



INL's Advanced Test Reactor

Ensuring the safe and sustainable operation of a unique national asset

Advanced Test Reactor is the largest and most powerful research reactor in the world and supports vital research needs for the departments of Energy and Defense. It is a one-of-a-kind national asset that provides a wide range of nuclear fuel and materials testing capabilities for government and industry partners. Its continued operation is of great importance for national priority missions. ATR's internal components are routinely upgraded, and its operations are continually assessed against the latest safety and seismic standards.

Based on more than 50 years of operating experience and a well-documented record of continuous safety analyses and upgrades, INL scientists, engineers, and safety professionals are confident



the Advanced Test Reactor can continue to operate safely and support INL's growing nuclear energy research mission for years to come.

COMPARING ATTRIBUTES

As illustrated in Figure 1 on the next page, ATR differs significantly from the large reactors used to generate most of the nation's emission-free electricity.

Because commercial nuclear reactors have a distinct purpose, their designs and

characteristics are quite different from research reactors such as ATR.

ATR SAFETY SYSTEMS

ATR emergency systems are qualified to withstand ground accelerations nearly 10 times what the facility felt during the historic 1983 Mount Borah quake. Reserve water and power help ensure ATR is ready to respond to a loss of power or other unplanned event.

The ATR Simulator—a replica of the ATR control room—enables ongoing operator training for a wide range of normal, abnormal, and emergency situations.

Examples of redundant safety systems at ATR include:

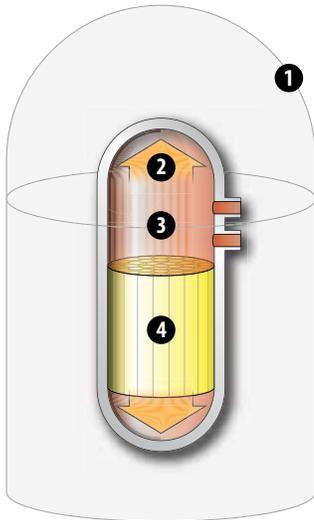
- Four diesel generators, including one to provide power for a deep-well pump

ATR operators train in a simulator that closely duplicates the control room, enabling safe, smooth operations under all conditions.

Commercial Power Reactor **VS** Advanced Test Reactor

Generates electricity for municipal utilities

Researches materials and makes medical isotopes



1 Containment Dome
Commercial reactors require a massive concrete structure to contain the reactor's high-temperature, high-pressure contents if there's an accident.

2 High Pressure
Commercial reactors typically operate at 1,000 - 2,500 PSI so the water can get hotter than its boiling point.

3 High Temperature
Commercial reactors typically operate near 600° F to make electricity generation more efficient.

4 Massive Core
Commercial reactor cores are typically more than 1,700 cubic feet and contain hundreds of fuel elements weighing hundreds of pounds each.

5 Cycle and Cooling
Commercial reactors typically run for 18 months at a time, meaning the fuel requires days or weeks of forced cooling after shutdown.

1 Confinement Structure
ATR's low operating temperature and pressure eliminates the possibility of a steam explosion and necessity for a concrete containment dome. A confinement structure minimizes the release of radioactive materials in the unlikely event of an accident.

2 Low Pressure
The ATR operates at 360 PSI.

3 Low Temperature
The ATR dissipates most of the heat it creates and operates at 125°-160° F, not much more than a home water heater.

4 Compact Core
The entire ATR core weighs roughly as much as a single commercial fuel element. ATR's core is about 36 cubic feet and contains 40 fuel elements weighing about 20 pounds each.

5 Cycle and Cooling
The ATR typically runs for 50-60 days at a time, meaning the fuel requires less than an hour of forced cooling after shutdown.

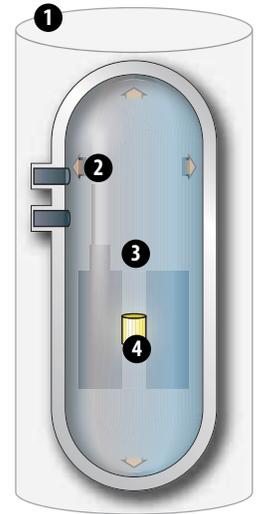
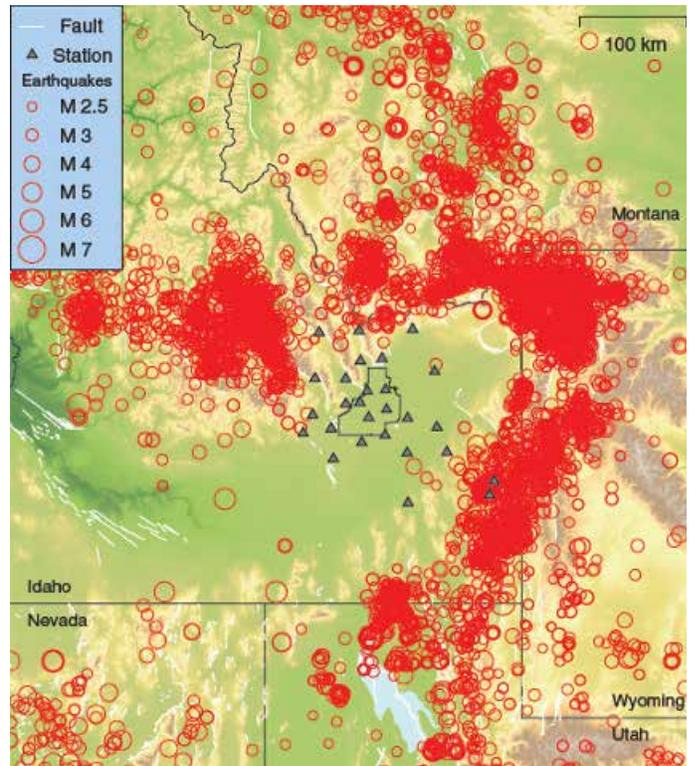


Figure 1. Key ATR parameters compared with those of a commercial pressurized water reactor

- Diesel fuel to last more than a month
- Backup batteries that are regularly tested and housed in a seismically strengthened room
- Reserve cooling water supplies exceeding 10 times the ATR core's volume, including a 1-million-gallon tank that has diesel motor driven pumps and can deliver water via gravity pressure if all power is lost
- Valves on reserve water supplies that default to open position if power is lost
- Ongoing operator training to evaluate response readiness for abnormal and emergency situations
- Continual review and analysis of emergency system readiness



The Department of Energy's Idaho site is located on the Eastern Snake River Plain, which is seismically quiet compared to the surrounding mountains. This map shows seismic events with magnitudes greater than 2.5 between 1850 and 2007. INL seismic monitoring stations have existed throughout the site since 1972 to characterize potential sources of future earthquakes.

FOR MORE INFORMATION

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