ATR
National Scientific User Facility

The Energy of Collaboration

The Value of Working with ATR NSUF

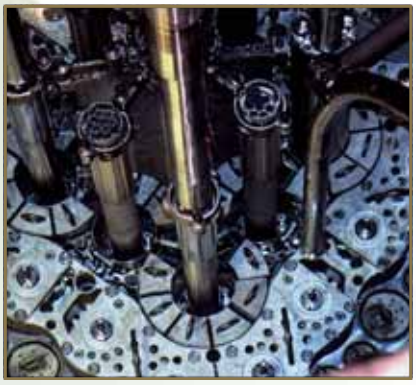
- Cost-free access to world-class nuclear research facilities
- Assistance from experienced INL staff/researchers with experiment design, assembly, and safety analysis
- Unique educational opportunities

Users: U.S. Universities & Colleges, National Laboratories, Industry

Sponsor: DOE-NE ENERGY Nuclear Energy

Irradiation Capabilities at the Idaho National Laboratory

What is ATR NSUF?



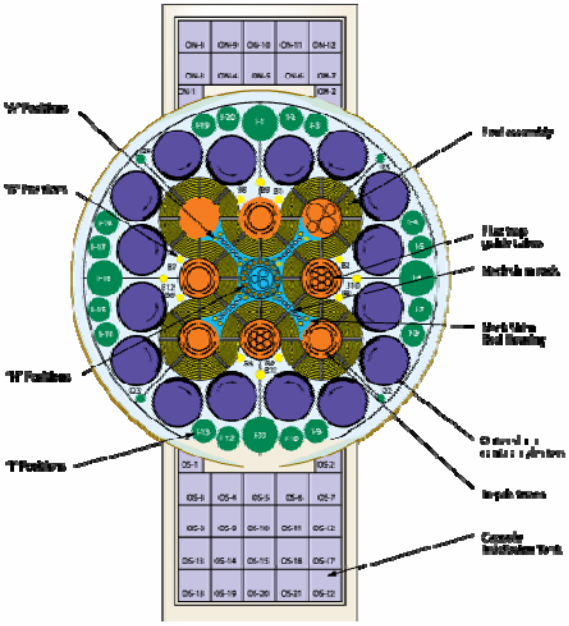
By establishing the Advanced Test Reactor National Scientific User Facility (ATR NSUF) in 2007, DOE-NE opened up the world of material test reactors to researchers from U.S. universities and colleges by granting access to Idaho National Laboratory irradiation and post-examination facilities. Until that time, university researchers did not have easy access to these kinds of world-class capabilities. Through the ATR NSUF, university researchers and their collaborators can build on current materials and fuels research to better understand the complex behavior in the radiation environment of a nuclear reactor. ATR NSUF also offers a variety of opportunities for networking, bringing the best minds together to address nuclear energy challenges. Through ATR NSUF researchers have the chance to lead the Nuclear Renaissance.

The combination of the Advanced Test Reactor and the Materials and Fuels Complex where PIE and characterization facilities and equipment are located is a key advantage of INL's R&D capabilities.

Key Facilities

Advanced Test Reactor

The Advanced Test Reactor is the only U.S. research reactor capable of providing large-volume, high-flux neutron irradiations in a prototypic reactor environment.



Reactor Type

The ATR is a pressurized water test reactor that operates at low pressure and low temperature. Its core contains a beryllium reflector to help concentrate neutrons in the core, where they are needed for fuels and materials testing.

Design Features

ATR's unique serpentine core allows the reactor's corner lobes to be operated at different power levels, making it possible to conduct multiple simultaneous experiments under different testing conditions. A hydraulic shuttle irradiation system allows experiments to be inserted and removed during reactor operation.

Other key features:

- Large test volumes – up to 48 in. long and 5.0 in. diameter
- 77 testing positions
- High neutron flux (4.4×10^{14} thermal, 2.2×10^{14} fast)
- Fast/thermal flux ratios ranging from 0.1 – 1.0
- Constant axial power profile
- Power tilt capability for experiments in same operating cycle
- Individual experiment control
- Frequent experiment changes
- Core internals replacement every 10 years
- Solid stainless steel reactor vessel ~ 48 in. from core region to minimize embrittlement
- Accelerated testing for fuel and materials development

Idaho National Laboratory INL

ATR NSUF brings the top minds in the nuclear field together to address the challenges of the current fleet of aging reactors and to research new fuels and materials for the next generation of reactors.

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Advanced Test Reactor-Critical

Also available for ATR NSUF user experiments is the Advanced Test Reactor Critical (ATRC) facility. The ATRC is a low-power prototype ATR environment for neutronics benchmarks and detector studies. This low-power version (same size and geometry) of the higher-powered Advanced Test Reactor (ATR) core is a category B reactor operated at power levels less than 5 KW with typical operating power levels of 600 W or less.

The ATRC, designed and constructed in the early 1960's, was originally used to support startup of the ATR. Currently, the primary use of the ATRC is to provide data for the design and safe operation of experiments for the ATR. The ATRC is also used to supply core performance data for the restart of the ATR after periodic core internals replacement and is occasionally used to perform low-power irradiation of experiments.

ATR Critical facility at the Idaho National Laboratory.

Accessing Irradiation Capabilities

The ATR NSUF annually conducts two open calls for proposals through a competitive proposal process: a fall call, which opens in the spring and closes in October, and a spring call, which opens in late October and closes in late March or early April. An online submittal system helps prospective researchers to develop, edit, review and submit their proposals. ATR NSUF staff is available to help any researcher who desires to submit a proposal. Awards are announced within two to three months of the call's closing date, generally in January and June. To access the proposal site, please visit: https://secure.inl.gov/atrproposal/Common/UserHome.aspx

Irradiation project proposals should:

- Directly support Department of Energy Nuclear Energy research and development programs (visit http://www.nuclear.gov)
- Be led by an accredited U.S. colleges and universities (collaboration with national laboratories and industry is strongly encouraged)
- Be for **non-proprietary** research only. Open publication of research results is expected.
- Have a typical expected duration of between 2 to 4 years (with length dependent on experiment specifications)

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