



# ORNL's Nuclear Facilities: Making Innovation Possible

Oak Ridge National Laboratory (ORNL) has a mission to produce isotopes and develop nuclear fuels and other new materials—work enabled by the Laboratory's unique complex of nuclear facilities. The diverse R&D undertaken at ORNL requires hot and cold laboratories, gloveboxes, high bays, and heavily shielded hot cells, with an array of specialized equipment.

ORNL has highly trained workers to staff and maintain these facilities, keeping science happening around the clock. Without these support systems, the world-changing research performed by ORNL and its collaborators would be impossible.

## Research Thrusts

- Advanced manufacturing techniques in a nuclear environment
- Examination of advanced nuclear fuel forms after they have been irradiated
- Characterization of the properties of irradiated materials
- Continuous improvements to nuclear fuel waste forms
- Nuclear nonproliferation science to keep our nation safe
- Isotope production for applications in research, energy, national security, medicine, and industry

### Actinium-227

Produced by ORNL in the Radioisotope Development Laboratory for Bayer's Xofigo cancer drug

### 250+

Stable isotopes distributed by ORNL in quality-controlled batches

### 1950

Year of construction of the Irradiated Material Examination and Testing facility; with multiple upgrades, it's still in use today

"Sometimes when you're a researcher, you do a lot of theoretical work—you do a calculation, and that's where it stops. It's really exciting to see the work you do actually makes something physical that you can see. We occasionally get letters from people overseas and elsewhere thanking us for supplying these materials to them. It makes you happy to be able to enable other people's work."

—Radioisotope Science and Technology  
Division Director **Susan Hogle**



# ORNL's Nuclear Facilities

**Radiochemical Engineering Development Center (REDC)**—The largest hot cell facility at ORNL, REDC has 15 hot cells where scientists can safely handle radioactive materials for processing, testing, recovery, and purification. In its unique laboratory spaces, experts work with some of the most exotic and rare materials on Earth using specialized equipment and systems to produce unique radioisotopes. These radioisotopes include berkelium-249, which enabled the discovery of tennessine, element 117, and could help further expand the periodic table.

**Irradiated Material Examination and Testing (IMET) Facility**—IMET has six heavily shielded hot cells for testing the physical and mechanical properties of materials and examining materials that have undergone radiation. Sixty shielded storage walls provide space for irradiated specimens and hot equipment. IMET also has a specimen preparation lab with a hood and gloveboxes, where samples are prepared, and a tank vault room for storing and draining liquids.

**Irradiated Fuels Examination Laboratory (IFEL)**—This building allows for the safe handling of increasing levels of radiation when examining the chemical, physical, and metallurgical properties of nuclear reactor fuel elements and reactor parts. Many tasks can be completed in IFEL, including capsule disassembly, spent nuclear fuel examination and repackaging, safe testing of novel fuels, and fuel particle sorting and analysis.

**Radioisotope Development Laboratory**—This facility houses four high-level hot cells specifically for beta and gamma radiation and one hot cell specifically for alpha radiation, along with seven laboratories for handling low-level materials, and a decontamination room.

**Radiochemistry Laboratory**—This four-floor facility has laboratories, shop areas, cell ventilation ducts, and storage areas with chemical and radioactive labs throughout. The first floor has four hot cells surrounded by support laboratories and operating areas. The second floor houses the high bay area and chemical and radiochemical laboratories. Controlled storage is available in the attic, which contains exhaust stacks for several ventilation systems.

Irradiated Fuels Examination Laboratory

Radiochemical Engineering Development Center

Radiochemical Engineering Development Center

**NE Facility**  
Radioisotope Development Laboratory

Irradiated Materials Examination and Testing Laboratory

Future Radioisotope Processing Facility



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