A HISTORICAL REVIEW OF THE SAFE TRANSPORT OF SPENT NUCLEAR FUEL

Shipments of spent or used nuclear fuel have occurred in the United States and abroad for more than 65 years without any injury or loss of life caused by the radioactive nature of the material transported.

Background

There is extensive experience worldwide in transporting used nuclear fuel (UNF)[1] safely. This experience can inform the U.S. Department of Energy's (DOE's) planning for a large-scale transportation system that will transport commercial UNF and other radioactive materials to future Federal UNF staging facilities. DOE reviewed worldwide records of UNF and high-level radioactive waste shipments made via trucks, trains, aircraft, and ships between 1957 and 2021. The review showed that all reported shipments were undertaken without any injury or loss of life caused by the radioactive nature of the material transported.

Thousands of Tons Shipped Safely Worldwide

Within the United States, over 6,000 tons of UNF have been safely transported between nuclear power plants, research reactors, nuclear research facilities, Naval facilities, reprocessing plants, and interim storage facilities. Over 4,000 strong and secure packages (called "casks") containing UNF have been transported in the United States since 1957.

In the rest of the world, over 84,000 tons of UNF have been safely transported from nuclear power plants to reprocessing plants and storage facilities since 1962. Based on available records, more than 21,000 casks containing UNF have been safely transported by over a dozen other countries, but likely more than 40,000 casks have been safely moved over roads, rails, inland waterways, and oceans. UNF has even been transported safely by airplane!

Strong Containers and Low Risk

DOE found only one serious accident in the United States involving a loaded UNF cask. During a shipment in 1971, a truck overturned following a head-on road collision and the cask separated from the trailer. The cask was only superficially damaged; it succeeded in containing all the radioactive material. Furthermore, the UNF element inside the cask was undamaged – a testament to the cask's resiliency.

As computational analysis methods have improved, estimated risks of transporting UNF have decreased. Radiological risks of transporting UNF are deemed low compared to other risks during shipping. The collective dose received by the public from shipments is smaller than naturally occurring background doses. For more information on the history of transporting UNF, see the full DOE report, "A Historical Review of the Safe Transport of Spent Nuclear Fuel."

Used nuclear fuel is moved between railcars and a ship specially built for this cargo at Barrow-in-Furness, England. Photo credit: Ron Pope

[1] The term "used nuclear fuel" is intended to be synonymous with the term "spent nuclear fuel" as used and defined in the Nuclear Waste Policy Act of 1982, as amended, and the Standard Contract for the Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961).