The Hot Fuel Examination Facility is the largest hot cell dedicated to radioactive material research at Idaho National Laboratory.

Hot Fuel Examination Facility

Post-irradiation examination of fuels and materials

The Hot Fuel Examination Facility (HFEF) is the flagship facility for conducting post-irradiation examination of fuels and materials at Idaho National Laboratory (INL) – a critical component of the research needed to develop new nuclear technologies. Located at INL's Materials and Fuels Complex west of Idaho Falls, HFEF is a national research asset with the largest inert atmosphere hot cell dedicated to radioactive materials research in the U.S.

HFEF capabilities help provide the ability to remotely handle and perform detailed non-destructive and destructive examination of highly irradiated fuel and material samples. This is in support of INL's mission of research and development of safer and more efficient fuel designs and to evaluate material performance after irradiation.

Current Missions

HFEF's hot cells provide shielding and containment for remote examination, processing, and handling of highly radioactive materials. Its argon-atmosphere hot cell, air-atmosphere decontamination cell, labs, support areas, and special equipment for handling, examining, and testing highly radioactive materials make the facility an invaluable part of the nation's nuclear research infrastructure.

HFEF can receive almost any over-the-road commercial shipping cask, including fuel pins up to 13 feet long. HFEF handles a wide variety of fuel forms, including tiny particles, four-foot research reactor plates, and full-sized commercial rods.

HFEF provides support to a variety of programs including, but not limited to, DOE's nuclear technology research and development, Generation IV Reactor technologies, and research reactor fuels.

Key Capabilities

Using HFEF's extensive array of research tools, INL scientists can conduct non-

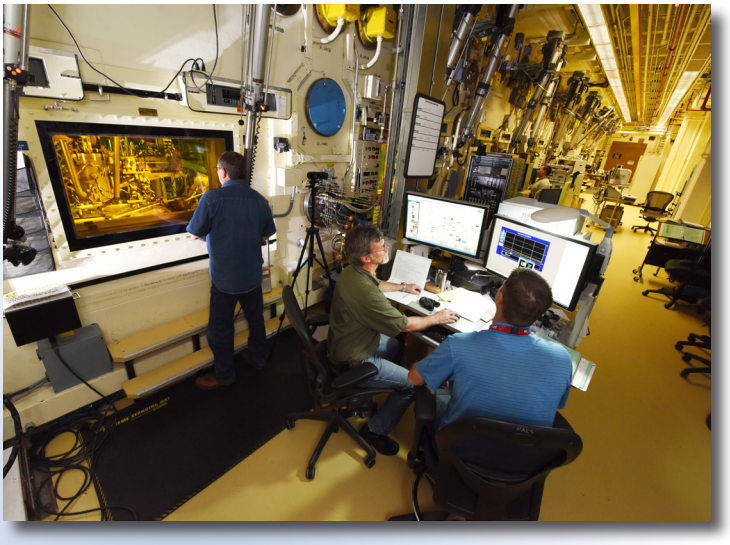
Continued next page

Continued from previous page

destructive examination of irradiated samples, such as dimensional measurements and neutron radiography. The facility also enables destructive examination, such as mechanical testing or metallographic/ceramographic characterization. Development at HFEF also supports fuel processing activities at the Fuel Conditioning Facility.

Significant aspects of HFEF include:

- **Hot Cells:** HFEF has two large, shielded hot cells. The main cell, which is 70 by 30 feet, is stainless steel-lined and gas tight; is fitted with two 5-ton cranes and two electromechanical manipulators; and has 15 workstations, each with a 4-foot-thick window of oil-filled, cerium-stabilized glass, and a pair of remote manipulators for use in its purified argon atmosphere. The second hot cell is an air cell which includes five workstations and a water wash spray chamber for decontaminating materials and equipment.
- **Neutron Radiography:** The Neutron Radiography reactor is a 300 kW TRIGA reactor in the basement of HFEF. It is equipped with two beam tubes and two separate radiography stations that make it one of the finest facilities in the world for neutron radiography of small test components.
- **Precision Gamma Scanning:** This type of scanning allows scientists to precisely determine the location of radioactive elements in fuel and material samples.
- **Visual Examination and Eddy Current Examination:** This equipment supports non-destructive examination of samples, enabling researchers to evaluate a fuel or material's performance and detect material surface defects.
- **Gas Sampling:** Laser puncture and gas collection with the Gas Assay Sample and Recharge (GASR) from fuel samples helps researchers gain needed information on fission gas and helium release.
- **Accident Simulation Testing:** HFEF's Fuel Accident Condition Simulator (FACS) furnace provides the capability to test fuel and material samples under worst-case scenarios involving temperatures of up to 2,000° Celsius for extended periods of time. This allows scientists to understand performance and improve the safety of fuel designs.
- **Metallic and Ceramic Sample Preparation Capabilities:** In addition to the non-destructive PIE tools, HFEF operators are able to disassemble fuel assemblies and prepare mounted samples for microscopic examination and chemical analysis.
- **Precision Mill:** This low-speed mill is used for precision fuel disassembly and ingot sampling.
- **Measurement Bench:** The measurement bench is designed to perform remote automatic dimensional measurements and oxide thickness measurements on plate and pin-type fuel samples, which includes flat and curved fuel plates and rodlets up to 1.3 meters in length.



The main hot cell is 70 by 30 feet with 15 workstations each at a 4-foot-thick window.

For more information

Nora Heikkinen
(208) 533-7783
nora.heikkinen@inl.gov

A U.S. Department of Energy National Laboratory