

# TEST REACTOR AREA

**T**he INEEL is a Department of Energy facility dedicated to research supporting national DOE missions, including nuclear technology research. The INEEL and Argonne National Laboratory are designated as the Nuclear Energy lead laboratories for reactor technology. For over 50 years, the INEEL has played a key role in both DOE's and the Nuclear Regulatory Commission's nuclear energy research programs. The INEEL's contributions helped establish the technical basis for regulating the domestic and international nuclear energy community. The Test Reactor

Area, located in the southwestern region of the INEEL, is a focal point for implementing this mission. TRA has made many scientific contributions through test programs at facilities such as the Advanced Test Reactor. The primary mission at TRA is operation of the Advanced Test Reactor, the world's premier test reactor, which is used to study the effects of radiation on materials. This reactor also produces rare and valuable medical and industrial isotopes.

## Employees

Approximately 400 employees work at the TRA. The employee base has strong skills in nuclear reactor operations and support, reactor experiment design, materials testing and chemical and radiological analysis.

## Operating Facilities

The TRA has six essential facilities:

- The Advanced Test Reactor creates a wide range of reactor environments in which the effects of radiation on materials and fuels may be studied. The ATR set a new record in January 2001, achieving 57 days of continuous full power operation. The ATR experiments and tests determine how fuels and materials react when bombarded by streams of neutrons and gamma rays under a variety of pressure and temperature conditions. Information that would normally require years to gather from normal reactor operations can be obtained in a matter of weeks or months using ATR's high neutron flux capability. The primary user of the ATR is the Naval Nuclear Propulsion Program. However, this is a multipurpose facility that has several other government, commercial and foreign users. The unique four-leaf-

*The Advanced Test Reactor at TRA produces many of the nation's medical and industrial isotopes. This photo looks down into the reactor core from above.*



clover core design provides nine main test spaces. Additional smaller test spaces allow even more experiments to be conducted independently. These smaller spaces are routinely used for production of medical and industrial isotopes.

- Advanced Test Reactor Critical Facility is a low-power, full-size nuclear duplicate of the ATR, designed to provide physics data in support of the ATR test program.
- The TRA Hot Cell Facility has three hot cells equipped with remote-control machine tools, measuring instruments and manipulators. The cells

are used to examine irradiated samples and process radioisotopes.

- The Radiation Measurements Laboratory specializes in measuring the quantity and quality of alpha, beta, gamma and neutron radiation.
- The Radiochemistry Laboratory is used to support the Radiation Measurements Laboratory as well as to carry on independent research and development work. Investigators here study ways to produce and purify medical radioisotopes, as well as studying the effects of radiation on hazardous waste.

- The Safety and Tritium Applications Research (STAR) Facility does fusion-related research and development for the DOE Office of Fusion Energy Science. The research focuses on how radioactive and hazardous materials behave in fusion machines. Two key research areas are tritium behavior in materials exposed to plasma, and chemistry and behavior of tritium in molten salts. The fusion research involves scientists from national and international laboratories.



*TRA is home to the world's largest and most advanced test reactor, capable of simulating years of radiation exposure in short periods of time to test how materials perform.*

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### *History*

The TRA, established in the early 1950s, has been the site for operation of three major test reactors: the Materials Test Reactor (1952-1970), the Engineering Test Reactor (1957-1982), and the Advanced Test Reactor (1967-present). The Materials Test Reactor was the second reactor to be operated at the INEEL. (Experimental Breeder Reactor No. 1, now a Registered National Historic Landmark, was the first INEEL operating reactor.) Information obtained from tests run at the MTR influenced the choice of core structural materials and fuel elements for every reactor designed in this country since 1952. The Engineering Test Reactor provided more testing space and flexibility than the MTR. At the time of startup, the ETR was the largest and most advanced materials test reactor in the world. The reactor was used to evaluate fuels, coolant and moderator characteristics under environments similar to those in many types of power reactors. In 1972, the ETR was modified to support the Department of Energy's breeder reactor safety program. The ETR and MTR reactors have been deactivated, but remain in place. The Advanced Test Reactor began operating in 1967 (see discussion for Operating Facilities).

### *Distances*

Distances to nearby cities or other INEEL facilities:

TRA is located 4.5 miles (6.4 kilometers) northwest of the Central Facilities Area

47 miles (75 kilometers) west of Idaho Falls

28 miles (45 kilometers) southwest of Mud Lake

16 miles (26 kilometers) east of Arco

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