Advanced Test Reactor



GENERAL INFORMATION	
Acronym:	ATR
Facility name:	Advanced Test Reactor
Organization:	Idaho National Laboratory
Country:	USA
Operational since:	1967
Reactor family: ☒ Water Cooled ☐ Molten Salt Other:	 ☐ High Temperature Gas Cooled ☐ Liquid Metal Cooled Fast Spectrum
Website/Contact email:	https://inl.gov/advanced-test-reactor/

TECHNICAL DESCRIPTION

Operating conditions modelled: ☒ Normal operation ☐ Accident conditions
please specify:

Application:

☒ Thermalhydraulics - separate effects ☒ Thermalhydraulics - integral effects ☒ Neutronics
☒ Fuel ☒ Components/Feature ☒ Materials
☒ Containment ☐ Severe Accident ☐ Hazards (seismic)

Other:

Phenomena modelled:

ATR is capable of providing large-volume, high-flux thermal neutron irradiation in a prototype environment. The reactor's singular design makes it possible to study the effects of intense neutron and gamma radiation on reactor materials and fuels. Experiments conducted at ATR provide a critical look at reactor components and systems. Testing at ATR supports reactor research around the world to extend the life of current nuclear power plants, develop designs for the reactors of the future, and test new types of stronger nuclear fuels that reduce waste generation and proliferation risks.

Key facility parameters:

Fluid: water

	Min	Max
Facility power [kW]:	0	250000
Neutron thermal flux level [n/cm^2/s]:	0	1.0x10^{15}
Neutron fast flux level [n/cm^2/s]:	0	5.0 x10^{14}
Pressure [MPa]:	0.1	2.5
Temperature [^{o}C]:	52	71
Flow Rate [kg/s]:	0	2646

- Large test volumes – — up to 1.2m (48 inches) long and 13.3 cm (5.25 inches) in diameter
- 77 total test positions available within the core/ reflector assembly
- High neutron flux enables accelerated testing for fuel and materials development
    - Maximum thermal flux in the core: 1.0×10^{15} n/cm^2-sec
    - Maximum fast flux in the core: 5.0×10^{14} n/cm^2-sec
- Fast/thermal flux ratios ranging from 0.1 – 1.0
- Constant axial power profile
- Power tilt capability for experiments in same operating cycle
- Operating Conditions:
    - 2482 Kpa (360 psia) reactor pressure with unique ability to provide independent pressure control for loops
    - 52-72° C (125-160° F)
    - 250 MW thermal max power level

Records of Experiments:

ATR has long history of testing fuels and materials.

Planned Experiments:

Please refer to https://inl.gov/advanced-test-reactor/ or https://www.osti.gov/ for the latest published ATR Integrated Strategic Operating Plan (ISOP).

QUALITY ASSURANCE, INTELLECTUAL PROPERTY AND DATA SHARING

QA standards followed by the Facility: NQA-1

QA certifications received by an independent organization(s): N/A

Confidentiality and Intellectual Property (IP):

Experimenters can interact with ATR personnel under non-disclosure agreements and IP can be protected under Department of Energy's (DOE's) Cooperative Research and Development Agreement (CRADA) rules.

Potential for data sharing:

Information which can legally be published can be shared with interested parties. Many of ATR's DOE-funded experiments have been or will be published openly.

DETAILED DESCRIPTION

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. Large test volumes – up to 48 inches long and 5.25 inches in diameter in the 9 large flux traps. There are 68 additional drop-in test positions available within the core/ reflector assembly. The physical dimensions of the available test positions in the ATR range in size from 0.659 inches in diameter to 5.00 inches in diameter. A detailed description of the ATR and its support facilities can be found at to https://inl.gov/advanced-test-reactor/