FACT SHEET

Sea Shipments of Radioactive Waste from Europe to Japan

Sea shipments of conditioned radioactive waste are an important part of the process for managing used nuclear fuel. Starting in 1969, used fuel was gradually transferred from Japanese nuclear power plants to facilities in the United Kingdom and France that specialize in the safe management of nuclear waste. Over a period of around thirty years, this used fuel was chemically processed to separate out the reusable products (97%) from the waste (3%).

Most of the material in the used fuel is recovered and can be recycled. This has conservation benefits and provides countries with improved energy security by giving them a long-term resource for generating electricity.

The separated waste is transformed into solid glass through a process called vitrification and sealed within stainless steel canisters.

This immobilizes the radioactive material by integrating it throughout a solid and stable structure. It also reduces the overall volume of material that ultimately requires disposal.

Other radioactive waste — typically the sheared metallic rods and end pieces from the used fuel — are compacted to reduce their volume by a factor of approximately five and loaded into similar stainless steel canisters.

The individual canisters of conditioned waste weigh around 500 kg and are suitable for both transportation and long-term storage. During the past twenty years, more than half of Japan's vitrified waste has been transported from Europe and is now stored in a specially engineered facility at Rokkasho-Mura.

Electrical utilities in several European countries manage their used fuel in the same way.

Pacific Grebe

QUICK FACTS

When fuel has been used in a nuclear reactor for 3–4 years it becomes less efficient at producing electricity and is replaced with fresh fuel

Many shipments of nuclear material involve transport by a combination of different modes — road, rail, air and sea. This is why the transport package is required to meet severe impact, fire and immersion standards.

Cask loading in Cherbourg, France

Rokkasho-Mura waste storage facility, Japan

PNTL pioneered standards for the maritime shipment of radioactive materials. Its ships meet the highest rating of the INF Code, which establishes international design and construction standards for vessels carrying nuclear cargoes.

There have been more than 180 sea shipments of used fuel and conditioned waste between Europe and Japan since 1969.

Vitrified waste is solid and stable and will maintain its structural integrity without dispersing into the environment if it is submerged in water. It is characterized by both long-term stability and low solubility.

Kansai Electric's Takahama Nuclear Power Plant, Japan

Focus on Nuclear Power

Nuclear power is an established means for generating baseload electricity without emitting gases that could affect the world's climate and the many species that inhabit our planet. Today, nuclear power plants generate around 11 percent of the world's electricity.

By reducing global emissions of greenhouse gases, nuclear power plants provide benefits around the world — even in countries that don't operate nuclear power stations.

The use of nuclear power continues to expand as global energy demand increases to meet the needs of expanding populations with higher standards of living, particularly in developing countries. Around two-thirds of the world's population lives in countries that already have nuclear power.

Worldwide, nuclear power saves more than 2 billion tonnes of CO_2 emissions each year.

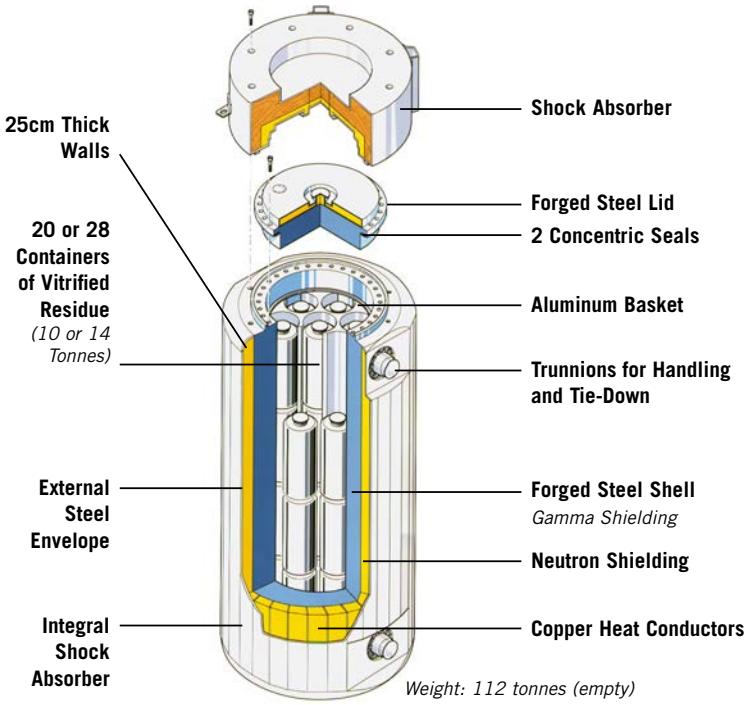
Focus on the Packages

The canisters of conditioned waste are transported inside special packages that are fixed to the holds of the ships.

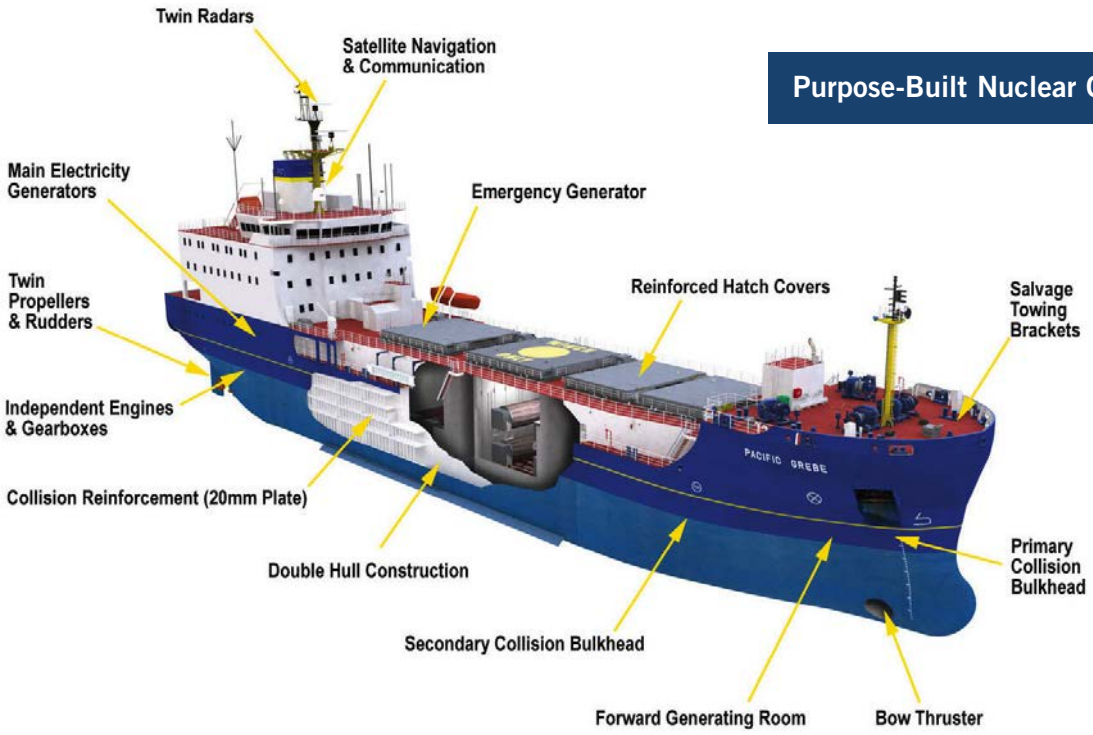
The standards for packages of nuclear material are set by the International Atomic Energy Agency (IAEA), which is a United Nations body. Vitrified and compacted waste must be moved in "Type B" packages, which are able to withstand a series of challenging tests that demonstrate resistance to severe impact, fire and immersion.

The Type B packages are robust structures made from 250mm thick forged steel and weigh around 100 tonnes. Each one contains up to 28 stainless steel canisters of conditioned waste.

TN28 VT Transport Cask



Purpose-Built Nuclear Carrier



Focus on the Ships

Conditioned radioactive waste is transported in dedicated purpose-built ships. The ships are owned and operated by Pacific Nuclear Transport Limited (PNTL), which is jointly owned by International Nuclear Services (UK), Areva (France) and Japanese nuclear companies.

PNTL is now using its second generation of purpose-built ships. They are flagged in the United Kingdom and based in Barrow, around 40 miles from the Sellafield nuclear site in the north west of England. The ships meet national and international regulations, including the requirements of the INF code of the International Maritime Organization (IMO), the United Nations agency that regulates shipping.

The PNTL ships travel to Japan non-stop and have fully trained and qualified crews. Operational equipment is checked and tested prior to each departure from Barrow.

The PNTL ships have covered more than 5 million miles.

Some of the design features include:

- Double hulls and hull reinforcing
- Enhanced buoyancy
- Dual navigation, communications, cargo monitoring and cooling systems
- Satellite navigation and tracking
- Twin engines and propellers
- Hold flooding capability
- Redundancy of electrical power generation

FOR FURTHER INFORMATION VISIT:

www.pntl.co.uk | www.innuserv.com | www.areva.com

INTERNATIONAL NUCLEAR SERVICES

International Nuclear Services Ltd.
Hinton House, Risley
Warrington, Cheshire
WA3 6GR, UK

AREVA

Tour AREVA
1 Place Jean Millier
92400 – COURBEVOIE
France

ORC

Overseas Reprocessing Committee
11F Hibiya-daibiru Building
2-2 Uchisaiwai-cho 1-chome
Chiyoda-ku
Tokyo 100, Japan

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