

Pioneering Maritime Standards

PACIFIC NUCLEAR TRANSPORT LIMITED (PNTL) IS THE WORLD'S MOST EXPERIENCED SHIPPER OF NUCLEAR CARGOES



Its ships are dedicated to the transportation of nuclear material that is classified by the International Maritime Organization (IMO) of the United Nations at its highest level of "Class INF 3". The "INF Code" regulates shipments by sea of used (spent) fuel, plutonium and highly radioactive waste.

PNTL has successfully completed more than 180 shipments over nearly forty years, including:

- Used commercial nuclear fuel from Japan to Europe
- Vitrified high-level waste (HLW) from Europe to Japan
- Mixed oxide (MOX) fuel from the UK and France to Japan, and from France to the United States
- Research reactor (Materials Test Reactor) used fuel from Japan to the United States
- Plutonium dioxide from the United States to Europe

In each case, the nuclear material is shipped in specially designed packages. The ships have safely covered more than 5 million miles and there has never been a single incident resulting in the release of radioactivity. Over 2,000 casks of nuclear material have been safely transported by PNTL.

PNTL is owned by International Nuclear Services Ltd., AREVA and Japanese nuclear companies. PNTL operates as a subsidiary company of International Nuclear Services Ltd, which is owned by the UK's Nuclear Decommissioning Authority (NDA). The PNTL fleet is managed by Serco Limited.

PNTL Quick Facts	
Established	29 September 1975
Home port	Barrow, England (UK flag)
Operational ships	3 'INF 3' vessels: - Pacific Heron (2008) - Pacific Egret (2010) - Pacific Grebe (2010)
Number of completed shipments	More than 180
Average crew radiation dose	0.08 millisieverts per year (mSv/yr)*

*Natural background radiation varies significantly from place to place. The world average dose received by individuals is 2.4 mSv/yr. Type of occupation can also influence radiation doses. Typical figures for occupations are 1.0 mSv/yr for a nuclear worker and 2.0 mSv/yr for an airline pilot.

Ship crews receive lower natural radiation doses while at sea than people living on land because they are not exposed to ground-borne radiation and are exposed to less cosmic radiation at sea level.

Design Features

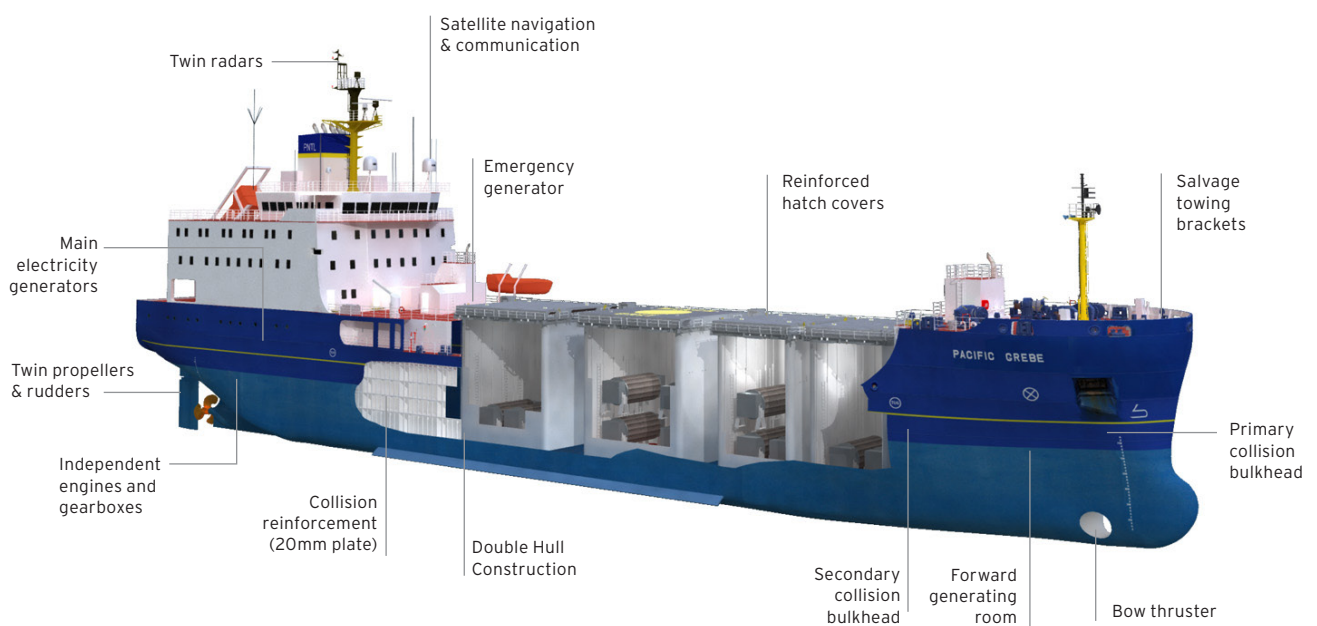
The PNTL ships have been designed to provide a safe and reliable shipping service, with the cargo compartments protected by a double hull configuration and duplication and separation of all essential systems. This means that if any important system fails during a voyage, there is always a back-up ready to be brought into operation. PNTL operated the first generation of ships from 1979 to 2010. They were designed after wide consultation with Lloyds of London, The Salvage Association and leading salvage companies. The second generation design builds on the successful operation of these vessels.

The PNTL ships have a series of specific design features to ensure their reliability:

- Double hulls and hull reinforcement to withstand collision damage
- Enhanced buoyancy to ensure the ship will continue to float even in extreme circumstances
- Dual navigation, communications, cargo monitoring and cooling systems
- Satellite navigation and tracking
- Twin engines, rudders and propellers
- Additional firefighting equipment, including a hold flooding system and spare electrical generators

In addition to manual radiation monitoring, there are fixed radiation monitors for each hold that are linked to an alert system on the bridge.

The PNTL ships are equipped with a satellite weather routing system and also use professional shore-based maritime services that provide up to the minute local meteorological data. These enable the ships to follow the safest routes and avoid severe weather patterns.



INF3 Vessel



The PNTL Fleet

The Pacific Grebe transports used nuclear fuel and HLW, travelling principally between Europe and Japan. The Pacific Heron and Pacific Egret have additional security features that enable them to transport MOX fuel and plutonium dioxide. For mutual protection, these vessels travel together, each escorting the other. They are fitted with fixed naval guns and have other additional physical protection systems, only some of which are visible.

Regulations and Certification

The original PNTL ship design formed the basis of the INF Code that was established by the IMO in 1993 and became mandatory in January 2001. PNTL operated to the INF standards twenty years before they were introduced as an IMO requirement.

PNTL was the first UK shipping company to receive international environmental accreditation. The company's operations are underpinned by Lloyd's Register's independent third party certification, covering Quality Systems (ISO 9001:2008) and Environmental Management Systems (ISO 14001).

Each ship undergoes regular maintenance inspections and operational equipment is checked and tested prior to each voyage from the home port of Barrow.

All voyages 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. PNTL shipments are also covered by shipping and damage insurance.

Manpower

PNTL has fully trained and experienced crews. Each senior officer is qualified to perform the duties of his immediate superior. For example, the Chief Officer (second in command) on each PNTL ship holds a Master's Certificate. All personnel are actively encouraged to enhance their skills and qualification and to take relevant training courses.

For shipments of MOX fuel and plutonium, armed officers of the United Kingdom Civil Nuclear Constabulary (CNC) provide on-board protection from departure to arrival. CNC officers are specially trained to protect nuclear facilities and materials.

Safety In Depth

All PNTL 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 material being transported (such as solid vitrified waste), canisters or fuel rods, special packages in which the canisters or fuel are transported, and the protection provided by the ships with their reinforced double hulls.

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.

PNTL ships are routed away from areas of international instability and do not travel through seas that are considered vulnerable to acts of piracy.

Contingency Arrangements

While at sea, PNTL ships maintain a communications link with a report centre that is manned 24 hours a day. This voyage monitoring system reports the vessel's latitude and longitude, speed and heading every two hours. It is backed up with secondary systems such as email and satellite and radio telephones.

In line with International Atomic Energy Agency (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.

PNTL contracts with the world's most experienced international salvage experts, Smit International, 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. Each PNTL ship has a sonar location system capable of operating in several thousands of metres of water. Special monitors in the holds are able to provide information to a salvage team about the position of the ship, its depth and the status of the cargo.

Second Generation PNTL INF3 Vessel

Length	104 meters
Beam (width)	17 meters
Deadweight	4,916 tonnes
Displacement	9,667 tonnes
Engine	2 Diesel engines, each with 3,600 hp
Maximum Cargo Capacity	20 casks



Pacific Heron



Pacific Egret



Pacific Grebe

Several emergency training exercises are held each year to test the company's overall response activities, the communication system, the expertise of team members and the ships' crews and the performance of equipment.

Public Information

PNTL's operations are discussed with local community leaders and members of the public at regular meetings of the Ramsden Dock Terminal Stakeholder Group (RDTSG) in Barrow. The Committee comprises representatives from Barrow Borough Council, Cumbria County Council, the local emergency services and PNTL staff.

Reliability

With an established record of reliability and a special focus on safety, PNTL has earned a reputation for utmost dependability and for having ships that are among the safest on the seas today.

PNTL continues to show the way by applying industry-leading standards for safety and design.

PNTL Ship Regulatory Requirements

- Certified by UK Department of Transportation as meeting IMO INF3
- Class A carrier under UK Nuclear Industry Security Regulations
- Japanese Ministry of Transport regulation KAISA 520
- IAEA Regulations for the Safe Transport of Radioactive Material
- IAEA Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material
- Convention on the Physical Protection of Nuclear Material
- IAEA INFCIRC/225/rev.5 security requirements
- IMO SOLAS (International Convention for the Safety of Life at Sea)
- IMO MARPOL (International Convention for the Prevention of Pollution from Ships)
- IMO IMDG Code (International Maritime Dangerous Goods)
- IMO INF Code (International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board Ships)
- IMO ISM Code (International Safety Management)
- UNCLOS (United Nations Convention on the Law of the Sea)
- IMO ISPS Code (International Ship and Port Facility Security)



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