

This factsheet explains the different types of transport that may be required in the Submarine Dismantling Project (SDP) and how transport will be managed safely.

## Introduction

The activities involved in the Submarine Dismantling Project may take place at different sites, and various materials will have to be transported. Submarines may need to be transported from a current storage site to a site where the radioactive materials are removed (the initial dismantling site). The submarine hulls will then be moved to a ship recycling facility. The radioactive waste removed from the submarines will also need to be transported for disposal and/or storage. Each of these stages is described in more detail overleaf.

Radioactive waste is transported regularly in the UK by road, rail or sea. UK legislation sets strict requirements for the safe transport of these materials and the Submarine Dismantling Project will be closely regulated to ensure it complies with these requirements.

## Transport of defuelled submarines

Out-of service submarines are currently stored afloat at Devonport (England) and at Rosyth (Scotland). If initial dismantling is done at both sites, the submarines will be dismantled at the site where they are stored.

If just one of these sites is selected, however, defuelled submarines will need to be transported from one site to the other. In this case, the transport options are to tow, move

by barge or use a heavy lift ship (see illustration below) but further work will be done to determine the most appropriate method.

The MOD's Salvage and Marine Operations team provides salvage, recovery, and transport assistance to Royal Navy vessels, and would assist with the design of SDP transport arrangements. The team members are internationally-recognised experts in their field and have helped other countries move out-of-service nuclear submarines. Transportation of defuelled submarines will be regulated by the Defence Nuclear Safety Regulator.

## Transport of submarine hulls

After the radioactive materials have been removed (the initial dismantling activity), each submarine will be transported by sea to a ship recycling facility with the necessary environmental permits. The transport options are similar to those for the transport of defuelled submarines (above). If the option of separating Reactor Compartments is selected, however, it is unlikely that the remaining front and rear sections of the hull could be towed, so the transport options would be limited to barge or heavy lift ship.

Transport of submarine hulls will be regulated by the Maritime and Coastguard Agency and the Department for Transport (DfT).

## Transport of Low Level Waste (LLW) for disposal

There is a UK strategy for disposing of LLW, with which the SDP will comply. LLW has been transported regularly for many years by both road and rail in standard, approved containers, mainly to the UK LLW Repository in Cumbria.

Transportation of LLW is regulated by the DfT.

The SDP will dispose of LLW using these well-established approaches. We expect that initial dismantling of a typical Trafalgar class submarine, for example, will generate about 175 tonnes of LLW, which would be transported in a number of separate consignments.



Illustration of heavy lift ship transport



## Transport of Intermediate Level Waste (ILW) for storage and disposal

If the initial dismantling and ILW storage sites are different, the ILW removed from the submarines will need to be transported. The project will also be responsible for transporting the ILW from the storage facility to the proposed Geological Disposal Facility when it is available to receive waste from SDP.

There are strict regulations for the packages that hold ILW when it is being transported, including the types of package allowed and how much radioactivity they can contain. ILW packages must be designed and rigorously tested to demonstrate resilience to fire and impact in the event of a transport accident.

The method and frequency of the transport of ILW that has been removed from the submarines will depend on a number of factors, including the location of the storage site and method of initial dismantling, as explained below.

### Separate and store the whole Reactor Compartment (RC)

- If initial dismantling takes place at two sites, RCs will need to be moved to the storage site. Intact RCs are large (around 10m diameter) and very heavy (around 700 tonnes), and could only be transported by sea. Once they were sealed to make them watertight, no additional packaging or shielding would be needed. RCs are currently transported in the USA, Russia and France. Since it is predicted that around one submarine will be dismantled per year, it is estimated that one RC would be moved per year in this option

### Remove and store the Reactor Pressure Vessel (RPV)

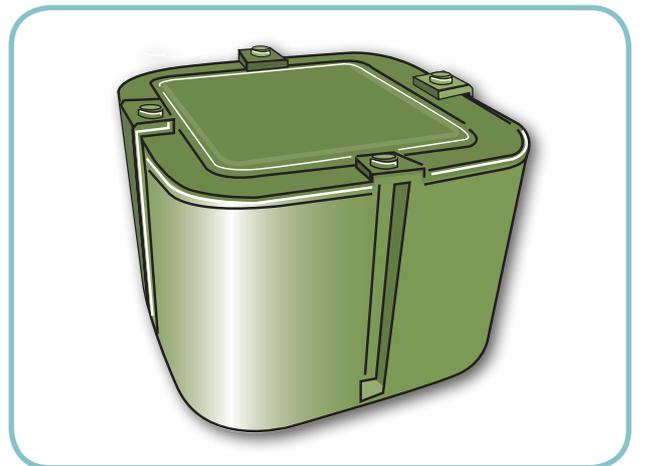
- RPVs can be moved by road or rail. RPVs from civil nuclear power reactors are already moved in other countries and these are much larger than those from submarines. A customised, approved transport package would be required. It is estimated that one RPV a year would be moved in this option.

### Remove and size reduce the RPV for storage as Packaged Waste

- Packaged ILW is already transported regularly in the UK and abroad. There are standard pre-approved packages (pictured) that are used for road or rail transport. If this dismantling method is chosen, it is estimated that around 6 packages of waste per year would be moved in this option.



Examples of RPV Transport



Illustrative example of Packaged Waste Container for Transport