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Revision 0

Idaho National Laboratory Ten-Year Site Plan Project Description Document

Descriptions of the capital projects delineated in the Idaho National Laboratory 2013 – 2022 Ten-Year Site Plan as of June 2011

March 2012

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Idaho National Laboratory
Campus Development Office

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Idaho National Laboratory
Ten-Year Site Plan
Project Description Document

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3/30/12
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ABSTRACT

This document describes the currently active and proposed infrastructure projects listed in Appendix B of the Idaho National Laboratory 2013-2022 Ten-Year Site Plan (DOE/ID-11449) with project statuses as of June 2011. This document was previously titled, "Idaho Facilities Management Funded and Proposed Projects' Descriptions," and was produced in accordance with Contract Data Requirements List I.06.

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ACRONYMS

ATR	Advanced Test Reactor
ATRC	Advanced Test Reactor Critical Facility
ATS	Automatic Transfer Switch
CAS	Central Alarm Station
CD	Critical Decision (e.g., CD-0)
CF	Central Facilities (building number prefix used at the Central Facilities Area)
CFA	Central Facilities Area
CIC	Core Internals Changeout
CITRC	Critical Infrastructure Test Range Complex
CPP	Chemical Processing Plant (legacy building number prefix used at the Idaho Nuclear Technology and Engineering Center)
DOE	Department of Energy
DSA	Documented Safety Analysis
E&E	Energy and Environment
EA	Environmental Assessment
EDM	Electric Discharge Machining
EFIS	Emergency Firewater Injection System
EML	Electron Microscopy Laboratory
EPA	Environmental Protection Agency
EPMA	Electron Probe Micro-Analyzer
ES&H	Environment, Safety and Health
ESL	Energy Systems Laboratory
F&SS	Facilities and Site Services
FASB	Fuels and Applied Science Building
FCF	Fuel Conditioning Facility
FIB	Focused Ion Beam
HEPA	High-Efficiency Particulate Air
FMF	Fuel Manufacturing Facility
HFEF	Hot Fuel Examination Facility
HVAC	Heating, Ventilation and Air Conditioning
IASCC	Irradiation-Assisted Stress Corrosion Cracking
IF	Idaho Falls (legacy building number prefix used at the Research and Education Campus)
IFM	Idaho Facilities Management
IMCL	Irradiated Materials Characterization Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center

IRC	INL Research Center
KV	Kilovolt
KVA	Kilovolt-Ampere
LEU	Low Enriched Uranium
LLC	Limited Liability Company
LLW	Low-Level Waste
LWR	Light Water Reactor
MFC	Materials and Fuels Complex (also used as a building number prefix)
MVA	Megavolt-Ampere
MXRD	Microscale X-Ray Diffractometer
NHS or N&HS	National and Homeland Security
NE	Office of Nuclear Energy
NGNP	Next Generation Nuclear Plant
NHS	National and Homeland Security
NO	Nuclear Operations
NR	Office of Naval Reactors
NRAD	Neutron Radiography reactor
NRF	Nuclear Reactors Facility
NST	Nuclear Science and Technology
NSTR	National Security Test Range
NSUF	National Scientific User Facility
PBX	Private Branch Exchange
PIE	Post-Irradiation Examination
R&D	Research and Development
REC	Research and Education Campus
RERTR	Reduced Enrichment Research and Test Reactors
S&S	Safeguards and Security
SCRAM	Emergency shutdown of a nuclear reactor
SERA	Suited Entry Repair Area
SMC	Specific Manufacturing Capability
SW	Site Wide
TAN	Test Area North (also used as a building number prefix at the Specific Manufacturing Capability)
TEV	Technical Evaluation
TRA	Test Reactor Area (legacy building number prefix used at the Advanced Test Reactor Complex)
TREAT	Transient Reactor Experiment and Test Facility

TRIGA	Training, Research, Isotopes, General Atomics
TYSP	Ten-Year Site Plan
USU	Utah State University
V	Volt
WCB	Willow Creek Building
WFO	Work for Others

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INTRODUCTION

Purpose

This document supplements the *Idaho National Laboratory (INL)* 2013-*2022 Ten-Year Site Plan* (TYSP) and was produced in accordance with Contract Data Requirements List I.06. The document describes the active and proposed Institutional General Plant Projects, Program-Funded Capital Projects, Operating-Funded Projects, and Line Item Construction Projects included in Appendix B of the TYSP. The following information is provided for each project:

- Problem or need addressed by the project
- Project description
- Mission(s) and activities supported by the project
- Status of the project. (to be consistent with the TYSP, which was published in June 2011, the statuses in this document are as of June 2011)

Background

The projects delineated in this document support infrastructure needs at INL's Research and Education Campus, Materials and Fuels Complex, Advanced Test Reactor Complex and the greater site-wide area. The projects provide critical infrastructure needed to meet current and future INL operational and research needs. Execution of these projects will restore, rebuild, and revitalize INL's physical infrastructure; enhance program execution, and make a significant contribution toward reducing complex-wide deferred maintenance.

PROJECT INDEX

Table 1. Institutional General Plant Project List (INL Indirect-funded)

Reference No.	Area/Subarea	Requesting Organization	Project
I-1	MFC	F&SS	MFC Technical Support Building
I-2	ATR Complex	F&SS	TRA-653 Machine Shop Heating, Ventilating, and Air Conditioning Replacement
I-3	MFC	F&SS	MFC Sewage Lagoon Capacity Upgrade
I-4	REC	E&E	Energy Systems Laboratory Lease-Hold Improvements
I-5	MFC	NST	Contaminated Equipment Storage Building Conversion
I-6	MFC	NST	Ceramic Fuel Research and Development Strategy Glovebox Support Line
I-7	SW	SMC/N&HS	INL Test Range Multi Use Facility
I-8	MFC/FASB	NSUF	Irradiation Assisted Stress Corrosion Cracking Test Rigs 3 & 4
I-9	MFC	F&SS	MFC Substation and Transformer Capacity Improvements
I-10	SW/SMC	F&SS	Nile Avenue Reconstruction
I-11	MFC	NST	Ceramic Fuel Research and Development Obsolete Glovebox Replacement
I-12	ATR Complex	IM	ATR Dial Room Replacement
I-13	SW/CITRC	N&HS	Critical Infrastructure Test Range Complex Substation Upgrade
I-14	MFC	N&HS	Non-Proliferation Test and Evaluation Center
I-15	ATR Complex	NO	ATR Operations Support and Cafeteria Facility
I-16	ATR Complex	NO	Advanced Test Reactor Critical Control System Upgrade
I-17	MFC/FCF	NST	Advanced Electrochemical Development Glovebox
I-18	MFC	IM	MFC Fiber Optic Backbone Capacity and Reliability Upgrade (Manhole 50 Reconfiguration)
I-19	MFC	IM	MFC Cable Upgrades
I-20	MFC/FCF	NO	FCF Suited Entry Repair Area Crane
I-21	MFC/NRAD	NO	Neutron Radiography Reactor Elevator Control System
I-22	MFC/FASB	NST	Install Fume Hoods at FASB

Table 1 (continued)

Reference No.	Area/Subarea	Requesting Organization	Project
I-23	MFC	NST	Advanced Electrochemical Actinide Process Development and Monitoring Laboratory
I-24	MFC	NST	Electric Discharge Machining Installation
I-25	MFC	IM	Nuclear Operations Support Facilities Cable Upgrades at MFC
I-26	SW/SMC	SMC	TAN Multi-Use Facility
I-27	SW/SMC	SMC	Extend Feeder to TAN-679A
I-28	MFC	NST	Installation of Electron Probe Micro-Analyzer instrument into the Irradiated Materials Characterization Laboratory
I-29	MFC	NST	Installation of Focused Ion Beam instrument into the IMCL
I-30	ATR Complex	NO	ATR Complex Common Support Building II
I-31	REC	E&E	Interim Engineering Demonstration Facility Upgrade
I-32	SW/CFA	ES&H	CF-1618 Whole Body Counter/Lung Counter Annex
I-33	ATR Complex	NO	Diesel Oil Header System Upgrade
I-34	ATR Complex	F&SS	TRA-604 Switchgear Upgrade – 2400 Volt Transfer Switch
I-35	SW/CFA	F&SS	Convert CF-601/623/624/674 to Electric Heat
I-36	MFC	NST	Installation of Micro X-Ray Diffractometer instrument into the IMCL
I-37	ATR Complex	NO	ATR Complex Nuclear Training Center
I-38	SW	F&SS	INL Power System Reliability Enhancement with Transformer Circuit Switchers
I-39	MFC	IM	Layered Network Infrastructure
I-40	SW	N&HS	National Security Test Range Enhancements
I-41	SW	IM	Video Conferencing and Multimedia Enterprise Standard
I-42	REC	IM	REC Information Technology Corridor Build-Out
I-43	SW/SMC	IM	TAN/SMC Dial Room Replacement
I-44	REC	IM	Enterprise Computing Data Center
I-45	REC	F&SS	Replace Obsolete IRC Fire Alarm System
I-46	MFC/FASB	NO	Stack Monitor Replacement (includes FASB)
I-47	REC	E&E	Dry Room
I-48	SW/SMC	SMC	TAN Multi-Use Trailers TAN-671 & 672

Table 2. Program-Funded Capital Projects and Operating-Funded Projects (INL Direct-funded)

Reference No.	Area/Subarea	Sponsoring Organization	Project
PF-1	MFC	IFM	Irradiated Materials Characterization Lab
PF-2	MFC	IFM	MFC Dial Room Replacement
PF-3	MFC	IFM	MFC Modular Office
PF-4	MFC	IFM	MFC-752 Analytical Lab Safety Basis Upgrade Implementation
PF-5	MFC	IFM	Neutron Radiography Reactor Console Upgrade
PF-6	MFC	IFM	MFC Water Tank Replacement
PF-7	SW	N&HS	National Electric Grid Reliability Test Bed
PF-8	SW	N&HS	Stand-Off Experiment Range Facility (for high-energy accelerator testing)
PF-9	MFC	N&HS	Electron Microscopy Lab Shielded Prep Sample Area
PF-10	SW	N&HS	Upgrades to the National Security Test Range (explosives range) – Data Collection Systems
PF-11	MFC	S&S	Security Technology Command and Control Space
PF-12	MFC	S&S	Aerial Protection Grid
PF-13	MFC	NGNP	Neutron Radiography Reactor Pneumatic Transfer System Installation
PF-14	MFC	NGNP	Bulk Thermal Conductivity of Irradiated Fuel Measurement Device

Table 3. Line Item Construction Projects (DOE-NE Direct-funded)

Reference No.	Area/Subarea	Sponsoring Organization	Project
L-1	INL	NE	Remote-Handled Low-Level Waste Disposal Project (NE/NR)
L-2	MFC	NST	Advanced Post-Irradiation Examination Capability (Project engineering and design only)
L-3	INTEC	NE	Materials Security and Consolidation Project
L-4	ATR Complex	NO	ATR Diesel Electric Bus and Switch Gear Replacement Project
L-5	ATR Complex	NO	ATR Primary Coolant Pump and Motor Replacements Project
L-6	ATR Complex	NO	ATR Emergency Firewater Injection System Replacement Project

Table 4. Operating-Funded Projects (DOE-NE Direct-funded)

Reference No.	Area/Subarea	Sponsoring Organization	Project
OF-1	MFC	NO	Transient Testing Capability Restoration
OF-2	INL	F&SS	Mission-Critical Proactive Sustainment
OF-3	INL	F&SS	Mission-Dependent Proactive Sustainment
OF-4	INL	F&SS	Roof Repair and Replacement

INSTITUTIONAL GENERAL PLANT PROJECTS

I-1 MFC Technical Support Building

Problem or Need

Given current facility utilization, consolidation opportunities, and staff growth projections, there is an identified need for 100 to 150 additional office spaces at the Materials and Fuels Complex (MFC). Without this new office space, achievement of INL lead laboratory status will be jeopardized due to the quality and quantity of current available office space and the resulting negative impact on INL recruiting.

Project Description

This project will provide 17,000 square feet of space configured as approximately 80 offices for use by MFC programs. The new building will provide space for researchers to collaborate on nuclear reactors and fuel cycle facilities. It will consolidate several organizations into a single facility, provide modern space to attract new employees (several employment offers have been rejected due to facility condition), feature optimized conference rooms, support video conferencing, and address security issues associated with foreign nationals.

Asset Mission

This project will directly support the research and development (R&D) activities included in the following strategic plans:

1. *Consolidated World-Class PIE Capabilities Strategic Plan*, INL/EXT-09-16831, September 28, 2009
2. *World-Class Ceramic Fuel R&D Capabilities Strategic Plan*, INL/EXT-09-16832, September 28, 2009.

In addition, this work will directly aid the projects supporting U.S. Department of Energy (DOE) Energy R&D Roadmap Objectives 1 through 4.

This facility will provide office space for Fuel Cycle Research and Development, Reduced Enrichment Research and Test Reactors, Next Generation Nuclear Plant, Light Water Reactor Sustainability, and National and Homeland Security program employees working at MFC.

Project Status [a]

Design is in progress and will be completed in FY 2012. The request for proposal for construction is planned for early FY 2013, with construction to follow in the spring of FY 2013.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-2 TRA-653 Machine Shop Heating, Ventilating, and Air Conditioning Replacement

Problem or Need

The Advanced Test Reactor (ATR) Complex TRA-653 ATR Machine Shop, activated in 1957, houses machine, electrical, and welding shops on the first floor, with nuclear maintenance management, work planning, and work control offices located on the second floor. The heating, ventilation and air conditioning (HVAC) system serving the second floor office area does not provide effective heating or cooling for the occupants, and no cooling capability is provided in the other areas of the building. Areas inside of TRA-653 can reach temperatures of more than 90°F in the summer months.

The HVAC system serving the shop area consists of electric unit heaters. Each summer, a portable evaporative cooling unit is attached to an opening in the west roll-up door to provide cooling to the area. Unfortunately, the unit is substantially under-sized for the application. The machining operations conducted in the facility require tight temperature control to maintain dimensional tolerances. However, the existing "system" cannot adequately deal with the temperature variations experienced from early morning to late afternoon during the summer months, and machining operations, along with employee comfort and productivity, are negatively impacted.

Project Description

This project will replace the three office area HVAC units and associated ductwork with updated units, as well as install new rooftop HVAC units in the machine shop. With the completion of the proposed modifications, all areas of the building will become temperature controlled and will provide comfortable working conditions for all occupants.

Asset Mission

All employees and equipment housed in TRA-653 support nuclear operations and are essential to ongoing work at the ATR Complex. Activities performed in TRA-653 are critical to ATR operations and the INL mission.

Project Status [a]

The project is in the execution phase (construction) and is expected to be completed in November 2011.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-3 MFC Sewage Lagoon Capacity Upgrade

Problem or Need

The Materials and Fuels Complex (MFC) evaporative sewage lagoons are operating at full capacity and cannot support future growth or expansion. The current MFC population is approximately 800 personnel, and INL is projecting the population at MFC to grow to 1,150 by the year 2020, increasing to 1,500 personnel in later years. In addition, inflow/outflow data indicates that the current lagoons are leaking at an unacceptable rate.

Project Description

This project will install new evaporative sewage lagoons sized to accommodate a population of 1,150 personnel, and expandable to meet the needs of 1,500 personnel, if needed. Accordingly, the project will be designed to be constructed in two stages. The design will be in accordance with Idaho Administrative Procedures Act 58.01.16-410 and will be approved by the Idaho Department of Environmental Quality. Initial lagoon installation will encompass approximately 10.5 acres. Should future needs warrant an expansion, the plans will already be in place for an additional 3.5-acre evaporative lagoon.

Asset Mission

Construction of new evaporative sewage lagoons is necessary to maintain current sewage treatment services and to accommodate MFC's projected future growth in support of the INL nuclear mission.

Project Status [a]

The project is in the execution phase (construction) and is expected to be completed in September 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-4 Energy Systems Laboratory Lease-Hold Improvements

Problem or Need

The INL Clean Energy Program, including the Bioenergy, Energy Storage, and Hybrid Energy Systems programs, continues to grow at a steady and predictable pace, but the INL facilities serving these programs are already functioning at full capacity. To accommodate these programs for the future, Battelle Energy Alliance, LLC, has leased a new 90,000 ft^2 office, laboratory, and high-bay facility, known as the INL Energy Systems Laboratory (ESL). However, certain program-required functionality enhancements needed to address utility; heating, ventilation and air conditioning (HVAC); information technology, security; and laboratory configuration needs are not part of the lease.

Project Description

This project will implement the leasehold improvements needed to co-locate the Advanced Energy Storage, Bioenergy, and Hybrid Energy Systems programs. Specific improvements will address electrical and gas distribution, lab hood exhaust trunk installation, additional HVAC units, telecommunications, and the procurement and installation of laboratory casework and hoods. This project will also relocate personnel and install modular office and conference room furniture. The result will be better integrated research and development of synergistic and comprehensive energy systems.

Asset Mission

Acquisition of the ESL will accomplish an essential step towards meeting the mission needs defined for INL Energy and Environment's research into energy supply. The laboratory will support field performance and life testing of advanced technology vehicles, hybrid energy systems research – an emerging area of INL research, and biomass feedstock assembly.

The ESL Leasehold Improvements project directly supports the INL strategy to advance the clean energy research, development, demonstration and deployment mission. The project will configure the facility for the Feedstock Process Demonstration Unit, Hybrid Energy Systems Testing, and Battery Testing Laboratory, and will provide Energy Systems and Technology office and laboratory space.

Project Status [a]

The project is in the execution phase (design/construction). Beneficial occupancy is expected in August 2012, with personnel moves into the facility continuing into FY 2013.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-5 Contaminated Equipment Storage Building Conversion

Problem or Need

The Materials and Fuels Complex (MFC) performs research and technology development in support of advanced energy initiatives. MFC work is focused on increasing energy security, developing clean economical fuel technologies, minimizing nuclear energy waste, post-irradiation examination, and supporting Next Generation Nuclear Plant and other programs. This project will provide additional laboratory space critically needed to accommodate MFC's projected growth in support of the DOE Office of Nuclear Energy (NE) mission.

Project Description

This project will convert the Contaminated Equipment Storage Building from a Hazard Category III nuclear facility used for packaging and storage of radioactive waste, equipment and materials to a research-oriented radiological facility. The facility is a storage building that is currently being de-inventoried to avoid the cost of upgrading its documented safety analysis to comply with 10 Code of Federal Regulations 830. The building includes a functional, conditioned high bay that could provide needed floor space for nuclear fuel fabrication research and development supporting DOE-NE and National Nuclear Security Administration missions. This proposal specifically addresses conversion of the east side of the facility. Follow-on conversion of the west side will be examined, and the proposal will be amended if it is determined to be viable to convert that space to useable, conditioned research space.

Asset Mission

This project will support fuel fabrication work for multiple customers at INL. Oxide, nitride, carbide, silicide, and composite fuels are within the fuel research portfolio for future reactors. Several of these alternative ceramic materials offer significant advantages over current commercial technologies. To support further development of such fuels within a science-based strategy, the nation needs comprehensive, consolidated, state-of-the-art nuclear fuel fabrication and characterization capabilities.

This facility will support the Fuel Cycle Research and Development; Generation IV, Work for Others (for example, the National Aeronautic and Space Administration), and Light Water Reactor Sustainability programs. This project directly supports research and development included in the *World-Class Ceramic Fuel R&D Capabilities Strategic Plan*, INL/EXT-09-16832, September 28, 2009. In addition, this capability would be used by numerous other projects, including the National Scientific User Facility and the Reduced Enrichment Research and Test Reactors program.

Project Status [a]

The project is in the execution phase. Construction will start in October 2011 and will be completed in March 2012. The project is expected to be completed in July 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-6 Ceramic Fuel Research and Development Strategy Glovebox Support Line

Problem or Need

INL's existing oxide fuel fabrication capability is co-located with metal fuel fabrication equipment within an existing set of Fuel Manufacturing Facility (FMF) gloveboxes. This installation is not adequate to support the establishment of a world-class ceramic fuels research and development (R&D) capability at INL for the following reasons:

- The work space in the existing glovebox is limited and cannot accommodate the 1 kilogram heavy metal batch sizes needed to obtain statistically meaningful fabrication process data.
- The existing glovebox does not allow for future upgrades to test advanced fabrication techniques.
- Metal and oxide fabrication equipment co-exist in the existing glovebox. This is a serious disadvantage in terms of cross-contamination and atmosphere control issues.

To support DOE's science-based fuel development strategy, a flexible ceramic fuel R&D infrastructure is needed.

Project Description

This project includes design and installation of a glovebox support line in the FMF south work room. The glovebox support line is the facility support infrastructure that allows the technical programs to readily change or add processes or equipment. This project does not include glovebox design or installation.

Asset Mission

The glovebox support line will accommodate multiple programs and functions that require glovebox operations, including Fuel Cycle Research and Development, and will serve as the back bone of INL's multiprogram and multifunction research.

This project directly supports R&D included in the *World-Class Ceramic Fuel R&D Capabilities Strategic Plan*, INL/EXT-09-16832, September 28, 2009. All of this work is directly applicable to Objectives 1 through 4 of the DOE Energy R&D Roadmap.

Project Status [a]

The project is in the execution phase. Final design is expected to be completed in November 2011. The project will then be placed on hold awaiting completion of the design and fabrication of a new ceramic fuel glovebox. (See Project I-11, Ceramic Fuel Research and Development Obsolete Glovebox Replacement.) Installation of the support line and glove box will be accomplished in a coordinated effort during FY 2013/2014.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-7 INL Test Range Multi Use Facility

Problem or Need

National and Homeland Security (NHS) uses the INL National Security Test Range (NSTR) to conduct live fire testing of various materials associated with numerous Department of Defense and DOE research and development (R&D) projects. However, the existing facilities do not provide world-class observation or data acquisition. As a result of these limitations, NHS cannot adequately accommodate existing customers or attract new customers.

This capability is also critical to developing future missions for the Specific Manufacturing Capability (SMC) by 2013. SMC is one of the largest Work for Others programs at INL, and loss of this program would have a significant impact on the Laboratory's annual funding.

Project Description

This project will construct an approximately 10,000 ft^2 multi-use building at the NSTR to support current INL needs and the needs of future national defense projects. The project will also provide basic infrastructure upgrades to support installation and use of the building and range.

The new facility will have Special Access Program-approved conference and viewing rooms, video and data collection rooms, and general inhabitance areas. The road to the facility will be upgraded to a compacted aggregate capable of supporting heavy vehicles in all seasons. Power and data lines will be run from the Materials and Fuels Complex. The approximate length of the upgraded road and the power and data lines is seven miles. Water and sewer services will also be provided.

Construction of this new facility will improve working conditions, eliminate congestion, increase efficiencies, eliminate the mixing of classified work with current production, and provide capabilities that don't currently exist at INL. This new facility will also allow for the communication of multi-use program availability at SMC and the INL. Overall, this project will enhance the public image of INL and SMC capabilities.

Asset Mission

This new facility will be focused almost entirely on supporting future national security missions at the INL. NHS has already improved strategic partnerships with entities outside of the U.S. Army, including the Office of the Secretary of Defense. This project is critical to the future utilization of NHS for multiple national security programs in the areas of classified manufacturing, assembly, and R&D.

As a multi-program facility, this building will also be used to advance the nuclear energy mission by supporting Advanced Test Reactor (ATR) needs for classified experiments, as well as other classified INL needs. NHS has supported ATR in these experiments in the past, and it is expected this will continue into the future. This facility will support the clean energy mission as needed, especially where classified or business sensitive activities need to be performed. This project also supports the effort to identify and execute a new and sustainable mission for SMC.

Project Status [a]

This project is in the initiation phase (pre-Critical Decision-0).

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-8 Irradiation Assisted Stress Corrosion Cracking Test Rigs 3 & 4

Problem or Need

The ability to predict the lifetime behavior of Light Water Reactor internal components is critical to the extension of reactor operational lifetimes to 60, 80, or more years. The measurement of mechanical property changes in highly irradiated materials as a function of irradiation has been recognized throughout the nuclear industry and regulatory agencies as essential to the predictive process.

The Nuclear Regulatory Commission, Electric Power Research Institute, and leading industry experts have formulated a plan to develop the infrastructure needed to collect this critical data. The INL has committed to develop the test cells and equipment to support this need. To supply the enormous volume of data necessary to support re-licensing decisions, at least four Irradiation Assisted Stress Corrosion Cracking (IASCC) test systems will be required.

The Advanced Test Reactor (ATR) National Scientific User Facility (NSUF) has been funded to build two shielded IASCC systems as part of the INL's effort to enhance its post-irradiation examination (PIE) capabilities,. However, a minimum of two additional systems are needed. Some experts estimate that the demand for IASCC data is expected to grow to the point that as many as ten systems will eventually be required.

Project Description

Each test rig system will consist of a shielded hot cell, master-slave manipulators, a transfer cart for sample movement, and in-cell equipment including: state-of-the-art autoclaves and electric actuators for sample testing and crack development, a scanning electron microscope for fractography, a camera system, and control/data gathering software. The hot cells will configured to utilize the Fuels and Applied Science Building (MFC-787) heating, ventilation, and air conditioning system, and utilities (including purified water, power, and internet) will be provided.

The ability to measure mechanical property changes in highly irradiated materials as a function of irradiation will make these systems unique in the United States. The primary variable to be studied will be crack growth rate, but fracture toughness, propensity for crack initiation, and tensile strength are perhaps equally important and will be studied as well.

Asset Mission

In its 2010 roadmap, the DOE Office of Nuclear Energy (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. The first is: Develop technologies and other solutions that can improve reliability, sustain the safety, and extend the life of current reactors. As described above, this project will provide a capability that is essential to life-extension and safety sustainment of existing reactors.

This project will also extend one of the laboratory's distinguishing core capabilities, PIE. Access to the IASCC systems through ATR NSUF will provide essential capabilities to the nuclear research community and the nuclear energy industry.

Project Status [a]

Proposed – programmatic funding is being pursued for this project.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-9 MFC Substation and Transformer Capacity Improvements

Problem or Need

INL will complete the Materials and Fuels Complex (MFC) Energy Savings Performance project, which will reconfigure most building heat at MFC from steam to electric, in FY 2011. The four MFC laboratories that utilize once-through air flow will continue to be heated by steam due to the large heating load; however, the steam for these four buildings will be provided by modern electric boilers rather than old oil-fired boilers. These modifications will increase MFC's electric load by up to 10 megawatts.

The capacity of the main MFC substation is 12 megavolt-ampere (MVA) without fan cooling of the transformers and 16 MVA with fan cooling. MFC's maximum possible load, following the energy savings contract modifications, will be approximately 14 MVA. The addition of 1 MVA of load to support the new Irradiated Materials Characterization Laboratory that is currently under construction will increase the maximum possible load to approximately 15 MVA, about 94 percent of the substation's capacity. Upgrade of the main substation transformers is essential to support any additional increase in MFC's electrical load.

Project Description

This project will implement the infrastructure upgrades and modifications identified in the MFC Sitewide Electrical Study (TEV-1347). It includes replacement of the two 138-kilovolt (kV)/13.8-kV-12/16 MVA substation class transformers at the MFC main substation (EBR-II-707) with two new transformers with sufficient capacity (about 20/24 kilovolt-ampere) to handle the projected future electrical load at the MFC. The actual capacity of the new transformers will be determined as the lab builds an electrical load history for the electric boilers and electric building heating. This project may also include upgrades to the lower voltage substations in the MFC electrical distribution system and construction of a 13.8 kV distribution loop around the MFC. These upgrades will ensure the increased available power from the main substation transformer capacity upgrade can be efficiently and reliably controlled and distributed to MFC buildings.

Asset Mission

This project is necessary to provide a reasonable margin (~20%) between the actual load and maximum capacity and is a prerequisite to planned MFC facility and equipment upgrades that will add to MFC's electrical load, such as the MFC Technical Support Building and Advanced Post-Irradiation Examination Facility. This project will directly support the following DOE Energy research and development programs:

- Fuel Cycle Research and Development
- National Scientific User Facility
- Reduced Enrichment Research and Test Reactors
- Next Generation Nuclear Plant
- Light Water Reactor Sustainability
- National and Homeland Security.

Project Status [a]

This project is in the initiation phase (pre-Critical Decision-0).

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-10 Nile Avenue Reconstruction

Problem or Need

Nile Avenue is the only paved road connecting the INL's Specific Manufacturing Capability (SMC) and Test Area North (TAN). In addition to employee transportation, all shipments of supplies, equipment, and products into and out of SMC utilize Nile Avenue. The TAN Fire station is also located on this road. A field inspection of the road was performed by Michael Baker Jr., Inc in the fall of 2010. This inspection is recorded in Technical Evaluation Study (TEV)-1027.

Nile Avenue is in poor condition. The road exhibits widespread degradation including cracking, rutting, raveling, and degradation of the chip seal. Immediate attention is required to maintain the safe operation of the road. The deterioration of the road is likely due to wear, poor roadbed preparation, and lack of maintenance. Based on MicroPAVER, a road/paved surface condition and deficiency evaluation and tracking system, the road is approximately 23 years old.

Failure to take action soon could result in adverse safety conditions for those using the road. Adverse conditions could include, but are not limited to, additional potholes, standing water causing hydroplaning, and further pavement deformation that could cause drivers to lose vehicular control and/or cause damage to property and life.

Project Description

This project will rehabilitate and reconstruct Nile Avenue, a 1.7 mile asphalt concrete roadway between TAN and SMC.

Based on sample results and geotechnical recommendations, the long-term fix for Nile Avenue includes reconstruction of part of the road and rehabilitation of the rest. Complete reconstruction is recommended starting from the intersection of Nile Avenue and Lincoln Boulevard, and extending west approximately 4,500 feet along the road. It is recommended that the remaining portion of Nile Avenue that extends to the SMC parking lot be fully milled and blended with the existing roadbed, and replaced with new asphalt pavement.

Because the road currently has a minimal shoulder and steep side slopes, it is also recommended that the road be widened to include a larger shoulder with a shallower grade off the shoulder. The current width of the road is 32 feet from shoulder to shoulder. It is recommended the road be upgraded to 40 feet from shoulder to shoulder.

Asset Mission

Nile Avenue supports all work undertaken at SMC in support of the U. S. Army, Department of Defense, and others. The TAN Fire Station located on Nile Avenue provides fire protection services to all facilities and activities situated in the northern portion of the INL.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-11 Ceramic Fuel Research and Development Obsolete Glovebox Replacement

Problem or Need

The condition of the existing waste characterization glovebox and fume hood located in the Fuel Manufacturing Facility (FMF) south workroom is severely impacting work efficiency. As a result, INL's ability to meet current fuel handling and fuel development programmatic needs is significantly limited. The outdated system is 25 years old, requires high levels of maintenance, and is vulnerable to single-point failures. If the glovebox and hood are not replaced, continued system degradation will make it impossible to sustain current fuel handling capabilities.

Project Description

This project will include removal and one-to-one replacement of the existing FMF south work room waste characterization glovebox and fume hood. The project will enhance the safety, efficiency and effectiveness of current and future research and development (R&D) fuel handling work, and will ensure that the Laboratory maintains its current capabilities in these critical areas.

Asset Mission

This project will sustain and complement the following INL strategic advantages:

- INL has extensive metallic fuel fabrication expertise, broad characterization capabilities, and basic fuel fabrication capabilities, such as for ceramic fuel. The replacement capabilities will support multiple nuclear fuel development programs.
- The basic nuclear and radiological facilities needed to support fuel fabrication already exist at the Materials and Fuels Complex (e.g., FMF, Analytical Laboratory, and Electron Microscopy Laboratory).
- INL's fuel handling and fabrication capability is located near both irradiation and PIE facilities. This offers a major advantage for providing feedback and improvement between fuel fabrication activities and observed fuel performance.
- The glovebox capability complements the Advanced Test Reactor National Scientific User Facility, which provides irradiation capabilities to a broad nuclear research community. A comprehensive set of actinide-bearing ceramic fuel fabrication and characterization capabilities for irradiation benefits the United States and global research communities.
- INL's existing trained workforce, with considerable expertise in fuels and materials technology, forms a solid foundation to build upon as new nuclear fuel R&D capabilities are implemented and work load increases.
- Nuclear fuel cycle R&D requires a nuclear safety and security infrastructure that is currently funded at INL under the base DOE Office of Nuclear Energy's infrastructure budget.

The primary internal drivers for the replacement are based on sustaining current capabilities.

Project Status [a]

The project is in the advanced planning/conceptual design phase (Critical Decision-1/2). Final design and fabrication of the glovebox is expected to start in the second quarter of FY 2012, with installation design planned for FY 2013. Installation of the glovebox and a new support line will be accomplished in a coordinated effort during FY 2013/2014 (see Project I-6, Ceramic Fuel Research and Development Strategy Glovebox Support Line.).

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-12 ATR Dial Room Replacement

Problem or Need

The Advanced Test Reactor (ATR) Complex TRA-614 Office Building/Bunk House contains the "dial room," which houses the telecommunications and transport optical electronics that provide and support voice, video, data, fire, safety, security, and radio service for the campus. The building is 50 years old and exhibits serious deficiencies, namely, the facility floor space is exhausted; there is no room for expansion; and equipment access is limited. Additionally, the heating, ventilation, and air conditioning system is old and dysfunctional, creating undue high temperature stress on telecommunication electronics. Electrical services to the dial room are also inadequate and create a hazard to the facility, equipment, components, and personnel.

The ATR Complex telephone system is at very high risk (i.e., only one hardware or software breakdown away) of complete failure and loss of service for the entire campus, as illustrated by the following conditions.

- The current Private Branch Exchange (PBX) infrastructure has been in service since 1988. The PBX switches are operating on end-of-life hardware and software.
- As of October 1, 2007, the vendor will not support or repair the hardware. After-market/secondary-market sources have been unable to provide replacement parts, and the in-house spare hardware inventory is depleted.
- Software life extension is not possible. The software was discontinued in 2007, and software patches and fixes are not available. The vendor continued to support existing installations until February 23, 2010, but will no longer provide software patches and fixes should an issue be found within the software itself.
- The ATR Complex PBXs are functioning at capacity. Telephone service for additional buildings is not available.

Because of the location and nature of deficiencies and the physical lack of floor space, repairs to the structure are unlikely and cost-prohibitive. End-of-life support issues for both hardware and software have increased the impact and risk of failure to unacceptable levels.

Project Description

This project will provide a new dial/telecommunications room, replacement PBX switches for the ATR Complex, and new remote switches for TAN and the Idaho Nuclear Technology and Engineering Center. The project will substantially improve the reliability of telecommunications services for the ATR Complex and enhance the protection of the telecommunications hardware and software.

Asset Mission

This project will support multiple INL missions by ensuring the reliability of telecommunications services for the ATR Complex and other INL operations.

Project Status [a]

The project has completed the advanced planning/conceptual phase (Critical Decision-1/2). Further work is on hold pending funding.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-13 Critical Infrastructure Test Range Complex Substation Upgrade

Problem or Need

The INL's existing power infrastructure has been used for conducting DOE and Work for Others projects related to power grid research since 2003. Tests have been conducted at a range of voltage levels including the138 kilovolt (kV) transmission, 12.5 kV and 13.8 kV distribution, and 480 volt (V) utilization levels, and have addressed operational elements that include control systems, communications, cyber security, and power quality. While most of the research and test range-related activities have been conducted within the Critical Infrastructure Test Range Complex (CITRC) infrastructure, key efforts have also been undertaken at the Idaho National Technology and Engineering Center, Materials and Fuels Complex, Central Facilities Area, and Test Area North.

Increased national interest in protecting critical power infrastructures and the resulting growth in power and control systems research at INL have pushed the laboratory's test capabilities to their limit. The existing test facilities on INL's transmission and distribution system have reached capacity in schedule availability, test design flexibility, and the ability to maintain minimal risk of impact to INL's operating nuclear facilities.

Project Description

This project will modify the CITRC substation to minimize the impact of test activities on the operational side of the INL's 138 kV power distribution loop. The project will also install equipment to increase the flexibility of testing on the 13.8 kV circuits. The project addresses issues that limit design flexibility and scheduling, and also minimizes the risk of tests impacting the laboratory's operating nuclear facilities.

The project offers a near-term, stand-alone solution to address customer requirements and demonstrate the value of investing in INL's power grid infrastructure for research, development demonstration, and deployment. The project will integrate seamlessly with the planned large-scale National Electric Grid Reliability Test Bed Project (see PF-7).

Asset Mission

This project will support INL's National and Homeland Security mission to protect the nation's critical power infrastructure, and will also ensure that the pursuit of that mission does not adversely impact other INL missions and operations.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-14 Non-Proliferation Test and Evaluation Center

Problem or Need

INL nonproliferation programs require the coupling of nonproliferation, counter-proliferation, and consequence management technologies and services with the unique radiological and nuclear materials available at the laboratory. Currently, no INL facility or site area is dedicated to this purpose.

The programs compete for limited space in the idle Transient Reactor Experiment and Test (TREAT) facility, which may be restarted soon, and in other facilities that are already used heavily for other missions. Work being performed to support existing nonproliferation programs, including active interrogation, radiological dispersal device/weapons of mass destruction training, and chemical and explosives detection, is scattered across the site in facilities that are used on a catch-as-catch-can basis. INL is contractually bound to establish a center of excellence in nonproliferation, yet there is no place on the site to showcase the laboratory's nonproliferation capabilities to advantage.

INL's nonproliferation programs need a dedicated facility that can meet their needs. The facility must provide the space, utilities, and other features necessary for development, demonstration, and promotion of nonproliferation technologies, while allowing for the use of moderate quantities of radiological and nuclear material in support of the work. The facility must have an adjacent outdoor area and must either contain at least a Category 2 nuclear storage area or be connected to such a storage facility in a way that facilitates the efficient and economical transfer of materials into and out of the facility.

Project Description

This project will design and construct a new, multi-programmatic, non-proliferation testing, evaluation, and training center at the INL. The center may incorporate both new and existing facilities. The location of nuclear material resources will be considered when determining the center's location.

The approach to meeting the project needs is closely linked to other projects described herein. For example, the TREAT facility provides an adequate space for Radiological Dispersal Device/Weapons of Mass Destruction training evolutions and provides the capability to work with needed amounts of nuclear materials. Thus, the need date for the new facility is dependent on plans for TREAT restart, and the new facility would need to be in place and operational at the start of significant modification activities for TREAT restart. Similarly, the location of the facility is dependent on the primary location for Category I material storage at INL. Currently, the new facility should be located at or near the Materials and Fuels Complex to be co-located with the Zero Power Physics Reactor facility. If, on the other hand, plans to relocate Category I storage to the Idaho Nuclear Technology and Engineering Center (INTEC) are approved and funded, the location of this new facility should be at or near INTEC.

Asset Mission

This project is needed to support nonproliferation programs as mandated by DOE and to support Battelle Energy Alliance, LLC's contractual requirement to establish a center of excellence in nonproliferation safeguards and security.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-15 ATR Operations Support and Cafeteria Facility

Problem or Need

In 2015, the Advanced Test Reactor (ATR) will undergo the next Core Internals Changeout (CIC) to ensure its continued safe operation. CIC-associated activities will include numerous movements and lifts of large/heavy pieces of equipment and materials, requiring 40-foot below-the-hook lifts and loads greater than 20 tons. No ATR Complex buildings have the space, overhead clearance, and lifting capabilities necessary. The ATR main floor and canal area cranes are located in congested areas that have floor loading, lift height, and combustible material limits to ensure reactor safety. These limits make the areas under both cranes unsuitable for handling and storage of materials not directly related to the immediate operational needs of the ATR. There are INL buildings 5-25 miles away that are capable of handling those loads, but transportation between them and the ATR Complex is impractical.

A new building sufficient in size and capability is necessary to receive, prepare, stage, assemble, and test materials and equipment in support of both the CIC and on-going operations. A facility with these capabilities would eliminate the need to develop less than ideal alternatives.

Project Description

The ATR Operations Support Facility will include a high bay with a 30-ton crane capable of a 40-foot below-the-hook lift, and will be adequately sized and configured to accommodate both the CIC and ongoing, day-to-day operations. The building will house ATR operational support activities including equipment mock-up and assembly, materials kitting and staging, field radiography, Industrial Health Instrument Laboratory operations, radiological controls monitoring, and quality receipt and inspection. The facility will support ATR's remaining operation lifetime through 2040.

Acquisition of this facility will reduce the transportation costs currently incurred in the shipping of parts and materials to and from other facilities for fabrication and assembly. These savings will initially be small but will increase as the ATR National Scientific User Facility grows to include more users. Construction of this building will also eliminate the costs that would otherwise be incurred to upgrade, utilize, and maintain other buildings. The systems and structure will be new, and the facility will feature sufficient space properly configured to enable the execution of multiple projects without forcing personnel into minimally safe working conditions.

Asset Mission

The ATR Complex Operations Support Facility will provide direct support to DOE's mission to advance and develop the next generation of nuclear reactors, fuels, and materials. The facility will also support other strategic goals, such as continued irradiation of multiple fuels and materials experiments for National and Homeland Security.

The building is essential to the successful completion of the CIC and to the continued operation of ATR. Numerous nuclear fuels and materials will need to be tested elsewhere if ATR does not operate.

This project does not include a cafeteria. The title of the project will be revised at the publication of the next Ten-Year Site Plan.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-16 Advanced Test Reactor Critical Control System Upgrade

Problem or Need

The Advanced Test Reactor Critical Facility (ATRC) is a low-power reactor located at the INL's Advanced Test Reactor (ATR) Complex. The ATRC consists of a small pool-type reactor and a canal that is shared with the ATR. The facility was designed and constructed in the early 1960s. Portions of the original instrument and control system were upgraded in the 1980s with 1960's and 1970's vintage hardware from decommissioned reactors.

The instrument and control system is experiencing end-of-life failures with increasing frequency. Already strained support personnel are required to devote increased time in troubleshooting and repairing failures. Due to the age of the failed components, it is increasingly difficult to obtain replacement parts from reliable vendors. Parts obtained from "gray market" sources require additional testing to demonstrate compliance with quality assurance requirements. When parts are not available from alternative sources, reverse engineering of the affected portions of the system are required to determine alternative solutions. Additionally, the present system does not comply with modern day design requirements.

Equipment failures have caused delays to high-profile projects and cancellation of projects involving local universities. The existing ATRC control system averages about two weeks between failures. Every new failure is different from the previous failures. Often the failures are sequential; the first failure must be corrected before the next failure can be identified.

Project Description

This project will replace the existing ATRC instrument and control system with a system designed to modern day requirements and incorporating modern capabilities, such as self testing features. The system will be fabricated from readily available parts that are expected to remain available for the foreseeable future.

Asset Mission

The ATRC provides direct support to DOE's mission to advance and develop the next generation of nuclear reactors, fuels, and materials. The facility also supports other strategic goals, such as continued irradiation of multiple fuels and materials experiments for National and Homeland Security. Essentially every new irradiation project proposed for ATR needs to be tested in ATRC before approval can be obtained to insert the experiment into the ATR. This facility supports a number of activities including the ATR National Scientific User Facility, World-Leading ATR Advanced In-Reactor Experiment Instrumentation, Post-Irradiation Examination and Testing Capability, and Start-up of Domestic Production of Pu-238. Without this facility each of these activities would be affected.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-17 Advanced Electrochemical Development Glovebox

Problem or Need

The Materials and Fuels Complex lacks the facilities and equipment needed to support advanced fuel cycle research and development (R&D) activities involving actinide materials. Consequently, programs that support research in these areas have been significantly limited.

Project Description

This project will design, purchase, and install inert atmosphere gloveboxes, fume hoods, and thermal/material properties measurement equipment in the Fuel Conditioning Facility (FCF). The measurement equipment will include thermal gravimetric analyzers, differential scanning calorimeters, X-ray diffractometers, and other instruments needed to support fuel cycle R&D. Installation will require decontamination and decommissioning of existing equipment, and modification of FCF systems to provide the necessary support utilities, including ventilation, suspect exhaust, cooling water, power, and instrument gases.

A significant amount of research will be enabled by this new capability. Samples to be analyzed will be generated by the Advanced Electrochemical Actinide Process Development & Monitoring Laboratory proposed for installation in FCF, and by other general process equipment located within FCF and the Hot Fuel Examination Facility.

Asset Mission

This equipment will directly benefit Fuel Cycle Research and Development (i.e., separations, fuels, and waste-form development), National Security and Non-Proliferation (NA-24), and material disposition activities.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-18 MFC Fiber Optic Backbone Capacity and Reliability Upgrade (Manhole 50 Reconfiguration)

Problem or Need

The Materials and Fuels Complex (MFC) fiber backbone is part of the network ring that connects each of INL's site campuses and carries all information into and out of those campuses. All internet, intranet, email, forms, scientific data, engineering data, access to Battelle Energy Alliance, LLC, business applications, business data, telecommunications data, safety alarms, and emergency systems data sent via networked computers or systems to or from the desert campuses passes through MFC's fiber backbone.

The MFC fiber backbone currently comprises four fibers in and four fibers out of the complex. These eight fibers are fully utilized, with a significant amount of information transmitted on each fiber. When a fiber connection fails, 25% of the networked communications capability to or from MFC is immediately lost and cannot be rerouted. Information processing is slowed; data is lost during transmission; and network errors are likely to occur. No spare fiber or spare capacity is available to pick up the failed fiber's information load.

Fiber failures can have a significant negative impact on MCF and INL mission performance. Furthermore, the new facilities being built at MFC will increase the amount of information flowing across each of the fibers, slow data throughput, and increase the impact of a failure.

Project Description

This project will install new inner ducts and optical fibers from the existing manhole 50, situated near the MFC-735 Guardhouse Inspection Facility, to the MFC dial room located in the MFC-752 Laboratory and Office Building. Manhole 50 will be reconfigured to allow more fibers to be added and dropped into MFC to support research, operational, and business communications requirements at the complex.

This project will alleviate the fiber backbone shortage and improve the distribution of information across the fibers to and from MFC and other site campuses. Additional capacity in manhole 50 will better support increased telecommunications needs being brought about by new facilities and increased research work at MFC.

Asset Mission

This project will support multiple INL missions by ensuring the reliability, and increasing the capacity, of telecommunications services to and from MFC and other site campuses. This project supports the planned MFC campus development and enables the technologies the program offices are planning to deploy.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-19 MFC Cable Upgrades

Problem or Need

The fiber optic cable systems contained within the non-nuclear operations support facilities at the Materials and Fuels Complex (MFC) carry all internet, intranet, email, forms, operations data, scientific data, engineering data, access to high performance computing, access to Battelle Energy Alliance, LLC business applications, business data, telecommunications data, safety alarms, and emergency systems data sent via networked computers or systems into, out of, and within the facilities. Information is also passed to the fiber optic backbone for communication to or from the campus and outside of INL.

The network switches and fiber optic cable installed in these facilities are unreliable, outdated, and expensive to maintain. The bandwidth capacity of the existing cable limits the quantity and speed of the research, operational, and business information flowing into, out of, and within the non-nuclear operations support facilities, and does not provide the capacity needed to adequately support current and future missions.

Furthermore, network use projections indicate that planned program and facility growth will cause the data volume to exceed the available bandwidth within a few years. The new facilities being built at MFC will be equipped with up-to-date, high-bandwidth fiber optic cable. The capacity of the new installations will further tax the limited bandwidth capabilities of the existing fiber optic cable systems in the older facilities.

Project Description

This project will upgrade the fiber optic cable network inside the non-nuclear operations support facilities at MFC to support research, operational, and business communications requirements and accommodate expected growth.

Asset Mission

This project will support multiple essential INL missions by ensuring the reliability and increasing the capacity of telecommunications services into, out of, and within MFC's non-nuclear operations support facilities. This project supports the planned MFC campus development and enables the technologies the program offices are planning to deploy.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-20 FCF Suited Entry Repair Area Crane

Problem or Need

The Suited Entry Repair Area (SERA) crane system installed in the Materials and Fuels Complex (MFC) Fuel Conditioning Facility (FCF) is over 17 years old and incorporates equipment technology that has proven unreliable. Spare parts are obsolete and are no longer supported by any manufacturer.

A loss of the SERA crane would stop all project work in the facility, including decontamination of the facility.

Project Description

This project will replace the FCF SERA crane system. The design and qualification of a new system based on federal and state design standards and seismic requirements would take at least two years to complete. However, replacing controls, motors, brake, and the collector system with the latest off-the-shelf technology will provide a functionally new system in a shorter time and at a much lower cost. A staged approach (e.g., motors, controls, and collectors) will minimize cost and operational impact.

Asset Mission

The FCF SERA crane system is critical equipment that must be functional to operate FCF and support Post-Irradiation Examination research. This equipment provides support to multiple programs and facilities including Fuel Cycle Research and Development, the Fast Flux Test Facility, and the Idaho Nuclear Technology and Engineering Center Experimental Breeder Reactor-II fuel return projects.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-21 Neutron Radiography Reactor Elevator Control System

Problem or Need

The INL's Neutron Radiography Reactor (NRAD) is located in the basement of the Hot Fuel Examination Facility at the Materials and Fuels Complex. The reactor is used for neutron radiography of fuel rods, pins, capsules, and other small test components. The NRAD elevator is used to position test samples in the neutron beam.

Failures of the NRAD sample elevator control station, combined with the antiquated state of the equipment and the lack of available spare parts, are disrupting radiography production.

Project Description

This project will accomplish the in-house design and upgrade of the sample elevator control station. The upgrade will make use of the latest technologies to ensure dependable, supportable, and accurate radiography sample positioning.

Asset Mission

This project directly supports the multi-programmatic research and development described in the *Consolidated World-Class PIE Capabilities Strategic Plan*, INL/EXT-09-16831, September 28, 2009.

The NRAD reactor is used by numerous programs including Fuel Cycle Research and Development, National Scientific User Facility, Reduced Enrichment Research and Test Reactors, Next Generation Nuclear Plant, Light Water Reactor Sustainability, and National and Homeland Security.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-22 Install Fume Hoods at FASB

Problem or Need

The Fuels and Applied Science Building (FASB) is a Materials and Fuels Complex radiological facility that supports multiple programs at the INL. Radiological fume hoods are needed in the facility to support sample preparation and analysis for the research and development (R&D) projects undertaken there.

A hood was purchased several years ago to support general work in FASB. When the hood was connected to the ventilation system, it was discovered that the hood did not meet radiological requirements and best practices. New compliant fume hoods have since been purchased, but funding is needed to install them and correct a problem with the hood high-efficiency particulate air (HEPA) filter.

Project Description

This project will accomplish the installation of new, already- procured fume hoods in FASB. The project will also correct a HEPA ventilation problem associated with the hoods.

Asset Mission

These hoods support radiological sample preparation for multiple R&D projects conducted in FASB.

Project Status [a]

Programmatic funding is being pursued to complete this project.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-23 Advanced Electrochemical Actinide Process Development & Monitoring Laboratory

Problem or Need

The lack of actinide-process development and monitoring equipment constitutes a critical technical gap in Materials and Fuels Complex capabilities. Such equipment is needed to support advanced research and development (R&D) involving the use of actinide containing materials.

Research opportunities involving radioactive materials have expanded in recent years; however, the capability to support radioactive research requiring specialized equipment and processes remains severely limited. The Hot Fuel Examination Facility has the capability to handle research and bench-scale samples, but it is complicated and extremely costly to handle actinides and cold samples in the hot cells.

Cold samples are surrogates used to investigate fuel characteristics. Cold samples can be investigated in inert atmosphere gloveboxes and fume hoods. Actinides can be investigated in shielded hoods and gloveboxes. The best alternative for mitigating this gap, for at least the next decade, is to install the equipment needed for select cold sample and actinide R&D activities in hoods and inert gloveboxes to be located in the Fuel Cycle Facility (FCF).

Project Description

This project will design, purchase, and install state-of-the-art, inert atmosphere gloveboxes and fume hoods in an existing suitable location in the FCF. The gloveboxes will be configured to support general purpose research needs and will each be eight feet long and equipped with atmospheric purification systems. Installation will require decontamination and decommissioning of existing equipment, and modification of FCF systems to provide the necessary support utilities, including ventilation, suspect exhaust, cooling water, power, and instrument gases.

The gloveboxes will be used to develop improvements to existing FCF process equipment, and will facilitate research and development of a new generation of electrochemical process equipment. These efforts require the use of glovebox-contained process development equipment including molten salt furnaces, process columns, and general furnaces.

Asset Mission

This equipment will directly benefit Fuel Cycle Research and Development (i.e., separations, fuels, and waste-form development), National Security and Non-Proliferation (NA-24), and material disposition activities.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-24 Electric Discharge Machining Installation

Problem or Need

INL has recently installed a remote mechanical testing system in the Hot Fuel Examination Facility (HFEF) hot cell. This system provides the basic functionality needed to perform tensile tests and to collect force-displacement response data. The laboratory, however, lacks the capability to machine samples of irradiated cladding tubes and other structural materials into the complex shapes required for testing. A remote electric discharge machining (EDM) capability is needed to perform this function. This request presumes that the laboratory will have already developed a de-fueling capability for the nuclear fuel rod cladding tubes.

Irradiation-Assisted Stress Corrosion Cracking test rigs are scheduled to be delivered to the Materials and Fuels Complex (MFC) in November 2011 and to be operational by January 2013[a]. Use of these test rigs is important to several DOE programs and Work for Others (WFO) projects, and is heavily dependent upon an EDM capability to prepare samples. An EDM capability purchased by the Post-Irradiation Examination Upgrades Project was planned for installation in the HFEF Decontamination Cell; however, it has been determined that this specific EDM will not work well in a sealed hot cell.

Project Description

This project will design, purchase, and install a wire-feed EDM capability at MFC. The exact installation location will be based on an engineering evaluation of available locations. This project also includes the purchase and installation of a modular hot cell to house the EDM capability.

Asset Mission

The establishment of a remote EDM capability in a hot cell is an integral component of establishing a cladding mechanical testing capability at the INL. This capability will support multiple programs, including Light Water Reactor (LWR) Sustainability, Fuel Cycle Research and Development, Reduced Enrichment Research and Test Reactors, and Generation IV, as well as WFO projects for the LWR industry.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-25 Nuclear Operations Support Facilities Cable Upgrades at MFC

Problem or Need

The fiber optic cable systems contained within the nuclear operations support facilities at the Materials and Fuels Complex (MFC) carry all internet, intranet, email, forms, operations data, scientific data, engineering data, access to high performance computing, access to Battelle Energy Alliance, LLC business applications, business data, telecommunications data, safety alarms, and emergency systems data sent via networked computers or systems into, out of, and within the facilities. Information is also passed to the fiber optic backbone for communication to or from the campus and outside of INL.

The network switches and fiber optic cable installed in these facilities are unreliable, outdated, and expensive to maintain. The bandwidth capacity of the existing cable limits the quantity and speed of the research, operational, and business information flowing into, out of, and within the nuclear operations support facilities, and does not provide the capacity needed to adequately support current and future missions.

Furthermore, network use projections indicate that planned program and facility growth will cause the data volume to exceed the available bandwidth within a few years. The new facilities being built at MFC will be equipped with up-to-date, high-bandwidth fiber optic cable. The capacity of the new installations will further tax the limited bandwidth capabilities of the existing fiber optic cable systems in the older facilities.

Project Description

This project will upgrade the fiber optic cable network inside the nuclear operations support facilities at MFC to support research, operational, and business communications requirements and accommodate expected growth.

Asset Mission

This project will support multiple essential INL missions by ensuring the reliability and increasing the capacity of telecommunications services into, out of, and within MFC's nuclear operations support facilities. This project supports the planned MFC campus development and enables the technologies the program offices are planning to deploy.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-26 TAN Multi-Use Facility

Problem or Need

Specific Manufacturing Capability (SMC) space needs have exceeded current facility capacities and capabilities. As a result, the reconfiguration of facilities to accommodate customer requirements has become an ongoing issue. The crowded nature of SMC operations increases the potential for accidents. Additionally, congestion causes problems with forklift traffic and material movement and poses a substantial daily risk for significant injury. The lack of appropriate facilities also increases the security vulnerabilities associated with accommodating multiple programs featuring varying security requirements.

Efforts to optimize SMC facility utilization have fulfilled some of the space need, but this option is now nearing exhaustion. Limited facility space is still available for expansion, but the space is inadequate to meet current and future needs. Furthermore, the demolition of SMC's TAN-607 Hot Shop/ Manufacturing and Assembly Facility eliminated the areas that were previously available to support both national security projects and general uses with special or differing classification levels.

SMC is required to find a new sustainable mission to replace the existing mission by 2013. The lack of adequate facilities is impeding the development of the strategic partnerships necessary to support a new mission. One example is the partnership SMC has been building with the Office of the Secretary of Defense. SMC is one of the largest Work for Others programs at the INL, and loss of this program would have a significant impact on the Laboratory's annual funding.

Project Description

This project will construct a new multi-use facility at Test Area North to support current SMC, National and Homeland Security, and Advanced Test Reactor (ATR) needs, as well as the needs of future national defense projects related to armor production and research. The facility design will reduce the vulnerability caused by the co-location of multiple programs with varying security requirements.

The facility will be approximately 125-ft wide by 275-ft long and feature a high bay with overhead crane. The facility will incorporate work floor space, truck ramps/dock, office areas, gas cylinder storage, and the electrical and mechanical equipment necessary to support habitation. New storage space will allow for relocation of materials to alternate storage locations and improve overall material flow and forklift safety. The building will include multiple exhaust systems to ensure the flexibility needed to support multiple materials and programs. The air permitting process requires separation of processes for various materials.

Asset Mission

This facility will support future national security missions at the INL and is critical to the future utilization of SMC by multiple programs in the areas of classified research and development, manufacturing, and assembly. This facility will also benefit current SMC production activities by providing long-term classified storage and locations for material recovery projects.

As a multi-program facility, this building will also be used to advance the nuclear energy mission by supporting ATR needs for classified experiments and other site classified needs. SMC has supported ATR for these experiments in the past and expects to continue to do so in the future. This facility will support the clean energy mission as needed, especially where classified or business sensitive activities need to be performed.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-27 Extend Feeder to TAN-679A

Problem or Need

The TAN-679A substation at Test Area North (TAN) is double-ended and designed to be fed from two separate power sources. The double-ended design is intended to ensure continuity of power delivery during electrical equipment failures that disable one end of the substation and during maintenance activities in which part of the substation must be de-energized. However, the substation is provided with only one source of power, the overhead 13.8 kilovolt (kV) feeder 56-B from the main TAN substation. This feeder presents a single point failure risk to the activities and processes powered by the TAN-679A substation. The 56-B feeder is vulnerable to weather, vehicle collisions, and equipment induced failures.

The 56-B feeder and TAN-679A substation serve a critical load. Power failures that last 20 seconds or more cause process interruptions that take at least three days for recovery. Such delays result in significant negative impacts to a rigid production schedule.

Currently, maintenance of the 56-B feeder, or any part of the TAN-679A substation, requires a complete outage of the substation. Planned outages of TAN-679A are difficult and rare, which means that 13.8 kV maintenance is rare. The result is a higher probability of power failure and costly unplanned outages for TAN-679A.

Project Description

This project will extend feeder 51-A from its present termination north of the Specific Manufacturing Capability (SMC) complex to the TAN-679A substation. The extension will provide a second feeder for the existing double-ended TAN-679A substation and will close the gap in the 13.8-kv loop between feeders 51-A and 56-B. This modification will ensure that critical operations will not be interrupted due to a failure of a single feeder and that current and potential customer deliverables will not be correspondingly delayed.

The expected payback period of this project is between five and ten years. The interruption of power to the SMC annex facility can cost upwards of $96,000 per occurrence, and this facility experiences two or three occurrences per year.

Asset Mission

This project will improve the operational reliability of current classified experimental, manufacturing, and research and development activities undertaken at SMC. The project will also support SMC's transition to a multi-program facility that undertakes classified work for various INL programs and activities, including national security. Finally, the project will support the development of new strategic partnerships, such as SMC's emerging relationship with the Office of the Secretary of Defense.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-28 Installation of Electron Probe Micro-Analyzer instrument into the Irradiated Materials Characterization Laboratory

Problem or Need

The Electron Probe Micro-Analyzer (EPMA) is a $3.5M state-of-the-art instrument used to characterize fuel and irradiated materials. The EPMA was installed in the Materials and Fuels Complex (MFC) Analytical Laboratory as a temporary location to undergo testing and qualification using cold samples then gradually transition to low-level radiological samples. Analysis of highly irradiated fuels and materials requires a shielded enclosure and alpha containment.

Once the MFC Irradiated Materials Characterization Laboratory (IMCL) is completed, the EPMA will need to be relocated into a shielded enclosure already installed in the facility. Specialized support systems will need to be provided in the IMCL to enable hot operation of the EPMA.

Project Description

This project will relocate the EPMA from the Analytical Laboratory to the IMCL, install the EPMA in a shielded enclosure already provided in the IMCL, and provide the glovebox and support systems needed within the shielded enclosure to make the instrument operational.

Asset Mission

Characterization of highly irradiated samples using the EPMA is required to execute the INL Post-Irradiation Examination Strategic Plan and support IMCL-related implementation plans.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-29 Installation of Focused Ion Beam Instrument into the IMCL

Problem or Need

The Focused Ion Beam (FIB) is a $1.8M state-of-the-art instrument used for the characterization of fuel and irradiated materials. The FIB was installed in the Materials and Fuels Complex Electron Microscopy Laboratory (EML) as a temporary location to undergo testing and qualification using cold samples then gradually transition to low-level radiological samples. Analysis of highly irradiated fuels and materials requires a shielded enclosure and alpha containment.

Project Description

This project will relocate the FIB from the EML to the Irradiated Materials Characterization Laboratory (IMCL), install the FIB in a shielded enclosure already provided in the IMCL, and provide the glovebox and support systems needed within the shielded enclosure to make the instrument operational.

Asset Mission

Characterization of highly irradiated samples using the FIB is required to execute the INL Post-Irradiation Examination Strategic Plan and support IMCL-related implementation plans.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-30 ATR Complex Common Support Building II

Problem or Need

The Advanced Test Reactor (ATR) Complex does not have sufficient permanent office and support space to accommodate the current staff. Over the past several years, DOE Office of Environmental Management funded footprint reduction efforts have eliminated much of the office space previously utilized to support ATR operations. The recently constructed ATR Complex Common Support Building provided 60 offices, but additional spaces are needed. ATR Complex and National Scientific User Facility (NSUF) personnel are allocated substandard space, doubled up in offices, not assigned office space, or assigned offices in Idaho Falls at the Research and Education Campus because space is not available at the ATR Complex.

The ATR Complex cafeteria is housed in an antiquated, high-maintenance structure that was designed as a warehouse and later modified for use as a cafeteria. A new office building and cafeteria are essential to continued operation of ATR. No other suitable building currently exists at the ATR Complex to provide the necessary office space.

Project Description

This project will construct the ATR Complex Common Support Building II, which will provide 40 additional offices and a cafeteria. Construction of a new office and cafeteria building will significantly improve the morale of personnel assigned to the ATR Complex. The new facility will provide sufficient office space to support multiple projects without forcing personnel into minimally safe working conditions. Operating and maintenance costs will be reduced compared to the facilities supplanted, and the new cafeteria will require less maintenance than its predecessor. The Common Support Building II will support the remaining operational lifetime of the ATR through 2040.

Asset Mission

This project will provide direct support to DOE's mission to advance and develop the next generation of nuclear reactors, fuels, and materials, as well as supporting other strategic goals, such as continued irradiation of multiple fuels and materials experiments for National and Homeland Security.

This facility will support a number of programs and activities including the NSUF, World-Leading ATR Advanced In-Reactor Experiment Instrumentation, Post-Irradiation Examination and Testing Capability, ATR Life Extension Program Activities, ATR Documented Safety Analysis and Core Safety Analysis Method Upgrades, Core Internals Change-out, and Start-up Domestic Production of Pu-238. Without this facility, each of the above activities will be affected.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-31 Interim Engineering Demonstration Facility Upgrade

Problem or Need

Additional electric power is needed to support planned operations in the Interim Engineering Demonstration Facility (IEDF) located on the Research and Education Campus. New demonstration systems planned for installation in the IEDF have combined power requirements that exceed the facility's current electrical service capacity. The inadequate power supply is impacting INL's ability to meet customer commitments and milestones, and research and development (R&D) programs are unable to support experiments that require a significant amount of electical power without impacting other R&D activities taking place in the facility.

The installation of more energy intensive equipment will increase the facility's cooling load. Upgrades to the heating, ventilation and air conditioning (HVAC) system will be necessary to meet required experiment environmental tolerances.

Project Description

This project will accomplish an upgrade of the electrical service to and within the IEDF. A new 2000 kilovolt-ampere transformer, switchgear, and distribution system are planned for installation. The impact to the building's HVAC system will be evaluated relative to the increased electrical capacity, and additional cooling capacity will be installed as needed to address the increased heat load. The project may also include the installation of a nitrogen storage tank to supply the large volume of nitrogen gas needed by some of the test equipment.

Asset Mission

This upgrade will allow advanced hybrid energy system demonstration test beds to be installed in the IEDF in support of R&D partnerships with industry. Demonstration systems and test beds are needed in the areas of hybrid energy, biomass treatment, and advanced heat exchange equipment development. The Hybrid Energy System Test alkaline metal reduction system and DOE's only advanced cold crucible induction melter are two of the systems that will be installed in the IEDF.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-32 CF-1618 Whole Body Counter/Lung Counter Annex

Problem or Need

The INL Radiation Dosimetry group's whole body counter provides the laboratory with the ability to quantify the amount of radioactive material in a person's lungs. The counter is housed in the Central Facilities Area CF-690 Radiological and Environmental Science Laboratory, which is otherwise unoccupied and scheduled for demolition. The counter needs to be relocated.

The laboratory housing the counter is surrounded by radiation shielding (a 9-inch thick pre-World War II steel vault/iron room). The shielding prevents outside radiation from interfering with the measurement process and allows the counter to detect very small amounts of radioactive material. The shielding needs to be relocated with the counter.

Project Description

This project will construct a 900-square foot addition to the CF-1618 Health Physics Instrumentation Laboratory to house the whole body counter system. The addition will incorporate the necessary radiation shielding as well as support spaces, such as office space and changing rooms.

Asset Mission

This project will support multiple essential INL missions by ensuring the continuing availability of a whole body counting capability at the laboratory. If the INL does not maintain a whole body counting capability that meets DOE Laboratory Accreditation Program standards, employees will need to be transported to another facility, such as Pacific Northwest National Laboratory or Oak Ridge National Laboratory, for analysis when uptakes of low-energy-emitting radionuclides occur and lung counts are needed.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-33 Diesel Oil Header System Upgrade

Problem or Need

The Advanced Test Reactor (ATR) cannot go critical or stay critical if at least one of the enterprise diesels is not functioning to provide an alternate power supply to the ATR electrical buses. Operation of the diesels is, therefore, essential to accomplishing INL nuclear energy and national security missions that depend on the reactor for research and testing.

The diesel oil header system stores and directs fuel to the ATR enterprise diesels' day tank. Due to age-related deterioration, the diesel header piping could fail at any time. If the header fails, the diesels will become inoperable and ATR will have to be shut down. If the reactor is unexpectedly shutdown, numerous nuclear fuels and materials tests could be interrupted or delayed, and INL would not be able to meet its irradiation schedules and commitments with customers and partners.

Additionally, failure of the header system could release thousands of gallons of diesel fuel into the surrounding environment, since the ATR Complex uses about 1000 gallons of diesel fuel a day. Diesel fuel was discovered at the bottom of an excavation adjacent to the foundation of the ATR Complex TRA-627 Fuel Transfer Building in the summer of 2010.

Project Description

This project will replace the diesel oil distribution header with new piping that conforms to Environmental Protection Agency (EPA) requirements. The upgrade will result in a safe, code-compliant system able to support increasing and more diverse programmatic needs.

Completion of this project will reduce corrective maintenance costs associated with the existing system and protect the INL from potential EPA fines (e.g., due to leaking pipes) and possibly from a Price Anderson violation.

Asset Mission

The diesel fuel header system is essential to continued operation of ATR and, as such, provides direct support to DOE's mission to advance and develop the next generation of nuclear reactors, fuels, and materials. The system also supports other strategic goals, such as continued irradiation of multiple fuels and materials experiments for National and Homeland Security.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-34 TRA-604 Switchgear Upgrade – 2400 Volt Transfer Switch

Problem or Need

The electrical switchgear located in the Advanced Test Reactor (ATR) Complex TRA-604 Materials Test Reactor Utility Basement supplies power to several buildings. Two different "types" of power are provided, commercial and commercial/diesel. Both are normally supplied from the INL power loop; however, the commercial/diesel power is also supplied with diesel generated backup power. Upon loss of commercial power, the generator starts and an automatic transfer switch (ATS) shifts the load to the generator. However, the manufacturer of the ATS has stated that this type of switch has been known to blow up during use and strongly recommends that it be replaced.

One of the buildings fed by commercial/diesel power, the TRA-614 Office Building/Bunk House, houses the ATR communications dial room. A reliable electrical power source is crucial to the continuing proper operation of the dial room, as well as to other facility support services in the other buildings powered by TRA-604.

Project Description

The project will feed the TRA-604 low voltage switchgear from TRA-605, thereby eliminating dependence on the 60-year old, 2,400 volt switchgear and deficient automatic transfer switch located in TRA-604.

As a result of the recent demolition of several older ATR Complex facilities, excess commercial power capacity is available. Therefore, rather than replace the switch, all the buildings fed from TRA-604 will be provided with commercial power supplied from TRA-605. This approach also reduces the electrical arc fault hazards that just replacing the switch does not address.

Asset Mission

This project will support all missions and programs that execute work and utilize the communications systems at the ATR Complex.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-35 Convert CF-601/623/624/674 to Electric Heat

Problem or Need

The boilers located in the Central Facilities Area CF-671 Boiler House are at the end of their operating lifetimes and are exhibiting an increased need for corrective maintenance. Additionally, implementation of Executive Orders 13423 and 13415 requires the INL to accomplish a 3% year-over-year reduction in overall energy consumption and to work toward the complete elimination of the use of petroleum to heat buildings.

The CF-623 Multicraft Shop 3 and CF-624 Multicraft Shop 4 are heated by steam supplied by the CF-671 boilers. Conversion of these buildings to electric heat will significantly reduce boiler demand and fuel oil usage. The provision of a new heat source for the Multicraft buildings is also necessary to facilitate the permanent shut down of the CF-671 boilers.

Project Description

This project will remove the steam heat coils from CF-623 and CF-624 and replace them with electric duct heaters. Some duct modifications may be required to accommodate the differences between the steam and electric heating devices. Additional wiring and electrical control devices will be added to the building electric distribution system to power and control the electric heaters.

This project does not involve CF-601 or CF-674. The name of the project will be revised to reflect the correct scope when the next INL Ten-Year Site Plan is issued.

Asset Mission

This project will support multiple INL missions and programs. Accomplishment of INL's energy reduction goals benefits the whole laboratory. CF-623 and 624 provide shop and office areas utilized by INL crafts in support of facility and research operations throughout the DOE Office of Nuclear Energy facilities situated on the INL desert site.

Project Status [a]

This project is awaiting funding to complete final design and execute construction. Conceptual drawings and funding determination are complete. The May 2011 funding determination identified this activity as an Institutional General Plant Project. A formal Class 4 cost estimate of $1.6M was completed in April 2011.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-36 Installation of Micro X-Ray Diffractometer Instrument into the IMCL

Problem or Need

The Microscale X-Ray Diffractometer (MXRD) is a $0.5M state-of-the-art instrument used to characterize fuel and irradiated materials. The MXRD has been installed in the Materials and Fuels Complex Analytical Laboratory as a temporary location to undergo testing and qualification using cold samples then gradually transition to low-level radiological samples. Analysis of highly irradiated fuels and material requires a shielded enclosure and alpha containment.

Project Description

This project will relocate the MXRD from the Analytical Laboratory to the Irradiated Materials Characterization Laboratory (IMCL), install the MXRD in a shielded enclosure already provided in the IMCL, and provide the glovebox and support systems needed within the shielded enclosure to make the instrument operational.

Asset Mission

Characterization of highly irradiated samples using the MXRD is required to execute the INL Post-Irradiation Examination Strategic Plan and support IMCL-related implementation plans.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-37 ATR Complex Nuclear Training Center

Problem or Need

The INL requires a state-of-the-art nuclear training facility that can satisfy the needs and expectations of the laboratory's nuclear industry, commercial nuclear power, and academic customers and partners. In this light, the Advanced Test Reactor (ATR) Complex TRA-679 ATR Simulator Training Facility exhibits the following deficiencies:

- Classroom space is insufficient to meet the requirements of the training organization.
- Space for mock-ups; maintenance training; laboratory training; radiation worker training; and environmental, safety, and health training is not provided.
- The floor space is not efficiently utilized, and a clear separation between instructional space and instructor workspace is not provided.
- The facility does not provide a learning environment conducive to a systematic approach to training and the learning process.
- The building has inadequate restroom facilities and a heating and ventilation system that does not meets the requirements of a training facility.

The INL needs a Nuclear Training Center that corrects the deficiencies listed above, showcases the capabilities of the training organization, and incorporates a number of capabilities currently lacking:

- Dedicated space for simulators and laboratory training (e.g., Radiation Worker, Lockout/Tagout, and Maintenance)
- Sufficient classroom and classroom support space
- Environmental, safety, and health training support space
- Teleconferencing and distance learning support
- A conference room or auditorium, display space, and general purpose areas.

In addition to training activities, the facility would be used as the starting point of on-site tours and to provide briefings or overviews highlighting the organization's capabilities, resources, and the direction of future activities.

Project Description

This project will construct the necessary training, instructional, and administrative space required to support nuclear operations and the National Scientific User Facility. This could be done by building a new facility, remodeling and expanding TRA-679, or by constructing a building that connects TRA-679 and TRA-680.

Asset Mission

The Nuclear Training Center will interface with and support INL strategic objectives and focus areas, including: the Center for Advanced Energy Studies, the Center for Space Nuclear Research, the Center for Nuclear Fuels and Materials Research, and collaborative efforts with INL's academic partners.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-38 INL Power System Reliability Enhancement with Transformer Circuit Switchers

Problem or Need

The reliability of the INL high-voltage electrical system is based on the transformer, equipment protective relay redundancy, and the integrity of the transmission loop. Because of advances in technology and equipment protection philosophy, system reliability enhancements can be achieved without major infrastructure modification.

Transformers in the INL's high-voltage substations are installed in a redundant configuration for reliability. These transformers are protected by equipment protective relays, some of which isolate the transformer from the system should the need arise. In particular, the transformer differential relay is designed to sense an internal fault within the transformer and open circuit breakers on both sides of the transformer. This operation isolates the transformer from the system and from the source of high current, thus protecting it from internal damage. In the current INL control scheme, isolation of a major substation transformer includes opening the high voltage loop or, as in the Scoville Substation, isolation of a bus.

Opening the high-voltage loop limits power transfer capability and reduces the reliability of the high-voltage system. In addition, if the loop is already open to facilitate maintenance activities, a power outage may occur elsewhere along the loop. Isolation of a bus also reduces reliability by removing the bus from service. In the Scoville Substation, bus isolation causes a power outage at the Central Facilities Area, the Radioactive Waste Management Complex, and the Advanced Mixed Waste Treatment Project. Opening the high-voltage loop and isolation of a bus are first contingency cases that have occurred many times but do not need to. An outage with the loop already open is a second contingency case and should never occur.

Project Description

This project will install candlestick-type (vertical) circuit switchers on the high-voltage side of all the major substation transformers and modify the control schemes to utilize the switchers for isolation. The high-voltage loop will no longer be opened for transformer differential operation and isolation of a bus will no longer occur.

Asset Mission

The INL transmission and distribution system and its associated substations control and distribute high-voltage electric power to the INL's major site operating areas. This project will benefit all missions and programs that undertake work at these areas by improving the overall reliability of power delivery and reducing the risk of power loss when a section of the transmission loop is opened to support maintenance or research activities.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-39 Layered Network Infrastructure

Problem or Need

The existing Materials and Fuels Complex (MFC) communications network is a "flat" design; that is, it treats all data and information flow the same regardless of sensitivity. The preferred design would allow partitioning such that sensitive data runs behind various firewalls appropriate to their sensitivity. This is known as a "layered" design.

The security limitations inherent in the flat network design are inhibiting INL's transformation into a multi-disciplinary research center that addresses a wide set of national goals and receives international recognition.

Project Description

This project will reconfigure the MFC communications network into a layered design, also know as a Service Oriented Architecture. Specific activities will include fiber/cable plant upgrades, network device upgrades, physical plant upgrades (e.g., heating, ventilation and air conditioning; power; and space), and construction activities.

The project will correct existing network deficiencies throughout MFC and provide reliable and secure access to computing collaboration resources for scientists, engineers, and other personnel. Failure to fund this project will severely limit INL's capability to provide appropriately secure access to communication resources.

Impacted services will include internet; intranet; email; forms; transmission of scientific and engineering data; access to Battelle Energy Alliance, LLC business applications and data; and transmission of telecommunication, safety alarm, and emergency systems data.

Asset Mission

This project will support multiple essential INL missions by improving the security of all telecommunications services into, out of, and within MFC. This project supports planned MFC campus development and enables the technologies the program offices are planning to deploy.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-40 National Security Test Range Enhancements

Problem or Need

Work at the National Security Test Range (NSTR) is limited by a lack of infrastructure. There are no permanent structures, and utilities are either not present or insufficient. Permanent structures and utilities would allow for specialized testing and a more comfortable work environment for employees and customers.

Project Description

This project will implement the following enhancements to the test range to enable increases in both the volume of work and the types of testing conducted:

- Provide permanent power, communications, water and sewer utilities
- Increase the concrete test pad and add new concrete and/or gravel test pads within the area of the existing safety boundary
- Expand the ability to conduct ballistic/projectile tests in the lay down areas
- Expand the safety fan to allow personnel to set up targets and fire projectiles
- Upgrade the access road and construct new roads to new pads and within the safety fan
- Install a weather station.

The scope of this upgrade falls outside of the existing NSTR Environmental Assessment (EA). However, the assessment is being updated as part of the INL Test Range Multi-Use Facility project. The revised EA will accommodate the upgrade scope and allow additional work, including energetics, explosives, and ballistic testing, to be undertaken at the test range.

The completion of the INL Test Range Multi-Use Facility (Project I-7) could change the scope of this project.

Asset Mission

Work at the NSTR directly supports DOE; Department of Defense, including warfighters; the Department of Homeland Security; local govermental entities; and other government agencies. All NSTR customers will benefit from this project.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-41 Video Conferencing and Multimedia Enterprise Standard

Problem or Need

INL's current, non-standard multimedia and video conferencing capabilities frequently experience failures and delayed or lost connections. These issues interfere with communications, cause delays, reduce productivity, and result in elevated travel expenses due to the increased need for face-to-face meetings and training.

The installation and use of standard, high-quality multimedia equipment in conference room and room-based video conferencing installations would correct these deficiencies.

Project Description

This project will upgrade INL video conferencing and multimedia capabilities by implementing a standard solution INL-wide. Standardized high-quality equipment will be installed in conference rooms across the laboratory. The new equipment will provide reliable service and a consistent interface to all users. The result will be an enhanced experience for video conferees, multimedia presenters, and audiences alike. In addition, better and more available video conferencing will reduce the need for travel between site and Idaho Falls facilities as well as across the country.

The project will address both new and existing common-use and multi-programmatic facilities. Project activities will include the acquisition and installation of new equipment and the physical preparation of conference rooms to present a consistent configuration and appearance. The existing INL network will be utilized to deliver video conference signals from the end-point devices to the control system that will manage the flow of the ongoing video conferences. This video conference control system is included in the project.

The base capabilities introduced by this upgrade will greatly improve visual communications and collaboration among research, operations, and management personnel within and outside the laboratory. The ability to have face-to-face discussions while displaying presentations, running simulation models, or displaying other technical information will significantly improve technical and business discussions and decisions.

The new system will also be able to support the potential future introduction of real-time video feeds from remote fixed or wireless mobile cameras. Such a capability could greatly enhance experimental and emergency situational awareness and operational support.

Asset Mission

This project will support multiple essential INL missions and activities by implementing a standard solution to INL video conferencing and multimedia presentation issues laboratory-wide. The enhanced capabilities will benefit all laboratory stakeholders.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-42 REC Information Technology Corridor Build-Out

Problem or Need

The Research and Education Campus (REC) fiber backbone carries all information within, into, and out of the campus, and is part of the network that connects all of the INL's campuses. All internet, intranet, email, forms, scientific data, engineering data, access to Battelle Energy Alliance, LLC business applications, business data, telecommunications data, safety alarms, and emergency systems data sent via networked computers or systems passes through the backbone.

The current backbone along University Boulevard is subject to single point failures in the network infrastructure as a result of not being configured in a ring. A failure in cabling or communications hardware can interrupt network communications to one or more Idaho Falls facilities serviced by the network. Failures affecting multiple facilities have already occurred. In addition, it is impossible to perform regularly required network maintenance without interrupting network availability. REC research activities have become computationally and network intensive, and even off-hour service interruptions significantly disrupt research activities and are increasingly difficult to coordinate.

Disruption of network communications severely impacts operations and limits collaborative research efforts, not only on the INL but also across the nation and around the world. Reliable and secure communications are essential to the laboratory's mission success.

Project Description

This project will add to the REC backbone to achieve a ring configuration. New fiber will be run from the network terminus at the Center for Advanced Energy Studies, south across the railroad to the University of Idaho/Idaho State University facilities, then to the Willow Creek Building, and finally to the Engineering Research Office Building, where it will tie back into the existing network. Data will be able to flow in either direction around the ring thereby ensuring communications continuity to all facilities in the event of a failure at a single point in the ring.

Asset Mission

This project will benefit all missions and programs that undertake work at the REC by improving the reliability of network communications and eliminating the occurrence of service interruptions due to network maintenance.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-43 TAN/SMC Dial Room Replacement

Problem or Need

The TAN-601 dial room at Test Area North (TAN) houses the telecommunications and transport optical electronics that provide communications services to the Specific Manufacturing Capability (SMC) complex, and is the entry point for the INL fiber backbone connection to the campus. All internet, intranet, email, forms, scientific data, engineering data, access to Battelle Energy Alliance, LLC business applications, business data, telecommunications data, safety alarms, and emergency systems data sent via networked computers or systems, to or from the area, pass through the equipment and fiber backbone in the dial room. Telephone and land mobile radio communications also pass through the facility. Because the dial room is an essential part of the network ring that connects all the INL campuses, the dial room fiber backbone also carries information from all the other laboratory campuses.

The dial room is over 30 years old, in poor condition, and at the end of its effective operational life. The cessation of prior TAN activities and the demolition of related facilities have left the current dial room isolated and vulnerable. The facility needs to be replaced to ensure the continued availability of reliable and secure communication services to support current and future operations at SMC and across INL.

Any future test range development or project undertaken by the laboratory in the SMC area will also benefit from dial room replacement.

Project Description

This project will construct a new dial/telecommunications room at SMC. The new facility will be located in the SMC controlled area to ensure the physical protection of the telecommunications hardware and software such that the security of phone, pager, and computer network services is assured. Because the dial room relays information to and from other campuses, replacement will also help to maintain the reliability and security of telecommunications services for the whole laboratory.

Asset Mission

This project will support multiple INL missions by ensuring the reliability of telecommunications services for SMC and other INL operations.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-44 Enterprise Computing Data Center

Problem or Need

The INL Enterprise Computing Data Center located in the Research and Education Campus IF-608 Information Operations and Research Center (IORC) cannot meet legal, National Institute of Standards and Technology, and DOE requirements-based contractual obligations. The federal government has strengthened applicable cyber security standards over the last several years, but many of the required administrative, technical, and physical security practices can't be implemented in the IORC due to physical capability limitations. As a result, INL business and operations information is at a higher risk of compromise than it should be.

The IORC was designed to support mainframe computing over 40 years ago and has been extensively updated over the intervening years. However, the demands of today's server-based networked systems continue to grow and the building is very costly to modify. Subsequently, the facility has reached the practical limit of its capabilities.

Many of the facility's computer rooms are at capacity, and the rest have very little room for growth. The heating, ventilation and air conditioning and electrical systems only marginally support the existing systems and have no capacity to accommodate growth. Further, the facility does not meet Federal Continuity of Operations requirements. This deficiency has been identified by federal audits. The support systems are vulnerable to single point failures, and the performance of routine maintenance frequently requires that facility operations be shut down. The loss of business data, research data, or other important information could severely undermine INL's research efforts, business operations, and reputation.

Project Description

This project will construct a new Enterprise Computing Data Center within a new or existing common-use or multi-programmatic facility. The facility will be designed to support both current and anticipated needs while satisfying all regulatory requirements. The new data center will incorporate the redundant support systems and features necessary to ensure continuity of enterprise computing operations in the event of a disaster. The increased capacity of the new facility will enable the consolidation of equipment currently located in numerous inadequate small computer rooms.

Asset Mission

This project will benefit all INL missions and programs. Every laboratory employee, organization, project, and program uses data center services on a daily basis. Key data center business applications and services include financial, general ledger, payroll, timecard, human resources, property, messaging, documentation, cyber security, and computer backup/restoration.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-45 Replace Obsolete IRC Fire Alarm System

Problem or Need

The INL Research Center (IRC) fire alarm system provides primary detection, alarm, and notification in the event of a fire. The system transmits fire alarms and trouble notifications to the INL Fire Alarm Center located in the Central Facilities Area CF-1611 Fire Station via the Research and Education Campus IF-616 Willow Creek Building (WCB) "global net" fire alarm panel. This makes the WCB fire alarm panel a single point of failure that could block IRC fire alarms or trouble notifications from reaching the Fire Alarm Center.

Both the IRC fire alarm system and the global net panel are obsolete, maintenance-intensive, and failure-prone. Parts and technical support for most of the fire alarm panels are not available from their manufacturers, so many replacement parts must be procured from secondary sources, such as eBay.

Continued utilization of unsupported fire alarm system components increases the possibility of prolonged system impairments and increases maintenance and operations costs due to the labor-intensive fire safety tours required during impairments.

Project Description

This project will replace the IRC fire alarm panels and communication lines with a modern and compliant "Notifier" brand system. This new, fiber-optic-based technology provides emergency responders and facility personnel with the specific types and locations of fire alarms and is being adopted as the laboratory-wide fire alarm system standard.

The new system will transmit fire alarm and trouble notification signals directly to the INL Fire Alarm Center instead of routing them through the WCB hub. This configuration prevents the failure of any single panel from blocking transmission of all IRC alarms to the Fire Alarm Center. The system will also provide the voice paging functionality that IRC presently lacks.

Asset Mission

This project will benefit all missions and programs that undertake work on the IRC campus by improving the reliability of the fire alarm system and reducing the costs associated with alarm system impairments.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-46 Stack Monitor Replacement (includes FASB)

Problem or Need

INL is required to report stack emissions from the Materials and Fuels Complex (MFC) Analytical Laboratory (MFC-752) in the annual National Emission Standards for Hazardous Air Pollutants (NESHAPs) Report. The Analytical Lab's stack emissions are approaching a limit (0.1 millirem/year) that, if exceeded, will require the continuous monitoring of radionuclides. If the emissions were to go unmonitored, the unmitigated source term would eventually exceed the limit and INL would be out of compliance with 40 Code of Federal Regulations 61, NESHAPs: Subpart H: Department of Energy Facilities.

The system that monitors the Sodium Wing and Non-Destructive Assay Wing emissions needs to be upgraded. The sample pump is unreliable, off-line about 25% of the time, and lacks sufficient capacity to pull appropriately sized samples. The sample transport line needs to be reconfigured and enlarged to minimize particulate deposition on interior walls prior to the point of sample collection. The system needs to be able to collect isokinetic-velocity, unbiased samples, and verify the stack flow rate.

When the stack monitor system is unable to operate, all radioactive work in the Sodium Wing and the Non-Destructive Assay Wing has to be suspended, and the Analytical Laboratory's ability to perform critical work is significantly curtailed. Such curtailments impact work done in the Inductively Coupled Plasma Mass Spectrometer; the Mass Spectrometer Glovebox; three fume hoods in Room B-154; and the Non-Destructive Assay, Casting, and Mass Separator Laboratories.

Project Description

This project will upgrade the stack monitor system that tracks air emissions from the MFC-752 Analytical Laboratory Sodium and Non-Destructive Assay Wings. The project does not include monitors at Fuels and Applied Sciences Building. The title of the project is inaccurate and will be revised at the publication of the next Ten-Year Site Plan.

Asset Mission

The project will support the multiple research and development programs and projects that conduct work in the MFC Analytical Laboratory Sodium and Non-Destructive Assay Wings.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-47 Dry Room

Problem or Need

The INL Energy Storage and Transportation System Program undertakes the development and testing of advanced battery materials, additives, components, electrode materials, and electrolytes, along with the fabrication of experimental cells for diagnostic testing.

Many of the advanced battery chemistries currently under development use moisture-sensitive electrolyte/electrode systems that can only be handled in dryrooms or glove boxes that limit moisture levels. A dry room is needed to allow hands-on fabrication of research electrodes into small research type battery cells free of moisture contamination and with better quality control than can be achieved in a glove box system.

Without this dry room, the INL Energy Storage and Transportation System Program will not be able to continue to build on its successes. Hence, the program will be unable to provide a multi-faceted approach to research into improved energy storage systems, both for DOE and for private companies.

Project Description

This project will purchase and install a modular dry room system in Laboratory C11of the IF-603 IRC Laboratory Building.

Asset Mission

This project will directly benefit the DOE Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Program and many identified industry and Department of Defense (DOD) energy storage system needs. The Energy Storage and Transporation System Program receives funding from the DOE, DOD, and several private companies to test and verify newly developed battery chemistries for life and performance, as well as to develop INL-invented materials for advanced energy storage applications.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

I-48 TAN Multi-Use Trailers TAN-671 & 672

Problem or Need

Until recently, Specific Manufacturing Capability (SMC) utilized the Test Area North (TAN) office trailers, TAN-671 and 672, for unclassified training and meetings. These trailers originally housed construction administration personnel but were relocated and converted to provide a bus driver lounge, office areas, and unclassified training areas. The trailers are over 25 years old, in poor condition, do not meet safety and fire code requirements, and need to be replaced.

Without the trailers, SMC has no suitable location to conduct meetings with potential customers without granting access into the secured facilities. SMC also has nowhere to conduct general worker training (e.g., Radiation, Respirator) without sending personnel to other site facilities and thereby incurring a significant impact on production.

The need for a facility to conduct site-wide training is a major problem for SMC. Each year, more than 200 employees must be sent to the Central Facilities Area, Materials and Fuels Complex, and other locations for training at a direct cost to SMC of over $200K.

Project Description

This project will replace the TAN-671 and 672 trailers with two new modular buildings. The new buildings will be approximately 1800 ft^2 each and will be installed on new foundations and connected to standard utilities. The new buildings will provide safe office space for conducting unclassified meetings and training for SMC, Facilities and Site Services, and National and Homeland Security personnel. The old trailers will be excessed.

SMC is transitioning into a multi-programmatic campus that supports all areas of the INL for classified research and development, experimental, and manufacturing activities. The installation of a multi-use office facility will demonstrate long-term commitment to SMC resources and will help develop strategic communications with customers and partners who do not have a need for access to the SMC classified facilities.

This project will save SMC over $200K per year through the avoidance of sending personnel to other facilities for training and meetings.

Asset Mission

SMC is required to find a new sustainable mission to replace the existing mission by 2013. The new multi-use facility will support the new mission and will demonstrate a commitment to maintaining the infrastructure. The demonstration of such commitment is critical to securing additional work from existing customers in the next two years. The new trailers will be used by all SMC organizations and personnel.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PROGRAM-FUNDED CAPITAL PROJECTS AND OPERATING-FUNDED PROJECTS (INL DIRECT FUNDED)

PF-1 Irradiated Materials Characterization Laboratory

Problem or Need

INL does not possess facilities adequate to house the analytical equipment needed to perform the microstructural characterization and analysis of nuclear fuels and materials described in the INL Strategic Plan for World-Leading Post-Irradiation Examination (PIE) Capabilities. The Materials and Fuels Complex nuclear facilities were not built to house the next generation of sensitive analytical equipment, are filled to capacity, or cannot handle sufficient quantities of irradiated fuels and materials to meet customer needs.

Project Description

As articulated in the PIE Strategic Plan, INL plans to establish two modern facilities for the characterization and analysis of nuclear fuels and materials. The first of these will be the Irradiated Materials Characterization Laboratory (IMCL).

The IMCL project will construct a modern developmental laboratory to house and test new, state-of-the-art research equipment. The laboratory will contain space for installation of instruments and equipment within shielding structures that can be redesigned and refitted whenever necessary. The facility will have mechanical systems that tightly control temperature, electrical and magnetic noise, and vibration to the standards required for advanced research equipment. The initial suite of equipment installed in the facility will include the Electron Probe Micro-Analyzer, Focused Ion Beam, and Microscale X-Ray Diffractometer already purchased by the DOE Office of Nuclear Energy. This equipment will be developed, tested, and modified as necessary to support research in a high-radiation environment. Use of this equipment is needed to fulfill INL's current mission.

Microstructural characterization capabilities that are developed will transition to the advanced PIE capability when it is completed. IMCL will then be used to consolidate mechanical testing capabilities or other missions suitable for this flexible and reconfigurable Hazard Category 2 nuclear facility.

Asset Mission

The IMCL will directly support Fuel Cycle Research and Development, National Scientific User Facility, Reduced Enrichment Research and Test Reactors, Next Generation Nuclear Plant, Light Water Reactor Sustainability, and National and Homeland Security programs and projects.

Project Status [a]

This project is under construction and expected to be completed in December 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-2 MFC Dial Room Replacement

Problem or Need

The MFC-752 Laboratory and Office Building basement houses the Materials and Fuels Complex (MFC) "dial room," the telecommunications and transport optical electronics that provide and support voice, video, data, fire, safety, security, and radio services for the campus. The dial room has experienced issues with an unknown liquid leaking into the room, causing problems for the telephone equipment.

- The telephone system is at very high risk (i.e., one hardware or software breakdown away) of complete failure and loss of service for the entire campus. The current Private Branch Exchange (PBX) infrastructure has been in service since 1988, and the PBX switches are operating on end-of-life hardware and software.
- As of October 1, 2007, the vendor will not support or repair the hardware. After-market/secondary-market sources have been unable to provide replacement parts, and the in-house spare hardware inventory is depleted.
- Software life extension is not possible. Software support was discontinued on February 23, 2007, and the vendor will no longer provide software patches or fixes.
- After completion of the MFC-736 Vehicle Explosive Detection System Equipment Enclosure, MFC-1702 Radiochemistry Laboratory, and MFC-1732 Technical Support Building (scheduled for construction start in the Spring of 2013), the PBX will be at capacity. Telephone service for any additional buildings will not be available.

Because of the location of the dial room, deficiency repairs are unlikely. End-of-life support issues for switch hardware and software have increased the impact and risk of failure to unacceptable levels.

Project Description

This project will provide a new dial/telecommunications room; replacement PBX switches for MFC; and new remote switches for the Central Facilities Area, Radioactive Waste Management Complex, and Power Burst Facility. This project addresses part of the backbone network loop that serves the site and allows connections into MFC. The project does not address connections from the dial room to the rest of MFC. The project will substantially improve the reliability of telecommunications services for MFC and enhance the protection of the telecommunications hardware and software.

Asset Mission

This project will support multiple INL missions by ensuring the reliability of telecommunications services for MFC and other INL operations. This project supports the planned MFC campus development and enables the technologies the program offices are planning to deploy.

Project Status [a]

Procurement has been initiated on key communication equipment and components for this project. The dial room building is due on site by the end of October 2011. Telecommunications service cutover is planned for March 2012, and the project is expected to be complete by the end of FY 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-3 MFC Modular Office

Problem or Need

Existing Materials and Fuels Complex (MFC) office facilities critical to ongoing and future programs are aging and utilized at or beyond capacity.

Project Description

This project will purchase a used modular office building and install it inside the MFC perimeter security fence. The office unit will be sized and configured to provide 81 office spaces. The proposed location of the building is east of the MFC-717 and 718 modular offices. The new office unit will be connected to firewater, potable water, sewer, electrical, and telecommunications utilities. Installation of stairs, sidewalks, and entrance door awnings, as well as removal of an existing material lay down area, will also be included.

Asset Mission

Installation of this modular office building will address MFC's immediate need for office space to support INL nuclear mission accomplishment.

Project Status [a]

This building will be transitioned from construction to operations in July 2011. The project close-out phase is expected to be completed in October 2011.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-4 MFC-752 Analytical Lab Safety Basis Upgrade Implementation

Problem or Need

The DOE Idaho Operations Office conducted a nuclear safety practices review of the Materials and Fuels Complex (MFC) documented safety analyses (DSAs) in 2005 during transition of operating contractors. The assessment concluded that the DSAs exhibited potential inadequacies relative to complying with the safe harbor methodology of the nuclear safety rule. As a result of the review, a key action was initiated to upgrade the DSAs to bring them into full compliance with the nuclear safety rule and, thereby, correct the potential deficiencies noted in the assessment. The DSA for the MFC-752 Analytical Laboratory has since been upgraded and now needs to be implemented.

Project Description

This project will implement the upgraded MFC-752 Analytical Laboratory DSA. The new DSA requires major structural modifications to the roof and walls of the A, B, and C wings, as well as the basement of the facility, to achieve compliance with current requirements for structural integrity. The structural inadequacies of the roof will be remedied by the construction of new roof structures over some portions of the roof and the reinforcement of other portions of the roof from inside.

The walls of the facility will also be structurally upgraded. For interior walls, the connections between the roof and the wall will be reinforced. Above-grade exterior walls will be reinforced through the attachment of vertical strong backs. Some basement walls will be reinforced by installing braces on the inside to improve resistance to external soil pressure. For other basement walls, the soil load will be reduced with light-weight fill.

Other modifications will include structural reinforcement of an exhaust stack and the installation of door stoppers on the hot cell doors.

Asset Mission

The Analytical Laboratory is important to INL's nuclear research efforts. This project will support the many research programs and projects that conduct work in the Analytical Laboratory.

Project Status [a]

The exterior work on the A, B, and C Wing roofs has been initiated using FY 2012 funds. This scope is expected to be completed by May 2012. The remainder of the work is on hold pending additional funding, which is not expected until FY 2013.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-5 Neutron Radiography Reactor Console Upgrade

Problem or Need

The Neutron Radiography Reactor (NRAD) is a unique tool that INL needs to utilize at a higher capacity than is currently possible. NRAD is located at the Materials and Fuels Complex (MFC) in the basement of the MFC-785 Hot Fuel Examination Facility.

A number of INL programs have scheduled needs for reliable NRAD operations through the year 2013; however, the reactor's aged and degraded console has become unreliable. Program radiography has been repeatedly delayed by the system's frequent failures. Fuel development programs for the Next Generation Nuclear Plant (NGNP), Fuel Cycle Research and Development (FCRD), Reduced Enrichment Research and Test Reactors (RERTR), and National and Homeland Security (NHS), and the qualification of new operators for the Transient Reactor Experiment and Test (TREAT) facility restart will be impacted if NRAD's availability is not significantly improved.

NRAD has recently undergone a repair effort spanning three months and costing $12,000 in craft support alone. This total does not include engineering, operations, or production control staff hours. NRAD failures are characterized by aged and unsupported circuit cards, switch failures, and degraded wire insulation and solder joints.

Project Description

This project will replace the NRAD control console. The installation of a new control console will significantly increase reactor availability and improve efficiency, reliability, ergonomics, and working conditions. In addition to improving the support of existing programs, increased NRAD availability will enable additional work, such as the development of neutron detector technologies and collaboration with universities to develop digital neutron radiography.

Asset Mission

This project will directly support the research and development activities included in the following strategic plans:

1. *Consolidated World-Class PIE Capabilities Strategic Plan*, INL/EXT-09-16831, September 28, 2009
2. *World-Class Ceramic Fuel R&D Capabilities Strategic Plan*, INL/EXT-09-16832, September 28, 2009.

In addition, this work will directly aid the projects supporting the DOE Energy R&D Roadmap Objectives 1 through 4. The console upgrade will increase NRAD availability for utilization by the FCRD, National Scientific User Facility, RERTR, NGNP, Light Water Reactor Sustainability, and NHS programs.

Project Status [a]

The project is in the execution phase. Fabrication has been initiated and installation is expected to be complete by July 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-6 MFC Water Tank Replacement

Problem or Need

The Materials and Fuels Complex (MFC) Water Storage Tank (MFC-754A) is in need of replacement. An assessment of the 200,000 gallon tank two years ago recommended significant repair work to ensure tank integrity. A corrective action feasibility study was performed to examine the following options: do nothing, re-coat the existing tank, and install a new tank. The storage tank does not meet seismic requirements and cannot be operated at full capacity. The feasibility study concluded that the third option, replacing the tank, is the most desirable option.

Project Description

This project will replace the MFC-754A Water Storage Tank.

Asset Mission

A functional water storage tank is essential to maintaining on-going MFC programs. Additionally, an analysis of future growth needs determined that additional water storage capacity will be required to adequately support anticipated future demand, including planned new construction and growth of research and development capabilities.

Project Status [a]

This project is on hold pending availability of funding.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-7 National Electric Grid Reliability Test Bed

Problem or Need

An independent electrical test grid is needed to expand the laboratory's power testing capabilities and capacity and to mitigate potential impacts to INL facilities. Tests are currently conducted using the electrical transmission and distribution systems that supply power to INL research and development campuses. This situation places those facilities at risk of power disruptions in the event of unanticipated impacts from the tests.

Project Description

This project will construct an independent stand-alone test grid that will consist of power lines, substations, switchgear, control systems, and support facilities. It will be designed to leverage existing INL assets and unique site characteristics to meet customer needs while minimizing operational impacts to the INL.

Asset Mission

The independent test grid will expand the laboratory's ability to investigate renewable energy and smart grid technologies, electrical distribution grid vulnerabilities and mitigation, and other critical infrastructure protection issues.

Project Status [a]

Proposed. The project's mission need, technical requirements, and functional capabilities have been drafted.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-8 Stand-Off Experiment Range Facility (for high-energy accelerator testing)

Problem or Need

The Critical Infrastructure Test Range Complex (CITRC) area that is being used for limited accelerator operations is too small and too close to other active CITRC test areas to allow higher-energy accelerator operations. These constraints prevent high-energy accelerators from being utilized at their full potential and capacity, and limit the testing that can be performed by customers. A dedicated high-energy test range situated on a larger expanse of land is needed to accommodate customers' high-energy accelerator research needs.

Project Description

This project will construct a new Stand-Off Experiment Range Facility at a larger and more remote INL area. The facility will comprise gravel pad areas, a gravel beam-line road, overhead electrical power distribution lines, and fencing.

Asset Mission

This project will accommodate full power use of high-energy accelerators and enable the laboratory to completely satisfy customers' field condition specifications and other research needs and mission requirements.

Project Status [a]

The Environmental Assessment and National Emission Standards for Hazardous Air Pollutants (NESHAPs) documentation have been completed. A contract for construction is expected to be awarded in August 2011 with construction to be completed by November 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-9 Electron Microscopy Laboratory Shielded Prep Sample Area

Problem or Need

The Materials and Fuels Complex (MFC) Electron Microscopy Laboratory (EML) is integral to INL's nuclear research efforts. However, the facility lacks the shielded sample preparation capability it needs to efficiently support monolithic fuel development activities.

A dedicated, sample preparation capability at EML would facilitate the handling of post-irradiated fuels for the Reduced Enrichment Research and Test Reactors (RERTR) Program and would enable more-timely generation of research results by reducing reliance on Hot Fuel Examination Facility (HFEF). HFEF is consistently backlogged with many other projects, and as a result, fuel examination lead times are long.

Project Description

This project will construct a 20 ft x 24 ft addition to the EML and install a glovebox or modular hot cell built to MFC specifications in the addition. The project will also provide the necessary support equipment and utilities, including electrical power; high-efficiency particulate air filtration; and heating, ventilation, and air conditioning. The project also includes acquisition of a shielded shipping container or "pig" to move hot samples between the EML and HFEF.

Asset Mission

This project will facilitate electron microscopy examination of radioactive samples for the RERTR Program and other EML customers.

Project Status [a]

The National Nuclear Security Administration planned to fund this project under the RERTR program for base fuel qualification, but cut the project's FY 2012 funding. Before the funding cut, sufficient funding had been provided to allow the project to start, including procuring the shielded glovebox, installing a foundation pad for the building addition, and mounting the glovebox to the pad. Because the FY12 funding was cut, the building addition, including the necessary utilities and services, could no longer be completed under the RERTR program.

Completion of the facility modifications and connecting the glovebox to the building utilities is contingent upon additional funding from a source other than RERTR. If funding is not secured in time to complete the building shell before winter, the glovebox will be shrink-wrapped in place to protect it from the weather, any weather sensitive equipment will be placed in heated storage, and the project will be left on hold until funding can be secured.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-10 Upgrades to the National Security Test Range (explosives range) – Data Collection Systems

Problem or Need

The National Security Test Range (NSTR) lacks the capability to properly collect and manage test data.

Project Description

This project will acquire initial test data collection devices and software and install the equipment in a temporary structure or trailer at the NSTR,

Asset Mission

This project will enable the automated and timely processing of test data in support of all customers of the NSTR.

Project Status [a]

An initial data collection system was purchased by the customer and installation was completed. The system is now being tested and is expected to be declared operational in FY 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-11 Security Technology Command and Control Space

Problem or Need

The Materials and Fuels Complex (MFC) Central Alarm Station (CAS) performs security command and control functions for MFC and the INL. The CAS is located within the security perimeter of the MFC Complex, but the room is only large enough to house a single operator's console. Over time, changes to the laboratory and its threat environment have significantly increased the CAS operator's work load. These changes include:

- Incorporation of MFC as part of the INL
- Addition of new-technology intrusion detection and monitoring equipment
- An increase in the threat to materials at MFC, which has resulted in the installation of additional intrusion detection and access control equipment.

These new and expanded systems are controlled by the console operator in the CAS. The work load on the CAS operator has reached the point that a second operator and console are necessary to manage daily tasks.

Project Description

This project will enlarge the CAS to provide space for one to two additional CAS operator work stations, provide work space for the monitoring and control of equipment and systems recently added by the technology deployment effort; improve heating, ventilation, and air conditioning in the area; and improve general working conditions.

No new floor space will be required for the expanded CAS. The enlargement will be accomplished by expanding into the adjacent protective force weight training room. Accordingly, the project will also include the construction of a new weight training facility and the relocation of the weight training equipment from the basement industrial area in which it is currently located.

Asset Mission

The expanded CAS and additional console(s) will provide protective forces with the ability to efficiently monitor and control security systems at MFC. Proper levels of security are required for the storage and use of materials at MFC and the utilization of DOE security interests at the INL. Enhanced security benefits all MFC and INL programs and employees.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-12 Aerial Protection Grid

Problem or Need

The INL has implemented numerous physical barriers to control ground-based movement of personnel and vehicles. These barriers are intentionally designed and placed to impede the movement of adversarial teams with malevolent intentions. A small similar system of barriers is necessary to control the movement and/or landing of aerial vehicles.

Project Description

This project will design and construct a system of barriers to prevent the free movement of aerial vehicles at specified areas of the INL.

Asset Mission

Proper levels of physical security are required for the storage and use of materials and utilization of DOE security interests at the INL. The aerial grid will improve physical security at the INL by denying the free movement of aerial vehicles in certain areas. Enhanced security benefits all INL programs and employees.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-13 Neutron Radiography Reactor Pneumatic Transfer System Installation

Problem or Need

The Neutron Radiography Reactor (NRAD) is a 250 kilowatt (kW) Training, Research, Isotopes, General Atomics (TRIGA) reactor located at the Materials and Fuels Complex (MFC) in the basement of MFC-785 Hot Fuels Examination Facility (HFEF). It is primarily used for neutron radiography of components and experiments in the HFEF hot cells, and also for the irradiation of small samples inserted in a water-filled tube in its core. There is currently no means of transferring small radioactive samples into the NRAD core while the reactor is operating. Sample insertions must be accomplished manually during reactor shut-down. The inability to transfer radioactive samples directly from the hot cell to the core and back limits the type of experiments and analysis that can be performed at INL.

An irradiation capability that takes advantage of the reactor, the hot cells, and most importantly their close proximity would enhance INL experimental capabilities and make many transfers to and from other reactor facilities, including the Advanced Test Reactor, unnecessary. Such a capability would allow immediate processing, characterization, and/or testing of the newly irradiated samples. The installation of the NRAD pneumatic transfer system (NPTS) would provide this capability. The system has been designed, constructed, and successfully tested in mockup, but still requires installation in the HFEF hot cell and NRAD reactor room.

The NPTS would offer a number of practical advantages over the current method of manual sample insertion. Because the insertions would be handled remotely, the number of reactor room entries and the resources and time associated with the entries would be greatly reduced. Because samples could be inserted into the core while it is operating at normal power, the total neutron fluence uncertainty associated with cold insertion and slow reactor power-up could also be greatly reduced.

Project Description

This project will install a pneumatic transfer system for remote transfer of samples to and from the HFEF hot cell into the NRAD reactor core for irradiation.

Asset Mission

Installation of this system supports the capabilities described in the INL Post-Irradiation Examination Capabilities Strategic Plan. This capability would be utilized by numerous programs and projects, including:

- Re-irradiation of fuel specimens to generate short-lived isotopes prior to post-irradiation testing for the NGNP Program
- Isotope production for the National and Homeland Security Program
- Irradiation of flux wires used for characterization of ATR neutronics
- Various university experiments as part of ATR National Scientific User Facility research projects
- Neutron activation analyses.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

PF-14 Bulk Thermal Conductivity of Irradiated Fuel Measurement Device

Problem or Need

The thermal properties of nuclear fuel play an important role in fuel and reactor performance. Thermal conductivity governs fuel temperature and temperature gradients, which in turn affect fuel microstructure, fission product and pore migration, and thermal stresses. Knowledge of fuel bulk thermal conductivity is required to accurately calculate thermal distributions and heat transfer in fuel assemblies. However, INL does not have the capability to measure the thermal conductivity of highly radioactive irradiated fuel.

An apparatus capable of measuring one-dimensional bulk thermal conductivity in bulk solids is currently being developed at Utah State University (USU). The system is based on the American Society for Testing and Materials standard method E1225, "Guarded Longitudinal Comparative Heat Flow Method." The prototype apparatus will demonstrate the feasibility of applying the method to fuel specimens and will have the capability to measure thermal conductivity up to a temperature of approximately 800°C. The ultimate goal is to extend the upper temperature limit once initial system functionality has been demonstrated.

The USU bench-top prototype will provide the basis for the production and fabrication of a hot-cell instrument and will be modified or reproduced as appropriate to enable operation in a hot-cell environment, including operation and maintenance with master-slave manipulators. The instrument also needs to be installed in a shielded hot-cell. Modification of the prototype to enable higher temperature operation is also desired.

Project Description

Using the USU instrument as a basis, with modifications or reproduction as appropriate, this project will fabricate an instrument to measure the bulk thermal conductivity of irradiated fuel specimens, accomplish remote qualification of the device, and install it at the Materials and Fuels Complex (MFC) in an MFC-752 Analytical Laboratory hot cell.

Asset Mission

This new capability will support implementation of the INL Post-Irradiation Examination Capabilities Strategic Plan, and will be utilized by programs that require thermal conductivity measurement of irradiated fuel samples. These include: the Advanced Fuel-Cycle Initiative, Light Water Reactor Work for Others projects, and the Next Generation Nuclear Plant Program.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

LINE ITEM CONSTRUCTION PROJECTS (DOE-NE DIRECT FUNDED)

L-1 Remote-Handled Low-Level Waste Disposal Project (NE/NR)

Problem or Need

Remote-handled low-level waste (LLW) is generated by INL nuclear program activities, including Naval Reactors Facility (NRF) operations and spent nuclear fuel handling and Advanced Test Reactor (ATR) Complex operations. Remote-handled LLW will also be generated by the segregation and treatment of remote-handled scrap and waste currently stored in the Radioactive Scrap and Waste Facility located at MFC, and by future programs.

INL's current LLW disposal facility, the Radioactive Waste Management Complex Subsurface Disposal Area is planned for closure and remediation and will not be available after FY 2017. Accordingly, INL needs to establish a new remote-handled LLW disposal capability to support ongoing and future work. Failure to replace this capability would negatively impact INL's long-term viability as the nation's lead nuclear energy laboratory.

Project Description

This project will provide on-site replacement of INL's remote-handled LLW disposal capability.

Asset Mission

This project will support DOE's Office of Nuclear Energy and Office of Naval Reactors programs at INL and facilitate responsible and sound waste management at the laboratory. The project will:

- Provide on-going, remote-handled LLW disposal support of INL and NRF operations
- Allow continued processing of Navy fuels at NRF to support the Navy's nuclear-powered fleet while fulfilling the terms of the Idaho Settlement Agreement (State of Idaho 1995; State of Idaho 2008)
- Provide remote-handled LLW management and disposal consistent with DOE Order 435.1, "Radioactive Waste Management," which requires, "a consistent, site-wide waste management system, reducing required coordination among multiple programs to identify and implement cost-effective waste management options."
- Enable continued materials testing operations at the ATR Complex once interim storage capacity is exhausted
- Facilitate future INL nuclear programs that rely on safe, compliant, remote-handled LLW disposal.

Project Status [a]

The project is on schedule for a Critical Decision-1 (CD-1) in July 2011, and for the final Environmental Assessment by the end of the calendar year.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

L-2 Advanced Post-Irradiation Examination Capability (Project engineering and design only)

Problem or Need

Currently, the United States does not have the capability to conduct the comprehensive post-irradiation examination (PIE) of irradiated nuclear fuel and materials necessary to develop advanced nuclear energy systems. Existing DOE, university, and private sector PIE capabilities are widely distributed and lack the state-of-the-art macro-, micro-, and nano-scale characterization capabilities necessary to meet the U.S. nuclear energy mission need. During the last 15 years, nano-scale (10^{-9} meter) characterization of materials has become routine, with capabilities for sub-angstrom (10^{-10} meter) investigation becoming increasingly available. Understanding nuclear fuel and material performance in the nuclear environment at this scale is critical to developing the innovative fuels and materials required for tomorrow's nuclear energy systems.

All significant advances in nuclear energy technology rely on understanding irradiation effects on the performance of materials and fuels. Understanding these effects relies on experimental programs ranging from tests aimed at targeted scientific questions to integral effects under representative and prototypic conditions. Within the new DOE paradigm of a science-based approach aimed at a more fundamental understanding of performance, more specialized experiments and measurements are needed.

The construction of a technical foundation to sustain nuclear power's contribution to meeting U.S. energy needs requires that the PIE capability shortfall be resolved. The lack of advanced domestic PIE capabilities will increase the likelihood that future long-term advances in nuclear energy will be achieved outside the United States, and will severely limit the success of domestic and international DOE Office of Nuclear Energy (NE) programs.

Project Description

This project will perform project engineering and design for the construction of an advanced PIE capability at an undetermined location. The facility is anticipated to be of modular design to facilitate equipment-specific shielding solutions, and to provide flexibility for future equipment deployment, configuration alteration, and replacement. The designed-in flexibility will allow the facility to remain relevant and current over a projected 40-year useful life.

The facility will feature state-of-the-art equipment and will provide a flexible footprint with a variety of laboratories in both fixed and reconfigurable space. Radiological confinement will be provided in the form of fume hoods, gloveboxes, and reconfigurable hot cells. Open laboratories will provide the space necessary to accommodate instruments with specific shielding and confinement requirements. The advanced PIE capability will serve as a national research and development center for advanced fuels and materials characterization and development of new processes, tools, and instruments.

Asset Mission

The advanced PIE capability will support sustainment of the existing fleet of nuclear reactors by ensuring that material degradation issues can be understood and overcome and that continued improvement in fuel reliability can be achieved. Ensuring the long-term availability of nuclear power as an energy source in the United States is the key goal of the DOE-NE Roadmap. All four Roadmap objectives will benefit from filling the current gap in advanced PIE analytical capability.

Project Status [a]

Initiation phase (Critical Decision-0).

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

L-3 Materials Security and Consolidation Project

Problem or Need

Additional storage for low enriched uranium (LEU) sodium-bonded fuel disposition product is needed at the INL. The additional storage is necessary to help ensure compliance with the 1995 Settlement Agreement between the State of Idaho and DOE.

Project Description

This project will provide additional storage by revitalizing the CPP-651 Material Security and Consolidation Facility and associated facilities located at the Idaho Nuclear Technology and Engineering Center (INTEC). The other facilities are the CPP-1634 Technology Development Facility, the CPP-1674 Central Alarm Station, the CPP-653 Waste Handling Facility, and the CPP-609 Cold Waste Facility Office. All of these facilities were transferred from DOE Office of Environmental Management to the DOE Office of Nuclear Energy on April 14, 2010.

These facilities will be isolated from the rest of INTEC by a fence. The 4,600 square foot CPP-651, which previously stored special nuclear material as a disposition product from nuclear fuel at INTEC, will be refurbished to support LEU storage.

The fenced area will be utilized for the receipt of material from other INL locations and for access control. CPP-1674 and CPP-609 will provide necessary security and office support functions. CPP-653 will be used for construction staging or storage of materials, such as those removed from the Transient Reactor Experiment and Test (TREAT) warehouse. National and Homeland Security and Fuel Cycle Research and Development activities are ongoing in CPP-653 and CPP-1634.

Asset Mission

This project will support all site missions by helping ensure compliance with the 1995 Settlement Agreement between the State of Idaho and DOE. The project will also support:

- TREAT restart through the removal of all nuclear and non-nuclear materials from the Materials and Fuels Complex (MFC)-723 TREAT Warehouse located at MFC
- The National Nuclear Security Administration Tritium Readiness Subprogram and research reactors through the supply of low-enriched uranium.

Project Status [a]

The project is currently in design review. Critical Decision (CD)-2/3 is scheduled for the end of FY 2011, and CD-4 is scheduled for the end of FY 2012.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

L-4 ATR Diesel Electric Bus and Switch Gear Replacement Project

Problem or Need

To ensure electrical power is supplied to the Advanced Test Reactor (ATR) safety-related electrical bus E-3, one of the 1,500 kilowatt (kW) diesel-generators, M-42 or M-43, must be kept in continuous operation when the reactor is operating. Both diesel-generators and all E-3 bus switchgear are original plant equipment and have been in operation in excess of 40 years. Continued operation of this antiquated equipment presents personnel safety, operational reliability, maintenance, and sustainability issues. Operation of M-42 and M-43 generates more than 50% of the INL's stationary-source carbon footprint.

Project Description

This project will enhance electrical power reliability to ATR while reducing the carbon footprint. Because this project is at a pre-conceptual phase, the options will evolve, but physically separate cable trays consistent with the Nuclear Regulatory Commission's current design requirements, uninterruptable power supplies, and quick-start generators will likely be parts of the solution. The antiquated switchgear will be replaced with new switchgear featuring arc-flash protection. A new Performance Category 4 building will be provided to house the safety-related bus and switchgear. Execution of the project will achieve the following objectives:

- Provide a reliable redundant source of backup power to the diesel bus in the event of a loss of commercial power
- Maintain or reduce core (fuel) damage frequency by improving electrical power reliability
- Reduce the probability of an unintended reactor SCRAM (emergency shutdown) associated with diesel-generator operations
- Address the arc-flash personnel safety issues of the current switchgear and upgrade the building housing the switchgear to Performance Category 4
- Reduce INL's stationary-source carbon footprint.

Asset Mission

This project is needed to ensure ATR's continued reliability now and in the future. DOE Office of Nuclear Energy missions require the availability of ATR capabilities to comply with Congressional mandate and to support the evolving nuclear resurgence. ATR's unique fuel and material testing capabilities are critical to the development of the new nuclear technologies needed to meet world-wide energy needs in an environmentally sound manner. ATR is required to fulfill the following DOE needs:

- Serve as a test-bed for development of new nuclear technologies
- Provide essential fuel and material testing in support of the Office of Naval Reactors
- Support DOE-NE as the lead nuclear energy research office through continued reliable availability
- Provide fuels testing capability to the Reduced Enrichment Research and Test Reactors Program in support of the National Nuclear Security Administration's Office of Global Threat Reduction Initiative.
- Provide reactor test capabilities at the INL in support of the National Scientific User Facility to provide expanded capabilities to commercial industry and the academic community.

Project Status [a]

A pre-conceptual design study has been performed to identify potential design solutions. The project is in the pre-Critical Decision-0, initiation phase.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

L-5 ATR Primary Coolant Pump and Motor Replacements Project

Problem or Need

The Advanced Test Reactor (ATR) utilizes four primary coolant pumps in the primary coolant system. The pumps are HSB Bingham horizontal centrifugal pumps powered by Westinghouse 2,000 hp electric motors. The pumps and motors are original plant equipment and have been in service for over 40 years. The original equipment manufacturers are no longer in business and spare parts and technical support are no longer available. These pumps and motors are beyond reasonable expectations of design life and are a continuing source of age-related operational and maintenance problems. Acquisition of replacement pump assemblies requires a three to four year lead time and should be accomplished before a pump failure occurs with resultant negative impact to ATR operations.

Project Description

This project will replace ATR's four primary coolant pumps and motors. Execution of the project will help maintain ATR's viability as DOE's premier nuclear test facility and will achieve the following specific technical objectives:

- Provide flow rates and pressure equivalent to the currently installed primary coolant pumps
- Achieve the lowest possible leak rate
- Eliminate mechanical coupling and shaft alignment problems
- Reduce maintenance requirements to a minimum
- Provide pump flow control capabilities
- Provide a minimum 40-year design life.

Asset Mission

This project is needed to ensure ATR's continued reliability now and in the future. DOE Office of Nuclear Energy (NE) missions require the availability of ATR capabilities to comply with Congressional mandate and to support the evolving nuclear resurgence. ATR's unique fuel and material testing capabilities are critical to the development of the new nuclear technologies needed to meet world-wide energy needs in an environmentally sound manner. ATR is required to fulfill the following DOE needs:

- Serve as a test-bed for development of new nuclear technologies
- Provide essential fuel and material testing in support of the Office of Naval Reactors
- Support DOE-NE as the lead nuclear energy research office through continued reliable availability
- Provide fuels testing capability to the Reduced Enrichment Research and Test Reactors Program in support of the National Nuclear Security Administration's Office of Global Threat Reduction Initiative
- Provide reactor test capabilities at the INL in support of the National Scientific User Facility to provide expanded capabilities to commercial industry and the academic community.

Project Status [a]

A pre-conceptual scoping study has been performed to identify potential design solutions. The project is in the pre-Critical Decision-0, initiation phase.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

L-6 ATR Emergency Firewater Injection System Replacement Project

Problem or Need

The aging, original-equipment Advanced Test Reactor (ATR) Emergency Firewater Injection System (EFIS) is designed to use untreated well water, supplied from the ATR Complex fire main system, for core cooling in select emergency conditions. However, due to water chemistry issues, the use of untreated water as an emergency coolant would place ATR's ability to return to service in serious question, even after recovery from the initiating event. The system, as designed and installed, is hydraulically untestable. Furthermore, once flow has been initiated, use of well water as an emergency coolant could possibly lead to uncontrolled flooding of the ATR confinement building.

Project Description

This project will replace the ATR EFIS with a new system that will more closely resemble contemporary emergency core cooling systems in use in commercial nuclear power plants. The project will achieve the following specific technical objectives:

- Provide the capability to inject reactor grade water into the primary coolant system
- Provide for controlled injection of cooling water and a transition to long-term cooling
- Provide system control from the ATR control room and/or from a pre-determined alternate location
- Accommodate system end-to-end testing
- Provide the capability to recirculate coolant that would otherwise be lost during a loss-of-coolant accident.

Asset Mission

This project is needed to ensure ATR's continued reliability now and in the future. DOE Office of Nuclear Energy (NE) missions require the availability of ATR capabilities to comply with Congressional mandate and to support the evolving nuclear resurgence. ATR's unique fuel and material testing capabilities are critical to the development of the new nuclear technologies needed to meet world-wide energy needs in an environmentally sound manner. ATR is required to fulfill the following DOE needs:

- Serve as a test-bed for development of new nuclear technologies
- Provide essential fuel and material testing in support of the Office of Naval Reactors
- Support DOE-NE as the lead nuclear energy research office through continued reliable availability
- Provide fuels testing capability to the Reduced Enrichment Research and Test Reactors Program in support of the National Nuclear Security Administration's Office of Global Threat Reduction Initiative
- Provide reactor test capabilities at the INL in support of the National Scientific User Facility to provide expanded capabilities to commercial industry and the academic community.

Project Status [a]

A pre-conceptual design study has been performed to identify potential design solutions. The project is in the pre-Critical Decision-0, initiation phase.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

OPERATING-FUNDED PROJECTS (DOE-NE DIRECT FUNDED)

OF-1 Transient Testing Capability Restoration

Problem or Need

Transient testing is part of the development and qualification of advanced fuels for different reactor and fuel cycle systems. Fuels and materials behavior under transient conditions determines the feasibility of a fuel concept. Transient testing enables elimination of non-viable concepts early in the selection process. Fast reactor technology and advanced Light Water Reactor fuel development both require transient testing and subsequent qualification of the fuel. The transient testing capability is in demand both domestically and internationally.

The United States does not currently have a transient testing capability to support the country's nuclear technology development needs. A programmatic alternatives analysis required by DOE Order 413.3B and the National Environmental Policy Act process will provide a preferred approach for resumption of transient testing. The proposed solution may include capability to be created in several U.S. facilities for a wide range of testing of power reactor and fast reactor experiments. One of the facilities to be considered will be the Transient Reactor Experiment and Test (TREAT) facility and supporting capabilities at the INL Materials and Fuels Complex.

TREAT is a small, air-cooled nuclear reactor with a fuel and materials experiment capability for in-pile testing. TREAT is normally operated in pulse mode to study effects of simulated reactor severe transient events. The TREAT core has slots and detectors for studying fuel motion during a transient test and is equipped with instrumentation that can reliably monitor the time history of material motion during a transient accident. The TREAT core consists of a 19×19 array of fuel and reflector assemblies that contain a 4-ft active fuel region. The core is capable of a 2.5 gigajoule maximum energy pulse. The shape of the pulse can be varied to accommodate a particular experiment. The automatic control system controls the insertion and removal of the control rods to shape the transient pulse.

Project Description

Once the preferred approach for resumption of transient testing is determined, and if TREAT is selected for utilization, a conceptual refurbishment report for TREAT restart and MFC facilities refurbishment will be completed in support of Critical Decision (CD)-1.

The resumption of transient testing will be a multi-year process and will require an integrated effort among several facilities to establish the necessary support infrastructure. Testing resumption will include refurbishing equipment and systems, updating the operating and safety basis documentation, training reactor personnel, and upgrading high-efficiency particulate air filtration. The refurbishment of the reactor control, experiment control, data acquisition hardware and software, and other reactor systems will be required.

Asset Mission

This project will support development of advanced fuels, reactors and fuel cycle systems in support of DOE, private, and international customers. TREAT restart will provide a state-of-the-art transient testing capability for a projected mission life of 40 years.

Project Status [a]

The Mission Need Statement document was approved on December 3, 2010, and CD-0 is complete. This project is currently on hold with no funding in FY 2012. FY 2013 and beyond include funding, but at those planned funding levels, TREAT restart would not occur until FY 2019 or FY 2020.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

OF-2 Mission-Critical Proactive Sustainment

Problem or Need

Sustainment of INL real property assets has historically included preventive/predictive and reactive corrective maintenance. However, INL is committed to implementing proactive sustainment when the risk of an unplanned failure warrants the investment necessary to prevent negative impacts to worker safety and health, the environment, or INL's mission. Analysis of potential sustainment activities for INL "mission-critical" assets, exclusive of the Advanced Test Reactor (ATR), indicates that an annual investment of approximately $2M, or $20M over the next 10 years, will be required.

Project Description

This project will implement proactive sustainment of INL mission-critical assets, exclusive of the ATR.

Asset Mission

INL mission-critical assets are those DOE Office of Nuclear Energy (NE)-owned real property assets that have been deemed necessary to perform primary mission work activities and that are vital to the long-term research mission of the laboratory. These assets have direct links to program sponsors, DOE-NE Roadmap research and development objectives, or other external commitments.

This project will support all laboratory programs and projects that utilize mission-critical real property assets at the INL.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

OF-3 Mission-Dependent Proactive Sustainment

Problem or Need

Sustainment of INL real property assets has historically included preventive/predictive and reactive corrective maintenance. However, INL is committed to implementing proactive sustainment when the risk of an unplanned failure warrants the investment necessary to prevent negative impacts to worker safety and health, the environment, or INL's mission. Analysis of potential sustainment activities for INL "mission-dependent, not critical" assets indicates that an annual investment of approximately $4M, or $40M over the next 10 years, will be required.

Project Description

This project will implement proactive sustainment of INL mission-dependent, not critical assets.

Asset Mission

INL mission-dependent, not critical assets are those DOE Office of Nuclear Energy (NE)-owned real property assets that provide direct support for INL mission-critical assets. Failure of components in these assets can have an indirect impact on mission activities.

This project will support all laboratory programs and projects that utilize mission-dependent, not critical real property assets at the INL.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*

OF-4 Roof Repair and Replacement

Problem or Need

INL maintenance budgets have historically been inadequate to allow roof replacement activities to be accomplished at the optimum time in the roof life cycle. This situation has caused recurring problems with roof leaks, thereby placing important equipment at risk, and has incurred a negative impact on employee work environment and moral.

The results of the FY 2010 roof inspection performed by the Roof Asset Management Program (RAMP) forecast that 36% of INL roof area will require replacement in the next five years, and 60% in the next ten years. An annual investment of approximately $4M will be required to address both the current backlog and the additional roof replacements forecast for 2011 through 2016. After 2016, the annual investment forecast decreases to approximately $2.5M.

Additionally, starting in FY 2012, the INL Performance Evaluation and Measurement Plan will attach contract fee to INL's adoption and utilization of the National Nuclear Security Administration's RAMP to repair and replace INL roofs and to the installation of roofs that meet DOE "Cool Roof" standards.

Project Description

This project will replace INL facility roofs to reduce the backlog of roofs that are past their effective service lifetimes, repair roofs to correct functional problems and extend their lives, and accomplish the roof replacements forecast for the future.

Asset Mission

Roofs are a key component to maintaining the enclosure integrity of the INL buildings and trailers owned by DOE Office of Nuclear Energy (NE). Failure to properly maintain the laboratory's roofs presents a risk to operations and equipment housed in INL buildings.

This project will support all laboratory programs and projects that utilize DOE-NE owned facilities at the INL.

Project Status [a]

Proposed.

a - Project Statuses are as of June 2011 for consistency with the *Idaho National Laboratory 2013-2022 Ten-Year Site Plan.*