

Remote Handling and Waste Containment Approach for Whiteshell Laboratories Standpipe and Bunker Legacy Waste Retrieval

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Veolia Nuclear Solutions (VNS) has been contracted by Canadian Nuclear Laboratories (CNL) to design and deliver a system to retrieve and repackage legacy waste. The waste has a variety of forms and conditions as described below and requires a flexible and robust set of remote handling devices housed within 3 major shielded containments to complete the tasks. The focus of the presentation is to highlight the remote handling, material handling and containment philosophies being used on the project for processing retrieved materials that are analogous to hot-cell design and operation. This approach is based on past experience and uses a range of remote handling devices and techniques matched to the variety of tasks in the project. The waste material fully contained remote processing design approach from retrieved waste receipt, processing and packaging will be discussed and presented.

CNL's Whiteshell facility is under decommissioning and it is necessary to remotely retrieve, characterize, condition, and repackage some legacy waste stored underground on-site using a variety of systems. The waste is stored in underground standpipes and bunkers. Standpipes are concrete pipes mounted vertically in the ground, which were capped when full. The bunkers are underground rectangular concrete bunkers with above ground roofs. The waste includes high dose rate materials, fissile materials, potentially pyrophoric materials, chemicals, and combustible gases. It must all be handled safely in a remote and contained environment. The waste being removed is in a variety of forms coming from reactor fuel experiments. It is packaged in boxes, bags, barrels and paint cans. The condition of the packages varies from intact to degrees of rupture/disintegration, all of which must be handled by the system in their current condition.

Remote Handling

Overall Approach. The Whiteshell project is challenging requiring a variety of remote handling approaches. This project is a good reference to highlight an overall remote handling approach to complex decommissioning jobs.

For the Whiteshell project the remote handling equipment must be able to handle a range of waste (Solids, Sludge, and Liquids) in a difficult environment (Cold, Rain/Snow, Wet). Operations vary from remote concrete demolition to delicate waste segregation activities.

This range of activities means that one piece of equipment is not sufficient, and a variety of devices must be used to accomplish the total scope of the project. The remote handling presentation discussion will further focus on the following topics: A. Basic Requirements for all Remote Handling. B. Manual Work. C. Semi-Remote/Manual Assisted Work. D. Lightly Modified Commercial Equipment for Heavy Work. E. Significantly Modified Commercial Equipment for Heavy Work. F. Custom Equipment for Fine Work.

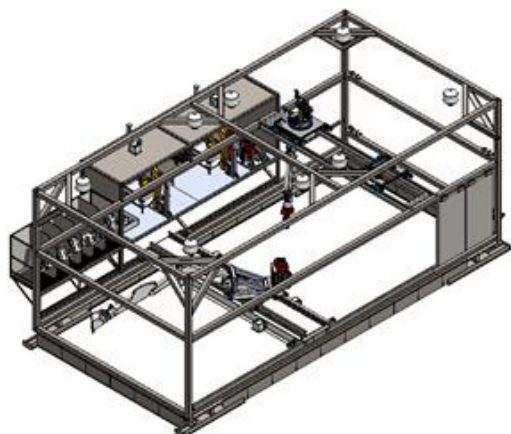


Figure 67: Bunker Remote Excavator System

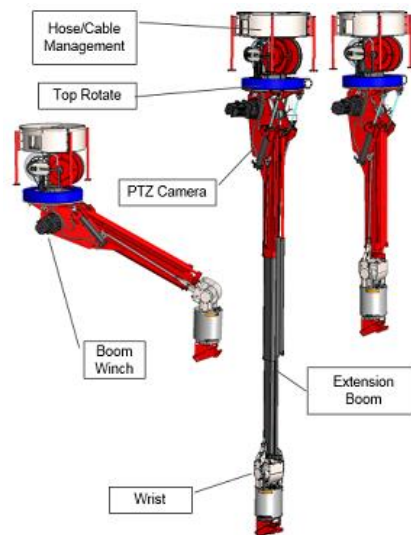


Figure 68: Long Reach Waste Retrieval Tool

Material Handling and Containment

Overall Approach. The Whiteshell project process the waste materials within three major shielded, fully remote operated, and portable, containment structures. The units are designed in accordance with and uses proven hot cell concepts and guidelines. In addition, each unit is designed and equipped for broad operational flexibility for known and also unknown and changing condition waste. The Sorting and Conditioning Unit (SCU) is used for sorting, segregating, characterizing and packaging the waste and is shown in Figure 69 below.

The material handling and containment strategy for the waste is movement of discrete waste packages using a tray-based material handling system. The trays are moved using robust and reliable conveyors that can be remotely maintained in the unlikely event of failure. The waste whether it is being moved from unit to unit, or while being processed in the final sorting unit, remain within containment and behind shielding. The Material Handling and Containment presentation discussion will further focus on the following topics: A. Contamination Containment Design. B. Waste Tray and Material Handling Equipment. C. Waste Transfer Containers. D. Waste Transfer Ports. E. Processing Equipment.

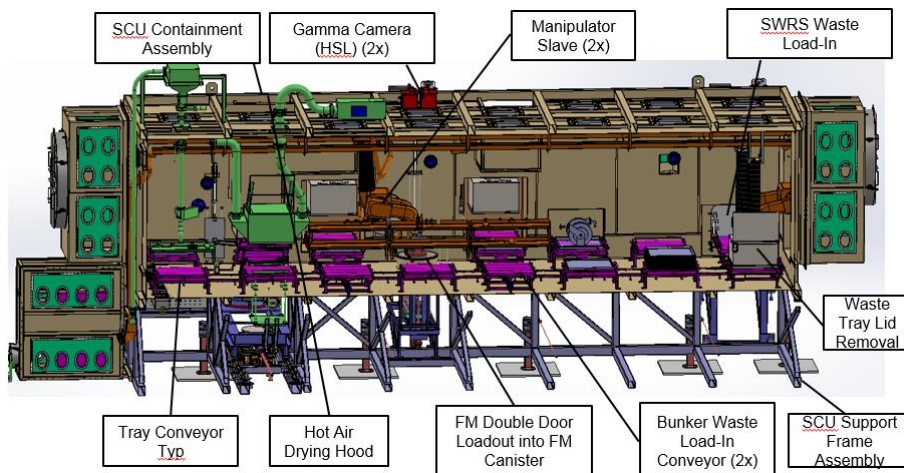


Figure 69: Sorting/Segregating/Characterizing/Packing Unit (shielding not shown).