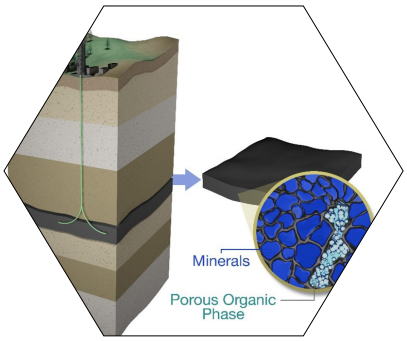
The High Flux Isotope Reactor
at Oak Ridge National Laboratory

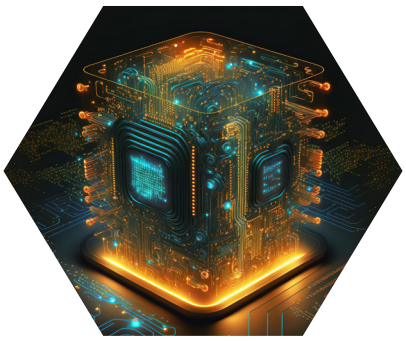
The High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory is the most powerful reactor-based source of neutrons in the United States.

HFIR is also one of the nation's top facilities for materials research and production of isotopes for energy, national security, medical applications and industrial use.

Here are just a few examples of how HFIR is making real-world impacts for energy security, healthcare and national defense:



Energy security: Chevron scientists conducted neutron experiments at HFIR to gain a better understanding of how shale nanoporosity and permeability can be used to improve hydrocarbon recovery strategies. This is particularly important because it enables increased exploration and utilization of unconventional resources that are needed to meet demand for oil and gas fuels.

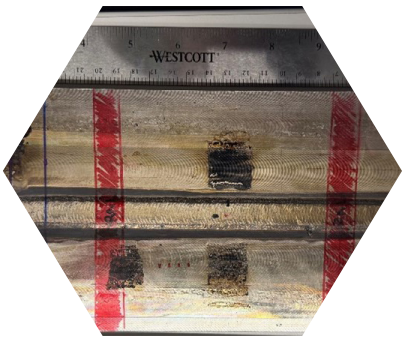


Quantum science: HFIR neutrons pass through materials easily, making them ideal probes for studying quantum materials with complex magnetic behaviors. Scientists at HFIR study the potential of quantum materials for manipulating, transferring and storing quantum information for use in practical applications, such as for quantum computers and sensors.

Energy competitiveness: Iridium-192 plays a crucial role in performing integrity assessments of oil and gas pipelines and ensuring the quality of manufacturing processes, particularly in sectors such as shipbuilding, auto manufacturing and aerospace. It is used for industrial testing to detect structural damage to metal parts such as castings and forgings, and weld defects.

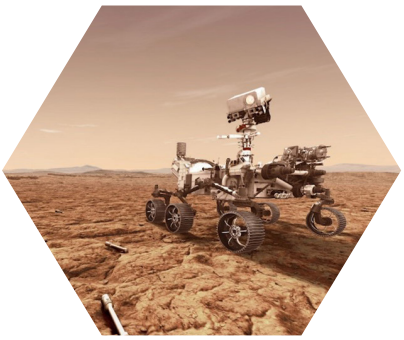
National security: HFIR is the only facility in North America that produces nickel-63, a radioisotope used in explosive detectors at airports, in narcotics detectors, and in nuclear batteries and electronic surge protectors. These capabilities are indispensable for ensuring the reliability of U.S. infrastructure and supporting national security.

Cancer treatment: Actinium-227, a medical radioisotope, is an essential FDA-approved treatment for metastasized prostate cancer, with a 30 percent reduction in the risk of death in patients. As the only near-term production site for actinium-227, HFIR contracts with Bayer to provide a reliable supply of the isotope.



Advanced materials: US Navy researchers used HFIR neutrons to non-destructively evaluate the real-time effects of welding copper-nickel alloys commonly used in submarines and other naval vessels. The results could help limit or prevent solid-state cracking, which increases the likelihood of corrosion and reduces the life of the metals.

Nuclear power: HFIR is the only source in the Western Hemisphere that produces the californium-252 isotope, an intense neutron source with a wide range of industrial applications, including starting up nuclear reactors, and for port security and energy exploration.



Space exploration: HFIR, along with the Advanced Test Reactor at Idaho National Laboratory, serves as the nation's source of new plutonium-238, a radioisotope used to fuel NASA's deep space missions and rovers. NASA's Mars Perseverance rover is powered by HFIR-produced plutonium-238 as it explores the planet's surface.

Discovering new elements: HFIR's cold-source capabilities were used in discovering element 117 in 2010. The element, officially named tennessine seven years later by the International Union of Pure and Applied Chemistry, required berkelium-249, which was available only at HFIR.