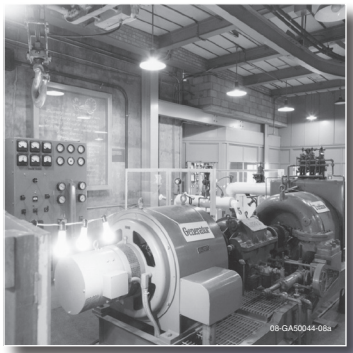
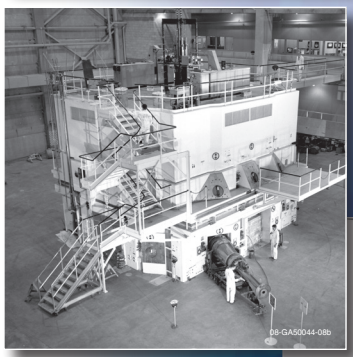
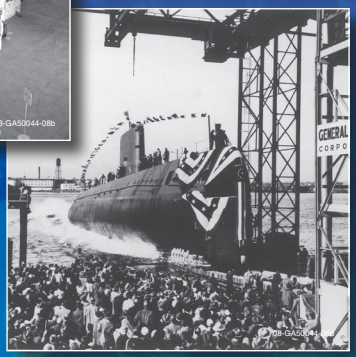
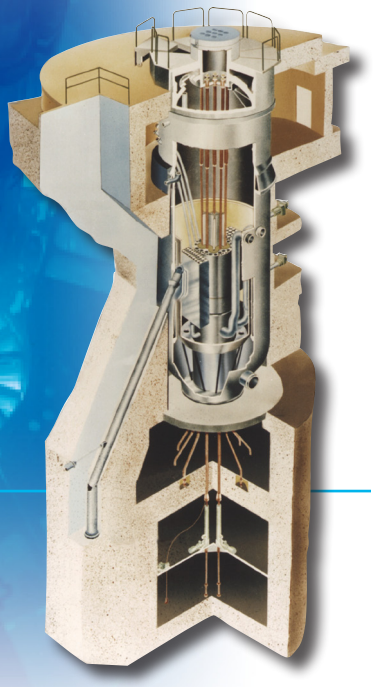




Unique facilities and innovative scientists and engineers have long kept Idaho at the forefront of nuclear energy research, development and demonstration.





Nuclear Programs

Nuclear Power Pioneers

In 1949, the U.S. Atomic Energy Commission established the National Reactor Testing Station – now known as Idaho National Laboratory (INL) – to take on the top-priority mission of harnessing the power of the atom for peaceful applications.

In the years that followed, thousands of world-class scientists and engineers made Idaho their home, and devoted their careers to advancing the state of the art in nuclear research and development. The results of their labors are legendary.

- In 1951, Experimental Breeder Reactor-I produced the first usable amounts of electricity from nuclear power.
- In 1955, the Borax-III reactor provided electricity to Arco, Idaho – the first time a nuclear reactor powered an entire U.S. community.
- The Advanced Test Reactor, one of the world's most consistently updated and capable materials test reactors, became one of the two primary reactors in the nation used to produce life-saving medical and industrial radioisotopes.
- The laboratory developed prototype nuclear propulsion plants for Navy submarines and aircraft carriers.

Over the years, INL's mission broadened into areas such as biotechnology, energy and materials research, and waste treatment and cleanup of Cold War-era sites. Today, INL is focused on meeting the nation's energy, nuclear technol-

Continued next page

The Energy of Innovation

Idaho National Laboratory

Continued from previous page

ogy, science, and national and homeland security needs.

Sustaining Light Water Reactors

INL scientists and engineers are focusing their R&D efforts on supporting the operation of current nuclear power plants, and Generation III+ advanced light water reactors. These efforts are directed toward assuring continued safe operation of LWRs, even during and after major natural disasters.

Fuel Cycle Research and Development

Researchers at INL are pursuing the development of fuel cycle technologies that will meet the need for economic and sustained nuclear energy production. The systems and processes under research and development should enable a significant reduction in the amount of high-level radioactive water requiring geologic disposal, reduced accumulation of plutonium in civilian spent fuel and the extraction of more useful energy from nuclear fuel.

Generation IV Nuclear Power (Gen IV)

INL is an active participant in Gen IV nuclear system research, working with industry, universities, other labs and overseas organizations in an effort to develop and deploy promising advanced reactor technologies by 2030. As an example, INL is collaborating broadly on development of high-temperature gas reactors.

Nuclear Hydrogen

Scientists at INL have made important breakthroughs required for the future, large-scale production of hydrogen using high temperature. The goal is to use nuclear energy to produce fuels needed for transportation as part of a multifaceted effort to reduce the nation's demand for oil.

Radioisotope Power Systems and Space Technologies

Radioisotope power systems are used to provide heat and electricity for space exploration missions and select military applications. INL assembled a radioisotope thermoelectric generator (RTG) for the New Horizons mission to Pluto in 2005, and assembled and fueled a specialized RTG for NASA's planned Mars Science Laboratory. Preparations are also under way for the potential future production of lunar surface power reactors.

Medical Applications

INL is helping develop boron neutron capture therapy techniques to treat cancer and alleviate pain, and also has the capability of producing isotopes to power highly specialized radiosurgery devices.

Infrastructure

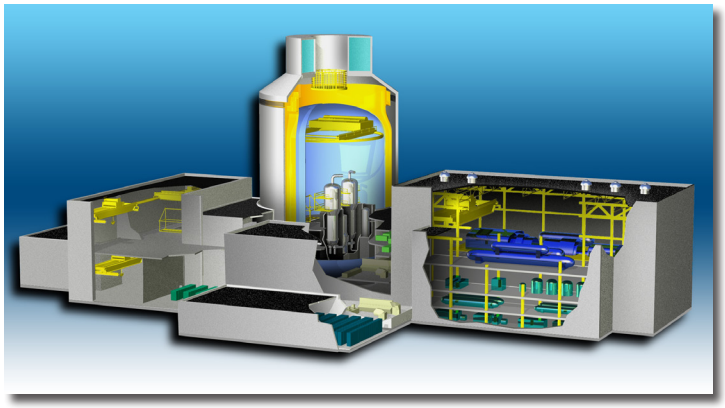
INL's unique physical assets allow it to be an international leader in nuclear energy technology research and development. The laboratory has three major facility areas:

- Materials and Fuels Complex
- Advanced Test Reactor Complex
- Research and Education Campus

The Materials and Fuels Complex includes the Hot Fuel Examination, Fuel Conditioning, and Fuel Manufacturing facilities; Fuel Assembly and Storage Building; and the Space and Security Power Systems Facility.

The Advanced Test Reactor Complex is anchored by the Advanced Test Reactor, the world's premier nuclear test reactor. The complex also features the Advanced Test Reactor-Critical Facility; Hot Cell Facility; Radiation Measurements Laboratory; Radiochemistry Laboratory; and the Safety and Tritium Applied Research Facility – a national fusion safety user facility.

The Research and Education Campus is anchored by the INL Research Center, and includes High Temperature Electrolysis and materials laboratories and the new Center for Advanced Energy Studies (CAES).



The Department of Energy is evaluating advanced light-water reactors for near-term deployment.

For more information

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