

INL's TREAT reactor successfully completes first fueled experiment

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INL's Transient Reactor Test Facility (TREAT) exposes nuclear fuel to extreme, accident-like conditions to provide valuable data that researchers and industry use to develop more robust fuels. Credit: Idaho National Laboratory

Today at 5:05 p.m., the Transient Reactor Test (TREAT) Facility at Idaho National Laboratory (INL) pulsed for a few seconds, subjecting a small capsule of light water reactor fuel to radiation and heat. The test marked the return of a capability that is critical to the United States' role

in the development of nuclear fuels, for both the existing fleet and a new generation of advanced reactors under design.

"Restoring this capability in the U.S. keeps our nation in a leading role to develop advanced nuclear fuels and reactor technologies," said INL Laboratory Director Mark Peters. "Because of that, INL's TREAT facility will once again enable systems that serve the U.S. economy, environment and national security."

While other transient test reactors exist in other countries, the United States had been without the capability since 1994, when TREAT was placed on operational standby. Many of the nuclear fuel types currently used in reactors operating in the United States and around the world were tested in TREAT.

The goal of transient testing of nuclear fuels is similar to high-impact car crash testing, which has helped the automobile industry make crucial advancements in safety technologies. Exposing fuels to extreme conditions in TREAT helps the nuclear industry develop more resilient and longer lasting fuels.

The experiment performed today is part of a series that will culminate in testing of new fuels being developed by the U.S. Department of Energy Office of Nuclear Energy's Accident Tolerant Fuels (ATF) program for use in light water reactors.



INL workers guide a test capsule into the reactor for the first fueled experiment at the Transient Reactor Test (TREAT) facility in more than two decades.

Credit: Idaho National Laboratory

Data gathered from the experiment will be compared to tests previously conducted at TREAT and other historic research facilities to verify modern experiment protocols and demonstrate performance of instrumentation. This experiment commissioned TREAT's fuel safety research capabilities and paved the way for upcoming tests over the next few weeks in which fuel samples will be exposed to increasing energy levels ramping up to sample melting point.

Finally, today's experiment will enable an enhanced understanding and lay the foundation for the next ATF experimental campaign in 2019 that will focus on water-environment testing.

TREAT came back online in November when the [reactor](#) went critical at low power. INL workers have been making final preparation for the first fuel experiment in the months since.

"We weren't going to claim TREAT restart success until we ran the first experiment," said INL's Dan Wachs, who serves as DOE's national technical lead for [fuel](#) safety research.

TREAT

TRANSIENT REACTOR TEST FACILITY

1959

Transient Reactor Test Facility (TREAT) construction and startup at Argonne National Laboratory-West.

1960s

Conducts wide array of fuel safety studies for light water and breeder reactors. ~ 3,000 transient tests through 1994.



1970s

Research focus shifts to sodium-cooled fast reactor (SFR) fuels.

1988

Addition to facility, biggest upgrades to instrumentation and control systems in a long history of incremental modifications.



1994

TREAT placed on operational standby.



2011

Fukushima Daiichi accident in Japan prompts DOE to call for development of accident tolerant fuels for nuclear reactors.



2014

TREAT restart listed as preferred alternative in DOE's Environmental Assessment for the Resumption of Transient Testing of Nuclear Fuels and Materials.

2017

TREAT achieves criticality for the first time since 1994.



2018

Start series of six tests, each at successively higher power to explore fuel response to increasingly harsh environment.

Post-test examination to investigate the response of each component to the experiment conditions. Comparison of experiment outcomes to code-simulated predictions to qualify for use in future designs and/or identify areas for potential improvement.

Use of data to complete design of follow-on tests for new Accident Tolerant Fuel designs.

A timeline of TREAT's operational history. Credit: Idaho National Laboratory

INL is one of the U.S. DOE's national laboratories. The laboratory performs work in each of DOE's strategic goal areas: energy, national security, science and environment. INL is the nation's leading center for nuclear energy research and development. Day-to-day management and operation of the laboratory is the responsibility of Battelle Energy Alliance.

Provided by DOE/Idaho National Laboratory

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