

A Project Concept for Nuclear Fuels Storage and Transportation

Fuel Cycle Research & Development

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Planning Project
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6.7 Waste Management

Low Level Radioactive Waste (LLW) typically consists of contaminated personal protective equipment, wiping rags, mops, filters, water treatment residues, and maintenance equipment and tools. The radioactivity can range from just above background levels found in nature to very highly radioactive in certain cases such as parts from inside the reactor vessel in a nuclear power plant. Low-level waste is typically stored on-site by licensees until amounts are large enough for shipment to a low-level waste disposal site in containers approved by the Department of Transportation.

All actively operating fuel storage facilities must deal with the generation, control and storage of LLW in solid and/or liquid form as a result of normal operation or in response to accidents or emergency response. The type and volume of LLW is highly dependent on the facility mission, building construction, staff training and operating procedures.

6.7.1 Pilot Waste Management

The goal for the Pilot is to generate a relatively small volume of LLW. This includes ventilation exhaust filters, spent ion exchange resin, and other solid and liquid LLW from operations, maintenance and decontamination activities. UNF and GTCC waste will be received in welded canisters, which will not need to be opened in order to store the waste on the storage pads. The canisters will be transferred from the transport over packs (casks) to the storage over packs or modules without having to inspect or handle the individual UNF assemblies or GTCC waste. Keeping the canisters sealed avoids the potential for fuel activation products from that fuel on the outside of the fuel cladding (i.e., “crud”) or through fuel defects to make their way into the waste stream.

To minimize the generation and cost of LLW at the Pilot will require that each utility thoroughly decontaminate their canisters before loading them into transportation casks prior to shipment to Pilot. The Pilot will need to maintain strict acceptance criteria and administrative procedures to ensure that the canisters, containers, and other packages received at the site are free from contamination.

While the Pilot is expected to have low volume of LLW, the facility must still be designed to handle radioactive surveys and decontamination activities including a wash down area. This would be located within the RCA and have coatings on all exposed surfaces to minimize absorption of radiological contaminants into the building structures. There must be facilities to store all solid LLW until sufficient volume is accumulated suitable for shipping offsite to licensed disposal site. Liquid waste is not included for the Pilot because any liquid waste is assumed to be able to be filtered to very low concentrations and released from the facility or reused. Based on the reference studies, estimates for the volume of solid waste generated over the life of the Pilot range from 1,000 ft³ to 3,000 ft³.

6.7.2 Larger ISF Waste Management

The larger ISF can be operated in much the same way as the Pilot if storage of the UNF and GTCC waste is done using the as shipped canisters from the utilities. As with the Pilot, the UNF and GTCC waste will be received in welded canisters, which will not need to be opened in order to store the waste on the storage pads.

However, the larger ISF will require a means to repackage UNF and GTCC waste into a storage configuration or DPCs for storage at the ISF and/or shipment to a final repository. This would require either a storage pool and/or a hot cell facility. Transport casks will be transferred to the pool or hot cell and then will be unloaded of their individual UNF assemblies or GTCC waste and placed into the storage pool and/or hot cell to await repackaging for further disposition. The UNF assemblies will release crud into the pool water or hot cell air, making it a source of contamination. The UNF pools and/or hot cells will require cooling, reactivity management and filtration systems. The equipment supporting these