

RPV Storage

The Submarine Dismantling Project (SDP) is the MOD's programme to deliver a safe, secure and environmentally responsible solution for dismantling 27 defuelled submarines. This involves recycling the bulk of the submarine and safely disposing of the remainder. The submarine's Reactor Pressure Vessel (RPV) contains Intermediate Level radioactive Waste (ILW) and must be stored for an interim period until it can be processed and sent to a proposed Geological Disposal Facility (GDF) sometime after 2040.

This Topic Summary provides information on developing concepts for RPV Storage.

Radioactive Waste Policies

The UK Government's policy for managing higher activity radioactive waste in the long-term is through geological disposal. The wastes that will be disposed of in a GDF include ILW such as the RPVs.

The process of deciding on the appropriate GDF location will take several years and construction will take several years more. Until a GDF is available, all nuclear operators - including MOD - therefore have to make arrangements for safe interim storage of ILW arising from ongoing operations and decommissioning.

Government guidance is that interim ILW waste stores - including the RPV store - should have a design life of at least 100 years.

Scottish Government policy is that higher activity radioactive waste should be managed in near-surface facilities, not a GDF. However, as the MOD retains responsibility for defence wastes the RPVs will be disposed of in a GDF as per current UK policy irrespective of where RPVs are removed from the submarines or subsequently stored.

The RPV Store

After they are removed from the submarines, the RPVs will be transported and stored in secure shielded containers. The RPVs and containers already provide a significant degree of shielding from radiation. This distinguishes them from many other types of packaged ILW where the interim storage facilities need thick walls to keep radiation levels external to the store low.

The RPV store could be of steel-framed construction with only limited additional internal shielding, in which case its main function would be to provide a weatherproof, secure environment.

Interim stores comparable to that proposed for the RPVs have been constructed or designed for nuclear sites around the country. Civil and MOD ILW is already being packaged and placed into them. The safety and environmental performance and the cost of the RPV store can therefore be estimated with greater confidence. Communities can get a general impression of what a future ILW store might look like from existing stores.

The picture below shows the store on the NDA Berkeley site but note that the appearance of the RPV store design may differ significantly.

Whatever the design, it is predicted that local members of the public will experience no measurable radiation dose from the store.

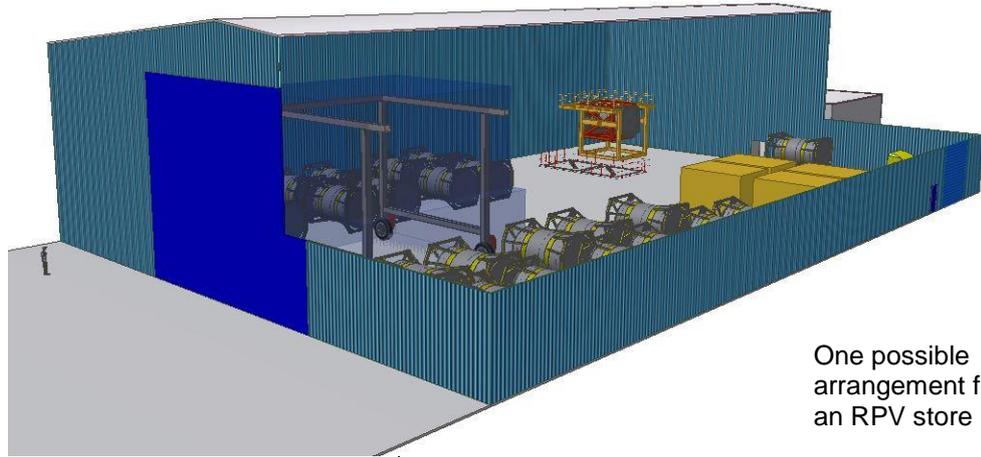
Baseline Concept

The RPV store must be large enough to take the 27 RPVs in their containers side by side with space for inspection, access and local shielding. The Baseline Concept building has a floor area of approximately 47m x 44m (around 2000m², perhaps a third of the area of a football pitch). A typical store height might be 20m to accommodate lifting operations.



NDA
radioactive
waste store at
Berkeley





One possible arrangement for an RPV store

An RPV store Baseline Concept has been developed by the project team to assist initial costing. It is not intended to constrain or prevent site operators from developing alternative or more robust site proposals. The final design may well differ significantly but the illustration above shows what the store might look like and how the RPVs might be arranged.

Shielding Requirements

Although the RPV transport containers are designed to meet the regulations for transport, it is assumed that additional shielding (not shown in the illustration above) will be required around the container so that the general access areas within the store have dose rates in line with regulations and site safety objectives. The amount of shielding would be determined based on the projected annual occupancy levels required to allow personnel access to the store to undertake container receipt, inspection and store maintenance activities.

Various options to add additional shielding to the store layout to achieve the required store dose objectives have been considered. Access inside the local shielding, where the dose rates would be higher than the general access areas, would be under managerial control with a written safe system of work.

The additional shielding could be made from a number of materials. Both steel and concrete have suitable characteristics.

Future Size Reduction

Size-reduction would involve dismantling and/or cutting up the RPVs into smaller pieces in a shielded facility before they can be sent to a GDF. After size reduction, any parts which may be LLW would be segregated for separate disposal.

Size-reduction would not take place until sometime after 2040. There will by then be other wastes from MOD and civil decommissioning activities that need to be size-reduced and there may be opportunities to work with other organisations using a shared facility. The SDP cannot, therefore, make any assumptions about the location of any RPV size-reduction at this time.

Specifically, it is not assumed that size reduction will be on the same site as the RPV store and therefore the ability to do it at the storage site has not been a factor in the SDP's analysis. Since the respective locations of the size reduction facility and GDF are not known, associated transport distances cannot yet be taken into account either.

More Information

Further information and all SDP consultation documents are available at:

<https://www.gov.uk/government/publications/submarine-dismantling-project-interim-storage-of-intermediate-level-radioactive-waste>

