

HFEF

Hot Fuel Examination Facility



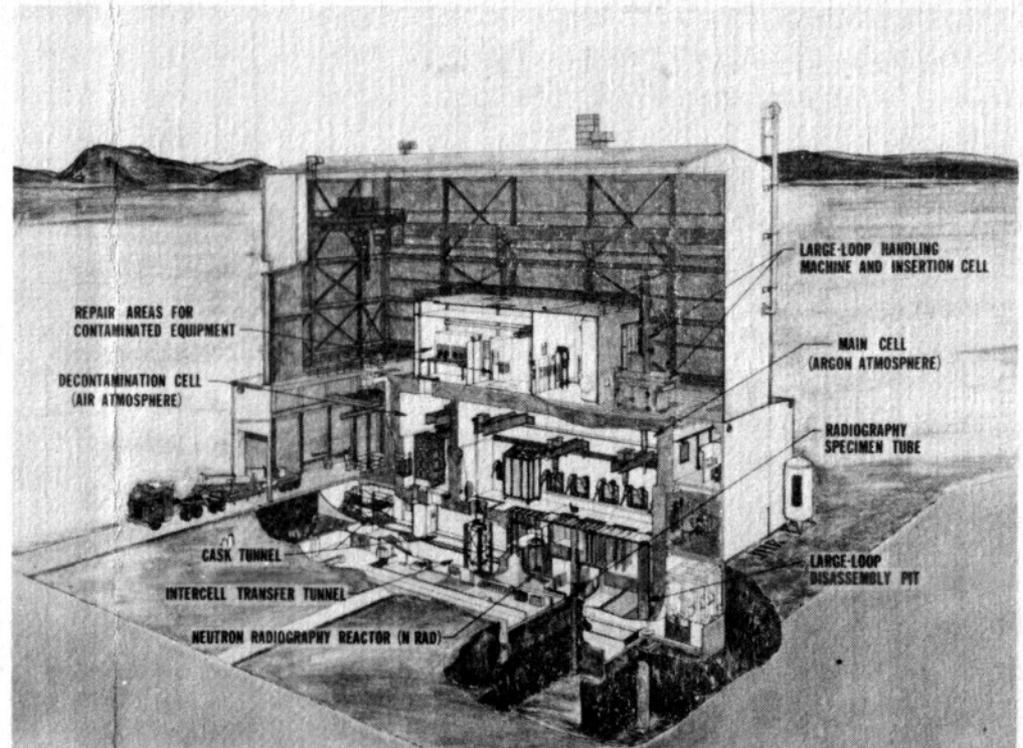
Examinations conducted in the Hot Fuel Examination Facility (HFEF) provide data that are essential for determining the performance of fuels and materials irradiated in the Experimental Breeder Reactor II (EBR-II), Transient Test Facility (TREAT), Fast Flux Test Facility (FFTF) at Hanford, Washington, and other DOE reactor facilities. HFEF, which went into operation in 1975, consists of two shielded hot cells, the decontamination cell which contains an air atmosphere and the main cell which contains an argon gas atmosphere. Both cells are surrounded by high-density concrete walls, four feet thick, that protect workers from the high radiation levels present in the cells. Each of the twenty one workstations in HFEF are equipped with shielded windows (also four feet thick) and master/slave manipulators. The main cell, with its inert argon gas atmosphere, is utilized for work involving exposure of materials such as sodium, plutonium, and other materials that would react chemically with air.

HFEF has several features that make it especially well suited for examining irradiated fuels and materials experiments. The main cell is designed for containment of any plutonium contamination that may be released during the handling and examination of irradiated experiments. The cell is also designed for the vertical handling, cutup, and examination of experiments up to about 30 feet in length. Much of the in-cell examination equipment for fuel elements is automated or semi-automated. All of the in-cell equipment is carefully designed to permit remote maintenance. The fact that no personnel entry has been required into the main cell since startup of the facility is a tribute to the success of this design effort.

Non-destructive in-cell examination capabilities include macro viewing and photography, weighing, precision dimensional surveys, gamma-ray spectroscopy, eddy-current testing, neutron radiography, and fission-gas sampling and assay.

Destructive examination capabilities include in-cell equipment for cutting specimens from irradiated hardware or fuel and the preparation of samples for physical testing, chemical analysis, or microscopic examinations. Samples in the main cell are transferred by pneumatic "rabbit" to the ANL-W Analytical Laboratory or to a small HFEF hot cell, where optical microscopy and scanning electron microscopy are available.

The capability to examine and characterize contact-handled transuranic waste destined for the Waste Isolation Pilot Plant (WIPP) in New Mexico was added to HFEF in 1990.



Hot Fuel Examination Facility

A 250-kW TRIGA research reactor is located in the basement of HFEF and provides a source of neutrons for neutron radiography. The Neutron Radiography (NRAD) Facility is equipped with two beam tubes and two separate radiography stations that make it one of the finest facilities in the world for radiography of irradiated components.

Specimens are lowered from the HFEF main cell to intersect one of the collimated neutron beams. The second neutron radiography station is outside of the main cell and permits neutron radiography of either unirradiated or irradiated specimens without introducing them into the contaminated main cell.

Other HFEF features include: a computer system for data acquisition and in-cell process control; a micro-densitometer that supports neutron tomography (A process similar to medical CAT scanning); and facilities for decontaminating and repairing hot cell equipment and manipulators.
