UTAH OFFICE OF ENERGY DEVELOPMENT

Nuclear Waste

Nuclear waste refers to radioactive materials generated as byproducts of nuclear power generation, defense programs, medical applications and scientific research. Nuclear waste is broadly categorized into two categories: high-level waste (HLW) and low-level waste (LLW).

DEFINING ENERGY

Spent Fuel

(n) Spent nuclear fuel refers to used fuel from commercial reactors that can no longer sustain a nuclear reaction economically. About 1/3 of a reactor's fuel is periodically replaced with fresh fuel.

Even after removal, spent fuel generates heat due to the radioactive decay of its elements. Though heat production decreases quickly at first, it continues for years. To protect the public and the environment, the Nuclear Regulatory Commission (NRC) regulates its handling and storage.

Advanced technologies for recycling spent nuclear fuel recover valuable materials, reduce radioactive waste, enhance energy sustainability, and minimize environmental impact.

Types of Nuclear Waste

Low Level (LLW)

LLW includes contaminated protective clothing, cleaning towels and supplies, filters, equipment and tools, medical tubes, swabs, needles and syringes and laboratory animal carcasses and tissues.

Because radioactivity levels can vary, the U.S. Nuclear Regulatory Commission has specified three classes of LLW: A, B and C, with class A having the lowest radioactivity and C having the highest.

High Level (HLW)

HLW is the most radioactive waste, primarily consisting of spent nuclear fuel and reprocessing byproducts. It emits intense radiation and heat, requiring cooling and heavy shielding during storage.

Spent nuclear fuel is reactor fuel that is no longer efficient for electricity generation due to a reduced fission rate. Because of the fuel's high radioactivity, the NRC has stringent standards in handling and storing HLW.

Nuclear power is the only large-scale energy source that manages all of its waste and includes the full cost of waste management in the price of its electricity.

HISTORY HIGHLIGHT

In 1957, the National Academy of Sciences recommended geologic disposal as the best method for managing nuclear waste, highlighting salt deposits for their stability and low permeability. This pivotal report influenced global policies, shaping projects like the Waste Isolation Pilot Plant (WIPP) and informing U.S. legislation such as the Nuclear Waste Policy Act of 1982.