

# IDAHO NUCLEAR INFRASTRUCTURE

*The U.S. Department of Energy's Office of Nuclear Energy*

ADVANCED TEST REACTOR

*The Department of Energy supports nuclear science and technology through one of the world's most comprehensive research infrastructures.*

In FY 2005, the Department of Energy (DOE) created the Idaho National Laboratory (INL) to serve as the center for its nuclear energy research and development (R&D) efforts. INL combines the expertise of government, industry, and academia in a single laboratory dedicated to the development of advanced reactor and fuel-cycle technologies. The result of this combination is a diverse laboratory managed by Battelle Energy Alliance (BEA). Team members include:

- Battelle Memorial Institute,
- BWXT Services Inc.,
- URS Washington Division,
- The Electric Power Research Institute, and
- Massachusetts Institute of Technology.



## A MULTI-PROGRAM NATIONAL LABORATORY

INL employs more than 3,900 personnel located primarily at the Idaho Site and in the city of Idaho Falls. In addition to its broad spectrum of nuclear energy and national security programs, the laboratory provides essential site services to DOE and other governmental agencies and private-sector companies doing business on the Idaho Site. INL conducts science and technology research across a wide range of disciplines. Its core missions include:

- Developing advanced, next-generation reactor and fuel-cycle technologies;
- Promoting nuclear technology education; and
- Applying its technical skills and unique features of the laboratory site to enhancing the Nation's security.

Under the oversight of the Department's Office of Nuclear Energy (NE), INL provides technical leadership to support long-term nuclear science and engineering R&D activities to address the Nation's energy and nuclear security goals. Key technical areas include nuclear fuel cycle science-based research, the development of alternative radioactive waste management strategies for the United States, and technology programs that support nuclear nonproliferation and other critical infrastructure protection.

INL also supports NE by conducting R&D and technical integration support for Generation IV (Gen IV) nuclear energy systems, as well as leadership in the Generation IV International Forum. Gen

IV technologies will feature enhanced safety, reduced waste, better economic performance, and perhaps most importantly, improved physical security and proliferation resistance.

INL provides NE with the project and technology development leadership for the Gen IV program. This includes research and development of high temperature materials and fuels, as well as development of the basis for commercialization and licensing. This important research will further advance energy and national security by exploring the application of nuclear energy in industrial applications and to help reduce the Nation's dependence on imported fossil fuel.

INL also provides the facilities and expertise needed to fuel and test radioisotope power systems for space and defense applications, and to accomplish national and homeland security missions, including critical infrastructure protection and nuclear nonproliferation.

## NUCLEAR ENGINEERING AND SCIENCE EDUCATION

The Center for Advanced Energy Studies (CAES) is a public-private partnership between the State of Idaho and its academic research institutions, DOE, and INL. CAES serves to advance the educational opportunities at the Idaho universities in energy-related areas, creating new capabilities within its member institutions and delivering technological innovations leading to technology-based economic development for the intermountain region. CAES also helps provide students and professors from across the country with access to the Laboratory's unique capabilities.

CAES also administers Nuclear Energy University Programs (NEUP), which includes three components – R&D, scholarships and fellowships, and research infrastructure enhancements. The goal is to improve America's competitiveness and develop more effective collaborations between universities, National Laboratories, and industry in direct support of DOE's NE R&D programs.

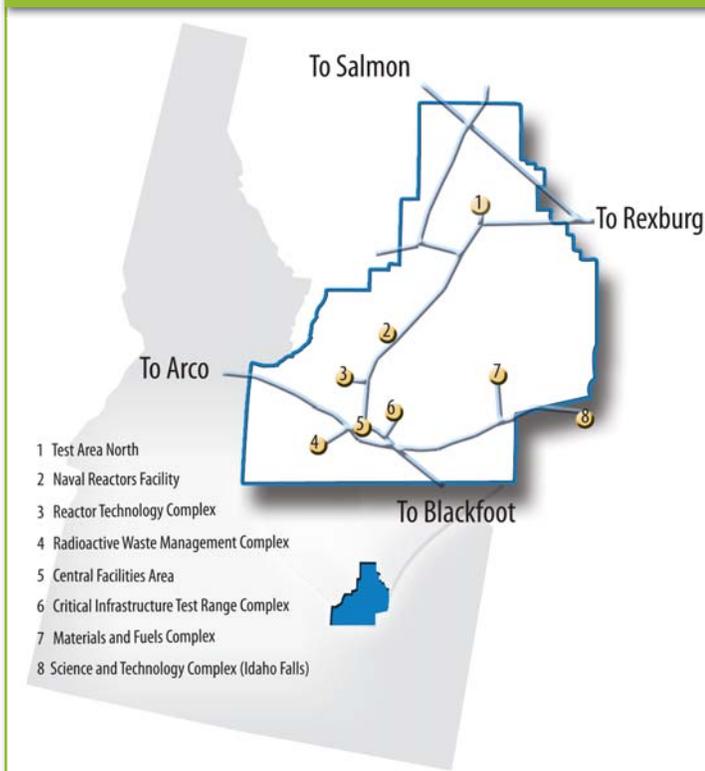
Formerly a separate program, the Research Reactor Infrastructure (RRI) element is added to the IFM program for the first time in FY 2010. Through the RRI program, the Department provides fresh reactor fuel to, and removes used fuel from, university research reactors. The program also supports the conversion of the remaining highly enriched uranium-fueled university research reactors to low-enriched uranium reactors.

## INL'S NUCLEAR INFRASTRUCTURE

Two programs support the nuclear infrastructure at INL:

- **The Idaho Facilities Management (IFM) Program.** Through IFM, NE maintains its research facilities in a safe, reliable, and environmentally compliant condition to support national nuclear programs.
- **The Idaho Site-Wide Safeguards and Security Program.** Through this program, NE supports activities that are required to protect the assets of the Idaho complex from theft, diversion, sabotage, espionage, unauthorized access, compromise, and other hostile acts.

## IDAHO NATIONAL LABORATORY MAP



The Department manages and operates three main engineering and research complexes at INL:

### Advanced Test Reactor (ATR) Complex —

This is the site of the ATR, a 250-megawatt test reactor used to provide irradiation services for a range of users. ATR is the largest and most versatile thermal test reactor in the world. Its current primary mission is to provide irradiation and testing services to the Naval Reactors Program.

ATR supports Gen IV, Fuel Cycle R&D, and National Nuclear Security Administration (NNSA) programs. ATR also provides irradiation and testing services on a cost-reimbursable basis to other national and international nuclear energy research groups and medical and industrial isotope producers.

In April 2007, DOE designated ATR as a National Scientific User Facility (NSUF). This designation has enabled ATR to become a cornerstone of nuclear energy R&D in the United States and allows a broader use of ATR capabilities. The extensive capabilities of ATR allow a wide range of advanced nuclear energy irradiation testing to be conducted simultaneously by universities, commercial industry, international organizations, and other National Laboratories without interfering with its primary missions. Increasing accessibility to ATR through the NSUF is an important step for INL in building strong ties with the nuclear industry and universities conducting nuclear energy R&D.

NE, through its IFM program, funds the ATR Life Extension Program to ensure the long-term availability of this essential nuclear power research capability.

### Materials and Fuels Complex (MFC) —

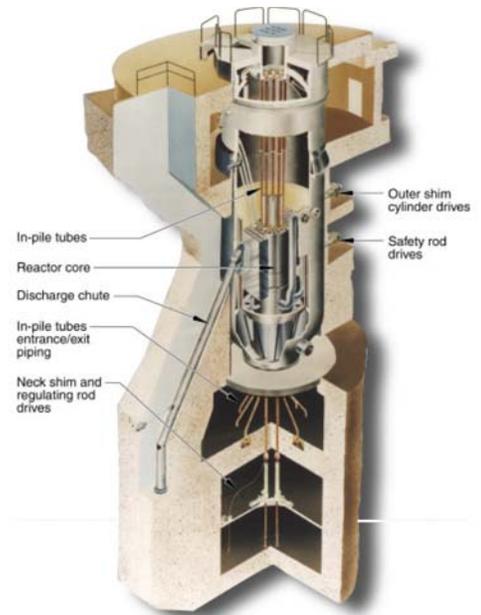
The facilities at MFC are used to conduct advanced nuclear energy technology R&D. The facilities, personnel, and infrastructure at MFC support several important DOE nuclear energy, defense, and environmental management programs, most notably the development of alternative nuclear fuel-cycle technologies. MFC includes the following major facilities:

- Fuel Conditioning Facility,
- Fuel Manufacturing Facility,
- Hot Fuels Examination Facility,
- Analytical Laboratory,
- Electron Microscopy Laboratory, and
- Radioactive Scrap and Waste Facility.

### Research and Education Campus (REC) —

Located in Idaho Falls, Idaho, REC includes more than 30 DOE-owned and leased buildings that house office space, CAES, and extensive laboratory facilities. The laboratories support NE's research and development activities, national security programs, and a wide range of research for other disciplines.

## ADVANCED TEST REACTOR



## Program Budget

Idaho Nuclear Infrastructure  
(\$ in Millions)

### Idaho Facilities Management

| FY 2009<br>Actual | FY 2010<br>Request |
|-------------------|--------------------|
| \$140.0           | \$203.4            |

### Idaho Site-wide Safeguards & Security

| FY 2009<br>Actual | FY 2010<br>Request |
|-------------------|--------------------|
| \$78.8            | \$83.4             |

## PLANNED PROGRAM ACCOMPLISHMENTS

### FY 2009

- Perform infrastructure maintenance and revitalization activities in accordance with the revised INL Ten-Year Site Plan.
- Complete the main CAES Research and Education campus building, consolidating in-town R&D activities to improve program efficiency and reduce maintenance backlog.
- Complete the upgrades of both the ATR Complex and MFC campuses by completing construction of new facilities and consolidating infrastructure functions.
- Achieve ATR irradiation program objectives established by the Naval Reactors Program, NE, and the new users of the ATR National Scientific User Facility (NSUF).
- Develop new capabilities for the ATR NSUF and expand the user base.
- Increase infrastructure management efficiency while improving safety performance.
- Develop the research, education, and analysis capabilities of CAES.
- Complete Post-Irradiation Examination equipment upgrades to support fuel-cycle R&D and other nuclear energy missions.
- Maintain a highly effective safeguards and security (and cyber security) program at INL.
- Transfer 29 excess facilities selected for decontamination, decommissioning, and demolition to the Office of Environmental Management (EM) for remediation.

### FY 2010

- Enable INL facility operations supporting nuclear science, engineering, and energy-related R&D programs for the Department of Energy, National Nuclear Security Administration, and U.S. universities.
- Conduct ATR base operations that enable 275 days of safe, compliant reactor operations per year, serving national security and civilian nuclear power R&D programs at this National Scientific User Facility.
- Continue ATR Life Extension Program (LEP) to restore hardware, analyze system performance, and complete safety analysis required to reliably operate this \$1.2B nuclear research reactor for at least another 20 years.
- Perform almost 1,000 single and recurring preventive equipment/system maintenance activities to maintain over 150 laboratories, hot cells, and shops at the MFC and ATR complex.
- Consolidate nuclear material at INL to improve nuclear material management and reduce cost.
- Establish the cost and schedule range for the new Remote-Handled Low-Level Waste Disposal Project to sustain critical laboratory capability.
- Support the Research Reactor Infrastructure program's purchase of fresh fuel for up to four university reactors (as needed) and the shipment of spent fuel to DOE facilities for storage.