactor Complex Idaho Facilities Management program-funded infrastructure Asset Condition Index.

| Operating and Operational Standby Assets | Msn. Dep. Category | # of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | $ to $ACI_{Goal}$ ($M) | 3-Year Plan ($M/yr) | 5-Year Plan ($M/yr) | 10-Year Plan ($M/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IFM Program-Funded ATR Complex Buildings | MC | 12 | 163 | 1 | 214 | 0.99 | 4 | <1 | <1 | <1 | <1 |
| | MD | 12 | 73 | 1 | 20 | 0.96 | 3 | <1 | <1 | <1 | <1 |
| | **Total** | **24** | **236** | **2** | **234** | **0.99** | **7** | **1** | **<1** | **<1** | **<1** |
| IFM Program-Funded ATR Complex OSFs (Except the ATR) | MC | 16 | - | 7 | 39 | 0.81 | 9 | 6 | 2 | 1 | 1 |
| | MD | 17 | - | 32 | 48 | 0.33 | 10 | 30 | 10 | 6 | 3 |
| | **Total** | **33** | | **39** | **87** | **0.55** | **19** | **36** | **12** | **7** | **4** |
| | **Grand Total** | **57** | **236** | **41** | **321** | **0.87** | **26** | **37** | **13** | **8** | **4** |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*IFM = Idaho Facilities Management*
*MC = mission critical*
*MD = mission dependent, not critical*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*

### A-1.5.6 Site-Wide and REC Assets

**Buildings:** The average ACI for the 135 site-wide and REC MC and MD buildings (0.95) (see Table A-1.7) meets the ACI goal (0.95). However, seven MC and 33 MD buildings have sufficient DM backlog to drive their ACI below the ACI goal.

**OSFs:** The average ACI for the 119 site-wide and REC OSFs (0.86) (see Table A-1.7) is less than the ACI goal (0.95). The uncertainties associated with OSF ACI data discussed in Section A-1.2.2 should be considered when reviewing this data.

**Infrastructure Projects:** List A-1.4 summarizes the site-wide and REC revitalization projects that are included in the prioritized project list contained in Table B-1.1 of Appendix B.

**LIST A-1.4**

**Revitalization Projects for Site-Wide and REC Infrastructure**

*Projects scheduled for execution in the TYSP window (From Appendix C, Table C-2.1):*

- *IF-608 Network Server UPS Upgrade*
- *CFA-668 Emergency Generator and Auto Transfer Switch Replacement*
- *Fuel Management System Upgrades*
- *IRC Nanoparticle Lab Filtration*
- *IRC Air Compressor Replacement*
- *Upgrade Site Unimproved Roads to Support NH&S Range*
- *INL Archive Center*
- *REC Information Technology Corridor Build Out*
- *Howe Peak Transmitter Station Underground Power Cable Replacement.*

Table A-1.5. Materials and Fuels Complex Idaho Facilities Management program-funded infrastructure Asset Condition Index.

| DOE-Owned Operating and Operational Standby Assets | Msn. Dep. Category | # of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | $ to $ACI_{Goal}$ ($M) | 3-Year Plan ($M/yr) | 5-Year Plan ($M/yr) | 10-Year Plan ($M/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IFM Program-Funded MFC/INTEC Buildings | MC | 9 | 151.3 | 15 | 158 | 0.91 | 4 | 8 | 3 | 2 | 1 |
| | MD | 12 | 59.3 | 2 | 26 | 0.94 | 4 | 1 | <1 | - | - |
| | **Total** | **21** | 210.5 | **16** | **184** | **0.91** | **8** | **9** | **3** | **2** | **1** |
| IFM Program-Funded MFC OSFs | MC | 2 | - | 0.0 | 4 | 1.00 | 0 | - | - | - | - |
| | MD | 1 | - | 0.0 | 26 | 1.00 | 0 | - | - | - | - |
| | **Total** | **3** | **-** | **0.0** | **30** | **1.00** | **0** | **-** | **-** | **-** | **-** |
| **Grand Total** | | **24** | **246** | **16** | **214** | **0.92** | **8** | **9** | **2** | **2** | **1** |

*NOTE: MFC/INTEC DM values involve a level of uncertainty and are in the process of being validated.*

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*IFM = Idaho Facilities Management*
*INTEC = Idaho Nuclear Technology and Engineering Center*
*MC = mission critical*
*MD = mission dependent, not critical*
*MFC = Materials and Fuels Complex*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*

Table A-1.6. Specific Manufacturing Capability program-funded infrastructure Asset Condition Index.

| SMC Division Operating and Operational Standby Assets | Asset Category | Number of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ |
|---|---|---|---|---|---|---|
| SMC Buildings | MC | 6 | 269 | 0.60 | 143 | 1.0 |
| | MD | 4 | 42 | 0.00 | 7 | 1.0 |
| | **Total** | **10** | **311** | **0.60** | **151** | **1.0** |
| SMC OSFs | MC | 3 | - | - | 0 | 1.0 |
| | MD | 4 | - | - | 1 | 1.0 |
| | **Total** | **7** | **-** | **-** | **1** | **1.0** |
| **Total SMC Complex Assets** | | **17** | **311** | **0.60** | **152** | **1.0** |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*MC = mission critical*
*MD = mission dependent, not critical*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*
*SMC = Specific Manufacturing Capability*

Table A-1.7. Site-Wide and REC infrastructure Asset Condition Index.

| All Site-Wide and REC Operating and Operational Standby Assets | Msn. Dep. Category | # of Assets | $SF_{Gross}$ (k) | DM ($M) | RPV ($M) | $ACI_{Avg}$ | # < $ACI_{Goal}$ | $ to $ACI_{Goal}$ ($M) | 3-Year Plan ($M/yr) | 5-Year Plan ($M/yr) | 10-Year Plan ($M/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site-Wide and REC Buildings | MC | 26 | 487 | 11 | 223 | 0.95 | 7 | 4 | 1 | 1 | <1 |
| | MD | 109 | 620 | 10 | 198 | 0.95 | 33 | 5 | 2 | 1 | <1 |
| | **Total** | **135** | **1,107** | **21** | **421** | **0.95** | **40** | **9** | **3** | **2** | **1** |
| Site-Wide and REC OSFs | MC | 5 | - | 1 | 12 | 0.89 | 2 | 1 | <1 | - | - |
| | MD | 114 | - | 54 | 372 | 0.85 | 17 | 47 | 16 | 9 | 5 |
| | **Total** | **119** | **-** | **56** | **384** | **0.86** | **19** | **48** | **16** | **10** | **5** |
| **Total Assets** | | **254** | **1,107** | **77** | **805** | **0.90** | **59** | **57** | **19** | **12** | **6** |

*ACI = Asset Condition Index*
*DM = deferred maintenance*
*MC = mission critical*
*MD = mission dependent, not critical*
*OSF = other structure and facility*
*RPV = replacement plant value*
*SF = square feet*
*SMC = Specific Manufacturing Capability*

## A-2 FOOTPRINT REDUCTION

Refer to Appendix B, Section B-1, for a discussion of INL's plans for disposition of excess DOE-NE facilities.

## A-3 IDAHO NATIONAL LABORATORY REAL PROPERTY INVENTORY

The INL site occupies 889 mi² in southeast Idaho. The site consists of eight facility areas situated on an expanse of otherwise undeveloped, high-desert terrain. Buildings and structures at the INL are clustered within these facility areas, which are typically less than a few square miles in size and separated by miles of open land. There are three primary DOE-NE facility areas at INL. Two are located on the INL site: the ATR Complex and the MFC. The third, the Research and Education Campus (REC), is located in the city of Idaho Falls, which is 25 miles east of the INL site border. Other, smaller DOE-NE site areas include the Critical Infrastructure Test Range Complex (CITRC), the Central Facilities Area (CFA), and Test Area North (TAN). Non-DOE-NE (i.e., Office of Environmental Management and Pittsburg Naval Reactors) facility areas at the INL site include INTEC, the Naval Reactors Facility (NRF), and the Radioactive Waste Management Complex (RWMC). The remainder of the INL site is DOE-NE land referred to as the site-wide area, which comprises all INL land outside the boundaries of the facility areas listed above. INL facility areas and buildings are summarized in Table A-3.1.

Based on November 30, 2009, FIMS information, the value of all INL (DOE-NE) real property assets (owned and leased; operating, standby, and shutdown) is approximately $3.34B. As shown in Table A-3.2, INL programmatic assets[4] total approximately $1.39B, while nonprogrammatic assets account for approximately $1.95B.

[4] *DOE Order 430.1B,* Real Property Asset Management, *Chg 1, dated 02/08/08, defines programmatic real property as reactors, accelerators, and similar devices used by programmatic personnel, acquired with line-item funding and listed in the Facilities Management System as "Other Structures and Facilities" under the 3200 series usage code.*

Table A-3.1. Facility Information Management System summary of Idaho National Laboratory buildings and land.[a]

| Facility | Land Area (acres) | Total Buildings | | NE Buildings | | EM Buildings | |
|---|---|---|---|---|---|---|---|
| | | Count | ($ft^2$) | Count | ($ft^2$) | Count | ($ft^2$) |
| ATR Complex | 102 | 87 | 493,082 | 73 | 377,523 | 14 | 115,559 |
| MFC | 1,707 | 91 | 610,560 | 84 | 574,701 | 7 | 35,859 |
| REC | Minimal[b] | 45 | 1,317,743 | 38 | 1,102,782 | 7 | 214,961 |
| CITRC | 967 | 11 | 56,955 | 10 | 55,532 | 1 | 1,423 |
| CFA | 968 | 56 | 635,849 | 55 | 635,449 | 1 | 400 |
| INTEC | 385 | 104 | 1,052,128 | 6 | 18,230 | 98 | 1,033,898 |
| NRF[c] | 4,400 | NA | NA | NA | NA | NA | NA |
| RWMC | 187 | 85 | 1,073,761 | 0 | 0 | 85 | 1,073,761 |
| Sitewide | 560,199 | 37 | 65,833 | 37 | 65,833 | 0 | 0 |
| Fort St. Vrain (Colorado)[d] | 30 | 2 | 16,946 | 0 | 0 | 2 | 16,946 |
| TAN | 220 | 40 | 366,178 | 31 | 350,966 | 9 | 15,212 |

*a. Based on 11/30/2009 data.*
*b. The majority of REC land is associated with leased facilities, only a few acres are DOE-owned.*
*c. NRF is not under the purview of DOE-ID.*
*d. DOE-ID purview also includes the Fort St. Vrain Fuel Storage Facility in Colorado.*

*ATR = Advanced Test Reactor*
*CFA = Central Facilities Area*
*CITRC = Critical Infrastructure Test Range Complex*
*INTEC = Idaho Nuclear Technology and Engineering Center*
*MFC = Materials and Fuels Complex*
*NRF = Naval Reactors Facility*
*REC = Research and Education Campus*
*RWMC = Radioactive Waste Management Complex*
*TAN = Test Area North*

Table A-3.2. Facility Information Management System summary of Idaho National Laboratory buildings and land.[a]

| Asset Category | Asset Value ($) |
|---|---|
| Nonprogrammatic buildings | 1,411,963,640 |
| Nonprogrammatic other structures and facilities | 533,500,359 |
| **Total nonprogrammatic assets** | **1,945,464,000[b]** |
| Programmatic assets (site other structures and facilities) | 1,391,016,652 |
| **Total programmatic assets** | **1,391,016,652** |
| **Total INL Nuclear Energy asset value** | **3,336,480,652** |

*a. Based on 11/30/2009 data.*
*b. Only nonprogrammatic RPV is used to calculate sustainment maintenance funding needs.*

Buildings and real property trailers comprise approximately $1.41B of the nonprogrammatic total, while other structures and facilities make up the remaining $534M.

## A-3.1 Asset Utilization

The FIMS database quantifies utilization based on the asset utilization index (AUI). The AUI provides a combined appraisal of two related real property utilization factors: (1) the rate of utilization of operating facilities, and (2) the elimination of excess facilities.

$$AUI = \frac{(\text{operating net ft}^2) \times (\text{utilization factor})}{(\text{operating net ft}^2) + (\text{shutdown net ft}^2)}$$

As a corporate measure, DOE assesses AUI at the national program level. In FIMS, ratings are assigned to AUI range measures. Table A-3.3 shows the FIMS AUI ranges and ratings.

#### A-3.1.1 Current Utilization of DOE-NE Nonprogammatic Facilities

The AUI improves as excess facilities are eliminated and as consolidation increases the space utilization rate of the remaining facilities. The factor can be assessed for individual facilities, groups of facilities, entire sites, or the entire DOE complex. Table A-3.4 shows the FIMS AUI ratings for the INL.

When compared to the previous year's results, the MFC AUI has improved from 0.98 to 1.00. The ATR Complex AUI has improved from 0.96 to 0.99, and the REC AUI has remained at 1.00. These high utilization ratings reflect the transition to a three-campus focus.

The 100% REC utilization rate also reflects the large percentage of leased space in Idaho Falls. Leased space is not included in the AUI calculation; however, leased space allows the REC footprint to be adjusted to accommodate changing space demands, and thus maintain full utilization of REC DOE-NE-owned space.

The AUI for the balance of INL facilities has remained constant at 0.92. Overall, the INL's AUI has increased from 0.95 to 0.96.

#### A-3.1.2 Future Utilization of DOE-NE Nonprogrammatic Facilities

The INL goal is to achieve and maintain an AUI performance rating of good to excellent for active mission-critical INL facilities by the year 2014.

Having modern facilities optimized for mission needs will ensure that INL's active facilities can be classified in FIMS as 100% used. Transfer or demolition of excess facilities will eliminate unused facilities. Both of these footprint reduction-related actions are necessary to improve INL's AUI performance.

### A-3.2 Space Utilization

INL space is managed with the following objectives:

- Optimizing the use of essential assets in support of INL missions
- Integrating long-range campus and mission planning into move plans
- Supporting the modernization of obsolete facilities, when economically viable
- Supporting footprint reduction by vacating nonessential assets
- Promoting the efficient use of space by linking tenant cost to the actual space occupied.

Occupancy and utilization of facilities are continuously evaluated. Current results are weighed against future needs, and alternatives are developed to satisfy the differences between the current state and future requirements. The best alternatives are developed into occupancy plans that efficiently use available space. When required, alternatives are developed into projects, including facility upgrades, new facilities, and facility disposal. Only mission-needed facilities continue to be used. Excess facilities are identified for inactivation and final disposition.

Day-to-day space management is accomplished to accommodate organizational and personnel changes in ways that optimize use of existing facilities. Longer-range space management processes are accomplished to support transformation of INL into three modern campuses that fully support the INL mission and vision. Figure A-3.1 illustrates the INL's efficient use of available space.

Table A-3.3. Facility Information Management System asset utilization index ranges and ratings.

| Asset Utilization Index Range | Asset Utilization Index Rating |
|---|---|
| 1.00–0.98 | Excellent |
| 0.98–0.95 | Good |
| 0.95–0.90 | Adequate |
| 0.90–0.75 | Fair |
| 0.75–0.00 | Poor |

Table A-3.4. Facility Information Management System asset utilization index ratings for nonprogrammatic Department of Energy Office of Nuclear Energy-owned assets at the Idaho National Laboratory.

| Site Area | Owned Facilities (nsf)[a] | Asset Utilization Index[a] | Rating |
|---|---|---|---|
| MFC | 493,351 | 1.00 | Excellent |
| ATR Complex | 322,400 | 0.99 | Excellent |
| REC | 240,194 | 1.00 | Excellent |
| Balance of INL | 985,114 | 0.92 | Adequate |
| All INL Facilities | 2,041,059 | 0.96 | Good |

*a. Based on 11/30/2009 data.*
*ATR = Advanced Test Reactor*
*INL = Idaho National Laboratory*
*MFC = Materials and Fuels Complex*
*REC = Research and Education Campus*

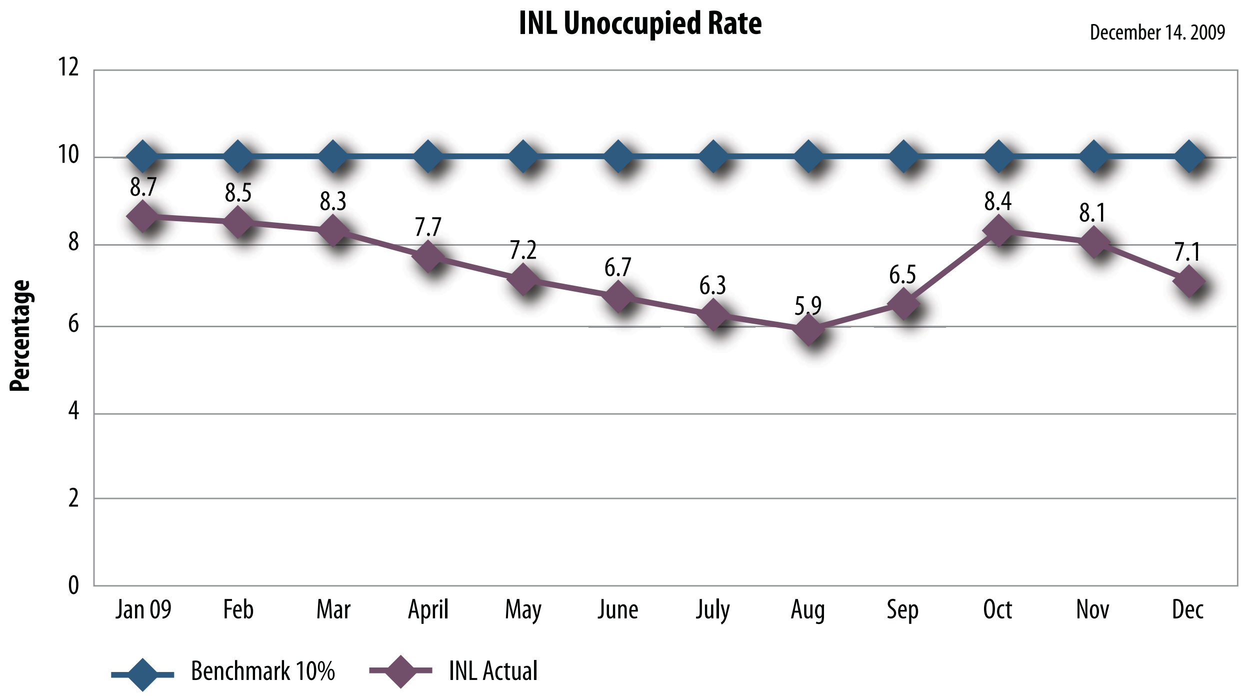



*Figure A-3.1. Idaho National Laboratory space utilization for the past year compared with an International Facility Management Association benchmark.*

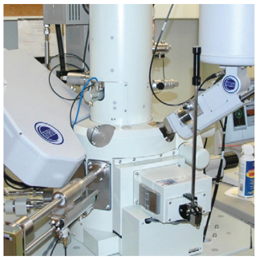
## A-3.3 Facility Leasing

During the past several decades, INL has experienced substantive swings in both mission goals and the corresponding employment base. With mission changes, facility requirements also change. To accommodate facility changes, INL employs facility leasing as a tool to optimize facility utilization, with a guiding focus on minimizing the number of buildings and maximizing occupancy. Recently, the INL has placed an emphasis on consolidating in-town activities in and around the REC through lease agreements for nearby private property. Consolidation on the campus has enabled INL to eliminate many smaller leased buildings around the community. However, on the INL site campuses where leasing is only an option for temporary structures (e.g., construction and short-term office trailers), the INL is primarily using General Plant Projects to satisfy space needs. Overall, INL employs facility leasing when it is in the best interest of the government and the INL mission (functionally and financially) and leases are terminated when more affordable government-owned property becomes available for occupancy.

It should be noted that the INL is unique in one important way: the lease rates of the Laboratory's two primary office buildings are extremely inexpensive, with 500,000 $ft^2$ leased at an average rate of \$3.75/$ft^2$ annually. Although the Laboratory intends to occupy government-owned buildings whenever possible, facility leasing will continue to be an important component in the INL's facility management strategy.

# APPENDIX B






## Prioritized Resource Needs

# CONTENTS



## Tables

# ACRONYMS

| | |
|---|---|
| BEA | Battelle Energy Alliance |
| DOE | U.S. Department of Energy |
| DOE-NE | Department of Energy Office of Nuclear Energy |
| FY | fiscal year |
| GPCE | General Purpose Capital Equipment |
| GPP | General Plant Project |
| IFI | Integrated Facilities and Infrastructure |
| IFM | Idaho Facilities Management |
| IGPCE | Institutional General Purpose Capital Equipment |
| IGPP | Institutional General Plant Projects |
| INL | Idaho National Laboratory |
| IPL | Integrated Priority List |
| M&O | Management and Operations |
| OFP | Operating Funded Project |
| POC | point-of-contact |
| TYSP | Ten-Year Site Plan |

# APPENDIX B
# PRIORITIZED RESOURCE NEEDS

## B-1. INTRODUCTION

The Idaho National Laboratory (INL) prepares and maintains prioritized lists of direct-funded General Plant Projects (GPPs), Operating Funded Projects (OFPs), and General Purpose Capital Equipment (GPCE) for the current and future fiscal years (FYs). The lists are developed using a systematic criteria definition and prioritization process, as summarized below:

1. Assess facilities and infrastructure availability and capability
2. Define company strategic objectives and facilities and infrastructure support requirements
3. Produce deficiency problem statements and implement systems engineering analysis of alternatives approach to resolution
4. List facilities and infrastructure needs and identify acquisition alternatives (e.g., GPP, OFP, or GPCE)
5. Define scoring/weighting prioritization evaluation criteria
6. Apply scoring/weighting criteria
7. Analyze prioritization results
8. Apply available and forecast funding to prioritized lists to produce current and future years acquisition planning
9. Present prioritized lists for management review and approval (e.g., INL Infrastructure Steering Committee and INL Executive Management Councils)
10. Assign project managers and technical points-of-contact (POCs) for implementation of near-term acquisitions.

In addition to direct-funded GPP, OFP, and GPCE acquisitions, the INL has developed and implemented a program for acquiring, where appropriate, general-purpose capital equipment utilizing a pool of indirect funding. Capital equipment acquired with indirect funds is known as Institutional General Purpose Capital Equipment (IGPCE). The INL is currently in the process of developing an Institutional General Plant Projects (IGPP) Program for acquisition of capital projects from the indirect funding pool. Implementation of the IGPP Program at the INL is forecast for October 1, 2010.

For integrated planning purposes, the INL has initiated a new process for acquiring and analyzing lists of capital projects and equipment planned for acquisition directly by the INL programs, utilizing their direct program funding.

## B-2. PRIORITIZED CAPITAL PROJECTS AND EQUIPMENT

### B-2.1 General Plant and Operating Funded Projects

Table B-2.1 reflects the INL in-progress, planned, and forecast GPP/OFP project expenditures from FY 2010 through FY 2021. These projects would be direct-funded by the Department of Energy Office of Nuclear Energy (DOE-NE) through the Idaho Facilities Management (IFM) Program.

This list is based on an assumption that DOE-NE/IFM funding basis for planning GPP expenditures is $165M in FY 2012, which includes a $20M mix of GPP and GPCE funding escalated at 2.5%/year after FY 2012.

The $165M base funding used in this TYSP is a mission-driven, need-based planning basis and is represented as the 10% above-target basis. The above-target basis provides additional workscope that may be executed if additional funds are made available due to changing priorities and/or differences between budget requests and appropriations.

## B-2.2 Program-Funded Capital Projects

The INL has initiated a new process for acquiring and analyzing lists of capital projects planned for acquisition directly by the INL programs, utilizing their direct program funding. This year, the INL requested program-funded capital projects information through an email data call. Accordingly, this initial program funded projects projection may not be complete. Additionally, this initial list is limited to a 3 year projection because beyond 3 years, project definition and cost are too uncertain to include them on a definitive list. For future years, acquisition and consideration of program-funded capital projects information will be included in the INL integrated infrastructure planning process and will be reported in a more comprehensive and comparative manner. Table B-2.2 provides a 3-year (FY 2010 through FY 2012) projection of program-funded capital projects.

## B-2.3 Institutional General Plant Projects

The INL is currently in the process of developing an Institutional General Plant Projects (IGPP) Program for acquisition of capital projects, utilizing the indirect funding pool. Implementation of the IGPP Program at the INL is forecast for October 1, 2010.

## B-2.4 General Purpose Capital Equipment

Table B-2.3 reflects the INL planned and forecast GPCE expenditures from FY 2010 through FY 2021.

## B-2.5 Line-Item Construction Projects

Table B-2.4 reflects the forecasted funding expenditures for the following INL Line-Item Construction projects:

- **INL Remote-Handled Low-Level Waste –** This project will provide on-site replacement of remote-handled low-level waste disposal capability for ongoing and future programs at INL beyond the end of FY 2017
- **Post-Irradiation Examination Line-Item Facility –** This multi-program, third-generation PIE analytical laboratory will further consolidate and expand capabilities that function on the micro, nano, and atomic scale.

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY09 - 1 | MFC/ FMF | NO | MFC Revitalization Project 2 | 2,262 | 2,262 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 1 | MFC | F&SS | MFC Water Tank Replacement | 1,683 | 1,683 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 2 | REC | IM | IF-608 Uninterrupted Power Supply (UPS) Upgrade | 664 | 664 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 3 | SW/CFA | F&SS | CFA-668 Backup Power Replacement | 742 | 742 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 4 | SW | F&SS | Fuel Management System Upgrades | 787 | 787 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 5 | MFC | NO | MFC Maintenance Shop Refurbishment | 479 | 479 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 6 | MFC | NO | MFC Sewage Lagoon Capacity Upgrade | 3,731 | 3,731 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 7 | MFC | NO | MFC Modular Office | 3,641 | 3,641 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 8 | REC/IRC | F&SS | IRC Nano Filtration | 180 | 180 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 9 | REC/IRC | F&SS | IRC Air Compressors | 365 | 360 | - | - | - | - | - | - | - | - | - | - | - |
| 1 | MFC | NST | Irradiated Materials Characterization Lab (IMCL) | 10,000 | 2,393 | 7,607 | - | - | - | - | - | - | - | - | - | - |
| 2 | MFC | IM | MFC Dial Room Replacement | 6,767 | 721 | 6,046 | - | - | - | - | - | - | - | - | - | - |
| 3 | MFC/ HFEF | NO | Neutron Radiography Reactor (NRAD) Console Replacement | 5,400 | 1,135 | 4,265 | - | - | - | - | - | - | - | - | - | - |
| 4 | MFC | NST | Contaminated Equipment Storage Building (CESB) Conversion [Emerging need for RERTR] | 4,000 | 428 | 3,572 | - | - | - | - | - | - | - | - | - | - |

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | MFC | F&SS | MFC High-Voltage Electrical System Transformer Upgrade (Emergent need for MFC) | 5,820 | - | - | 5,820 | | | | | | | | | |
| 6 | MFC/ FMF | NST | Ceramic Fuel R&D Strategy Glovebox Support Line for FMF South Work Room Modular Glovebox Utilization [Strategic Initiative] | 9,508 | 994 | - | 8,514 | - | - | - | - | - | - | - | - | - |
| 7[e] | SW/CFA | N&HS | Test Range Wireless / Control Systems Facility | 10,980 | - | - | 1,156 | - | 9,824 | - | - | - | - | - | - | - |
| 8[e] | MFC | N&HS | Non-Proliferation Test & Evaluation Center | 10,980 | - | - | 1,156 | - | 9,824 | - | - | - | - | - | - | - |
| 9[e] | SW/SMC | SMC | TAN Multi Use Facility | 11,054 | - | - | - | 1,163 | - | 9,891 | - | - | - | - | - | - |
| 10[e] | SW/SMC | SMC | INL Test Range Multi Use Building | 10,973 | - | - | - | 1,158 | - | 9,815 | - | - | - | - | - | - |
| 11[e] | MFC | NO | MFC Technical Support Facility | 12,020 | 1,099 | - | - | 10,921 | - | - | - | - | - | - | - | - |
| 12 | MFC/ HFEF | NO | HFEF Replace Element Contact Profilometer (ECP) Control System | 522 | - | 75 | 447 | - | - | - | - | - | - | - | - | - |
| 13 | ATR Complex | NO | Advanced Test Reactor Critical (ATR-C) Control System Upgrade | 11,144 | - | - | - | - | - | - | 1,200 | 9,943 | - | - | - | - |
| 14 | SW/SMC | IM/SMC | TAN Dial Room Replacement | 7,266 | - | - | - | - | - | - | 783 | 6,483 | - | - | - | - |
| 15 | ATR Complex | IM | ATR Complex Dial Room Replacement | 10,030 | - | - | - | - | - | - | 1,056 | - | 8,975 | - | - | - |

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | MFC/ HFEF | NO | NRAD Digital Radiography System | 696 | - | - | - | - | - | - | 696 | - | - | - | - | - |
| 17 | MFC | NST | Upgrade and Qualify Precision Gamma Scanner (PGS) spectrometer system | 336 | - | - | - | - | - | - | 336 | - | - | - | - | - |
| 18 | MFC/AL | NST | Replacement of the Failed Carbon, Oxygen, Nitrogen Analyzer in the AL Hot Cells | 878 | - | - | - | - | - | - | 878 | - | - | - | - | - |
| 19 | MFC | NST | Electric Discharge Machining (EDM) Installation | 168 | - | - | - | - | - | - | 168 | - | - | - | - | - |
| 20 | MFC | NST | Installation of Electron Probe Micro-Analyzer (EPMA) instrument into the IMCL | 1,160 | - | - | - | - | - | - | 1,160 | - | - | - | - | - |
| 21 | MFC | NST | Installation of Focused Ion Beam instrument into the IMCL | 1,160 | - | - | - | - | - | - | 1,160 | - | - | - | - | - |
| 22 | MFC | NST | Installation of Microscale X-Ray Diffractometer (MXRD) instrument into the IMCL | 1,160 | - | - | - | - | - | - | 1,160 | - | - | - | - | - |
| 23 | MFC | NST | Multi-Collector Inductively Coupled Plasma-Mass Spectroscopy (MC-ICP-MS) | 1,392 | - | - | - | - | - | - | 1,392 | - | - | - | - | - |
| 24 | MFC/ HFEF | NST | NRAD Pneumatic Transfer System Installation | 4,523 | - | - | - | - | - | - | 4,523 | - | - | - | - | - |

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | MFC | NST | Bulk Thermal Conductivity of Irradiated Fuel | 348 | - | - | - | - | - | - | 348 | - | - | - | - | - |
| 26 | MFC | NST | Fuel Exam Machine | 2,551 | - | - | - | - | - | - | 2,551 | - | - | - | - | - |
| 27 | ATR Complex | NO | ATR Operations Support Facility | 12,725 | - | - | - | - | - | - | 1,339 | - | 11,386 | - | - | - |
| 28 | MFC/ HFEF | NST | NRAD East Radiography Control Station | 336 | - | - | - | - | - | - | - | 336 | - | - | - | - |
| 29 | MFC | NST | Procurement and Installation of a Thermal Analytical Suite in a High Shielded Glovebox or Hot cell | 1,070 | - | - | - | - | - | - | - | 1,070 | - | - | - | - |
| 30 | REC / CAES | NST | Mechanical testing equipment | 1,873 | - | - | - | - | - | - | - | 196 | - | 1,667 | - | - |
| 31 | MFC | E&E | Actinide Science Laboratory | 7,087 | - | - | - | - | - | - | - | 626 | - | 6,461 | - | - |
| 32 | MFC | NST | Ceramic Fuel R&D Strategy Functional like-for-like Replacement of Obsolete Gloveboxes in FMF South Work Room | 8,355 | - | - | - | - | - | - | - | 612 | - | 7,743 | - | - |
| 33 | MFC/ HFEF | NO | Replacement of HFEF Periscopes | 937 | - | - | - | - | - | - | - | - | - | 937 | - | - |
| 34 | SW | N&HS | Upgrade Site Roads to Support N&HS Range | 1,868 | - | - | - | - | - | - | - | - | 201 | 1,667 | - | - |
| 35 | REC | E&E | INL Archive Center | 4,138 | - | - | - | - | - | - | - | - | - | 445 | 3,692 | - |
| 36 | MFC/ HFEF | NO | HFEF New Transfer Port in Main Cell | 960 | - | - | - | - | - | - | - | - | - | - | 960 | - |
| 37 | MFC/ HFEF | NO | HFEF Pneumatic Transfer System Repair/Rebuild | 960 | - | - | - | - | - | - | - | - | - | - | 960 | - |

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | REC/IRC | E&E | IRC High Bay Space | 6,387 | - | - | - | - | - | - | - | - | - | 525 | 5,863 | - |
| 39 | MFC/ HFEF | NO | Add Computer Network Capabilities in HFEF | 960 | - | - | - | - | - | - | - | - | - | - | 960 | - |
| 40 | MFC/ HFEF | NO | NRAD Elevator Control System | 397 | - | - | - | - | - | - | - | - | - | - | 397 | - |
| 41 | MFC/FCF | NST | Advanced Electrochemical Development Glovebox | 659 | - | - | - | - | - | - | - | - | - | - | 659 | - |
| 42 | REC | IM | REC Information Technology (IT) Corridor Build Out | 2,778 | - | - | - | - | - | - | - | - | - | - | 2,778 | - |
| 43 | MFC/FCF | NO | FCF SERA Crane | 576 | - | - | - | - | - | - | - | - | - | - | 576 | |
| 44 | MFC/ HFEF | NO | HFEF Main Cell Pressure and Temperature Control System | 960 | - | - | - | - | - | - | - | - | - | - | 960 | |
| 45 | MFC/ HFEF | NO | HFEF/NRAD Cooling Tower | 6,532 | - | - | - | - | - | - | - | - | - | 562 | | 5,970 |
| 46 | SW/SMC | SMC | Extend Feeder to TAN 679A | 653 | - | - | - | - | - | - | - | - | - | - | 653 | - |
| 47 | SW | F&SS | Howe Peak Transmitter Underground Power Cable Replacement | 3,036 | - | - | - | - | - | - | - | - | - | - | 327 | 2,709 |
| 48 | MFC/ EML | NO | EML Negative Pressure Control | 960 | - | - | - | - | - | - | - | - | - | - | 960 | - |
| 49 | MFC/ HFEF | NST | Install New Equipment Purchased for the HFEF Neutron Generator | 459 | - | - | - | - | - | - | - | - | - | - | - | 459 |
| 50 | MFC | NO | MFC New Maintenance Shop | 4,355 | - | - | - | - | - | - | - | - | - | - | 469 | 3,886 |
| 51 | ATR Complex | NO | ATR Complex Nuclear Training Center | 6,504 | - | - | - | - | - | - | - | - | - | - | 700 | 5,804 |

Table B-2.1. Idaho Facilities Management Program project list (DOE-NE direct-funded [$K]).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | MFC/ HFEF | NO | HFEF Window Leak 1M | 1,312 | | | | | | | | | | | | 1,312 |
| 53 | SW/SMC | F&SS | TAN 665 Diesel Firewater Pump Replacement | 787 | | | | | | | | | | | | 787 |
| | | | **Total** | | **21,304** | **21,565** | **17,093** | **13,241** | **19,648** | **19,706** | **18,749** | **19,267** | **20,562** | **20,007** | **20,913** | **20,928** |

*a. Areas are: Materials and Fuels Complex (MFC), Advanced Test Reactor (ATR) Complex (ATR Complex), Research and Education Campus (REC; Idaho Falls), Idaho Nuclear Technology and Engineering Center (INTEC) and Sitewide (SW). Sub Areas are: Analytical Laboratory (AL), Central Facility Area (CFA), Center for Advanced Energy Studies (CAES), Electron Microscopy Laboratory (EML), Engineering and Research Office Building (EROB), Fuel Conditioning Facility (FCF), Fuels and Applied Science Building (FASB), Fuel Manufacturing Facility (FMF), Hot Fuel Examination Facility (HFEF), INL Research Center (IRC), Radiochemistry Lab (RCL), Specific Manufacturing Capability (SMC), Test Area North (TAN), and Transient Reactor Experiment and Test facility (TREAT).*

*b. Requesting Organizations are: Applied Engineering (AE), Department of Energy-Idaho Operations Office (DOE-ID), Energy and Environment (E&E), Environmental, Safety, and Health (ES&H), Facility and Site Services (F&SS), Information Management (IM), National and Homeland Security (N&HS), Nuclear Operations (NO), Nuclear Science and Technology (NST), and Specific Manufacturing Capability (SMC).*

*c. Total project cost (TPC) values are based on preliminary scoping, evaluation, and rough-order-of-magnitude (ROM) estimates. As planning and execution funds are appropriated, scope, schedule, and costs will continue to be refined, resulting in changes to individual TPC.*

*d. Capital funding (total estimated cost) for a general plant project (GPP) cannot exceed $10M according to the U.S. Department of Energy Budget Formulation Handbook. However, based on the escalation rates of 2.5%, a GPP with an estimated total estimated cost of $10M in FY 2010 would have a total estimated cost of $12.5M in 2019. In addition, GPPs require both operating and capital funds for execution, the estimated aggregate of which is known as the TPC. Typically, TPC for a GPP will range between 115% and 130% as compared to the total estimated cost. That is, a project with a total estimated cost of $10M could have a TPC between $11.5M and $13M.*

*e. Pending further INL review.*

Table B-2.2. Program-funded capital projects as of June 4, 2010 ($K).

| INL Project/Program | INL Area | Project Description | ROM Total Project Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| National and Homeland Security (WFO) | SW | National Electric Grid Reliability Test Bed *Note: Funding has been requested but no formal commitments have been established* | 40,000[a] | - | 16,000 | 16,000 |
| | SW | SOX Range Facility (for high-energy accelerator testing) | 1,500 | 1,500 | - | - |
| | SW | Upgrades to the National Security Test Range (explosives range) – Data Collection Systems | 300 | - | 300 | - |
| FCRD | MFC | STDM | 799 | 799 | - | - |
| | MFC | TIMS | 1,095 | 1,095 | - | - |
| | MFC | Echem Radiological Integrated Testing Gloveboxes (in FCF room 10A) | 9,250[a] | - | 3,000 | 4,500 |
| | MFC | Echem Irradiated Integrated Testing Capability (workstations in HFEF hot cell) | 7,150[a] | - | 1,350 | 3,200 |
| S&S | MFC | Security Technology Command and Control Space | 3,625 | - | - | 3,625 |
| | MFC | Aerial Protection Grid | 1,300 | - | - | 1,300 |
| | Sitewide | Sitewide Video Upgrade | 3,500 | - | - | 3,500 |
| | MFC | SRT Operations Building | 1,000 | - | - | 1,000 |
| NO | ATR Complex | Passive Coolant Containment System | 1,250[b] | 513 | 234 | - |
| | | **Total Program Funded Capital Projects** | **70,769[b]** | **3,907** | **20,884** | **33,125** |

*a. Funding extends beyond FY 2012.*

*b. Project and funding began prior to FY 2010.*

*AL = Analytical Laboratory*

*ATR = Advanced Test Reactor*

*FCRD = Fuel Cycle Research and Development*

*HFEF = Hot Fuel Examination Facility*

*MFC = Materials and Fuels Complex*

*NGNP = Next-Generation Nuclear Plan*

*NO = Nuclear Operations*

*NRAD = Neutron Radiography Reactor*

*PGS = Plane Grating Spectrometer*

*ROM = rough order of magnitude*

*S&S = safeguards and security*

*SOX = Standoff Experiment*

*SRT = Special Response Team*

*STDM = Scanning Thermal Diffusivity Microscope*

*SW = Sitewide*

*TIMS = Thermal Ionization Mass Spectrometer*

*VHTR = Very-High Temperature Reactor*

*WFO = Work for Others*

Table B-2.3. General purpose capital equipment as of June 4, 2010 ($K).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY10 - 1 | MFC | F&SS | Taylor 25-ton Lift Truck | 418 | 418 | - | - | - | - | - | - | - | - | - | - | - |
| FY10 - 2 | REC/CAES | NST | Mechdyne Flex Display | 900 | 900 | - | - | - | - | - | - | - | - | - | - | - |
| FY10 - 3 | SW | ES&H | In Vivo Whole Body Counting System | 398 | 398 | - | - | - | - | - | - | - | - | - | - | - |
| FY10 - 4 | SW | IM | Network Service Upgrade | 913 | 913 | - | - | - | - | - | - | - | - | - | - | - |
| FY10 - 5 | SW | IM | Voice Mail End of Life System | 421 | 421 | - | - | - | - | - | - | - | - | - | - | - |
| FY10 - 6 | ATR Complex | F&SS | Mazak Quick Turn Computer Numerical Control (CNC) Lathe | 271 | 271 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 1 | REC/ EROB | IM | High Performance Computing Disk Storage Hardware | 850 | 850 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 2 | MFC | AE | Radiography Equipment System | 191 | 191 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 3 | MFC/FCF | NST | Rapid prototyping | 234 | 234 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 4 | MFC/AL | NO | Replacement of the AL Scintillation Counter | 129 | 129 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 5 | SW | F&SS | Ambulance 1 | 182 | 182 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 6 | SW | F&SS | Ambulance 2 | 182 | 182 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 7 | SW | F&SS | Ambulance 3 | 181 | 181 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 8 | MFC | F&SS | HAAS Computer Numerical Control (CNC) Turning Center | 76 | 76 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 9 | MFC | F&SS | Laser Etcher | 70 | 70 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 10 | MFC | F&SS | Sodick Wire EDM Machine | 428 | 428 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 11 | MFC | F&SS | Computer Controlled Plasma Table Cutting System | 265 | 265 | - | - | - | - | - | - | - | - | - | - | - |

Table B-2.3. General purpose capital equipment as of June 4, 2010 ($K).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BDL - 12 | SW | F&SS | HAAS V5/50 Mill | 185 | 185 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 13 | SW | F&SS | Dumpmaster Replacements (2) | 642 | 642 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 14 | MFC | AE | Upgrade from Film Based Radiography to Digital Radiography | 230 | 230 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 15 | SW | F&SS | Gun Drilling Machine | 634 | 634 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 16 | SW | F&SS | Power Management 70-ft Bucket Truck | 427 | 427 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 17 | MFC | F&SS | Mobile 90-ton Crane | 774 | 774 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 18 | ATR Complex | NO | ATR Mobile Electric Crane | 210 | 210 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 19 | ATR Complex | AE | ATR Digital Radiography | 241 | 241 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 20 | ATR Complex | NO | Radiological Waste Bag Monitor | 103 | 103 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 21 | SW | ES&H | Vehicle Radiation Detection System | 321 | 321 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 22 | ATR Complex | NO | 30-ton Hydraulic Mobile Crane | 376 | 376 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 23 | MFC | F&SS | Mako Mobile Breathing Air Trailer | 110 | 110 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 24 | REC | F&SS | INL Technical Library Compact Shelving | 366 | 366 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 25 | SW | F&SS | Subsurface Investigation Equipment | 313 | 313 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 26 | SW | IM | Enterprise Computing Infrastructure Servers | 594 | 594 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 27 | MFC | NST | X-Ray Diffractometer | 454 | 454 | - | - | - | - | - | - | - | - | - | - | - |

Table B-2.3. General purpose capital equipment as of June 4, 2010 ($K).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BDL - 28 | MFC/ HFEF | NO | Model N Master Slave Manipulator | 140 | 140 | - | - | - | - | - | - | - | - | - | - | - |
| BDL - 29 | REC | IFM | INL Network (INET) Equipment | 146 | 146 | - | - | - | - | - | - | - | - | - | - | - |
| 1 | REC/ EROB | IM | High Performance Computing (HPC) Network Transport | 1,953 | 0 | - | 1,953 | - | - | - | - | - | - | - | - | - |
| 2 | REC/ EROB | IM | HPC Computing Platforms | 5,384 | 0 | - | - | 5,384 | - | - | - | - | - | - | - | - |
| 3 | REC/CAES | NST | Spatially Resolved Positron Annihilation Spectroscopy | 1,319 | 0 | - | - | 1,319 | - | - | - | - | - | - | - | - |
| 4 | SW/CFA | IM | CFA and EROB Dial Room (INET) UPS Expansion | 81 | 0 | 81 | - | - | - | - | - | - | - | - | - | - |
| 5 | MFC | NO | Replace Components of the Visual Exam Machine (VEM) | 379 | 0 | 379 | - | - | - | - | - | - | - | - | - | - |
| 6 | MFC/ FASB | NST | Procurement and Installation of Radiological Hoods in the Fuels and Applied Science Building East Laboratory | 68 | 0 | - | 68 | - | - | - | - | - | - | - | - | - |
| 7 | REC/IRC | NST | Fieldable Laser Resonant Ultrasound Imaging System for Mechanical Properties Characterization | 166 | 0 | - | - | - | 166 | - | - | - | - | - | - | - |
| 8 | MFC/ HFEF | NO | HFEF Fabrication of 2nd Feed through glovebox | 838 | 0 | - | - | - | 838 | - | - | - | - | - | - | - |
| 9 | REC/CAES | NST | OPAL Real Time Simulation | 1,245 | 0 | - | - | - | - | 1,245 | - | - | - | - | - | - |
| 10 | REC/CAES | NST | Tandetron Accelerator | 1,160 | 0 | - | - | - | - | - | 1,160 | - | - | - | - | - |

Table B-2.3. General purpose capital equipment as of June 4, 2010 ($K).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | MFC/AL | NST | Sample Exchange Glovebox for Shielded Electron Probe Micro-Analyzer (EPMA) | 1,009 | 0 | - | - | - | - | - | 1,009 | - | - | - | - | - |
| 12 | MFC/AL | NST | Shielded Glovebox for Post-Irradiation Examination Sample Preparation | 2,050 | 0 | - | - | - | - | - | - | 2,050 | - | - | - | - |
| 13 | SW/CFA | AE | 400 GPM Liquid Flow Calibrator Dedicated to Water | 413 | 0 | - | - | - | - | - | 413 | - | - | - | - | - |
| 14 | MFC/AL | NST | Shielded Waste Handling Glovebox | 713 | 0 | - | - | - | - | - | - | 713 | - | - | - | - |
| 15 | MFC/AL | NST | Supplemental Post-Irradiation Examination Capability/Immersion Density | 146 | 0 | - | - | - | - | - | - | - | 146 | - | - | - |
| 16 | SW | F&SS | Structural Fire Engine (Aerial) | 1,614 | 0 | - | - | - | - | - | - | - | 1,614 | - | - | - |
| 17 | SW | F&SS | Structural Fire Engine Pumper | 699 | 0 | - | - | - | - | - | - | - | - | 699 | - | - |
| 18 | MFC/ HFEF | NO | NRAD Wet Film Processor | 84 | 0 | - | - | - | - | - | - | - | 84 | - | - | - |
| 19 | SW | IM | Enhanced 911 System | 989 | 0 | - | - | - | - | - | - | - | - | 989 | - | - |
| 20 | REC/IRC | E&E | Century Sterilizer/Amsco Steam Generator | 129 | 0 | - | - | - | - | - | - | - | 129 | - | - | - |
| 21 | SW | F&SS | Structural Fire Engine (Pumper) | 711 | 0 | - | - | - | - | - | - | - | - | 711 | - | - |
| 22 | SW | F&SS | Structural Fire Engine (Pumper) | 754 | 0 | - | - | - | - | - | - | - | - | - | 754 | - |

Table B-2.3. General purpose capital equipment as of June 4, 2010 ($K).

| Reference No. | Area/ Sub Area[a] | Requesting Organization[b] | Project | ROM TPC[c,d] | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | SW | F&SS | Structural Fire Engine (Quint) | 1,190 | 0 | - | - | - | - | - | - | - | - | - | 1,190 | - |
| 24 | SW | F&SS | Wildland Fire Brush Truck #1 | 424 | 0 | - | - | - | - | - | - | - | - | - | 424 | - |
| 25 | SW | F&SS | Wildland Fire Brush Truck #2 | 439 | 0 | - | - | - | - | - | - | - | - | - | 439 | - |
| 26 | SW | F&SS | Wildland Fire Brush Truck #3 | 424 | 0 | - | - | - | - | - | - | - | - | - | 424 | - |
| 27 | SW | F&SS | Wildland Fire Brush Truck #4 | 439 | 0 | - | - | - | - | - | - | - | - | - | 439 | - |
| 28 | SW | IM | Replace INL Paging System | 1,985 | 0 | - | - | - | - | - | - | - | - | - | - | 1,985 |
| 29 | SW | F&SS | Wildland Fire Brush Truck #5 | 314 | 0 | - | - | - | - | - | - | - | - | - | - | 314 |
| 30 | MFC/RCL | NO | Radiochemistry Laboratory (RCL) Air Dryer | 102 | 0 | - | - | - | - | - | - | - | - | - | - | 102 |
| 31 | SW | F&SS | Hazardous Material (HAZMAT) Operations Truck | 800 | 0 | - | - | - | - | - | - | - | - | - | - | 800 |
| | | | **Total** | | **12,375** | **460** | **2,021** | **6,704** | **1,003** | **1,245** | **2,581** | **2,764** | **1,974** | **2,399** | **3,670** | **3,201** |

*a. Areas are: Materials and Fuels Complex (MFC), Advanced Test Reactor (ATR) Complex (ATR Complex), Research and Education Campus (REC; Idaho Falls), and Sitewide (SW). Sub Areas are: Analytical Laboratory (AL), Central Facility Area (CFA), Center for Advanced Energy Studies (CAES), Electron Microscopy Laboratory (EML), Engineering and Research Office Building (EROB), Fuel Conditioning Facility (FCF), Fuels and Applied Science Building (FASB), Fuel Manufacturing Facility (FMF), Hot Fuel Examination Facility (HFEF), Radiochemistry Lab (RCL), Specific Manufacturing Capability (SMC), Test Area North (TAN), and Transient Reactor Experiment and Test facility (TREAT).*

*b. Requesting Organizations are: Applied Engineering (AE), Department of Energy - Idaho Operations Office (DOE-ID), Energy and Environment (E&E), Environmental, Safety, and Health (ES&H), Facility and Site Services (F&SS), Information Management (IM), National and Homeland Security (N&HS), Nuclear Operations (NO), Nuclear Science and Technology (NST), and Specific Manufacturing Capability (SMC).*

Table B-2.4. Line-Item Construction projects ($K).

| Reference No. | Area[a] | Requesting Organization[b] | Project | ROM TPC | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INL | DOE-NE | Remote-Handled Low-Level Waste Disposal Project | 31,800 | 4,400 | 3,100 | 1,400 | 3,300 | 10,200 | 7,100 | 1,700 | 600 | | | | |
| 2 | MFC | NST | Post-Irradiation Examination Line-Item Facility | 171,200 | | 5,000 | 10,200 | 21,500 | 26,000 | 36,000 | 31,000 | 31,500 | 10,000 | | | |
| | | | **Total** | | **4,400** | **8,100** | **11,600** | **24,800** | **36,200** | **43,100** | **32,700** | **32,100** | **10,000** | **-** | **-** | **-** |

*a. Areas are: Materials and Fuels Complex (MFC).*

*b. Requesting Organizations are: Department of Energy Office of Nuclear Energy (DOE-NE) and Nuclear Science and Technology (NST).*

## B-2.6 Program-Funded Capital Equipment

The INL has initiated a new process for acquiring and analyzing lists of capital equipment planned for acquisition directly by the INL programs, utilizing their direct program funding. This year, the INL requested program-funded capital equipment information through an email data call. Accordingly, this initial program funded capital equipment projection may not be complete. Additionally, this initial list is limited to a 3-year projection because beyond 3 years, equipment definition and cost are too uncertain to include them on a definitive list. For future years, acquisition and consideration of program-funded capital equipment information will be included in the INL integrated infrastructure planning process and will be reported in a more comprehensive and comparative manner. Table B-2.5 provides a 3-year (FY 2010 through FY 2012) projection of program-funded capital equipment acquisitions.

## B-2.7 Institutional General Purpose Capital Equipment

The INL manages an IGPCE program for acquisition of capital equipment, utilizing an indirect funding pool. Table B-2.6 provides a 3-year (FY 2010 through FY 2012) projection of IGPCE acquisitions.

Table B-2.5. Program-funded capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| Bioenergy Program | REC | Deployable PDU | 27,500[a] | 4,000 | 4,000 | 1,500 |
| | REC | Thermochem Laboratory equipment | 2,000[a] | 350 | 150 | 150 |
| | REC | Biochem Laboratory equipment | 1,775[a] | 125 | 150 | 150 |
| Advanced Energy Storage | REC | Battery Testing Equipment | 9,077[a] | 1,100 | 1,848 | 2,529 |
| National & Homeland Security (WFO) | REC | Mass Spectrometer | 1,500 | - | - | 1,500 |
| Radioisotope Power Systems | MFC | Capital Equipment (glovebox, replacement environmental equipment, high temperature vacuum furnace, two trailer systems) | 6,000[a] | 500 | 500 | 500 |
| | MFC | Glovebox | 1,100 | 1,100 | - | - |
| NGNP VHTR Technology Development | ATR/MFC Use, CFA Storage | ATR Shipping Cask | 5,000 | - | 5,000 | - |
| | REC CAES | Procurement and Installation of Aberration Corrected Field-Emission Gun Scanning TEM | 4,200 | - | 4,200 | - |
| NGNP R&D Fuel Development | REC | Printer/Modeler | 88 | 88 | - | - |
| | ATR Complex | 7 Fission Gas Monitors | 830 | 830 | - | - |
| | ATR Complex | Ion Source Residual Gas Analyzer | 54 | 54 | - | - |
| NGNP Materials/ Graphite | REC | Machine Lathe | 99 | 99 | - | - |
| | ATR Complex | ATR Mill | 90 | 90 | - | - |
| NSUF | REC CAES | Focused Ion Beam | 1,210 | 1,210 | - | - |
| | REC CAES | Nano Indenter | 534 | 534 | - | - |
| | MFC | SEM Hot Stage | 66 | 66 | - | - |
| | REC CAES | Small Sample Test Machine | 130 | 130 | - | - |
| | REC CAES | Transmission Electron Microscope | 1,902 | 1,902 | - | - |
| | REC CAES | Atom Probe Equipment | 1,614 | 1,614 | - | - |
| | REC CAES | Atom Probe Subcontract | 350 | 350 | - | - |
| | REC CAES | LECO Hardness Tester | 100 | 100 | - | - |
| | MFC | IASCC Hot Cells (Premier sub) | 1,549 | 1,549 | - | - |
| | MFC | IASCC Engineering (Portage sub) | 664 | 664 | - | - |
| | MFC | GE-100 Cask | 213 | 213 | - | - |
| | MFC | Actuators | 207 | 207 | - | - |
| | MFC | LECO Hardness Tester for Univ PIE | 100 | 100 | - | - |

Table B-2.5. Program-funded capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| FCRD Separations - Aqueous | MFC | ICS-5000 ION Chromatograph | 103 | 103 | - | - |
| | MFC | ISQ GC-MS | 103 | 103 | - | - |
| | MFC | 1-cm Centrifugal Contactor System | - | - | 50 | - |
| | MFC | Fluorimeter/Time Resolved Laser Induced Fluorescence system | - | - | 150 | - |
| FCRD Metal Fuels | MFC | Model 576AC Roller Cutter System | 177 | 177 | - | - |
| | MFC | Laser Flash Analyzer | 368 | 368 | - | - |
| | MFC | Oscilliscope | 71 | 71 | - | - |
| | MFC | Shielded Electron Probe Micro Analyzer | 1,118 | 1,118 | - | - |
| FCRD Waste Forms | REC | OXY-Gon Retort Furnace | 69 | 69 | - | - |
| FCRD Separations - Echem | MFC | NETZSH Simultaneous Thermal Analyzer | 115 | 115 | - | - |
| S&S | MFC | Remote Operated Weapons | 3,000 | - | - | 3,000 |
| | MFC | Live Fire Range Turning Targets | 200 | - | - | 200 |
| | MFC | Replace Armored Vehicles | 900 | - | - | 900 |
| CAES | REC | Pressure Reactor Process Controller and support equipment | 164 | 164 | - | - |
| | REC | E500 Continuous Flow Electric Valve System | 28 | 28 | - | - |
| | REC | Optical Petrographic Microscope | 43 | 43 | - | - |
| | REC | Energy Dispersive X-Ray Fluorescence Microscope | 172 | 172 | - | - |
| | REC | Gas Chromatograph Mass Spectrometer | 56 | 56 | - | - |
| | REC | Inductively Coupled Plasma Critical Emission Spectrometer | 77 | 77 | - | - |
| | REC | Fluids Lab Support Equipment | 28 | 28 | - | - |
| | REC | Scanning Electron Microscope (Jeol JSM-6610LV/TMP SEM with EDX and EBSD A Systems) | 425 | 425 | - | - |
| | REC | Refractory Furnace | 96 | 96 | - | - |
| | REC | Electron Energy Loss Spectrometer | 194 | 194 | - | - |
| | REC | Materials Lab support equipment | 69 | 69 | - | - |
| | REC | Dilaometer | 174 | 174 | - | - |

Table B-2.5. Program-funded capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| CAES | REC | Detection/Lab Equipment | 97 | 97 | - | - |
| | REC | Secondary Ion Mass Spectrometer | 1,500 | - | 1,500 | - |
| | REC | Electron Probe Micro-Analyzer | 1,700 | - | 1,700 | - |
| | REC | Spark Plasma Sintering System | 550 | - | 550 | - |
| | | **Total Program Funded Capital Equipment** | **79,549[a]** | **20,722** | **19,798** | **10,429** |

*a. Funding extends beyond FY 2012.*

*ATR = Advanced Test Reactor*
*CAES = Center for Advanced Energy Studies*
*CFA = Central Facilities Area*
*FCRD = Fuel Cycle Research and Development*
*IASCC = Irradiation Assisted Stress Corrosion Cracking*
*MFC = Materials and Fuels Complex*
*NGNP = Next Generation Nuclear Plan*
*NSUF = National Scientific User Facility*
*PDU = pilot development unit*
*PIE = post-irradiation examination*
*R&D = research and development*
*REC = Research and Education Campus*
*ROM = rough order of magnitude*
*S&S = safeguards and security*
*SEM = scanning electron microscope*
*TEM = transmission electron microscope*
*VHTR = Very-High Temperature Reactor*
*WFO = Work for Others*

Table B-2.6. Institutional general purpose capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| EES&T | REC | Electrolytic Gaseous Hydrogen Generator | 138 | 138 | - | - |
| | REC | Raman Spectrometer Gas Analyzer | 211 | 211 | - | - |
| | REC | Gas Compressor | 112 | 112 | - | - |
| | REC | Siemens GC | 160 | 160 | - | - |
| | REC | NMR Spectrometer | 849 | 849 | - | - |
| | REC | FEG SEM Microscope | 1,173 | 1,173 | - | - |
| | REC | X-ray Diffractometer | 349 | 349 | - | - |
| | REC | Nanoparticle, Molecular Weight, Zeta Potential Analyzer | 89 | 89 | - | - |
| | REC | Bench Scale Torrefaction | 441 | 441 | - | - |
| | REC | Confocal Microscope | 550 | 550 | - | - |
| | REC | Synthesis Workflow System | 2,000 | - | 2,000 | - |
| | REC | Surface Analyzer/BET (Brunauer, Emmett, and Teller) method | 94 | - | 94 | - |
| | REC | Chemisorption Analyzer | 175 | - | 175 | - |
| | REC | FTIR Microscope | 250 | - | 250 | - |
| | REC | Prototyping System | 85 | - | 85 | - |

Table B-2.6. Institutional general purpose capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| EES&T | REC | Gas Chromatography – Time of Flight Mass Spectroscopy (GCTOFMS) | 250 | - | 250 | - |
| | REC | Liquid Chromatography Mass Spectroscopy (LCMS) | 250 | - | 250 | - |
| | REC | TGA/IR/MS | 200 | - | 200 | - |
| | REC | Intron 5882 Floor Model Testing System | 90 | - | 90 | - |
| | REC | Sterilizer System | 160 | - | 160 | - |
| | REC | NEXUS-II Glovebox System | 60 | - | 60 | - |
| | REC | RIK Refactoring | 50 | - | 50 | - |
| | REC | Rocking Autoclave System | 150 | - | 150 | - |
| | REC | MDGC-MSD | 250 | - | 250 | - |
| | REC | Radar System for UAVs | 250 | - | 250 | - |
| | REC | 12 FTMS/ESI/MALDI | 1,800 | - | - | 1,800 |
| | REC | Imaging SIMS | 1,200 | - | - | 1,200 |
| | REC | Membrane MS | 75 | - | - | 75 |
| | REC | UV-VIS-NIR | 80 | - | - | 80 |
| | REC | Research FTIR | 100 | - | - | 100 |
| | REC | Fluorescence Spectrometer | 65 | - | - | 65 |
| | REC | Carbon, Hydrogen, Nitrogen, and Sulfur (CHNS) Elemental Determinator and Semi-Automatic Calorimeter | 80 | - | - | 80 |
| | REC | ICP-MS | 150 | - | - | 150 |
| | REC | 400 MHz NMR | 400 | - | - | 400 |
| | REC | AF4-DLC | 175 | - | - | 175 |
| | REC | LECO Pegasus 4D GCxGC-TOFMS | 210 | - | - | 210 |
| | REC | X-Ray Imaging System | 250 | - | - | 250 |
| | REC | Lab Raman HR | 230 | - | - | 230 |
| NS&T | MFC | Ultrasonic Laboratory Micro Scanner | 278 | 278 | - | - |
| | MFC | UV-VIS-NIR | 75 | 75 | - | - |
| | MFC | Precision Gamma Scanner | 485 | 485 | - | - |
| | MFC | ZEISS SEM | 907 | 907 | - | - |
| | REC/CAES or MFC | NEC Model 12SDH Tandem Van de Graaff Pelletron Accelerator | 488 | 488 | - | - |
| | MFC | Gamma Ray Spectroscopy Systems | 300 | 300 | - | - |
| | MFC | Liquid Scintillation Detectors | 150 | 150 | - | - |
| | MFC | Ar Atmosphere Glovebox | 100 | 100 | - | - |
| | MFC | Differential Scanning Calorimeter and Dilatometer installed into an Inert Atmosphere Actinide GB | 324 | - | 324 | |
| | MFC | Liquid Scintillation Spectrometers | 150 | - | 150 | - |

Table B-2.6. Institutional general purpose capital equipment list as of June 4, 2010 ($K).

| INL Project/ Program | INL Area | Equipment Description | ROM Total Equipment Cost | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|
| NS&T | MFC | Shielded SIMS | 3,200 | - | 3,200 | - |
| | MFC | Solvent Extraction Research System | 325 | - | 325 | - |
| | MFC | Aberration Corrected Field-Emission Gun Scanning TEM | 4,400 | - | - | 4,400 |
| | MFC | ICP-MS with Reaction Cell | 200 | - | - | 200 |
| | MFC | Benchtop SEM | 100 | - | - | 100 |
| | MFC | Thermal Flash Diffusivity | 566 | - | - | 566 |
| | MFC | Walk-in Class A Rated Hood Enclosure | 125 | - | - | 125 |
| | MFC | Molten Salt Furnaces (4) | 400 | - | - | 400 |
| N&HS | REC | DMOS System | 699 | 699 | - | - |
| | REC | Real Time Digital Simulator System | 2,195 | 2,195 | - | - |
| | REC | Canberra MiniGrand System | 157 | 157 | - | - |
| | REC | Acoustic Mixer | 52 | 52 | - | - |
| | REC | TEMS RF Analysis Tools | 152 | 152 | - | - |
| | REC | Vector Signal Generator | 86 | 86 | - | - |
| | REC | Wireless Sensor Laboratory Equipment | 131 | 131 | - | - |
| | REC | Digital Cerenkov Viewing Device | 155 | 155 | - | - |
| | REC | 3D Imager | 118 | 118 | - | - |
| | REC | JWICS Connectivity | 1,200 | - | 1,200 | - |
| | REC | IAEA Safeguards Equipment Phases 3 & 4 | 1,000 | - | 1,000 | - |
| | Sitewide | Monitors and Sensors for Test Range | 1,000 | - | - | 1,000 |
| | REC | Blast Chamber | 400 | - | - | 400 |
| | Sitewide | Wireless Simulation and Performance Modeling Equipment | 1,050 | - | - | 1,050 |
| | Sitewide | Materials Engineering and Explosives Testing Equipment | 1,000 | - | 500 | 500 |
| | | **Total IGPCE** | **35,169** | **10,600** | **11,013** | **13,556** |

*BET = Brunauer, Emmett, and Teller method*
*CHNS = Carbon, Hydrogen, Nitrogen, and Sulfur*
*DMOS = Digital Multi-Channel Optical Surveillance*
*EES&T = Energy and Environment Science and Technology*
*FEG = field emission gun*
*FTIR = Fourier Transform Infrared*
*GC = gas chromatograph*
*GCTOFMS = Gas Chromatography – Time of Flight Mass Spectroscopy*
*IAEA = International Atomic Energy Agency*
*ICP-MS = inductively coupled plasma-mass spectroscopy*
*IGPCE = Institutional General Purpose Capital Equipment*
*LCMS = Liquid Chromatography Mass Spectroscopy*
*MDGC-MSD = multidimensional gas chromatograph with mass selective detector N&HS = National and Homeland Security*
*NS&T = Nuclear Science and Technology*
*NMR =Nuclear Magnetic Resonance*
*REC = Research and Education Campus*
*ROM = rough order of magnitude*
*SEM = scanning electron microscope*
*SIMS = secondary ion mass spectrometry*
*TEM = transmission electron microscope*
*TGA/IR/MS = thermogravimetric analysis/infrared/mass spectroscopy*
*UAV = unmanned aerial vehicle*
*UV-VIS-NIR = ultraviolet-visible-near infrared*

## B-3. FACILITY DISPOSITION PLAN

Table B-3.1 provides information on the DOE-NE-funded disposition of INL buildings, as required by DOE Order 430.1B, Real Property Asset Management, dated February 2008. The facilities are listed in the table according to the year disposition is anticipated to be completed.

From its inception as a national research laboratory nearly 60 years ago, the INL has built facilities and support infrastructure that were occupied and utilized by numerous programs to accomplish a diverse range of mission assignments. Due to the age and declining condition of many of the buildings and support infrastructure, they are now inadequate to provide the research, development, and demonstration capabilities required to support today's mission requirements. Investments in infrastructure improvements for many INL facilities can be made to further these capabilities; however, funding upgrades to keep some of the facilities functional and in use cannot be justified.

Accordingly, severely underutilized and/or unusable facilities are identified for inclusion in the INL's annual Footprint Reduction Plan. Terms of INL's Performance Evaluation Measurement Plan define footprint reduction as:

- Square footage for facility leases that are terminated
- Square footage placed in cold, dark, and/or dry condition (min-safe condition, as defined by DOE)
- Square footage restricted from demolition by agreements with the State Historical Preservation Office
- Square footage transferred to other entities
- Square footage deactivated and demolished.

Footprint reduction is projected to total 742,764 $ft^2$ by the end of FY 2019. From February 2005 (when Battelle Energy Alliance [BEA] became the INL Management and Operating [M&O] Contractor) to September 31, 2009, a total of 337,958 $ft^2$, or 45%, of the projected footprint reduction goal has been completed.

Footprint reduction planning is a very dynamic process, with footage projection totals changing from year-to-year. Footprint reduction opportunities are influenced and affected by a number of factors, including:

1. Availability of funding to demolish buildings
2. Availability of funding to construct or lease buildings to provide replacement or expansion space
3. Changes in program space needs ranging from space that is no longer required to space designated for reuse/revitalize/remodel existing for reuse.

To date, the BEA Footprint Reduction Program has been successful in meeting its goals for eliminating surplus, unusable space and is expected to continue doing so in the future.

Table B-3.1. Idaho National Laboratory buildings to be inactivated, demolished, or transferred from Fiscal Year 2010 through Fiscal Year 2019 as of June 4, 2010.

| Building ID | Name | Floor Area ($ft^2$) | Year Built | Status | Inactivation Date | Disposition Complete Date | Method of Disposition | Estimated Demolition Cost[a] ($K) | Expected NEPA Category and ES&H |
|---|---|---|---|---|---|---|---|---|---|
| B16-603 | Experimental Field Station Barn | 572 | 1964 | Operating | 2010 | 2010 | Demolish | 98 | CK |
| B16-605 | NOAA Storage Building | 37 | 1968 | Operating | 2010 | 2010 | Demolish | 3 | CX |
| B16-606 | Experimental Field Station Storage Building | 336 | 1963 | Operating | 2010 | 2010 | Demolish | 20 | CX |
| B16-610 | Meteorological Balloon Shelter | 144 | 1960 | Operating | 2010 | 2010 | Demolish | 9 | CX |
| CF-666 | Maintenance Support Building | 11,717 | 1951 | Shutdown pending D&D | 2009 | 2010 | Demolish | 319 | CX |
| IF-615 | May Street South | 6,161 | 1960 | Operating | 2010 | 2010 | Terminate lease | 0 | N/A |
| MFC-799 | Sodium Process Facility | 7,329 | 1986 | Operating | 2010 | 2010 | Transfer to EM to D&D | 3,768 | CX |
| MFC-799A | Caustic Storage Tank Building | 562 | 1979 | Operating | 2010 | 2010 | Transfer to EM to D&D | 43 | CX |
| MFC-770C | Nuclear Calibration Lab | 240 | 1963 | Operating | 2010 | 2010 | Transfer to EM to D&D | 14 | CX |
| PBF-641 | CITRC Wireless Communication Network Ctr | 7,000 | 1993 | Operating | 2010 | 2010 | Demolish | 166 | CX |
| CF-612 | Office Building | 9,813 | 1983 | Operating | 2011 | 2011 | Demolish | 230 | CX |
| CF-674 | Excess Warehouse | 56,508 | 1952 | Operating | 2011 | 2011 | Demolish | 1,293 | CX |
| MFC-750B | EBR-II Storage Shed | 848 | 1969 | Operating | 2011 | 2011 | Demolish | 51 | CX |
| TRA 615 | Meteorological Instrument Building | 36 | 1970 | Shutdown pending D&D | 2002 | 2011 | Transfer or demolish | 3 | CX |
| TRA 631 | Acid and Caustic Pumphouse | 289 | 1952 | Shutdown pending D&D | 2002 | 2011 | Transfer or demolish | 31 | CX |
| TRA 675 | Waste Oil Dumpster Shed | 155 | 1987 | Shutdown pending D&D | 1997 | 2011 | Transfer or demolish | 13 | CX |
| TRA-689 | Radioactive Waste Storage Building | 5,470 | 1969 | Operational Standby | 1997 | 2011 | Transfer to EM to D&D | 561 | CX |
| CF-676 | DOE Equipment Storage | 1,475 | 1963 | Operating | 2012 | 2012 | Demolish | 69 | CX |

Table B-3.1. Idaho National Laboratory buildings to be inactivated, demolished, or transferred from Fiscal Year 2010 through Fiscal Year 2019 as of June 4, 2010.

| Building ID | Name | Floor Area ($ft^2$) | Year Built | Status | Inactivation Date | Disposition Complete Date | Method of Disposition | Estimated Demolition Cost[a] ($K) | Expected NEPA Category and ES&H |
|---|---|---|---|---|---|---|---|---|---|
| CF-688/689 | Technical Center Office Building | 46,107 | 1963 | Shutdown pending D&D | 2007 | 2012 | Demolish | 1,974 | CX |
| CF-690 | Radiological Environmental Science Lab | 32,394 | 1963 | Operating | 2012 | 2012 | Demolish | 1,944 | CX |
| IF-613 | North Boulevard Annex | 14,201 | 1963 | Operating | 2012 | 2012 | Terminate lease | 0 | N/A |
| IF-651 | North Yellowstone Laboratory | 8,000 | 1984 | Operating | 2012 | 2012 | Terminate lease | 0 | N/A |
| MFC-714 | Office Building T-12 | 6,048 | 1977 | Operating | 2013 | 2013 | Demolish | 151 | CX |
| MFC-770B | Sodium Component Storage | 258 | 1962 | Operating | 2013 | 2013 | Transfer to EM to D&D | 29 | CX |
| MFC-793 | Sodium Component Maintenance Shop | 3,809 | 1976 | Operating | 2013 | 2013 | Transfer to EM to D&D | 1,421 | CX |
| MFC-793C | SCMS Contaminated Storage | 1,880 | 1984 | Operating | 2013 | 2013 | Transfer to EM to D&D | 43 | CX |
| MFC-793G | SCMS Storage Building | 385 | 1979 | Operating | 2013 | 2013 | Transfer to EM to D&D | 14 | CX |
| PBF-632 | Office Building | 8,050 | 1981 | Operational Standby | 2005 | 2013 | Demolish | 145 | CX |
| TAN-601 | Guard House | 2,995 | 1954 | Operating | 2013 | 2013 | Demolish | 180 | CX |
| TRA-669 | Cold Storage Building | 2,269 | 1968 | Operating | 2013 | 2013 | Demolish | 136 | CX |
| TRA-673 | Storage Building | 1,188 | 1971 | Operating | 2013 | 2013 | Demolish | 71 | CX |
| TRA-675 | Waste Oil Dumpster | 155 | 1987 | Shutdown pending D&D | 2000 | 2013 | Demolish | 9 | CX |
| MFC-775 | ZPPR Work Room/Vault | 5,030 | 1968 | Operating | 2014 | 2014 | Transfer to EM to D&D | 377 | CX |
| MFC-776 | ZPPR Reactor Cell | 4,034 | 1968 | Operating | 2014 | 2014 | Transfer to EM to D&D | 1,123 | CX |
| MFC-777 | ZPPR Equipment Building | 480 | 1968 | Operating | 2014 | 2014 | Transfer to EM to D&D | 50 | CX |
| MFC-784 | ZPPR Material Control Building | 5,075 | 1968 | Operating | 2014 | 20114 | Transfer to EM to D&D | 115 | CX |
| PBF-612 | CITRC Control System Research Building | 6,248 | 1960 | Operating | 2014 | 2014 | Transfer to EM to D&D | 669 | CX |

Table B-3.1. Idaho National Laboratory buildings to be inactivated, demolished, or transferred from Fiscal Year 2010 through Fiscal Year 2019 as of June 4, 2010.

| Building ID | Name | Floor Area ($ft^2$) | Year Built | Status | Inactivation Date | Disposition Complete Date | Method of Disposition | Estimated Demolition Cost[a] ($K) | Expected NEPA Category and ES&H |
|---|---|---|---|---|---|---|---|---|---|
| PBF-622 | CITRC Explosives Detection Research Center | 5,185 | 1989 | Operating | 2014 | 2014 | Transfer to EM to D&D | 555 | CX |
| B25-601 | SDA Engineering Barriers Test Facility | 2,166 | 1996 | Shut down pending D&D | 2014 | 2014 | Demolish | 106 | CX |
| MFC-TR-1 | Bus Driver's Trailer | 624 | 1978 | Operating | 2015 | 2015 | Demolish | 42 | CX |
| MFC-TR-51 | SPF Operations Trailer | 870 | 2000 | Operating | 2015 | 2015 | Sell or demolish | 42 | CX |
| MFC-713 | Modular Office | 10,725 | 1978 | Operating | 2015 | 2015 | Sell or demolish | 526 | CX |
| MFC-716 | DOE Area Group-West (Modular Office) T-16A | 1,660 | 1962 | Operating | 2015 | 2015 | Sell or demolish | 82 | CX |
| MFC-717 | Technical Consolidation Building (Modular Office) T-2 | 11,417 | 1985 | Operating | 2015 | 2015 | Sell or demolish | 564 | CX |
| MFC-718 | Project Building (Modular Office) T-3 | 7,100 | 1985 | Operating | 2015 | 2015 | Sell or demolish | 352 | CX |
| CF-619 | Utility Building | 400 | 1989 | Operating | 2016 | 2016 | Demolish | 29 | CX |
| CF-625 | CFA Laboratory Complex | 8,797 | 1989 | Operating | 2016 | 2016 | Demolish | 416 | CX |
| CF-629 | Office Building | 9,850 | 1979 | Operating | 2016 | 2016 | Demolish | 478 | CX |
| CF-664 | Storage Building | 16,385 | 1951 | Operating | 2016 | 2016 | Demolish | 405 | CX |
| TRA-621 | Nuclear Material Inspection and Storage | 7,287 | 1982 | Operating | 2016 | 2016 | Demolish | 436 | CX |
| CF-614 | Office | 8,017 | 1986 | Operating | 2017 | 2017 | Demolish | 327 | CX |
| CF-695 | Fire Safety Equipment Storage | 1,584 | 1966 | Operating | 2017 | 2017 | Demolish | 85 | CX |
| CF-601 | Warehouse | 51,951 | 1950 | Operating | 2017 | 2017 | Demolish | 1,195 | CX |
| TAN-658 | Storage Building | 6,151 | 1957 | Operating | 2018 | 2018 | Demolish | 258 | CX |
| TAN-671 | Office Trailer South | 1,568 | 1979 | Operating | 2018 | 2018 | Sell or demolish | 39 | CX |
| TAN-672 | Office Trailer North | 1,568 | 1979 | Operating | 2018 | 2018 | Sell or demolish | 39 | CX |
| TRA-614 | Office Building | 6,218 | 1952 | Operating | 2018 | 2018 | Demolish | 257 | CX |
| TRA-620 | Office Building | 2,030 | 1952 | Operating | 2018 | 2018 | Sell or demolish | 102 | CX |

Table B-3.1. Idaho National Laboratory buildings to be inactivated, demolished, or transferred from Fiscal Year 2010 through Fiscal Year 2019 as of June 4, 2010.

| Building ID | Name | Floor Area ($ft^2$) | Year Built | Status | Inactivation Date | Disposition Complete Date | Method of Disposition | Estimated Demolition Cost[a] ($K) | Expected NEPA Category and ES&H |
|---|---|---|---|---|---|---|---|---|---|
| TRA-629 | Gas Cylinder Storage Building | 640 | 1956 | Operating | 2018 | 2018 | Demolish | 50 | CX |
| TRA-638 | Office Trailer | 2,049 | 1979 | Operating | 2018 | 2018 | Demolish | 51 | CX |
| TAN-682 | Storage Building | 20,000 | 1986 | Operating | 2019 | 2019 | Demolish | 810 | CX |
| TAN-688 | Warehouse | 20,400 | 1988 | Operating | 2019 | 2019 | Demolish | 808 | CX |
| TAN-690 | Oil Storage Facility | 360 | 1990 | Operating | 2019 | 2019 | Demolish | 39 | CX |
| TAN-693 | Paint Shop Building SMC | 410 | 1991 | Operating | 2019 | 2019 | Demolish | 9 | CX |
| TAN-1613 | Chemical Storage Building | 644 | 2002 | Operating | 2019 | 2019 | Demolish | 29 | CX |
| TRA-616 | Cafeteria | 4,417 | 1952 | Operating | 2019 | 2019 | Demolish | 265 | CX |

*a. Demolition cost is estimated in 2009 dollars.*

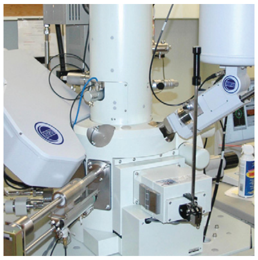
*B16 = Block 16 building number prefix*
*B25 = Subsurface Disposal Area building number prefix*
*CF = Central Facilities Area*
*CITRC = Critical Infrastructure Test Range Complex*
*CX = categorical exclusion*
*D&D = decontamination and decommissioning*
*DOE = U.S. Department of Energy*
*EBR II = Experimental Breeder Reactor II*
*EM = Department of Energy Office of Environmental Management*
*ES&H = environment, safety, and health*
*IF = Idaho Falls (Research and Education Campus number prefix)*
*MFC = Materials and Fuels Complex*
*NEPA = National Environmental Policy Act of 1969*
*NOAA = National Oceanic and Atmospheric Administration*
*PBF = Power Burst Facility*
*SCMS = Sodium Components Maintenance Shop*
*SDA = Subsurface Disposal Area*
*SMC = Specific Manufacturing Capability*
*SPF = Sodium Process Facility*
*TAN = Test Area North*
*TRA = Test Reactor Area (ATR Complex building number prefix)*
*ZPPR = Zero Power Physics Reactor*

## B-4 REFERENCES

DOE Order 430.1B, *Real Property Asset Management*, U.S. Department of Energy, February 2008.

# APPENDIX C






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

# CONTENTS



## Figures



## Tables

# ACRONYMS

| | |
|---|---|
| AMWTP | Advanced Mixed Waste Treatment Project |
| ARRA | American Recovery and Reinvestment Act |
| ATR | Advanced Test Reactor |
| CAIS | Condition Assessment Information System |
| CBFO | Carlsbad Field Office |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CSO | Cognizant Secretarial Office |
| D&D | decommissioning and demolition |
| DOD | Department of Defense |
| 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 |
| DRR | domestic research reactor |
| FIMS | Facility Information Management System |
| FRR | foreign research reactor |
| FSV | Fort St. Vrain |
| FY | fiscal year |
| ICDF | Idaho CERCLA Disposal Facility |
| ICP | Idaho Cleanup Project |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| ISFSI | Independent Spent Fuel Storage Installation |
| IWTU | Integrated Waste Treatment Unit |
| LLW | low-level waste |
| MFC | Materials and Fuels Complex |
| MLLW | mixed low-level waste |
| NRF | Naval Reactors Facility |
| OU | operable unit |
| PBF | Power Burst Facility |
| PED | project engineering and design |
| PSO | Program Secretarial Office |
| RCRA | Resource Conservation and Recovery Act |
| ROD | Record of Decision |
| RWMC | Radioactive Waste Management Complex |
| SAP | Special Access Program |
| SDA | Subsurface Disposal Area |
| SMC | Specific Manufacturing Capability |
| SRS | Savannah River Site |
| TAN | Test Area North |
| TMI | Three-Mile Island |
| TRU | transuranic |
| TYSP | Ten-Year Site Plan |
| UNF | used nuclear fuel |
| WIPP | Waste Isolation Pilot Plant |

# APPENDIX C COGNIZANT SECRETARIAL OFFICES, PROGRAM SECRETARIAL OFFICES, AND NON-DOE SITE PROGRAMS

Under Department of Energy (DOE) Order 430.1B, Chg 1, *Real Property Asset Management*, the landlord of a site has the responsibility to act as a host landlord for its resident Cognizant Secretarial Offices (CSOs) or Program Secretarial Offices (PSOs), including coordinating all CSO/PSO programmatic needs and presenting a single coordinated Ten-Year Site Plan (TYSP), which includes any tenant-specific TYSPs. The site landlord also has the responsibility to ensure that the TYSP reflects infrastructure agreements between the Lead PSO and CSOs. Projected programmatic needs and potential growth are analyzed and reviewed with the programs and their infrastructure support requirements are integrated into the planning process.

The DOE's Office of Environmental Management (DOE-EM) and Office of Naval Reactors are the two largest non nuclear energy organizations at the Idaho National Laboratory (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 Office of Naval Reactors owns the Naval Reactors Facility (NRF). The Department of Defense (DOD) funds the Specific Manufacturing Capability (SMC) operated in Department of Energy Office of Nuclear Energy (DOE-NE) owned facilities. This appendix describes the facilities occupied and/or work performed by DOE-EM, Office of Naval Reactors, and DOD at the INL.

## C-1. IDAHO CLEANUP PROJECT AND ADVANCED MIXED WASTE TREATMENT PROJECT OVERVIEW

DOE-EM's contracts for the ICP and AMWTP at the INL site are to safely accomplish as much of DOE-EM's cleanup mission as possible within available funding, while meeting regulatory requirements through the contract completion dates.

### C-1.1 Idaho Cleanup Project Mission

The Department of Energy Idaho Operations Office (DOE-ID)/INL mission is to develop and deliver cost-effective solutions to both fundamental and advanced challenges in DOE-NE (and other energy resources), national security, and DOE-EM. The DOE-EM ICP's goal is to complete the environmental cleanup in a safe, cost effective manner, consistent with the DOE-EM Five-Year Plan (dated February 2007). The objectives include the following:

- **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 Agreements.
- **Objective DOE EM 3:** Identify innovative approaches to post-2012 work scope such as calcine, spent fuel, decommissioning and demolition (D&D), and institutional control.
- **Objective DOE EM 4:** Maintain Federal Baseline Management and Government Furnished Services and Items delivery systems and apply to administration of new contracts.

### C-1.1.1 Scope and Schedule

Section C of the ICP contract, as amended by a number of contract modifications, defines the "Target" scope of work to be completed by September 30, 2012. In addition to the target scope, a substantial amount of ICP work is being conducted under Section B.5 of the contract (items not included in target cost). In addition, in April 2009, the American Recovery and Reinvestment Act (ARRA) provided funding to accelerate some high-priority-target work and added a new B.5 scope to the ICP contract. All ARRA-funded work scope is scheduled to be completed by September 2011. The current scope of the ICP is summarized below.

- **INTEC**
  - Target Scope:
    - Demolish or disposition all excess facilities
    - Design, construct, and operate a facility for liquid sodium-bearing waste
    - Provide interim storage of steam-reformed product generated during the term of the contract
    - Empty and disposition all Tank Farm Facility waste tanks
    - Place all DOE-EM used nuclear fuel (UNF) in safe dry storage
    - Deactivate DOE-EM UNF wet storage basins (CPP-603) (complete)
    - Dispose of or disposition all excess nuclear material (complete)
    - Complete all voluntary consent order tank system actions
    - Complete all required Operable Unit (OU) 3-13 remediation (complete)
    - Complete OU 3-14 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Tank Farm Interim Action
    - Maintain and operate the Idaho CERCLA Disposal Facility (ICDF).
  - Non-Target (B.5) Scope:
    - Transfer Navy Fuel, stored at INTEC, to dry storage at the NRF
    - Perform management and oversight for safe storage of UNF at the Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) and the Three-Mile Island, Unit 2 (TMI 2) ISFSI
    - Provide support and subject matter expert services for the activities required to ensure proper and timely response to requests in support of the removal of UNF from the State of Idaho, currently stored at INTEC, and at the FSV Colorado facility
    - Receive UNF from domestic research reactors (DRRs) and foreign research reactors (FRRs) and place the fuel in dry storage at INTEC
    - Provide the preparatory work to initiate the transfer of aluminum-clad UNF from the INL to the Savannah River Site (SRS) for recycling, and the shipment of non-aluminum UNF from SRS to INL, in support of the L-Basin Closure at SRS
    - Provide supplemental scope, outside the approved ICP (target) baseline, for the Calcine Disposition Project to achieve a viable disposition pathway, while meeting the applicable regulatory milestones.

- ARRA (B.5) Scope:
  - Complete activities that support the receipt, processing, and ultimate disposition of 161 containers of remote-handled TRU waste, located primarily at the Materials and Fuels Complex (MFC)
  - Complete activities that support the disposition of an estimated 1,970 $ft^3$ of low-level waste (LLW) and/or mixed low-level waste (MLLW) (including alpha contaminated waste) retrieved from AMWTP
  - Demolish or disposition additional excess facilities
  - Disposition of low-level, mixed low-level, and hazardous waste resulting from ARRA D&D activities.

- **RWMC**
  - Target Scope:
    - Retrieve stored remote-handled LLW and dispose of it at the Subsurface Disposal Area (SDA), or other appropriate disposal facility
    - Retrieve stored remote-handled TRU waste and dispose of it at the Waste Isolation Pilot Plant (WIPP) or transfer to MFC
    - Retrieve and dispose of waste resulting from the DOE-EM cleanup activities, including low-level, hazardous, mixed low-level, alpha-contaminated mixed low-level, and newly generated mixed and nonmixed TRU waste, at an appropriate disposal facility
    - Demolish and remove facilities no longer needed (ARRA funded post April 2009)
    - Continue operation of the vapor vacuum extraction system
    - Continue groundwater monitoring program
    - Complete contract-specified remediation of buried TRU waste, including exhumation and disposal
    - Finalize and submit the final comprehensive Record of Decision (ROD) for Waste Area Group 7, OU 7-13/14 (complete).
  - Non-Target (B.5) Scope:
    - Maintain the analytical laboratory (TR-14 located at RWMC) annual base load capability and provide chemical analysis of AMWTP, ICP, and non-ICP TRU waste samples for the DOE, Carlsbad Field Office (CBFO), until a small business set-a-aside contract can be awarded to operate the Laboratory or until CBFO transfers this capability to another DOE site.
  - ARRA Target Scope:
    - Complete in situ grouting of mobile radionuclide sources, as identified in the OU 7-13/14 ROD
    - Complete Pit 5 Targeted Waste Exhumation, Packaging, and Characterization
    - Complete Pit 6 Targeted Waste Exhumation, Packaging, and Characterization (complete).
  - ARRA (B.5) Scope:
    - Complete Pit 4W exhumation facility design and construction
    - Start Pit 4W excavation of the pit area footprint, retrieval and packaging, and shipment to WIPP of TRU and targeted waste.

- **Test Area North (TAN)**
  - Target Scope:
    - Demolish all DOE-EM facilities (only facilities required for groundwater remediation remain) (complete)

- Complete all voluntary consent order tank system actions (complete)
- Complete all remediation of contaminated soils and tanks at TAN (OU-1 10) (complete)
- Continue CERCLA remedial pump and treat activities (OU 1-07B)
- Close or transfer the TAN landfill to the INL contractor following completion of TAN demolition (complete).

- **Advanced Test Reactor (ATR) Complex**
  - Target Scope:
    - Demolish all DOE-EM owned facilities (ARRA funded post April 2009)
    - Disposition of the Engineering Test Reactor and the Materials Test Reactor complexes
    - Complete all voluntary consent order tank systems actions
    - Complete the 5-year review of OU 2-13
    - Complete remedial actions for ATR Complex release sites under OU 10-08.
  - ARRA (B.5) Scope:
    - Demolish or disposition all excess facilities
    - Disposition of LLW, MLLW, and hazardous waste resulting from ARRA D&D activities.
- **Critical Infrastructure Test Range Complex**
  - Target Scope:
    - Disposition Power Burst Facility (PBF) Reactor (complete)
    - Complete the 5-year review of OU 5-12.
  - ARRA (B.5) Scope:
    - Demolish or disposition excess facilities
    - Disposition of low-level, mixed low-level, and hazardous waste resulting from ARRA D&D activities.
- **Miscellaneous Sites:**
  - Complete all required remedial actions for OU 10-04
  - Perform actions necessary to complete the OU 10-08 ROD by the enforceable milestone and implement the ROD if it is finalized and signed during the contract period.
- **MFC**
  - ARRA (B.5) Scope:
    - Demolish or disposition excess facilities
    - Disposition of low-level, mixed low-level, and hazardous waste resulting from ARRA D&D activities.

A high-level summary schedule for completion of this scope of work is shown in Figure C-1.1.

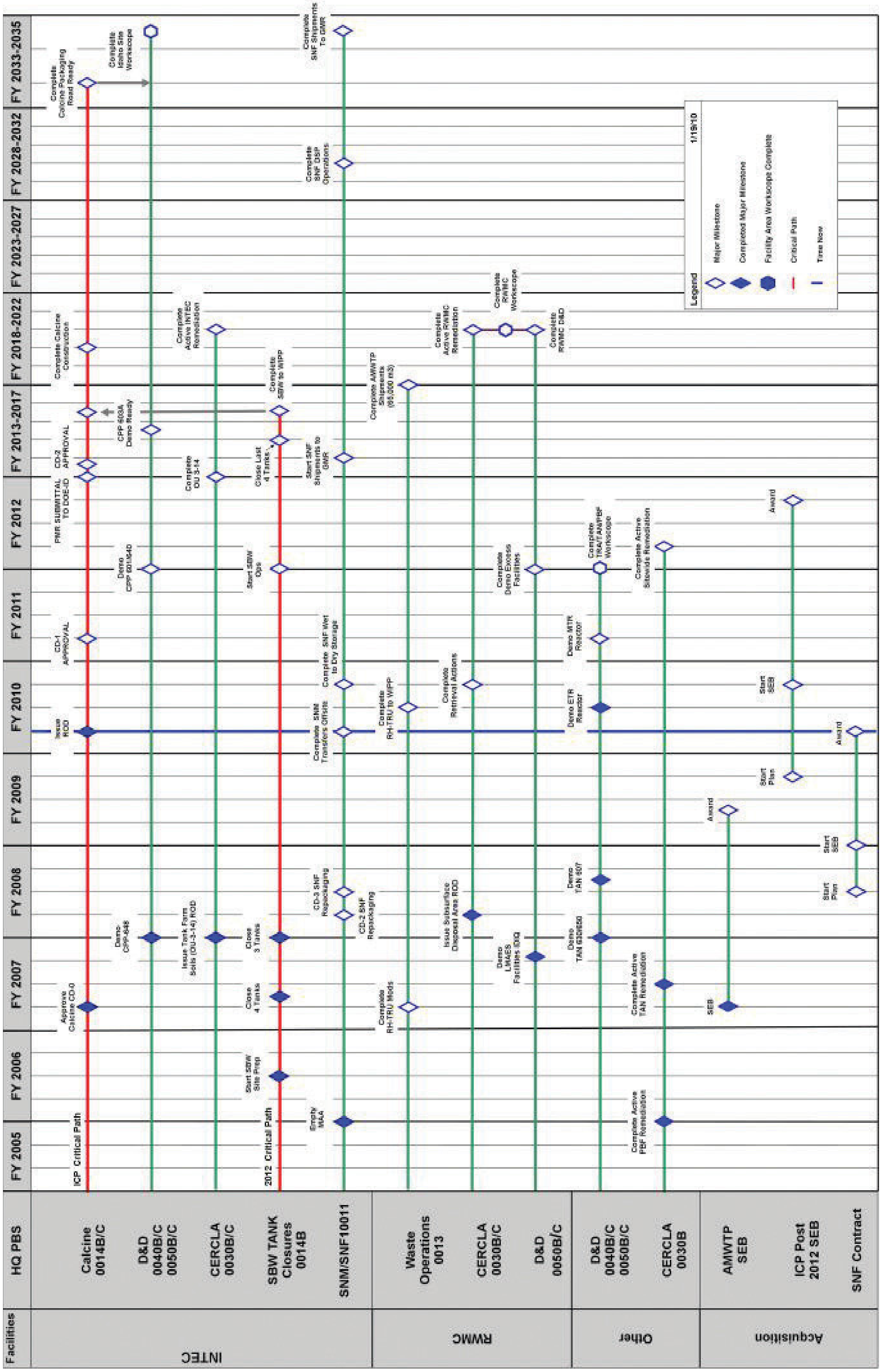



*Figure C-1.1. Idaho Cleanup Project life-cycle schedule.*

### C-1.1.2 Performance Measures

The ICP is held accountable for work scope through performance metrics based on measurable milestones or actions. Specifically, the ICP "Gold Chart" quantifies DOE's expectations by year for cleanup activities, such as disposal of low-level and mixed low-level waste, offsite shipment of stored TRU waste, UNF moved from wet to dry storage, and remediation of contaminated release sites and facilities. The Gold Chart metrics provide a consistent set of performance measures for the complex-wide DOE-EM program, and are a component of the DOE-Headquarters DOE-EM annual performance plan reported to Congress with the annual budget submittal. Gold Chart metrics are under DOE-EM configuration control and are statused monthly to DOE-EM-1.

With the addition of ARRA-funded work scope, an additional set of performance metrics, separate from the "Gold Chart," was instituted. Those metrics quantify the ICP's performance against the expectations set by the ICP contract modifications that authorize the ARRA-funded work scope. ARRA metrics report the quantities of remote-handled TRU received, processed, and shipped; the amount of buried waste retrieved and the number of facilities demolished; ARRA funds expended; and the number of jobs created or retained as a result of ARRA work scope.

### C-1.1.3 Funding and Staffing

The ICP is funded by the DOE EM. The annual projected funding for the ICP, through Fiscal Year (FY) 2012, is shown in Table C-1.1.

The ICP staffing will be aligned with project work scope, as necessary, throughout the course of the contract. Figure C-1.2 shows currently projected ICP staffing through the year 2012.

Table C-1.1. Idaho Cleanup Project funding schedule ($M).

| | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | Total |
|---|---|---|---|---|---|---|---|---|---|
| ICP Target Funding (contract Section B.2) | 237 | 477 | 464 | 371 | 357 | 335 | 337 | 335 | 2,913 |
| **Actual Funding** | | | | | | | | | |
| ICP Target Funding (non-ARRA) | 320 | 518 | 375 | 380 | 303 | 273 | 337 | 335 | 2,841 |
| B.5 Funding (non-Target, non-ARRA) | 27 | 9 | 30 | 12 | 31 | 6 | | | 115 |
| ARRA Funding (Target) | | | | | 142 | | | | 142 |
| ARRA Funding (non-Target) | | | | | 296 | | | | 296 |
| Total Funding | 347 | 527 | 405 | 392 | 772 | 279 | 337 | 335 | 3,394 |

*1. No current contract coverage exists beyond the year 2012.*

*2. FY 2010 funding includes current funding as of Contract Mod 119, dated December 9, 2009, and includes an expected increase of $97.7M over funding through Mod 119.*

*3. FY 2011 through FY 2012 funding is per Contract Section B.2, with Section B.5 funding developed annually, with no future commitment.*

*4. Table excludes $16.5M in FY 2005 funding for contract transition activities.*

*ARRA = American Recovery and Reinvestment Act*

*ICP = Idaho Cleanup Project*

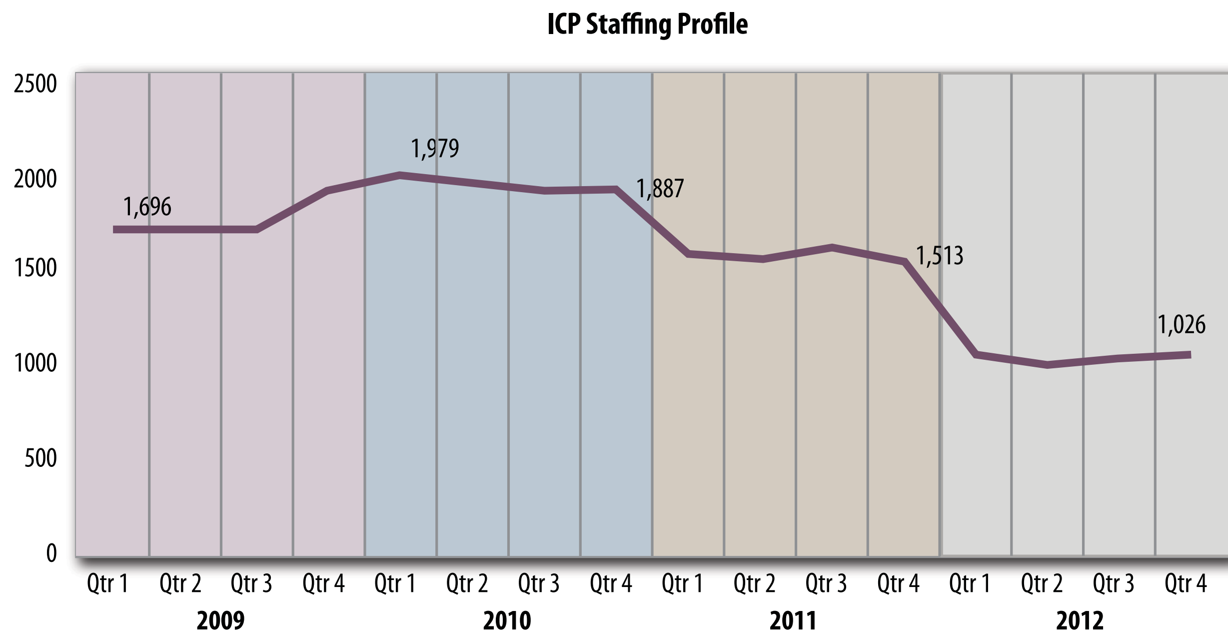



*Figure C-1.2. Projected Idaho Cleanup Project staffing for full-time equivalents averaged over the fiscal year.*

### C-1.1.4 Facilities and Infrastructure Overview

A breakdown of building ownership showing DOE-EM owned buildings (which includes both ICP and AMWTP facilities) versus DOE-NE-owned buildings is available in the Facilities Information Management System (FIMS) database. As of March 2008, the FIMS database showed 224 DOE-EM owned buildings at INL, with a total area of 2,695,845 $ft^2$.

Table C-1.2 provides a description of the buildings assigned to the ICP and their overall operating status, size, age, usage, and hazard description.

The current conditions of existing DOE-EM buildings (including the ICP and AMWTP) are illustrated in Figure C-1.3.

#### *C-1.1.4.1 Maintenance*

The ICP will continue to maintain mission essential facilities/utility systems in accordance with DOE Order 430.1B, Chg 1. Facilities/utility systems that no longer have a defined mission, and are considered candidates for decommissioning, will continue to undergo surveillance and maintenance adjustment according to the guidelines of DOE Guide 430.1, *Life Cycle Asset Management*.

A graded approach is implemented for surveillance and maintenance by the ICP. The graded approach being used is commensurate with the facility/utility systems condition, mission need, and schedule for demolition.

Maintenance, whether preventive, predictive, or corrective, is performed at a level to sustain property in a condition suitable for the property to be used for its designated purpose.

Surveillance is the scheduled periodic inspection of facilities, utility systems, equipment, or structures to demonstrate compliance, identify problems requiring corrective action, and determine the facility's present environmental, radiological, and physical condition.

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| **Idaho Cleanup Project Operating Facilities with Future Missions (no D&D planned under the Idaho Cleanup Project contract)** | | | | | | | | |
| CF-TR-01 | CFA CERCLA Staging Office | Excellent | 400 | 1990 | | MB02 Wood, Commercial and Industrial | 101 Office | 10 Not Applicable |
| CPP-1604 | Office Building | Good | 22,633 | 1986 | 2034 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-1605 | Engineering Support Building | Excellent | 17,105 | 1986 | 2034 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-1606 | Plant Support Warehouse | Excellent | 16,267 | 1986 | 2021 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1608 | Contaminated Equip. Storage | Good | 4,000 | 1987 | 2021 | MB05 Steel Light Frame | 607 Other Buildings Trades Shops | 04 Radiological Facility |
| CPP-1615 | Equipment Bldg 7th Bin Set | Excellent | 263 | 1989 | 2033 | MB07 Steel Frame with Infill Shear Walls | 593 Nuclear Waste Processing and/or Handling Bldg | 04 Radiological Facility |
| CPP-1617 | Waste Staging Facility | Excellent | 1,044 | 1986 | 2031 | MB05 Steel Light Frame | 593 Nuclear Waste Processing and/or Handling Bldg | 02 Nuclear Facility Category 2 |
| CPP-1618 | Liquid Eff. Treat. Disp. Bldg. | Excellent | 5,845 | 1990 | 2031 | MB04 Steel Braced Frame | 593 Nuclear Waste Processing and/or Handling Bldg | 04 Radiological Facility |
| CPP-1631 | Production Computer Support | Excellent | 12,000 | 1988 | 2034 | MB05 Steel Light Frame | 297 Computer Buildings | 10 Not Applicable |
| CPP-1636 | Warehouse | Excellent | 4,800 | 1989 | Post 2012 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1642 | Fire Pumphouse | Excellent | 656 | 1992 | 2035 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 694 Other Service Buildings | 10 Not Applicable |
| CPP-1643 | Fire Pumphouse | Excellent | 656 | 1992 | 2035 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 694 Other Service Buildings | 10 Not Applicable |
| CPP-1646 | Anti-C Safety Handling | Good | 3,708 | 1991 | Post 2012 | MB05 Steel Light Frame | 411 Nuclear Contaminated Storage | 10 Not Applicable |
| CPP-1647 | Water Treatment Facility | Excellent | 2,879 | 1991 | 2035 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-1650 | Training Support Facility | Good | 6,990 | 1992 | 2034 | MB05 Steel Light Frame | 230 Traditional Classroom Buildings | 10 Not Applicable |
| CPP-1651 | Operations Training Facility | Excellent | 6,242 | 1992 | Post 2012 | MB05 Steel Light Frame | 231 Specialized Training Buildings | 10 Not Applicable |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft$^2$ | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| CPP-1659 | Contaminated Equipment Maintenance Bldg | Excellent | 1,846 | 1986 | 2033 | MB04 Steel Braced Frame | 601 Maintenance Shops, General | 02 Nuclear Facility Category 2 |
| CPP-1662 | Remote Insp. Engr. Facility | Excellent | 3,173 | 1992 | Post 2012 | MB03 Steel Moment Frame | 781 Large Scale Demonstration/ Research Building | 10 Not Applicable |
| CPP-1663 | Security and Fire Prot. Support | Excellent | 4,891 | 1992 | 2035 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-1666 | Engineering Support Office | Excellent | 7,168 | 1993 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| TCPP-1671 | Protective Force Support Fac. | Excellent | 3,107 | 1993 | 2035 | MB05 Steel Light Frame | 296 Security Hq/ Badge Issuance/ Gate Houses | 10 Not Applicable |
| CPP-1673 | Utility Control Center | Excellent | 1,600 | 1993 | 2035 | MB05 Steel Light Frame | 615 Electrical/ Motor Repair Shops | 10 Not Applicable |
| CPP-1676 | Oil Hazardous Materials Bldg. | Adequate | 113 | 1994 | 2028 | MB16 Other-Desc brief in comments field/supp doc | 410 Hazardous/ Flammable Storage | 05 Chemical Hazard Facility |
| CPP-1678 | Contractors Lunch Room | Excellent | 2,044 | 1994 | Post 2012 | MB05 Steel Light Frame | 631 Change Houses | 10 Not Applicable |
| CPP-1681 | Box Staging Area | Excellent | 5,100 | 1994 | 2028 | MB16 Other-Desc brief in comments field/supp doc | 401 Programmatic General Storage | 04 Radiological Facility |
| CPP-1683 | Waste Operations Control Room | Excellent | 2,018 | 1996 | 2031 | MB05 Steel Light Frame | 642 Communications/ Control Centers | 02 Nuclear Facility Category 2 |
| CPP-1684 | Standby Generator Facility | Excellent | 3,760 | 2000 | 2034 | MB16 Other-Desc brief in comments field/supp doc | 694 Other Service Buildings | 10 Not Applicable |
| CPP-1686 | Access Control Facility | Excellent | 7,469 | 2000 | 2034 | MB05 Steel Light Frame | 296 Security Hq/ Badge Issuance/ Gate Houses | 04 Radiological Facility |
| CPP-1688 | SSSTF Decon Building | Fair | 6,266 | 2003 | 2028 | MB05 Steel Light Frame | 593 Nuclear Waste Processing and/or Handling Bldg | 10 Not Applicable |
| CPP-1689 | SSSTF Administration Building | Excellent | 1,960 | 2003 | 2028 | MB05 Steel Light Frame | 101 Office | 04 Radiological Facility |
| CPP-603 | Wet and Dry Fuel Storage Facility | Excellent | 40,759 | 1953 | 2035 | MB04 Steel Braced Frame | 412 Special Nuclear Material Storage | 02 Nuclear Facility Category 2 |
| CPP-604 | Rare Gas Plant/ Waste Bldg | Excellent | 21,175 | 1953 | 2028 | MB16 Other-Desc brief in comments field/supp doc | 593 Nuclear Waste Processing and/or Handling Bldg | 02 Nuclear Facility Category 2 |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| CPP-605 | Blower Building | Excellent | 3,436 | 1953 | 2028 | MB04 Steel Braced Frame | 593 Nuclear Waste Processing and/or Handling Bldg | 04 Radiological Facility |
| CPP-606 | Service Bldg Powerhouse | Excellent | 14,921 | 1953 | 2034 | MB04 Steel Braced Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-611 | Water Well #1 Pumphouse | Excellent | 216 | 1953 | 2035 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 10 Not Applicable |
| CPP-612 | Water Well #2 Pumphouse | Excellent | 216 | 1953 | 2035 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 10 Not Applicable |
| CPP-613 | Substation #10 | Excellent | 1,823 | 1953 | 2035 | MB09 Concrete Shear Walls | 694 Other Service Buildings | 10 Not Applicable |
| CPP-614 | Diesel Engine Pumphouse | Excellent | 626 | 1984 | 2034 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 694 Other Service Buildings | 10 Not Applicable |
| CPP-615 | Waste Water Treatment Plant | Excellent | 171 | 1982 | 2035 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 10 Not Applicable |
| CPP-616 | Emergency Air Compressor | Fair | 424 | 1979 | 2034 | MB01 Wood, Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-618 | Tank Farm Measure/Control Building | Excellent | 249 | 1955 | Post 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-623 | Tank Farm Instrument House | Excellent | 64 | 1960 | Post 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-626 | Office/Change Room | Excellent | 2,068 | 1953 | 2035 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-628 | Tank Farm Control House | Excellent | 1,552 | 1953 | Post 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-632 | Instrument House Tank Farm area | Excellent | 67 | 1960 | Post 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-635 | Waste Station WM-187-188 | Excellent | 331 | 1960 | Post 2012 | MB04 Steel Braced Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-636 | Waste Station WM-189-190 | Excellent | 363 | 1965 | Post 2012 | MB04 Steel Braced Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-639 | Instrumentation Bldg Bin Set 1 | Excellent | 169 | 1978 | 2034 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 593 Nuclear Waste Processing and/or Handling Bldg | 02 Nuclear Facility Category 2 |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| CPP-644 | Substation #20 Emer. Power | Excellent | 1,805 | 1960 | 2031 | MB04 Steel Braced Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-646 | Instrument Building 2nd Bin Set | Excellent | 91 | 1966 | 2034 | MB04 Steel Braced Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-647 | Instrument Building 3rd Bin set | Good | 91 | 1966 | 2034 | MB04 Steel Braced Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-649 | Atmospheric Protection System | Adequate | 4,825 | 1976 | 2034 | MB06 Steel Frame with Concrete Shear Walls | 591 Materials Handling or Processing Facilities | 04 Radiological Facility |
| CPP-652 | Cafeteria/Offices | Excellent | 8,858 | 1976 | 2030 | MB11 Precast/Tilt-up Concr Walls/Light Flx Diaphrm | 291 Cafeteria | 10 Not Applicable |
| CPP-655 | Craft Shop/ Warehouse | Adequate | 16,757 | 1977 | 2030 | MB05 Steel Light Frame | 601 Maintenance Shops, General | 10 Not Applicable |
| CPP-658 | Instrument Bldg 4th Bin Set | Excellent | 81 | 1980 | 2034 | MB05 Steel Light Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-659 | New Waste Calcine Facility | Excellent | 84,080 | 1981 | 2035 | MB16 Other-Desc brief in comments field/supp doc | 593 Nuclear Waste Processing and/or Handling Bldg | 02 Nuclear Facility Category 2 |
| CPP-662 | Maintenance/ Fab Shop | Good | 4,000 | 1979 | 2034 | MB04 Steel Braced Frame | 601 Maintenance Shops, General | 10 Not Applicable |
| CPP-663 | Maintenance/ Crafts/Whse Building | Good | 64,197 | 1980 | 2031 | MB16 Other-Desc brief in comments field/supp doc | 601 Maintenance Shops, General | 04 Radiological Facility |
| CPP-666 | FDP/FAST Facility | Excellent | 152,388 | 1983 | 2035 | MB16 Other-Desc brief in comments field/supp doc | 412 Special Nuclear Material Storage | 02 Nuclear Facility Category 2 |
| CPP-671 | Service Building 5th Bin Set | Excellent | 240 | 1981 | 2034 | MB04 Steel Braced Frame | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-673 | Service Building 6th Bin Set | Excellent | 256 | 1986 | 2034 | MB04 Steel Braced Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-674 | UREP Substation #40 | Excellent | 425 | 1983 | Post 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-677 | UREP Load Center #2 | Excellent | 512 | 1983 | 2027 | MB04 Steel Braced Frame | 694 Other Service Buildings | 10 Not Applicable |
| CPP-679 | Tent Fabrication Facility | Excellent | 2,023 | 1983 | 2021 | MB05 Steel Light Frame | 605 Carpentry Shops | 10 Not Applicable |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| CPP-684 | Remote Analytical Lab | Excellent | 13,101 | 1985 | 2035 | MB05 Steel Light Frame | 712 Chemical Laboratory (Nuclear) | 03 Nuclear Facility Category 3 |
| CPP-691 | Fuel Processing Restor. Facility | Excellent | 160,611 | 1992 | 2021 | MB16 Other-Desc brief in comments field/supp doc | 400 General Storage | 10 Not Applicable |
| CPP-692 | Waste Stack Monitor System | Excellent | 663 | 1983 | 2028 | MB05 Steel Light Frame | 591 Materials Handling Or Processing Facilities | 04 Radiological Facility |
| CPP-694 | NWCF Organic Solvent Disposal | N/A | 835 | 1982 | 2015 | MB04 Steel Braced Frame | 410 Hazardous/ Flammable Storage | 10 Not Applicable |
| CPP-697 | East Guardhouse & VMF | Excellent | 4,082 | 1986 | 2034 | MB16 Other-Desc brief in comments field/supp doc | 296 Security Hq/ Badge Issuance/ Gate Houses | 10 Not Applicable |
| CPP-698 | MK Offices/ Warehouse | Excellent | 23,958 | 1984 | Post 2012 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-TB-1 | Carpenter Shop | Excellent | 1,261 | 1980 | 2021 | MB01 Wood, Light Frame | 605 Carpentry Shops | 10 Not Applicable |
| CPP-TB-3 | TB-3 FPR Eastside Guardhouse | Excellent | 176 | 1986 | 2021 | MB01 Wood, Light Frame | 641 Guard Houses | 10 Not Applicable |
| CPP-TR-19 | Office Trailer | Excellent | 300 | 1974 | 2021 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| CPP-TR-54 | Control Trailer | Excellent | 400 | 2001 | 2021 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-TR-56 | TF Washdown Support Office | Excellent | 317 | 2001 | 2021 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| CPP-TR-57 | ICDF Rad Con Trailer | Excellent | 638 | 2003 | 2021 | MB01 Wood, Light Frame | 694 Other Service Buildings | 04 Radiological Facility |
| CPP-TR-61 | D&D Offices | Excellent | 3,541 | 2006 | 2012 | MB05 Steel Light Frame | 101 Office | |
| CPP-TR-62 | D&D Craft Trailer | Excellent | 1,423 | 2006 | 2012 | MB05 Steel Light Frame | 101 Office | |
| CPP-TR-64 | D&D Crafts Trailer | Excellent | 1,423 | 2006 | 2012 | MB05 Steel Light Frame | 101 Office | |
| CPP-TR-66 | D&D Offices | Excellent | 3,600 | | 2012 | MB01 Wood, Light Frame | 101 Office | |
| CPP-TR-67 | Integrated Waste Treatment Unit (IWTU) Document Control Trailer | Excellent | 1,525 | 2004 | 2012 | MB05 Steel Light Frame | 101 Office | |
| FSV-ISFSI | Independent Spent Fuel Storage Inst | Excellent | 13,586 | 1991 | 2027 | MB16 Other-Desc brief in comments field/supp doc | 412 Special Nuclear Material Storage | 02 Nuclear Facility Category 2 |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| FSV-MOF | Modular Office Facility | Excellent | 3,360 | 1997 | 2027 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| IF-604A | Technical Support Annex | Excellent | 50,528 | 1978 | 2021 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 101 Office | |
| IF-604B | Technical Support Building | Excellent | 49,787 | 1976 | 2021 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 101 Office | |
| IF-652B | Lindsay Blvd Warehouse - CWI | Excellent | 10,000 | 1987 | 2021 | MB09 Concrete Shear Walls | 400 General Storage | |
| TAN-1611 | Pump and Treatment Facility | Excellent | 1,500 | 2000 | 2023 | MB05 Steel Light Frame | 591 Materials Handling Or Processing Facilities | 10 Not Applicable |
| TAN-1614 | In Situ Bioremediation Facility | Excellent | 1,482 | 2003 | 2023 | MB05 Steel Light Frame | 591 Materials Handling Or Processing Facilities | 10 Not Applicable |
| TRA-1601 | D&D Rad Con Office | Excellent | 1,423 | 2005 | 2012 | MB05 Steel Light Frame | 101 Office | |
| TRA-1602 | D&D Engineering Office Building | Excellent | 3,696 | 2005 | 2012 | MB05 Steel Light Frame | 101 Office | |
| TRA-1603 | D&D Craft Office /Breakroom | Excellent | 1,423 | 2005 | 2012 | MB05 Steel Light Frame | 101 Office | |
| TRA-1604 | D&D Project Mgmt Office | Excellent | 3,696 | 2005 | 2012 | MB05 Steel Light Frame | 101 Office | |
| TRA-1607 | D&D Craft Trailer #2 | Excellent | 1,423 | 2006 | 2012 | MB01 Wood, Light Frame | 101 Office | |
| TRA-612 | Retention Basin Sump Pump House | Excellent | 64 | 1952 | 2010 | MB16 Other-Desc brief in comments field/supp doc | 694 Other Service Buildings | 04 Radiological Facility |
| TRA-698 | Comfort Station #1 | Excellent | 296 | 2005 | 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | |
| TRA-699 | Comfort Station #2 | Excellent | 296 | 2005 | 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | |
| WMF-1612 | Retrieval Enclosure II | Excellent | 46,038 | 2007 | | MB05 Steel Light Frame | 593 Nuclear Waste Processing And/Or Handling Bldg | 02 Nuclear Facility Category 2 |
| WMF-601 | Rad Con Field Office | Excellent | 5,044 | 1976 | Post 2012 | MB05 Steel Light Frame | 101 Office | 02 Nuclear Facility Category 2 |
| WMF-603 | Pumphouse | Excellent | 1,435 | 1977 | Post 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| WMF-604 | Change House & Lunch Room | Excellent | 1,272 | 1977 | Post 2012 | MB05 Steel Light Frame | 631 Change Houses | 10 Not Applicable |
| WMF-605 | Well House 87 | Excellent | 33 | 1979 | Post 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| WMF-609 | Heavy Equip. Storage Shed | Excellent | 11,133 | 1979 | Post 2012 | MB05 Steel Light Frame | 450 Shed Storage | 02 Nuclear Facility Category 2 |
| WMF-619 | Communication Building | Excellent | 945 | 1989 | Post 2012 | MB05 Steel Light Frame | 642 Communications/ Control Centers | 10 Not Applicable |
| WMF-620 | Work Control Center, Trailer | Excellent | 1,577 | 1988 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-621 | Work Control Support, Trailer | Excellent | 1,538 | 1988 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-622 | Office Annex, Trailer | Excellent | 1,605 | 1985 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-637 | Operations Control Building | Good | 24,262 | 1995 | Post 2012 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| WMF-639 | Firewater Pumphouse #2 | Excellent | 1,812 | 1995 | Post 2012 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| WMF-643 | Vapor Vacuum Extract Mon Well | N/A | 16 | 1990 | Post 2012 | MB16 Other-Desc brief in comments field/supp doc | 694 Other Service Buildings | 10 Not Applicable |
| WMF-645 | Construction Support Trailer | Excellent | 1,568 | 1991 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-646 | Field Support Trailer | Excellent | 1,568 | 1991 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-653 | Office Annex #2, Trailer | Good | 1,513 | 1993 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-655 | Material Handling Facility | Excellent | 5,483 | 1995 | Post 2012 | MB05 Steel Light Frame | 400 General Storage | 04 Radiological Facility |
| WMF-656 | Maintenance Facility | Excellent | 4,999 | 1995 | Post 2012 | MB05 Steel Light Frame | 601 Maintenance Shops, General | 10 Not Applicable |
| WMF-657 | Const Field Support, Trailer | Excellent | 1,568 | 1960 | Post 2012 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-658 | RWMC Office | Excellent | 4,518 | 1995 | Post 2012 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| WMF-661 | Hazardous Material Storage | Good | 128 | 1996 | Post 2012 | MB16 Other-Desc brief in comments field/supp doc | 410 Hazardous/ Flammable Storage | 10 Not Applicable |
| WMF-680 | Building Trailer | Good | 720 | 2001 | Post 2012 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross $ft^2$ | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| WMF-681 | Building Trailer | Excellent | 720 | 2001 | Post 2012 | MB05 Steel Light Frame | 101 Office | 10 Not Applicable |
| WMF-697 | Retrieval Enclosure I (PIT 4) | Excellent | 56,688 | 2004 | 2030 | MB02 Wood, Commercial and Industrial | 591 Materials Handling Or Processing Facilities | 02 Nuclear Facility Category 2 |
| WMF-698 | ARP Storage Enclosure | Excellent | 20,800 | 2005 | 2021 | MB16 Other-Desc brief in comments field/supp doc | 415 Nuclear Waste Storage Facility | 02 Nuclear Facility Category 2 |
| WMF-TR-1 | ARP Sample Support Trailer | Excellent | 1,680 | 2004 | 2025 | MB01 Wood, Light Frame | 694 Other Service Buildings | |
| WMF-TR-2 | ARP Operations Support Trailer | Excellent | 1,420 | 2003 | 2021 | MB01 Wood, Light Frame | 694 Other Service Buildings | |
| WMF-TR-3 | ARP Non Destructive Assay East Trailer | Excellent | 317 | 2006 | | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-TR-4 | ARP Office Trailer | Adequate | 317 | 2004 | 2021 | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-TR-5 | ARP Rad Con Trailer | N/A | 229 | 2004 | | MB01 Wood, Light Frame | 101 Office | 10 Not Applicable |
| WMF-TR-6 | ARP Men's Change Trailer | Excellent | 660 | 2003 | 2021 | MB01 Wood, Light Frame | 631 Change Houses | |
| WMF-TR-7 | ARP Women's Change Trailer | Adequate | 400 | 2003 | 2021 | MB01 Wood, Light Frame | 631 Change Houses | |
| WMF-TR-8 | 637 West Office Trailer | Excellent | 1,432 | 2005 | 2021 | MB01 Wood, Light Frame | 101 Office | |
| WMF-TR-9 | 637 East Office Trailer | Excellent | 1,432 | 2005 | 2021 | MB01 Wood, Light Frame | 101 Office | |
| **Idaho Cleanup Project Facilities Operating Pending D&D** | | | | | | | | |
| CPP-1635 | Hazardous Chemical Storage Facility | Excellent | 2,507 | 1992 | 2011 | MB05 Steel Light Frame | 410 Hazardous/ Flammable Storage | 05 Chemical Hazard Facility |
| CPP-1649 | Instr. Storage and Maint. Fac. | Excellent | 2,476 | 1991 | 2011 | MB05 Steel Light Frame | 212 Examination And Testing Facilities | 04 Radiological Facility |
| CPP-1653 | Subcontractor's Warehouse | Adequate | 10,773 | 1991 | 2011 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1656 | Warehouse | Excellent | 6,000 | 1991 | 2011 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-654 | Receiving Warehouse/ Offices | Excellent | 19,301 | 1976 | 2011 | MB05 Steel Light Frame | 401 Programmatic General Storage | 10 Not Applicable |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| TRA-604 | MTR Building Wing A | Excellent | 41,723 | 1952 | 2012 | MB03 Steel Moment Frame | 712 Chemical Laboratory (Nuclear) | 04 Radiological Facility |
| TRA-610 | MTR Fan House | Excellent | 3,217 | 1952 | 2011 | MB07 Steel Frame with Infill Shear Walls | 593 Nuclear Waste Processing And/Or Handling Bldg | 04 Radiological Facility |
| **Idaho Cleanup Project Facilities Shutdown Pending D&D** | | | | | | | | |
| CPP-1610 | Salt Pit Control House | N/A | 51 | 1985 | 2015 | MB15 Unreinforced Masonry Bearing Walls | 591 Materials Handling Or Processing Facilities | 10 Not Applicable |
| CPP-1637 | FPR Weld Fab Shop | N/A | 9,967 | 1989 | 2015 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1638 | Temporary Waste Storage Facility | N/A | 2,070 | 1989 | 2015 | MB05 Steel Light Frame | 411 Nuclear Contaminated Storage | 10 Not Applicable |
| CPP-1672 | Access Control Building Tank Farm | N/A | 158 | 1993 | 2015 | MB05 Steel Light Frame | 599 Other Industrial Facilities | 04 Radiological Facility |
| CPP-619 | Waste Storage Control House | N/A | 416 | 1955 | 2010 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-622 | Tank Farm Instrument House | N/A | 67 | 1960 | 2009 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-634 | Waste Station WM-185 | N/A | 223 | 1958 | 2010 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-638 | Waste Station WM-180 | N/A | 87 | 1968 | 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| MFC-750A | Experimental Equip Bldg | N/A | 199 | 1975 | 2010 | MB05 Steel Light Frame | 410 Hazardous/ Flammable Storage | 10 Not Applicable |
| MFC-766 | Sodium Boiler Building | N/A | 14,547 | 1962 | 2011 | MB16 Other-Desc brief in comments field/supp doc | 792 Laboratories, General (Nuclear) | 04 Radiological Facility |
| MFC-767 | EBR-II Reactor Plant Building | N/A | 18,967 | 1963 | 2012 | MB16 Other-Desc brief in comments field/supp doc | 783 Research Reactor | 04 Radiological Facility |
| MFC-793B | SCSM Alcohol Recovery Annex | N/A | 576 | 1979 | 2010 | MB05 Steel Light Frame | 694 Other Service Buildings | 04 Radiological Facility |

Table C-1.2. Idaho Cleanup Project building data.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp. Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| MFC-795 | Cover Gas Clean-Up System | N/A | 800 | 1978 | 2010 | MB05 Steel Light Frame | 784 Reactor Buildings (related reactor components) | 04 Radiological Facility |
| TRA-632 | Hot Cell Building | N/A | 11,862 | 1952 | 2010 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 782 Hot Cells | 02 Nuclear Facility Category 2 |
| **Idaho Cleanup Project Facilities with D&D In Progress** | | | | | | | | |
| CPP-601 | Fuel Process Building | N/A | 83,646 | 1953 | 2011 | MB04 Steel Braced Frame | 592 Nuclear Chemical Process Facilities | 02 Nuclear Facility Category 2 |
| CPP-602 | Laboratory/ Offices Bldg | N/A | 52,393 | 1953 | 2011 | MB03 Steel Moment Frame | 712 Chemical Laboratory (Nuclear) | 02 Nuclear Facility Category 2 |
| CPP-630 | Safety/ Spectrometry | N/A | 21,510 | 1956 | 2011 | MB13 Reinforce Masn Bear Walls/Wood, Metl Deck Dphm | 101 Office | 02 Nuclear Facility Category 2 |
| CPP-640 | Head-End Process Plant | N/A | 17,633 | 1961 | 2012 | MB04 Steel Braced Frame | 592 Nuclear Chemical Process Facilities | 10 Not Applicable |
| TRA-603 | Material Test Reactor Bldg. | N/A | 44,724 | 1952 | 2012 | MB03 Steel Moment Frame | 793 Multifunction Research/Lab Building | 04 Radiological Facility |
| TRA-613 | Hot Waste Storage Pump House | N/A | 1,076 | 1996 | 2011 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |
| TRA-630 | Catch Tank Pumphouse | N/A | 640 | 1996 | 2012 | MB05 Steel Light Frame | 593 Nuclear Waste Processing And/Or Handling Bldg | 04 Radiological Facility |

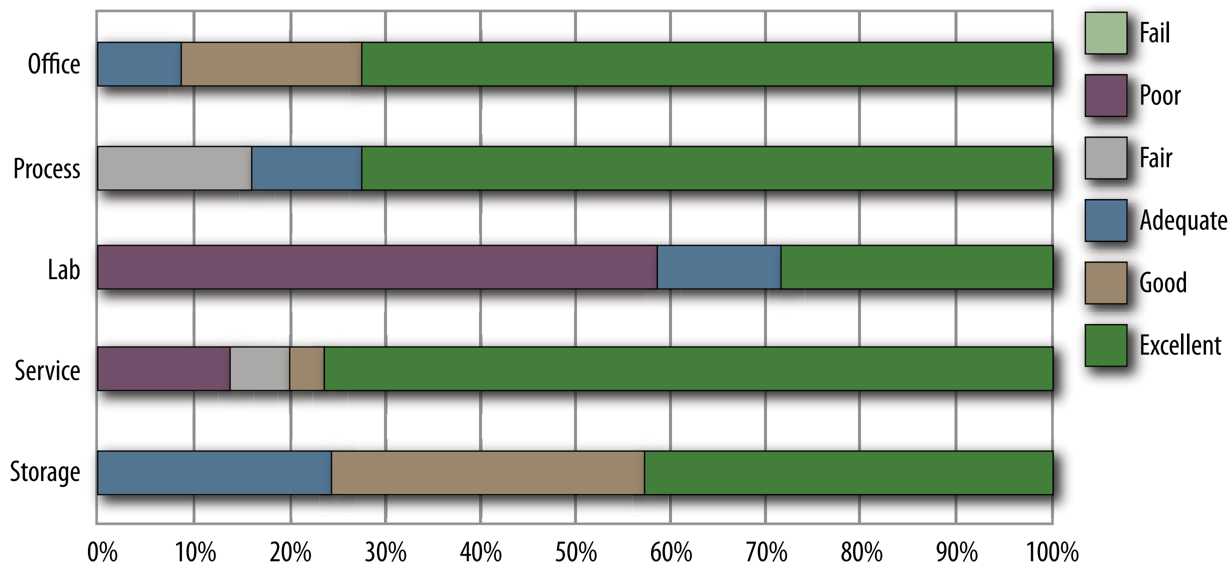



*Figure C-1.3. Fiscal Year 2010 Facility Information Management System conditions of Environmental Management buildings (including the Idaho Cleanup Project and Advanced Mixed Waste Treatment Project).*

Facilities/utility systems will be considered for recommendation of recapitalization based on facility/utility systems conditions established by scheduled surveillance/inspections and estimated remaining duration of facility/utility systems mission. Recapitalization recommendations will be described in the Condition Assessment Information System (CAIS) database section for the identified facility/utility system. Surveillance will be performed in a manner that ensures protection of the worker, the public, and the environment.

Facility management, with assistance from designated experts in each discipline, will identify facility specific surveillance and maintenance activities. The source of any such surveillance requirements and the end points at which the surveillance and maintenance activities can be stopped for facilities and structures slated for D&D also will be identified.

Any reduction in surveillance and maintenance will be justified and documented in accordance with company procedures.

The ICP also is responsible for over 250 small support structures (e.g., septic tanks, fuel storage tanks, and concrete pads), many of which will be demolished as the need for them is eliminated. These are identified in the FIMS database, as other structures and facilities 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). The ICP will complete a minimal number of capital equipment and line item projects to maintain facilities that are safe, compliant, and capable of supporting ICP mission needs. Table C-1.3 identifies those contained in the ICP life cycle budget at this time.

Table C-1.3. Idaho Cleanup Project capital and line-item projects ($).

| Project | Costs[1,2] | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|---|---|---|---|
| **Capital Projects** | | | | | | | | | |
| Remote Waste Disposal Project / HFEF Cans CPP-666 | Actual | 0 | 0 | 0 | 0 | 847,357 | -560 | 0 | 0 |
| CPP-603 (IFSF) HVAC | Actual | 266,509 | 224 | -5,441 | 0 | 0 | 0 | 0 | 0 |
| CPP-604 Embedded Lines | Actual | 34,011 | 886,420 | 186,332 | 82,940 | 807,258 | | | |
| CPP-652 Cafeteria Safety Upgrade | Actual | 189,715 | 225,336 | 1,401,087 | -85,408 | | | | |
| INTEC Security Fence | Actual | 80,609 | 471,351 | -2,965 | | | | | |
| RWMC Transuranic Analytical Lab Trailer | Actual | 0 | 0 | 0 | 0 | 3,875,207 | 11,893 | | |
| Emergency Control System and Dial Room Upgrade | Actual | 0 | 0 | 0 | 0 | 0 | 1,565 | | |
| RWMC Office Complex (ARRA funded) | Actual | | | | | | 208,758 | | |
| **Line Item Projects** | | | | | | | | | |
| IWTU PED | Actual | 3,996,434 | 47,186,234 | 31,337,484 | 1,699,531 | 1,928,961 | 4,032 | | |
| IWTU Construction | Actual / Budget | 0 | 1,410,472 | 43,932,005 | 76,837,480 | 123,812,841 | 69,226,042 | 1,406,236 | |
| Remote Treatment PED | Actual | 0 | 0 | 2,272,643 | 2,504,731 | 67,558 | 18,568 | | |

*1. Actual costs shown through FY 2009.*

*2. Budgeted costs shown are from FY 2010 through FY 2012 (unless no FY 2010 budget is in place, in which case FY 2010 costs-to-date are shown).*

*ARRA = American Recovery and Reinvestment Act*
*INTEC = Idaho Nuclear Technology and Engineering Complex*
*HFEF = Hot Fuel Examination Facility*
*IWTU = Integrated Waste Treatment Unit*
*HVAC = heating, ventilating, and air conditioning*
*PED = project engineering and design*
*IFSF = Irradiated Fuel Storage Facility*
*RWMC = Radioactive Waste Management Complex*

#### C-1.1.4.2 Utilities

Utilities and operations DOE-EM funds directly support site area missions. Utilities services and funding outside the site areas are maintained and operated by the Lead PSO – NE.

By the year 2012, the ICP plans to reduce its cleanup missions down to two primary areas, INTEC and RWMC. The RWMC utility systems are structurally sound and are expected to sustain operations until mission completion without major upgrades. The utility systems will be maintained as described in the maintenance section above.

The INTEC electrical distribution system received a major upgrade, which was completed in FY 2003 using line-item construction project funding. The underground water systems are old (i.e., over 40 years of service) and may require upgrades. Utility systems that are considered part of the Vital Safety Systems will be maintained as priorities, and the remaining utilities will have maintenance conducted as described in the maintenance section above.

Utility systems will be considered for recommendation of recapitalization based on utility conditions established by scheduled surveillance/inspections and the estimated remaining duration of the utility mission. Recapitalization recommendations will be described in the CAIS database section for the identified utility system.

Utility metering per building is not present at RWMC or INTEC. Based on the planned footprint reduction at RWMC and INTEC, both areas are expected to have a minimum reduction of 25% in utilities costs. The other three areas (i.e., TAN, PBF, and the ATR Complex) are to have DOE-EM presences eliminated, which will eliminate associated DOE-EM utilities costs.

#### C-1.1.4.3 Energy Management

With regard to energy management, the ICP is focusing its efforts in two areas. First, energy consumption is being reduced by terminating utilities to facilities no longer necessary for the DOE-EM cleanup mission. Secondly, the ICP is implementing specific projects to improve energy efficiency in enduring DOE-EM facilities.

Process changes at INTEC during 2008 and 2009 have reduced water use by over 196 million gallons/year. A water-pump replacement project to be completed at INTEC during 2010, along with D&D of the INTEC analytical laboratories, will further reduce water use by 150 million gallons per year. Along with the reduction in water use are associated electrical energy savings from the reduced run time of the water pumps.

A site data package was prepared and submitted to DOE in 2009. The package outlines an Energy Savings Performance Contract project for the INTEC facility (planned to begin in 2010). This project will include an investment-grade energy audit, including an evaluation for installation of advanced metering (for electricity, water, and steam), for 12 enduring facilities. Additionally, it requests evaluations for six specific actions, as follows:

1. Repair of the CPP-647 roof
2. Insulation of the FAST Annex
3. Repair or replacement of the CPP-655 roof
4. Energy and water conservation upgrades for the INTEC Service Waste System
5. Replacement or reconfiguration of the CPP-697 heat pumps to eliminate the water discharge to ground
6. Advanced metering capability for the ICDF.

Upon completion of the Energy Savings Performance Contract project at INTEC, a similar project is planned for the RWMC and is expected to begin in 2011 or 2012.

**Operating Facilities with Ongoing Missions (no D&D planned under Idaho Cleanup Project contract)**

The ICP is currently responsible for 127 facilities (90 buildings and 37 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 for fire protection and security installations.

**Facilities Scheduled for Decontamination and Decommissioning**

A significant portion of the ICP work scope involves the D&D of excess facilities. Prior to receipt of ARRA funding in April 2009, one-hundred seventy one facilities were scheduled for D&D. In addition to funding the D&D of some of these facilities, which were subject to delays because of funding shortfalls, ARRA funded the D&D of an additional 47 facilities – 218 in all. The original planned footprint reduction resulting from D&D of the 171 buildings was 1,626,845 $ft^2$. ARRA funding increases the total planned footprint reduction to 2,180,219 $ft^2$. As of December 2009, one-hundred fifty eight buildings had been demolished, with a total footprint reduction of 1,689,037 $ft^2$.

The status of DOE-EM-owned buildings and structures scheduled for D&D in the course of the ICP contract is show in Table C-1.4.

**Active Facilities Awaiting Decontamination and Decommissioning**

There are 17 active facilities awaiting D&D under the ICP contract (Table C-1.4). These include a number of support facilities, warehouses, offices, maintenance facilities, vapor vacuum extraction wells, and hazardous waste storage facilities.

Transition for these facilities begins once the facility has been declared (or forecasted to be) excess to current and future DOE needs. Transition includes placing the facility in a stable and known condition; identifying, eliminating, or mitigating hazards; and transferring programmatic and financial responsibilities from the operating program to the disposition program.

These facilities will be maintained only as needed to complete their missions and prepare them for D&D under the ICP contract.

**Inactive Facilities Awaiting Decontamination and Decommissioning**

Currently, 24 facilities are already shut down and awaiting D&D (Table C-1.4). Following operational shutdown and transition, the first disposition activity for these facilities 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.

Table C-1.4. Idaho Cleanup Project decontamination and decommissioning plan.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| **Idaho Cleanup Project Facilities Operating** | | | | | | | | |
| CPP-717A | Waste Storage Tank VES-WM-103 | | | | 2010 | | 4441 Tanks (Hazardous Contaminated) | 09 Radiological Facility and Chem Hazard Facility |
| CPP-717B | Waste Storage Tank VES-WM-104 | | | | 2010 | | 4441 Tanks (Hazardous Contaminated) | 09 Radiological Facility and Chem Hazard Facility |
| CPP-717C | Waste Storage Tank VES-WM-105 | | | | 2010 | | 4441 Tanks (Hazardous Contaminated) | 09 Radiological Facility and Chem Hazard Facility |
| CPP-717D | Waste Storage Tank VES-WM-105 | | | | 2010 | | 4441 Tanks (Hazardous Contaminated) | 09 Radiological Facility and Chem Hazard Facility |
| CPP-721 | Condenser Pit / VES WM-182 | | | | 2010 | | 6008 Other, Service Structures | 10 Not Applicable |
| CPP-722 | Condenser Pit / VES WM-183 | | | | 2010 | | 6008 Other, Service Structures | 10 Not Applicable |
| CPP-654 | Receiving Warehouse/ Offices | Excellent | 19,301 | 1976 | 2011 | MB05 Steel Light Frame | 401 Programmatic General Storage | 10 Not Applicable |
| CPP-723 | Relief Valve Pit / VES WM-181 | | | | 2011 | | 6008 Other, Service Structures | 10 Not Applicable |
| CPP-730 | Liquid Nitrogen Storage Tank | | | | 2011 | | 4421 Tanks | 05 Chemical Hazard Facility |
| WMF-736 | Cold Test Pit (CWI) | | | | 2012 | | 2009 Catchall | 10 Not Applicable |
| **Idaho Cleanup Project Facilities Operating Pending D&D** | | | | | | | | |
| CPP-1635 | Hazardous Chemical Storage Facility | Excellent | 2,507 | 1992 | 2011 | MB05 Steel Light Frame | 410 Hazardous/ Flammable Storage | 05 Chemical Hazard Facility |
| CPP-1649 | Instr. Storage and Maintenance Facility | Excellent | 2,476 | 1991 | 2011 | MB05 Steel Light Frame | 212 Examination and Testing Facilities | 04 Radiological Facility |
| CPP-1653 | Subcontractor's Warehouse | Adequate | 10,773 | 1991 | 2011 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1656 | Warehouse | Excellent | 6,000 | 1991 | 2011 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| TRA-610 | MTR Fan House | Excellent | 3,217 | 1952 | 2011 | MB07 Steel Frame with Infill Shear Walls | 593 Nuclear Waste Processing and/or Handling Bldg | 04 Radiological Facility |
| MFC-793A | Alcohol Storage Pad and Tanks | | | | 2012 | | 6009 Other, Other Service Structures | 04 Radiological Facility |

Table C-1.4. Idaho Cleanup Project decontamination and decommissioning plan.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| TRA-604 | MTR Building Wing A | Excellent | 41,723 | 1952 | 2012 | MB03 Steel Moment Frame | 712 Chemical Laboratory (Nuclear) | 04 Radiological Facility |
| CPP-622 | Tank Farm Instrument House | N/A | 67 | 1960 | 2009 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-619 | Waste Storage Control House | N/A | 416 | 1955 | 2010 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-634 | Waste Station WM-185 | N/A | 223 | 1958 | 2010 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-783 | Waste Tank Vault VES-WM-183 | | | | 2010 | | 4009 Other, Storage | 04 Radiological Facility |
| MFC-750A | Experimental Equipment Building | N/A | 199 | 1975 | 2010 | MB05 Steel Light Frame | 410 Hazardous/ Flammable Storage | 10 Not Applicable |
| MFC-793B | SCMS Alcohol Recovery Annex | N/A | 576 | 1979 | 2010 | MB05 Steel Light Frame | 694 Other Service Buildings | 04 Radiological Facility |
| MFC-795 | Cover Gas Clean-Up System | N/A | 800 | 1978 | 2010 | MB05 Steel Light Frame | 784 Reactor Buildings (related reactor components) | 04 Radiological Facility |
| TRA-632 | Hot Cell Building | N/A | 11,862 | 1952 | 2010 | MB13 Reinforce Masn Bear Walls/ Wood, Metl Deck Dphm | 782 Hot Cells | 02 Nuclear Facility Category 2 |
| TRA-712 | Retention Basin (Underground) | | | | 2010 | | 4009 Other, Storage | 04 Radiological Facility |
| TRA-760 | Inactivated Monitoring Station | | | | 2010 | | 5009 Structures, Industrial, Other | 04 Radiological Facility |
| CPP-784 | Waste Tank Vault VES-WM-184 | | | | 2011 | | 4009 Other, Storage | 04 Radiological Facility |
| **Idaho Cleanup Project Facilities Shutdown Pending D&D** | | | | | | | | |
| CPP-785 | Waste Tank Vault VES-WM-185 | | | | 2011 | | 4009 Other, Storage | 04 Radiological Facility |
| MFC-766 | Sodium Boiler Building | N/A | 14,547 | 1962 | 2011 | MB16 Other-Desc brief in comments field/supp doc | 792 Laboratories, General (Nuclear) | 04 Radiological Facility |
| TRA-713B | Hot Waste Storage Tank | | | | 2011 | | 4441 Tanks (Hazardous Contaminated) | 10 Not Applicable |

Table C-1.4. Idaho Cleanup Project decontamination and decommissioning plan.

| ID | Name | Condition | Gross ft² | Year Built | Est. Disp Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| TRA-713C | Hot Waste Storage Tank | | | | 2011 | | 4441 Tanks (Hazardous Contaminated) | 10 Not Applicable |
| TRA-713D | Hot Waste Storage Tank | | | | 2011 | | 4441 Tanks (Hazardous Contaminated) | 10 Not Applicable |
| CPP-638 | Waste Station WM-180 | N/A | 87 | 1968 | 2012 | MB15 Unreinforced Masonry Bearing Walls | 694 Other Service Buildings | 02 Nuclear Facility Category 2 |
| CPP-786 | Waste Tank Vault VES-WM-186 | | | | 2012 | | 4009 Other, Storage | 04 Radiological Facility |
| MFC-757 | EBR-II Cooling Tower (foundation only) | | | | 2012 | | 2009 Catchall | 10 Not Applicable |
| MFC-767 | EBR-II Reactor Plant Building | N/A | 18,967 | 1963 | 2012 | MB16 Other-Desc brief in comments field/supp doc | 783 Research Reactor | 04 Radiological Facility |
| CPP-1610 | Salt Pit Control House | N/A | 51 | 1985 | 2015 | MB15 Unreinforced Masonry Bearing Walls | 591 Materials Handling Or Processing Facilities | 10 Not Applicable |
| CPP-1637 | FPR Weld Fab Shop | N/A | 9,967 | 1989 | 2015 | MB05 Steel Light Frame | 400 General Storage | 10 Not Applicable |
| CPP-1638 | Temporary Waste Storage Facility | N/A | 2,070 | 1989 | 2015 | MB05 Steel Light Frame | 411 Nuclear Contaminated Storage | 10 Not Applicable |
| CPP-1672 | Access Control Building Tank Farm | N/A | 158 | 1993 | 2015 | MB05 Steel Light Frame | 599 Other Industrial Facilities | 04 Radiological Facility |
| **Idaho Cleanup Project Facilities D&D In Progress** | | | | | | | | |
| CPP-601 | Fuel Process Building | N/A | 83,646 | 1953 | 2011 | MB04 Steel Braced Frame | 592 Nuclear Chemical Process Facilities | 02 Nuclear Facility Category 2 |
| CPP-602 | Laboratory/Offices Building | N/A | 52,393 | 1953 | 2011 | MB03 Steel Moment Frame | 712 Chemical Laboratory (Nuclear) | 02 Nuclear Facility Category 2 |
| CPP-630 | Safety/Spectrometry | N/A | 21,510 | 1956 | 2011 | MB13 Reinforce Masn Bear Walls/ Wood, Metl Deck Dphm | 101 Office | 02 Nuclear Facility Category 2 |
| TRA-613 | Hot Waste Storage Pump House | N/A | 1,076 | 1996 | 2011 | MB05 Steel Light Frame | 694 Other Service Buildings | 10 Not Applicable |

Table C-1.4. Idaho Cleanup Project decontamination and decommissioning plan.

| ID | Name | Condition | Gross ft$^2$ | Year Built | Est. Disp Year | Model Building Description | Usage Code Description | Hazard Description |
|---|---|---|---|---|---|---|---|---|
| CPP-640 | Headend Process Plant | N/A | 17,633 | 1961 | 2012 | MB04 Steel Braced Frame | 592 Nuclear Chemical Process Facilities | 10 Not Applicable |
| TRA-603 | MTR Building | N/A | 44,724 | 1952 | 2012 | MB03 Steel Moment Frame | 793 Multifunction Research/Lab Building | 04 Radiological Facility |
| TRA-630 | Catch Tank Pumphouse | N/A | 640 | 1996 | 2012 | MB05 Steel Light Frame | 593 Nuclear Waste Processing And/Or Handling Bldg | 04 Radiological Facility |

*CWI = CH2M-WG Idaho, LLC*
*D&D = decommissioning and demolition*
*EBR = Experimental Breeder Reactor*
*FPR = Fuel Proessing Restoration*
*MTR = Materials Test Reactor*
*SCMS = Sodium Component Maintenance Shop*

**Deferred Maintenance**

Deferred maintenance will be reported in FIMS for those EM buildings with a designation of "Operating" (i.e., no D&D under the ICP contract). Reported deferred maintenance will be based on existing values for deferred maintenance and information resulting from scheduled facility-condition-assessment survey inspections.

Should facility inspections or surveillance activities identify the need to perform maintenance that has been deferred, ICP engineering and cost estimating will help establish that cost, and it will be reported accordingly. However, because the ICP life-cycle baseline does not include any specific capital projects for the reduction of deferred maintenance, baseline changes will be pursued as necessary to address the issue.

### C-1.1.5 Conclusions

By the year 2012, the following ICP achievements will have resulted in significant risk reduction at INL:

- Shipping a large majority of the stored TRU waste to the WIPP for final disposition
- Treating most of the liquid sodium bearing waste
- Removing UNF from wet storage in spent fuel pools to safer dry storage
- Decontaminating and decommissioning major facilities at TAN, ATR Complex, and PBF
- Removing and disposing of several hundred thousand cubic meters of contaminated soil.

By the year 2012, the DOE-EM footprint at INL will have been reduced by over 1 million ft$^2$, and DOE-EM will have a presence solely at INTEC and RWMC.

While the ICP contract ends in the year 2012, there will be substantial DOE-EM scope to complete beyond that date. That scope includes shipping the remaining TRU waste to WIPP, treating the remaining liquid sodium bearing waste, emptying and grouting the last four tanks that currently hold that waste, completing the Calcine Disposition Project, continuing to operate the vapor vacuum extraction units at RWMC, cleaning up soils under INTEC buildings, finishing capping the INTEC Tank Farm area, continuing the packaging and final disposition of UNF, and capping the SDA at RWMC. By the year 2035, the DOE-EM cleanup mission at INL will be complete.

## C-1.2 Advanced Mixed Waste Treatment Project Mission

The specific AMWTP requirements are to retrieve, characterize, treat, and dispose of TRU waste. The waste is currently stored in drums, boxes, and bins at the RWMC Transuranic Storage Area. The waste is anticipated to consist of heterogeneous mixtures of various solid materials, including paper, cloth, plastic, rubber, glass, graphite, bricks, concrete, metals, nitrate salts, process sludges, miscellaneous components, and some absorbed liquids. Most of the waste is believed to contain both Resource Conservation and Recovery Act (RCRA) hazardous waste constituents and radioactivity, thereby classifying it as mixed waste. Some waste may also contain Toxic Substances Control Act-regulated materials such as polychlorinated biphenyls and asbestos.

The target scope of the ARRA is as follows:

- Complete retrieval of identified volumes of legacy TRU waste and MLLW
- Accelerate the processing of problematic waste drums by eliminating the problem preventing the drums from completing characterization, certification, and eventual shipment out of Idaho
- Accelerate shipping offsite of MLLW historically managed as TRU waste
- Accelerate shipping offsite of organic MLLW historically managed as TRU waste
- Develop and submit for approval the waste-stream profile form to dispose of the uranium-233 waste, including the remote handled portion.

### C-1.2.1 Advanced Mixed Waste Treatment Project Facility Status

The AMWTP is a DOE-EM funded program. The overall vision for the AMWTP was to treat waste for final disposal by a process that provides the greatest value to the U.S. Government. The original contract called for the licensing, design, and construction of a treatment facility that has the capability to treat specified INL waste streams, with flexibility to treat other INL and DOE regional and national waste streams. This treatment facility was constructed by British Nuclear Fuels, PLC. During April 2005, all facilities and equipment owned by British Nuclear Fuels, PLC were purchased by DOE. Bechtel BWXT Idaho, LLC now operates those facilities, along with the DOE-provided RWMC facilities WMF-610, WMF-628, and WMF-711.

Currently, the AMWTP facilities are operational and require normal maintenance and repairs. No major facility upgrades are planned through FY 2010. Routine upgrades and facility modifications are expected to continue.

After disposition of the estimated 65,000 $m^3$ of stored TRU waste, DOE is evaluating use of the AMWTP facilities and equipment as a national asset to process materials from other sites across the DOE complex. Once the facilities are deemed as excess to the DOE-EM inventory, the facilities will be RCRA-closed, decontaminated, and demolished.

*Figure C-2.1. Naval Reactors Facility provides support to the U.S. Navy's nuclear powered fleet.*

## C-2 OFFICE OF NAVAL REACTORS

The NRF is operated by Bechtel Marine Propulsion Corporation, under contract with and direct supervision of the Naval Nuclear Propulsion Program. The NRF is not under the purview of DOE-ID; therefore, NRF real property assets information is not available in this plan.

NRF is a site tenant not under the purview of DOE-ID, based on a Memo of Understanding between the Pittsburgh Naval Reactors Office and DOE-ID. However, INL has agreed to provide 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 firefighter 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 remote handled TRU waste. NRF also disposes some of its CERCLA waste at the ICDF.

### C-2.1 Naval Reactors Facility Background

Established in 1950 to support development of naval nuclear propulsion, the NRF continues to provide support to the U.S. Navy's nuclear powered fleet (see Figure C-2.1).

### C-2.2 Naval Reactors Facility Area Forecast

The NRF is one of the INL site's primary facility areas that will continue to fulfill its currently assigned missions for the foreseeable future.

# C-3. SPECIFIC MANUFACTURING CAPABILITY

The mission of the Specific Manufacturing Capability (SMC) Program is to provide facilities, equipment, and trained personnel to manufacture armor packages for the U.S. Army's M1A2 main battle tank. The SMC Program maintains an exceptional record of production excellence, customer satisfaction, and safety. Current plans call for the program to end in FY 2013. The DOD funds the SMC Program.

## C-3.1 Facility Overview

The SMC Program is located at INL's TAN, which is situated in the north-central portion of the INL Site (Figure C-3.1). With selection of this site by the U.S. Army in the mid 1980s, a safety condition assessment and environmental impact evaluations of the design and construction were conducted by EXXON Nuclear Idaho Company, Ralph M. Parsons Company, and the DOE-ID SMC Program Office. The program has successfully used the existing facilities and expanded with new production and waste management facilities ever since.

The SMC Program currently occupies 14 buildings with numerous INL infrastructure support facilities, including telecommunications and power supply, fire and domestic water systems, a cafeteria, security guard post, and construction forces administrative facilities. The INL also maintains a fire station in the TAN area to support all ongoing area operations. All together, this program fully utilizes facilities of approximately 400,000 $ft^2$.

## C-3.2 Technical Capability Description

Developed and maintained by the U.S. Army at the INL Site, the SMC is a unique, state-of-the-art facility with extensive capabilities in high-temperature and unique materials fabrication and processing. Capabilities of the SMC Program include the full range of product development and

*Figure C-3.1. Specific Manufacturing Capability facilities at Test Area North.*

manufacturing skills specific to armor production, including material process development, modeling, and simulation of impact phenomena; prototype manufacture, mechanical testing, and evaluation; and full scale fabrication and production of heavy and light armor systems. In addition, the SMC Program has a full complement of support personnel who evaluate problems and develop solutions specific to armor development and production. In short, the SMC Program is a one stop shop in armor material and armor systems design, development, and manufacturing.

## C-3.3 Budget Profile

The SMC Program makes a significant contribution to the site's overall funding base. The SMC funding (Department of the Army) profile is provided in Table C-3.1.

Table C 3.1. Specific Manufacturing Capability funding profile ($M).

| | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 |
|---|---|---|---|---|---|
| Total Contract Funding | 143 | 142 | 160 | 148 | 148 |

*Note: FY 2010 through FY 2012 amounts are subject to change.*

## C-3.4 Infrastructure Needs

SMC and TAN infrastructure needs include several recapitalization projects necessary to continued utilization of SMC's unique capabilities and expansion of classified armor programs at the INL. These projects will provide the infrastructure critical to the successful development of new strategic partnerships and include:

- **TAN Multi-Use Facility –** The facility will be approximately 34,000 $ft^2$ in size and will include a high bay equipped with an overhead crane, material storage and work floor space, and office areas. This facility is necessary to the future utilization of SMC for national security missions including classified manufacturing, assembly and research and demonstration, and will also be used to support ATR classified experimental activities and other classified site needs.
- **INL Test Range Multi-Use Facility –** The facility will be approximately 10,000 $ft^2$ in size and will provide video and data collection capabilities, Special Access Program approved conference and viewing rooms, and general work areas. The facility will be designed to provide world-class observation and data collection capabilities in support of live fire testing of materials and components as well as other future classified national security and nuclear energy mission needs.
- **TAN Dial Room Replacement –** This project will provide a new Dial/Telecommunications Room for the TAN area, replacing the existing Dial/Telecommunications Room. The TAN Dial Room is a critical element of the INL communications network and provides internet connectivity for all site areas. This project will ensure the protection of telecommunications hardware and software, thereby improving the reliability of the telecommunications services that support research and business operations for TAN and other site areas.
- **Extend Feeder to TAN-679A –** This project will provide a second feeder for the existing double-ended TAN-679A substation and will ensure that critical operations will not be interrupted due to failure of the existing single overhead feeder. The resulting improvement in electrical power reliability will support SMC's transition to a multi-program facility supporting classified experiment, manufacturing, and research and demonstration activities.

## C-4. LONG-TERM STEWARDSHIP

DOE-EM currently conducts long-term stewardship activities at INL under the ICP contract. It is expected that, at some point, DOE-EM will transition those long-term stewardship activities to the INL. These long-term stewardship activities will most likely include groundwater monitoring, ecological monitoring, annual inspections of preventative caps, and reporting requirements as identified in Records of Decisions that will be managed by the Laboratory as part of its overall responsibility for the entire INL Site. Total liability for these activities will be evaluated prior to transition and included in subsequent updates to the TYSP. In the interim, INL continues to incorporate updates to site-wide programs for which ICP is currently tasked as the lead including CERCLA, RCRA, and Pollution Prevention Programs.

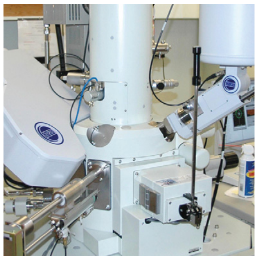
## C-5. REFERENCES

DOE Guide 430.1, *Life Cycle Asset Management*, U.S. Department of Energy, September 1999.

DOE Order 430.1B, *Real Property Asset Management*, Chg 1, U.S. Department of Energy, February 2008.

# APPENDIX D






## Sustainability Program

# CONTENTS



## Figures



## Tables

# ACRONYMS

| | |
|---|---|
| AFV | alternative fuel vehicle |
| ATR | Advanced Test Reactor |
| BEA | Battelle Energy Alliance |
| BPA | Bonneville Power Administration |
| CFA | Central Facilities Area |
| DOD | Department of Defense |
| DOE | Department of Energy |
| DOE-ID | Department of Energy, Idaho Operations Office |
| EFCOG | Energy Facility Contractors Group |
| ESPC | Energy Savings Performance Contracts |
| FY | fiscal year |
| GHG | greenhouse gas |
| GSA | General Services Administration |
| HVAC | heating, ventilation, and air conditioning |
| INL | Idaho National Laboratory |
| LEED™ | Leadership in Energy and Environmental Design |
| LMT | Leadership Management Team |
| LNG | liquefied natural gas |
| MFC | Materials and Fuels Complex |
| NRF | Naval Reactors Facility |
| PEMP | Performance Evaluation and Measurement Plan |
| REC | Renewable Energy Credit |
| REL | Research and Education Laboratory |
| SMC | Specific Manufacturing Capability |
| SSPP | Strategic Sustainability Performance Plan |
| UESC | Utility Energy Savings Contracts |
| USGBC | U.S. Green Building Council |

# APPENDIX D
# SUSTAINABILITY PROGRAM

## D-1 SUSTAINABILITY PROGRAM STRATEGY

**Sustainable INL**

*The 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.*

The Idaho National Laboratory (INL) has institutionalized a program to implement sustainable practices in facility design and operation, procurement, and program operations that meet the requirements of Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, and Department of Energy (DOE) Order 430.2B, *Departmental Energy, Renewable Energy, and Transportation Management*.

The goal of the INL sustainability program is to promote economic, environmental, and social sustainability for the INL, helping to ensure its long-term success and viability as a premier DOE national laboratory. The sustainability program seeks to achieve measurable and verifiable energy, water, and greenhouse gas reductions, as well as responsible use and disposal of materials and resources; advance sustainable building designs; explore the potential use of renewable energy; reduce utility costs across the INL; and support cost-effective facilities, services, and program management.

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

Achieving sustainability means simultaneously pursuing economic prosperity, environmental quality, and social equity. The long-term goal of the sustainability program is to assure the efficient and appropriate use of laboratory lands, energy, water, and materials as well as the services that rely upon them. INL sustainability moves beyond compliance-oriented initiatives and is a key strategy for achieving both a competitive advantage and meaningful change. This transformation sharpens the laboratory's focus on new designs, building upgrades, and scientific research.

The INL's vision for Fiscal Year (FY) 2020 is to be one of the leading laboratories in the United States in sustainability performance.

### D-1.1 People and Culture

The first step toward sustainability is to educate managers and staff about the physical, biological, 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. The INL will fully implement sustainability into its culture through thoughtful consideration of the following strategies:

- Make sustainable design easy and accessible to scientists, engineers, architects, and designers
- Partner and collaborate with innovators and thought-leaders such as the U.S. Green Building Council, the Integrated Design Lab, and others

- Encourage the development and certification of INL/Battelle Energy Alliance (BEA) research products that deliver significant, sustainable operating benefits to clients
- Increase innovation in product design around energy and environmental challenges
- Value nationally recognized certification and training programs for key personnel that address sustainable design and operations.

The Leadership Management Team (LMT) will champion the INL sustainability objectives, encourage organizations to align their strategic long-term goals with the sustainability objectives, and communicate a consistent sustainability message to stakeholders.

### D-1.2 Processes

The INL will enable its sustainability vision through permanent cultural changes and process modifications that champion the following sustainable concepts:

- Apply social, environmental, and resource-responsible approaches to planning and operations.
- Integrate sustainable considerations into business decisions across the company through BEA's established environmental policy, environmental management system, and governance model.
- Establish sustainability as central to ongoing success as a company. Sustainability is part of what makes BEA a smart, responsible company and is tied directly and increasingly to financial performance.
- Connect to critical stakeholders in government, the sustainable community, and the private sector to create future opportunities.
- Encourage management support for outreach and partnership opportunities for sustainable leadership.
- Through INL research, meet the growing demand for more energy-efficient products with associated sustainability benefits.
- Implement sustainable office practices among employees to reduce paper usage and conserve energy, and provide access to visual dashboards to track progress and communicate sustainable metrics in clear, accessible language.
- Foster among management a comprehensive, customized program of sustainable practices designed to create positive change.
- Elevate sustainability in company governance through direct LMT oversight and accountability over environmental and social issues, more diversity and special expertise on councils, and executive and other employee compensation linked to sustainability goals.
- Require LMT participation in robust, regular dialogues with key stakeholders (including employees, unions, suppliers, and clients) on sustainability challenges.
- Maintain open reporting on sustainability strategies, goals, and accomplishments.
- Incorporate systematic performance improvements to achieve environmental neutrality and other sustainability goals across the entire laboratory, including operations, supply-chain, and research and development.

## D-2 SUSTAINABILITY GOALS

The INL has adopted major programmatic sustainability goals to implement the requirements contained in DOE Orders 430.2B and 450.1A, *Environmental Protection Program*, Executive Orders 13423, *Strengthening Federal Environment, Energy, and Economic Performance*, and

**INL Sustainability Program major goals to be achieved by FY 2015**

- *Energy usage reduced 30% compared to FY 2003*
- *Water usage reduced 16% compared to FY 2007*
- *Petroleum fuels usage reduced 20% as compared to FY 2005*
- *Alternative fuels usage increased 100% compared to FY 2005*
- *Greenhouse gas emissions reduced 28% by FY 2020 as compared to base year FY 2008.*

13514, and the forthcoming Strategic Sustainability Performance Plan (SSPP). Sustainability is truly a performance improvement program that is readily validated through performance measurement and reporting. The primary energy, water, and fuels usage goals are the basis for validating the performance of INL sustainability. To ensure their implementation, the goals have been included in Focus Area 5.2 of the INL Performance Evaluation and Measurement Plan (PEMP).

## D-3 EXECUTABLE PLAN

The *Idaho National Laboratory FY 2010 Site Executable Plan for Energy and Transportation Fuels Management* (DOE-ID 2009) outlines a plan for continual efficiency improvements directed at meeting the goals and requirements of Executive Orders 13423 and 13514 and DOE Orders 430.2B and 450.1A before the end of FY 2015. The Executable Plan includes references to the *Idaho National Laboratory Site Pollution Prevention Plan* (DOE-ID 2007)), which addresses the procurement and environmental aspects of the Orders. It also summarizes energy and fuel use reporting requirements and references criteria for performing sustainable design.

The Executable Plan serves as the INL site energy and transportation fuels management plan. The INL will annually update the plan, adding specificity as projects are developed and requirements change. It encompasses all contractors and activities at the INL site under the control of the DOE-Idaho Operations Office (DOE-ID). Naval Reactors Facility (NRF) operations are excluded because NRF planning and reporting occur through the Department of Defense (DOD). BEA is the primary author and contributor to the INL Site Executable Plan (DOE-ID 2009).

Figure D-3.1 provides the FY 2009 status of the primary goals from the INL Site Executable Plan and the Orders. For each goal, the green column indicates the INL goal for the end of FY 2009, while the blue column shows actual status. This graph clearly shows where INL is meeting the goals and where improvements are needed. Note that energy, water, and petroleum fuel data indicate that INL was not meeting annual goals at the end of FY 2009. Additional resources are needed to ensure that these goals are met by FY 2015. INL will continue to work with DOE to explore alternative funding options (e.g., Engineering Savings Performance Contracts, Utility Savings Contracts, tracking and reinvesting cost savings in sustainable actions, and special funding requests made to the Federal Energy Management Program). Once the energy assessments are completed in FY 2012, INL will develop an investment strategy and use it to inform the required annual update of the Executable Plan.

### D-3.1 Energy Reductions

The INL goal for energy usage is a 30% reduction of energy intensity by FY 2015, as compared to the FY 2003 energy intensity baseline. Energy intensity is defined as energy use divided by building area measured in Btu/ft². On average, an annual energy use reduction goal of 3% supports meeting the overall goal and provides a means to measure

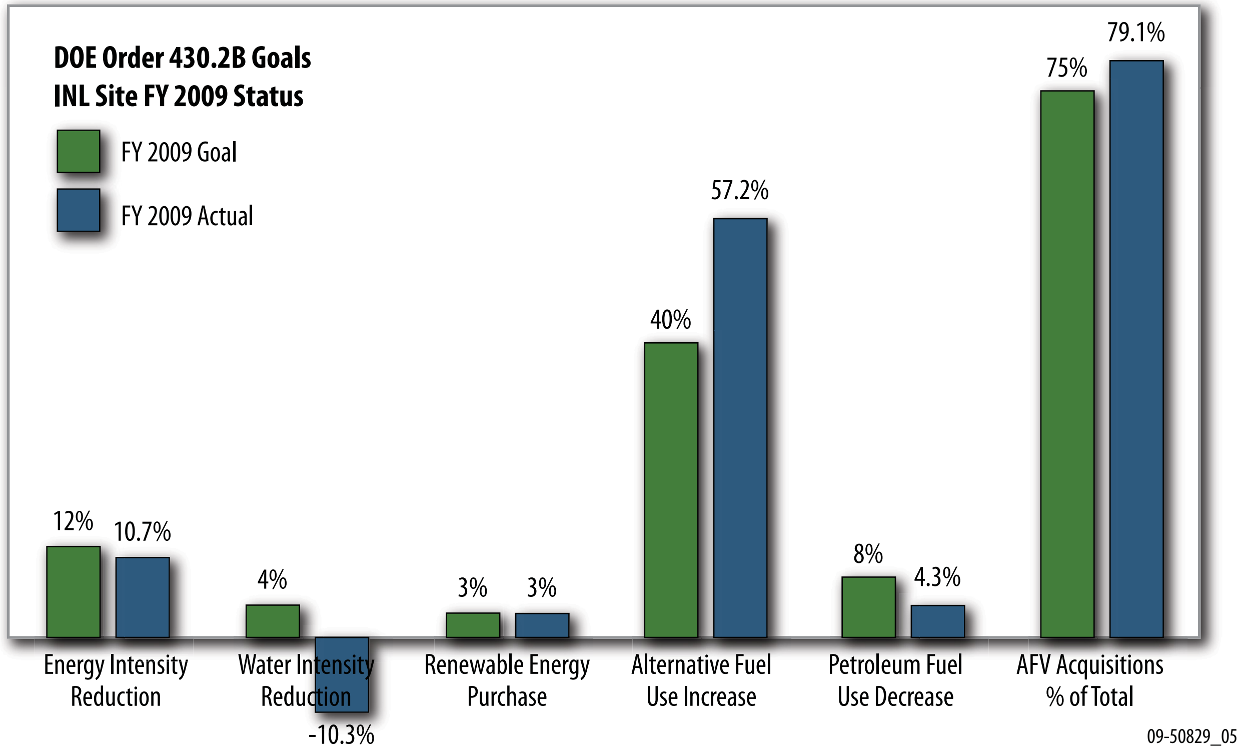



*Figure D-3.1. Fiscal Year 2009 primary goals of the Executable Plan and the Orders*

and trend progress. The energy use is normalized for weather-related factors to provide an accurate comparison with base-year FY 2003. Energy intensive loads that are mission specific are excluded from the goal. The Advanced Test Reactor (ATR) and its support facilities are currently exempted from the reporting goal but are not exempted from the responsibility to reduce energy use where practicable.

Energy sources affected by this goal include electricity, natural gas, fuel oil, liquefied natural gas (LNG), and propane. Methods to reduce energy usage include capital project upgrades, operational modifications, and behavior changes by the INL workforce.

Capital project upgrades are funded primarily through alternative funding mechanisms that include Energy Savings Performance Contracts (ESPC) and Utility Energy Savings Contracts (UESC). They both use external (non-DOE) funding for energy-related upgrades and are paid back over time using the energy cost savings generated by the project. The INL is actively pursuing these two alternative funding strategies to obtain additional energy savings.

The Materials and Fuels Complex (MFC) ESPC project includes $33M in energy and water saving upgrades that will provide overall energy reductions of 5% for the INL. This project will eliminate MFC's oil fired boilers and leaking condensate lines. The project will convert most facilities to electric heat; upgrade all lighting systems; replace the primary utility air compressors; install new digital heating, ventilating, and air conditioning (HVAC) controls; install new advanced electricity and water meters; and install two new solar walls to provide renewable pre-heating to the make-up air in MFC-774 and MFC-782. This project is planned for completion in FY 2011.

One UESC project, planned for implementation in most Idaho Falls facilities, is being funded by the Bonneville Power Administration (BPA) and is scheduled for completion by the end of FY 2012. The INL is developing a second ESPC project for the ATR Complex, Specific Manufacturing Capability (SMC), and the enduring facilities at the Central Facilities Area (CFA).

In addition to energy and water savings, these projects will result in a $10.5M reduction in INL's deferred maintenance backlog ($9.6M of which is associated with MFC mission-critical assets) by replacing aging equipment and systems using alternatively funded methods. Reducing the INL maintenance backlog is an additional benefit beyond the reduced energy usage and costs targeted by these types of projects.

The City of Idaho Falls is planning to upgrade all of its electrical power meters to smart meter technology. INL's Idaho Falls facilities will be upgraded as part of the city's initial upgrade project late in FY 2010. This upgrade will provide smart meters and a network to supply a central data-collection point, view and analyze the data, and provide demand management capabilities.

Metering is also planned for all buildings upgraded by ESPC projects as identified by the INL Metering Plan. The metering installed by these projects should provide additional data compilation and utility management benefits.

**ESPC**

*The ESPC being performed at the MFC will reduce the INL deferred maintenance backlog by $10.5M; of which, $9.6M is associated with mission critical assets.*

In addition to providing a means of trending and validating energy savings, metering also provides proactive space management opportunities. Building energy and water usage information assists with maintenance scheduling, enhanced resource utilization, and accurate space charge-back to building tenants. Advanced metering provides a method to encourage and validate employee behavior change, and provides a dependable tool for facility managers to tune building systems and controls.

### D-3.2 Water Reductions

The INL goal for water usage is a 16% reduction of usage intensity by FY 2015, or 2% each year, as compared to the FY 2007 Water Usage Intensity Baseline measured in gal/ft$^2$.

Water used for processes and returned to the aquifer through rapid infiltration ponds is eligible for exemption from the reportable INL water usage. The ATR Complex meters the process water returned to the aquifer via the Cold Waste Pond.

The INL is also using alternative funding methods for water reduction projects. The MFC ESPC project will eliminate the existing leaking condensate lines that are costly to repair and increase water consumption. The Idaho Falls UESC project will provide approximately 2% in water savings. The ESPC project planned for the ATR Complex, SMC, and CFA will eliminate once-through HVAC cooling water, increase efficiency through fixture replacements, and locate and repair leaking water lines.

Water metering for these projects will provide for project validation and enhance operational and maintenance tools.

## D-3.3 Fleet Fuels

The INL is developing diversified strategies for reducing fossil fuel use and carbon emissions associated with light and heavy-duty vehicles. The DOE Order 430.2B transportation fuels goal is to reduce petroleum fuels by 20% while increasing the use of alternative fuels by 100%, as compared 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 the INL.

The INL is meeting the fuel goals through actively pursuing increased Ethanol (E-85) fuel usage and by using biodiesel blends. These increases are facilitated by increasing the availability of E-85 and mandating its use while researching and implementing the use of biodiesel blends in the INL bus fleet throughout the year and across varied climate conditions.

Other potential opportunities include a proposal to convert the entire INL bus fleet to natural-gas-fueled intra-city coaches and smaller hybrid mini-motor coaches, and expanding the availability of other alternative fuels (Table D-3.1). The INL will further reduce petroleum fuels use by obtaining additional hybrid vehicles through the General Services Administration (GSA) as long as the availability of flex-fuel vehicles is not impacted.

## D-3.4 Carbon Footprint

DOE has committed to reduce greenhouse gas (GHG) emissions by 28% before the end of FY 2020, as compared to the FY 2008 baseline. The INL has determined the initial Carbon Footprint. This GHG inventory supports a major Battelle Corporate initiative to lead GHG emissions reduction efforts and is an accepted method of identifying environmental impacts by assessing major GHG contributors and the best methods to reduce them.

The INL Carbon Footprint indicates that GHG emissions for FY 2008 were slightly over 105,500 metric tons of $CO_2$ equivalent (mt $CO_2$e). Activities to reduce this baseline inventory will be funded primarily from alternative sources by increasing infrastructure efficiency and switching to fuel with less GHG-intensive emissions. The INL is pursuing other opportunities to increase the efficiency of on-site transportation, business activities, and employee commutes. GHG emissions will be tracked and allocated on a program-by-program basis to incorporate accountability.

## D-3.5 Sustainability in Leasing

The INL addresses sustainability in facility leasing by implementing new lease procurement requirements as identified in DOE Order 430.2B. These requirements state:

> *Starting in FY 2008, all procurement specifications and selection criteria for acquiring new leased space, including build-to-suit lease solicitations, are to include a preference for buildings certified as Leadership in Energy and Environmental Design (LEED$^{TM}$) Gold. When entering into renegotiation or extension of existing leases, the Department must include lease provisions that support the Guiding Principles.*

The INL has demonstrated its commitment to this essential goal through recent building space acquisitions, including the build-to-suit Research and Education Laboratory (REL) and Energy Systems

Laboratory (ESL), both of which will attain the U.S. Green Building Council (USGBC) LEED™ Gold certification.

The INL implements the sustainable guiding principles in existing leased facilities through a systematic and prioritized approach for maximizing building efficiency as part of the lease negotiation and solicitation process.

## D-3.6 Additional Activities Focused on 2020

The INL will continue to support energy and water efficiency reductions, transportation fuel efficiency, and GHG reductions through a variety of creative and proactive sustainable activities, including, but not limited to, the following:

- Ensuring that all new construction and new infrastructure leases include provisions to obtain the USGBC LEED™ Gold certification, at a minimum.
- Applying the Guiding Principles of Executive Order 13423 to operations and renovations of all appropriate enduring infrastructure across the INL Site and in Idaho Falls.
- Evaluating and supporting potential on-site renewable energy construction opportunities and purchasing Renewable Energy Credits (RECs) to support the growth and success of renewable energy generation industries and to reduce GHG emissions.
- Increasing the overall efficiency of the INL fleet while focusing on increased opportunities to utilize alternative fuels.
- Incorporating new Executive Order 13514 requirements into design and construction of all new facility projects before the Order goal to be net-zero facilities by FY 2020 is reached. Net-zero means that the facility generates at least as much renewable energy as the total energy it consumes.
- Evaluating and updating all internal plans, goals, and documentation of sustainability-related activities to remain current with Federal requirements.
- Actively leading and contributing to the Energy Facility Contractors Group (EFCOG), 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.
- 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.
- Reviewing and analyzing new building designs, proposed changes to existing buildings, and requests for new-leased facilities to ensure the integration of sustainable concepts.
- Actively pursuing advanced metering to provide central "real-time" energy and water usage evaluation, utility-level demand-side management, and tools to assist with facility and process operations.
- Achieving Carbon Neutrality for all non-mission-specific activities by FY 2025.
- Incorporating cool roof principles and technologies into roof replacements and new construction projects immediately.

Table D-3.1. Sustainable goals gap general description.

| Goal | Current | Future | Gaps |
|---|---|---|---|
| **Energy Reductions** | **INL Infrastructure Designed and Operated to meet Program Needs –** INL facilities are designed and operated to meet programmatic needs with energy and water usage usually considered as a second level priority. | **Facility Design and Operations Meet the Needs of a World Class Sustainable Laboratory –** Facilities are designed and operated to maximize energy efficiency.<br><br>Energy cost savings are equally reinvested into additional sustainable upgrades and back into the benefitting programs that champion the efficiency improvements. | Very low cost electricity at INL ($.036/kWh).<br><br>Older existing facilities with significant operational problems that limit the ability of facilities personnel to operate efficiently.<br><br>Entrenched belief that energy efficiency upgrades are too costly and take away from critical mission needs.<br><br>Lack of up-front capital to make energy efficiency improvements.<br><br>Long lead-time to develop and implement alternatively funded projects (ESPC and UESC). |
| **Water Reductions** | **Water Usage as an Inexpensive Resource –** Water is used for cooling and service utilities as an inexpensive resource with little incentive to use efficiently. | **Facility Design and Operations Meet the Needs of a World Class Sustainable Laboratory –** Facilities are designed and operated to maximize water efficiency.<br><br>Water is valued as a limited commodity and water cost savings are equally reinvested into additional sustainable upgrades and back into the benefitting programs that champion the efficiency improvements. | Water is very inexpensive at the INL ($.0006/gallon) and is plentiful from the Snake River Aquifer.<br><br>Many existing one-pass cooling processes that are inexpensive and require little or no maintenance. |
| **Transportation Fuels – Diesel and Bio Diesel** | **INL Bus Fleet –** Current INL bus fleet is efficient and provides employees with reliable transportation to and from the Site.<br><br>INL bus fleet is aging and needs replacement for approximately one-half of the fleet.<br><br>INL is in the unique position to provide DOE-HQ with a majority of its required petroleum reductions through an upgrade of the INL bus fleet and fuel switching to natural gas. | **Reduced Carbon, Non-Petroleum Transit Services for INL Employees –** INL bus fleet upgraded to CNG intra-city buses that provide shared benefits with INL research organizations for a Natural Gas Liquefaction Station to be located in Idaho Falls.<br><br>**Provide DOE-HQ Petroleum Reductions –** INL provides DOE-HQ with petroleum fuel reductions that will significantly reduce petroleum usage at the DOE level and allow DOE to meet its petroleum fuel reduction goal for the complex as a whole. | Availability of CNG buses from GSA on the order that INL would need to acquire to change out the entire bus fleet over a 3-year period.<br><br>Funding needed from DOE to lease and maintain the new bus fleet.<br><br>Availability of LNG transport, storage, and dispensing infrastructure at the INL to take advantage of the proposed LNG research station. |

Table D-3.1. Sustainable goals gap general description.

| Goal | Current | Future | Gaps |
|---|---|---|---|
| **Transportation Fuels – Gasoline and E-85** | **INL Light-Duty Fleet –** INL is in a state of growth with alternative fueled vehicles and currently has more E-85 vehicles than can be conveniently fueled. | **World Class Vehicle Fueling Infrastructure for Government and Private Fueling –** INL fueling infrastructure provides alternative fuels conveniently across the entire INL and provides access to employees to use alternative fuels in private vehicles. | Availability of fueling infrastructure for all employees is not convenient or at adequate locations to serve all needs.<br><br>Employee culture needs to be refined to accept the use of alternative fuels in all vehicles that use alternative fuels.<br><br>Cost of alternative fuels is still excessive in this area and needs to be obtained at a lower cost to compensate for the 30% reduction in energy content of E-85. |
| **Carbon Footprint** | **Draft INL Carbon Footprint –** Completed carbon footprint for base year FY 2008. Carbon Footprint includes all Scopes 1, 2, and 3 GHG emissions, exceeding the minimum required emissions reporting of Scopes 1 and 2. | **Lead GHG Emissions Reduction Efforts – Battelle Initiative –** Provide technical leadership to FEMP for compilation, calculation, and reductions methods for Scopes 1, 2, and 3 GHGs. | Established guidance from FEMP defining scope categories and emissions compilation strategies.<br><br>Carbon production not tied directly to programs.<br><br>Carbon chargeback requires modification to accounting systems. |
| **Sustainable Leasing** | **Facilities Procured to meet the Current Employee Quantity –** Facilities are procured as needed to house employees as missions and programs change. Acquisitions are worked the best as possible with the building stock that is available in Idaho Falls. | **Facility Acquisition and Design to meet the Needs of a World Class Sustainable Laboratory –** Sustainable features are included in the solicitations for all new, leased facilities to the maximum extent possible. INL does not consider procuring or designing a facility or facility modification that does not promote sustainability and certify as LEED™ Gold at a minimum. | Current entrenchment of culture that INL cannot afford a sustainable facility on a lease contract and that the building owners will not step up and offer facilities that meet sustainable requirements and follow the guiding principles.<br><br>Current entrenched belief that obtaining a below average facility for a short period has a higher priority than employee comfort or mission productivity. |
| **High Performance Building Design** | **INL Infrastructure Program –** INL building projects are designed to meet all technical aspects of operational and functional needs. Sustainable features are not currently accepted, as required, or desirable design features. | **Facility Acquisition and Design to meet the Needs of a World Class Sustainable Laboratory –** Sustainable features are included in the designs of all new facilities to the maximum extent possible. INL does not consider procuring or designing a facility or facility modification that does not promote sustainability and certify as LEED™ Gold at a minimum. | Current entrenchment of culture that sustainability is a non-essential design requirement that does not contribute to laboratory function or productivity.<br><br>Lack of direction from LMT that sustainability is desired and that sustainable facilities contribute to productivity and to the overall health of the Laboratory.<br><br>Funding for the 6% premium in project cost needed to incorporate sustainability in design and construction activities. |

*CNG = compressed natural gas*
*DOE = Department of Energy*
*DOE-HQ = Department of Energy Headquarters*
*ESPC = Energy Savings Performance Contracts*
*FEMP = Federal Energy Management Program*
*FY = fiscal year*
*GHG = greenhouse gas*
*GSA = General Services Administration*
*INL = Idaho National Laboratory*
*LEED™ Leadership in Energy and Environmental Design*
*LMT = Leadership Management Team*
*LNG = liquefied natural gas*
*UESC = Utility Energy Savings Contract*

## D-4 REFERENCES

DOE Order 430.2B, *Departmental Energy, Renewable Energy, and Transportation Management*, U.S. Department of Energy, February 27, 2008.

DOE Order 450.1A, *Environmental Protection Program*, U.S. Department of Energy, June 4, 2008.

DOE-ID, 2009, *Idaho National Laboratory FY 2010 Site Executable Plan for Energy and Transportation Fuels Management*, DOE/ID-11383, U.S. Department of Energy Idaho Operations Office, December 22, 2009.

DOE-ID, 2007, *Idaho National Laboratory Site Pollution Prevention Plan*, DOE/ID-10333 Rev 3, U.S. Department of Energy Idaho Operations Office, February 2007.

Executive Order 13423, S*trengthening Federal Environmental, Energy, and Transportation Management*, June 24, 2007.

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, October 5, 2009.