



INTERNATIONAL
NUCLEAR SERVICES

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Safely Transporting Highly Active Waste

World-leading capability
It's in our heritage.



PREPARING THE WASTE

HIGHLY ACTIVE WASTE (HAW) OCCURS INITIALLY IN A LIQUID FORM AS A RESULT OF REPROCESSING USED NUCLEAR FUEL. IT IS SUBSEQUENTLY CHANGED INTO A SOLID GLASS FORM IN A PROCESS CALLED VITRIFICATION, WHICH MAKES IT SUITABLE FOR LONG TERM STORAGE AND ALSO TRANSPORTING.

The liquid waste is concentrated through evaporation to a point where it is dried into granules. These granules are combined with molten glass, to form an homogenous mix that is poured into stainless steel canisters, left to cool and solidify.

The result is a solid glass block of vitrified waste, which is impermeable and immobile, sealed within a strong stainless steel canister that is suitable for storage, or for transferring to a shielded flask for transporting.



- We design complete end-to-end transport solutions, including engineering bespoke transport packages to meet your needs
- We bring to you the benefits of our expert ongoing contribution to IAEA regulations to ensure your transport is efficient and compliant
- Working with INS gives you access to 40 years of transport experience coupled with the latest operational insight

SAFELY PACKAGING WASTE

Nuclear materials are transported in flasks, often called packages, which protect employees, the public and the environment in normal transport conditions and also in the event of a severe accident.

This ensures high levels of safety whatever mode of transport is used. Many shipments of nuclear material involve transport by a combination of different modes – road, rail, air and sea.

The standards for packages of nuclear material are set by the International Atomic Energy Agency (IAEA), which is a United Nations agency. The standards have been established by experts and national regulators from many of its 145 member countries and are systematically revised on a continual basis.

The IAEA has set standards for packages based on the different characteristics of the nuclear material being transported. Vitrified waste must be moved in “Type B” packages, which are able to withstand a series of challenging tests that demonstrate resistance to severe impact, fire and immersion.

The Type B packages used for the shipments of vitrified waste are robust structures made from 250mm thick forged steel and weigh around 100 tonnes. Each one contains up to 28 stainless steel canisters of solid vitrified waste. Each individual canister of solid vitrified waste weighs around 500 kg.

TN28 VT TRANSPORT CASK

- 20 or 28 Containers of Vitrified Residue
- (10 or 14 Tonnes) External Steel Envelope
- Integral Shock Absorber
- Shock Absorber
- Forged Steel Lid
- 2 Concentric Seals
- Aluminium Basket
- Trunnions for Handling and Tie-Down
- Forged Steel Shell
- Gamma Shielding
- Neutron Shielding
- Copper Heat Conductors
- 10-Inch Thick Walls
- Weight: 112 tonnes

SHIPPING WASTE SAFELY

Safety in depth

INS is the world's leading transporter of nuclear materials, with more than 40 years of experience and five million miles without an incident involving the release of radioactivity.

All shipments are conducted in full compliance with international laws and the ships carry all the necessary certificates and documentation to demonstrate their compliance with international regulations. The shipments are also covered by shipping and damage insurance.

The shipments are carried out in a carefully managed and well conceived manner. There are a series of independent barriers between the radioactive material and the outside environment. This system of "safety in depth" encompasses the solid vitrified waste material, the canisters that hold the vitrified waste, the special flasks in which the canisters are transported and the protection provided by the ships.

This safety system provides much greater protection than typically exists for other hazardous cargoes such as chemicals, petroleum products and liquid gases, which are shipped much more frequently. It also removes reliance on specialist emergency assistance being available from countries adjacent to shipping routes.

Because the waste is in a solid form and is characterised by both long-term stability and low solubility, the material would maintain its structural integrity in water without dispersing into the environment.



EMERGENCY ARRANGEMENTS

In line with IAEA recommendations, a fully trained and equipped team of nuclear experts is available on a 24-hour emergency standby system. In the event of an emergency, this team would be dispatched to the ship and would direct and manage all remedial operations. Regular emergency exercises are held to test these arrangements.

INS contracts with the world's most experienced international salvage experts, who have operations in all regions of the globe. They are able to respond quickly to all requests for assistance and have successfully recovered large vessels from the seabed. Special monitors on the ship would provide information about the status of the cargo to a salvage team.



