

10. Storage and Disposal

10.1 Once a shipment of foreign research reactor spent fuel arrives at INEEL or the Savannah River Site, what happens to it?

When foreign research reactor spent fuel shipments arrive at INEEL or the Savannah River Site, they enter temporary storage facilities until the spent fuel is either treated or packaged for permanent disposition in a geologic repository (when one becomes available). A geologic repository is a deep underground facility specially constructed to serve as a safe, environmentally sound, permanent disposal site for radioactive waste.

Spent nuclear fuel storage facilities use two types of storage: wet and dry. Both methods are considered to be proven technologies for temporary storage of spent fuel.

- In wet storage facilities, spent fuel assemblies are placed on metal racks in water-filled pools. The water cools the fuel and provides shielding from radiation. The metal racks keep the fuel in safe positions to avoid the possibility of a “criticality”—an uncontrolled nuclear chain reaction. Water quality is tightly controlled to prevent the fuel from degrading.
- Dry storage facilities consist of steel or concrete containers that provide shielding from radiation and isolate the radioactive materials. Spent fuel assemblies, which are stored on racks inside the containers, are cooled by the atmosphere (either inert gas or air) within the container and by natural convection. Because dry storage cools the fuel less efficiently than wet storage, fresh spent fuel requires a preliminary cool-down period before it enters dry storage. However, dry storage has substantially lower maintenance and surveillance costs than wet storage.

10.2 How will foreign research reactor spent fuel be stored at INEEL? How will it be stored at the Savannah River Site?

TRIGA spent fuel from foreign research reactors will be placed in existing dry storage at INEEL. Analysis is under way to determine what kind of treatment, if any, will be necessary to prepare the spent fuel for permanent geologic disposal.

Aluminum-based spent fuel from foreign research reactors is placed in existing wet storage at the Savannah River Site. DOE is engaged in an accelerated program at the Savannah River Site to develop cost-effective packaging or treatment (other than reprocessing) technologies to prepare the fuel for ultimate geologic disposal. After treatment or packaging, the spent fuel will go to dry storage until it is transported for disposal or additional storage elsewhere. If new packaging or treatment technologies are not ready by 2000, DOE may need to chemically separate, or reprocess, some foreign research reactor spent fuel at the Savannah River Site. The chemically separated materials would be converted to low-enriched uranium and wastes. (The process would produce no highly enriched uranium.) The wastes would be vitrified—converted to a solid glass form—or solidified at the Savannah River Site.

10.3 When will a permanent geologic repository for spent nuclear fuel be available?

DOE is evaluating Yucca Mountain, Nevada, to determine if it will be a suitable location for geologic disposal of commercial spent fuel, DOE-owned spent fuel (including spent fuel from foreign research reactors), and high-level radioactive waste. If Yucca Mountain is found suitable and the NRC grants licenses to proceed, the repository will begin taking in waste in 2010.