Waste Handling in SVAFO's Hot Cell

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The decommissioning and dismantling of nuclear installations entails the generation of significant quantities of radioactive waste that must be accepted for disposal. In order to optimise the use of the final repositories for radioactive waste it is important that the waste be sent to the correct repository; that is, that waste containing short-lived radionuclides not be designated as long-lived due to conservative characterisation procedures. The disposal of short-lived waste in a future Swedish repository for long-lived waste will result in increased costs, due to the higher volumetric cost of the disposal as well as costs associated with decades of interim storage before disposal can occur.

SVAFO is a non-profit entity that is responsible for the decommissioning of nuclear facilities from historical research and development projects in Sweden. They provide interim storage for radioactive waste arising from research activities until the final repository for long-lived waste is available. SVAFO's offices and facilities are located on the Studsvik site on the east coast of Sweden near the town of Nyköping. Some of the retired facilities that SVAFO is in the process of decommissioning are located elsewhere in Sweden.

The HM facility is a small waste treatment plant owned and operated by SVAFO. The plant processes both liquid and solid radioactive wastes. The facility includes a hot cell equipped with a compactor, a saw and other tools as well as manipulators for the handling and packaging of waste with high dose rates. The cell is fitted with special systems for transporting waste in and passing it out in drums.

As with most hot cells there has been an accumulation of surface contamination on the walls, floor and other surfaces during decades of operation. Until recently there has been no attempt to quantify or characterize this contamination. Current practices dictate that after waste is handled in the hot cell it is conservatively designated as long-lived waste, even if the activity consists solely of short-lived nuclides such as Co-60. The subsequent disposal of the waste is thus delayed, as there is not yet a final repository for long-lived waste available. The Swedish repository for short-lived radioactive waste, SFR, has been in operation since 1988.

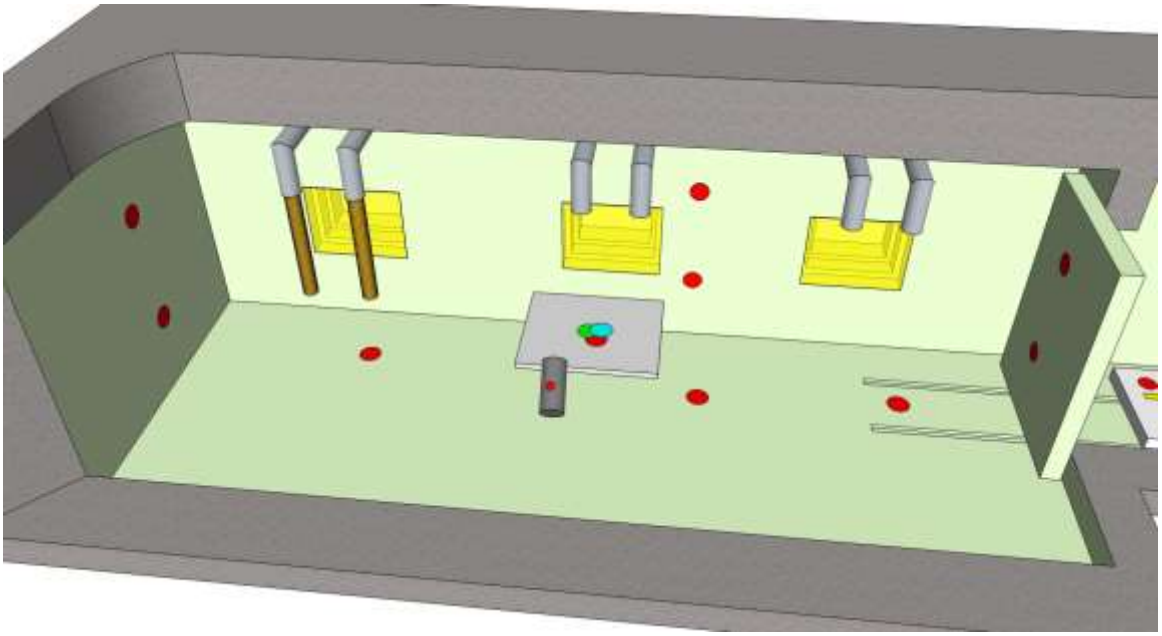

Figure 1: Schematic of SVAFO's HM hot cell with sampling locations

The question posed in the study was whether it is possible, in preparation for the dismantling of the R2 reactor and other nuclear facilities at the Studsvik site, to adequately characterize the hot cell environment with respect to radioactive contamination to allow short-lived waste brought into the hot cell to be classified as short-lived after it is passed out of the cell.

A method was developed to collect surface contamination samples inside the hot cell. These samples were analysed for various short and long-lived radionuclides. Tests were carried out to simulate typical waste handling operations inside the cell in order to determine how much contamination is transferred to objects introduced into the cell.

These results indicate that it may be possible to establish a method to justify the classification of certain waste items as short-lived, even after handling in the HM hot cell. Further analyses need to be carried out to validate the method.

It is believed that by developing a characterisation method that minimises the quantity of waste classified as long-lived, some intermediate level decommissioning wastes can be readily disposed of in the existing Swedish repository for short-lived waste, thereby reducing waste disposal costs.