



Packaging and Transportation Safeguards for Shipment of Liquid Low-Level Radioactive Waste

Summary

DOE and the commercial industry have extensive experience in safely transporting liquid low-level radioactive waste (LLW) in accordance with stringent requirements established by the Department of Transportation and the Nuclear Regulatory Commission.

Within the next 12 months, DOE intends to initiate the shipment of a small quantity (up to 8 gallons) from the up to 10,000 gallons of Savannah River Site Defense Waste Processing Facility (DWPF) recycle wastewater to the Waste Control Specialists LLC (WCS) Federal Waste Facility for treatment and disposal in accordance with the facility's waste acceptance criteria, license conditions, environmental permits, and all other applicable requirements.

Liquid LLW Shipments Would Meet Stringent Regulatory Requirements and Safeguards

The transportation of radioactive waste and other hazardous materials is highly regulated and compliance with applicable requirements is rigorously monitored and enforced. If implemented, the estimated one to three shipments (corresponding to the up to 8 gallons) of liquid DWPF recycle wastewater to WCS would meet existing regulations including:

- Department of Transportation [49 CFR Part 173, Subpart I](#), *Class 7 (Radioactive Materials)*, and other applicable Department of Transportation requirements.
- Nuclear Regulatory Commission [10 CFR Part 71](#), *Packaging and Transportation of Radioactive Material*; and
- Internal DOE requirements including [DOE Order 460.1D](#), *Hazardous Materials Packaging and Transportation Safety*, and [DOE Order 460.2A](#), *Departmental Materials Transportation and Packaging Management*.

These requirements ensure that liquid LLW and other hazardous materials are safely and responsibly transported.

- **Packaging** – Liquid DWPF recycle wastewater shipments would be packaged to protect workers, the public, and the environment during transport. Selection of the appropriate package would be based on the level and form of radioactivity (e.g., Industrial Package-2, Type A, or Type B).¹ Shipment of radioactive liquids requires more durable packaging than used for radiological solids. For example, Type A packages for liquids must pass stringent tests including a free-drop test from a height of at least 30 feet and a penetration test from a distance of at least 5.5 feet, and include an absorbent material or secondary containment in the event the primary containment leaks ([49 CFR 173.412](#)). Type B packages are used to transport higher radioactive material and, therefore, are subject to even more stringent requirements than a Type A package so as to withstand severe accidents.
- **Route Selection** – The one to three shipments of DWPF recycle wastewater would be made by truck. Vehicle and loads would be inspected by DOE and State inspectors (where required) before shipment. The shipments would use the most direct routes to the commercial treatment

¹ A summary of the packaging types can be found at: <https://www.nrc.gov/docs/ML1124/ML11245A184.pdf>

and/or disposal facility, bypassing heavily populated areas when possible to minimize radiological risk, as prescribed by [49 CFR 397.101](#). The regulations attempt to minimize potential hazards by avoiding populous areas and minimizing travel times.

- **Other Safeguards** – A number of other required safeguards would be applied to liquid DWPF recycle wastewater shipments, including practices to ensure shipments use of high-quality carriers and drivers; inspections of shipments to ensure vehicle roadworthiness and integrity of containers loaded on vehicles; hazard communication such as hazard labeling, vehicle placarding, shipping manifests; and other controls as described in 49 CFR Part 173, Subpart I and [DOE Manual 460.2-1A](#), *Radioactive Material Transportation Practices Manual*.

DOE's Exemplary Safety Record in Shipping Hazardous Materials including Liquid LLW

Safety is DOE's highest priority and this commitment to safety is integrated into all activities and requirements, including the transportation of hazardous materials. Annually, about three million radioactive materials packages are shipped in the United States by highway, rail, air, and water. Since fiscal year 2004, DOE's Office of Environmental Management has completed over 184,000 shipments of radioactive material and waste, including liquid LLW shipments to commercial treatment facilities.² Examples of liquid radioactive waste shipments include:

- In 2017, DOE's West Valley Demonstration Project in New York shipped approximately 1,000 gallons of liquid LLW by truck to a permitted/licensed commercial facility in Andrews County, Texas, for treatment and disposal.
- In 2012, DOE's Portsmouth Gaseous Diffusion Plant in Ohio shipped approximately 4,700 gallons of radiologically contaminated aqueous hydrogen fluoride by truck to a permitted/licensed commercial facility in Andrews County, Texas, for treatment and disposal as LLW.
- During the past decade, the Separations Process Research Unit in New York shipped approximately 150,000 gallons of liquid LLW by truck to a permitted/licensed commercial treatment facility in Richland, Washington, for treatment.
- The successful completion of DOE's Rocky Flats site in Colorado in 2005 was facilitated by more than 1.5 million gallons of liquid radioactive waste shipments to a permitted/licensed commercial treatment and disposal facility in Clive, Utah.

DOE has existing basic ordering agreements with a variety of commercial companies that are permitted and licensed to treat liquid radioactive waste using a variety of technologies including stabilization. These basic ordering agreements can be found at: <https://www.emcbc.doe.gov/About/PrimeContracts>.

² <https://www.energy.gov/em/services/waste-management/packaging-and-transportation>