

Recycling Nuclear Steam Generators from Bruce Power Defense

1. View this video to get an overview of the situation.
 - <http://rightthingtodo.ca/video.php>
2. Information about the safety and procedures put in place to transport the radioactive material to its destination. All the information can be found at <http://rightthingtodo.ca/transportation.php>.

Overview



The blue line shows the route across the Atlantic Ocean to the facility in Sweden. Inset: Road transport to the Public Port of Owen Sound.

Bruce Power has created a Transportation Plan to ensure the safe and efficient transport of 16 steam generators from Canada to Sweden. Our plan has been reviewed by a number of experts and will be approved by the Canadian Nuclear Safety Commission (CNSC) before a license is granted.

Bruce Power's Transportation Plan consists of the following steps:

1. Road Transportation of each of the steam generators by truck and trailer from the Bruce Power site to the Public Port of Owen Sound.
2. On arrival at Owen Sound, each steam generator will be loaded directly onto the ship. Loading is expected to take three to four weeks.
3. Once all 16 steam generators are loaded, the ship will travel the Great Lakes (including Lake Huron, Lake Erie and Lake Ontario), the St. Lawrence Seaway (including the Welland Canal) and the St. Lawrence River to the Atlantic Ocean.
4. On arriving at Studsvik's harbour in Sweden the steam generators will be offloaded and moved into the recycling facility for processing.
5. The 10% of the steam generator material that cannot be recycled will be returned to Canada as low level waste using the established road and marine transportation network.

Ship Transportation

The key consideration is safe and efficient transport in open water and through the locks of the St. Lawrence Seaway. This includes four important decisions:

1. Selection of a well maintained ship.
2. Ensuring the crew is well trained and proficient in handling nuclear materials.
3. Continually monitoring progress of the ship and cargo from its departure from Owen Sound to arrival in Sweden.
4. Ensuring that there is an emergency response plan that can be implemented in the unlikely event of an accident.

The ship will travel through Lake Huron, Lake Erie and Lake Ontario. While in the Great Lakes the ship will follow established safe shipping routes that may take it through U.S. waters. This will make it necessary to obtain a permit from the U.S. authorities.

While travelling the St. Lawrence Seaway, including the Welland Canal, the ship must comply with the **Seaway Handbook** (pdf) which identifies the requirements of the St. Lawrence Seaway Management Corporation (in Canada) and the Saint Lawrence Development Corporation (in the United States).

Upon leaving Canadian waters the ship will travel across the Atlantic Ocean and continue to Sweden where it will dock directly into a harbour that is owned by Swedish recycling company Studsvik.



The ship used will be the MV Palessa or one of its sister ships designed to transport heavy cargo. These ships, built around the year 2000, are 118 metres long and can transport up to 7,000 tonnes of cargo.

These ships are equipped with self-contained craning system that allow large items of cargo to be safely loaded and unloaded. The steam generators will be carried in the hold of the ship.

The specially dedicated ship will have a radiation safety officer on board at all times. In addition, the ship has its own radiation protection plan and emergency response plan.

The trip from Owen Sound to Sweden will take approximately three weeks.

SHIPPING SAFETY GUIDELINES

Bruce Power's steam generator recycling plan satisfies a comprehensive set of Canadian and international regulations and guidelines. In addition to meeting the requirements of the CNSC and the International Maritime Organization, the transport by ship to Sweden will comply with requirements set out by Canadian and U.S. authorities for the St. Lawrence Seaway. Compliance with other national requirements is necessary if the ship travels through other national waters. Approval from the U.S. and Swedish authorities is identified below along with the requirements of the country where the ship is registered.

Details

Steam generators will travel by dedicated ship between Owen Sound and Sweden. Bruce Power's transportation plan meets or exceeds all requirements for transporting nuclear substances in Canadian and international waters. This is achieved by the following decisions:

The transport system has been designed to meet the much more stringent requirements for marine transport of Irradiated Nuclear Fuel (high level radioactive waste)

The ship will operate under "exclusive use" provisions. No other cargo will be on board. There is no possible access by members of the public and no potential for affecting any other cargo.

All 16 steam generators will travel in a closed cargo hold covered by a steel double deck

Transport cradles will be welded to the floor of the cargo hold

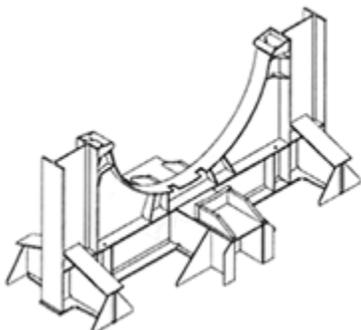
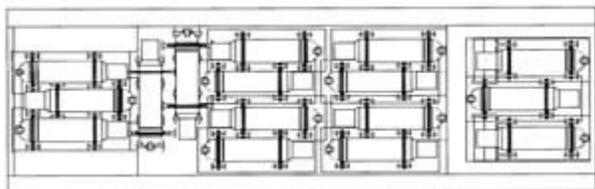
Ship will be loaded to approximately 25% of its capacity

The ship's crew are specifically trained in the handling requirements for this type of radioactive material and are managed under an approved Radiation Control Program. A radiation safety officer will be on board at all times

An emergency response plan will be in place

SHIPPING SAFETY MEASURES

All 16 steam generators will be arranged in the ship's cargo hold (below) by welding the transport cradles (bottom) to the cargo hold floor (photo above).



The ship will transport 16 steam generators in a single trip between Owen Sound and Sweden. Bruce Power has carefully planned all aspects of ship transportation to ensure it is safe and meets or exceeds all regulations. See Meeting the Standard.

The specific steps taken to ensure a safe journey are as follows:

1. The proposed ship (pdf) is a modern, well maintained vessel with crew experienced in safely handling large cargo items and transporting radioactive material around the world.
2. The proposed ship has a maximum draft of 7.25 metres when fully loaded and complies with the maximum draft permitted in the St. Lawrence Seaway. This includes the Seaway draft requirement, and the main channels between the Port of Montreal and Lake Erie which have a controlling depth of 8.23 metres. The ship also has the flexibility of reducing its draft if required by low water conditions.
3. No other cargo will be loaded on the ship. There is no possibility of any interaction between the steam generators and other materials in the cargo hold of the ship.
4. The steam generators will be transported inside the closed cargo hold of the ship. They will be secured to transport cradles with wire ropes, turnbuckles and welds. Further, to ensure that they are secure throughout the trip, the transport cradles themselves will be welded to the floor of the cargo hold.
5. The steel hull of the ship and cargo hold, including steel double deck, provides sufficient shielding so that there will be no radiation detectable to anyone on the outside of the ship. See Radiation Protection.
6. Qualified radiation protection staff and monitoring equipment will accompany the shipment.

PLANS FOR THE UNLIKELY EVENT OF AN ACCIDENT

An emergency response plan has been developed to ensure a planned response in the unlikely event of an accident. The shipboard emergency plan has been approved by the ship's flag state, the Department of Marine Services and Merchant Shipping Antigua and Barbuda, West Indies as meeting the requirements of the International Maritime Organization

| Description | Conclusion |
|--|--|
| Motor vehicle accident during road transport from Bruce Power site to Owen Sound | A motor vehicle accident will not result in a breach of the heavy steel outer shell of the steam generator and release of radioactivity. |
| Dropping steam generator during loading at the Public Port of Owen Sound | A portion of the radioactivity could be released if the steam generator shell is breached. However, it could be safely contained so that there is no impact on members of the public or the environment. |
| Sinking of ship during transit of St. Lawrence Seaway (shallow water) | The steam generators will sink but would remain intact without the release of any radioactivity |
| Sinking of ship in deep water | In this case the cover plates on the steam generator shell may fail allowing water to enter the steam generator. |