Energy and Environment

Storage of DOE High Level Radioactive Waste

For more information

Sandra Birk
(208) 526-1866
sandra.birk@inl.gov

Brett Carlsen
(208) 526-3347
brett.carlsen@inl.gov

High Level Radioactive Waste (HLW) as vitrified glass is being stored at West Valley and the Savannah River Site in HLW canisters. HLW calcine at the Idaho National Laboratory will be treated using a hot isostatic pressing (HIP) process to produce a stable waste form that will also require storage. The original design life of the HLW canisters was ~50 years, sufficient for emplacement in a geologic repository. Extending the design life for much longer periods (e.g. 200 to 300 years) will require an integrated assessment of the science behind current design bases, supplemented by monitoring of storage conditions.

The following is a summary of the quantities of HLW at the DOE sites along with the status of the HLW production and storage facilities.

West Valley

West Valley completed its production mission and stores 275 HLW canisters in the production facility. These HLW canisters must be moved to allow the process facility to be decontaminated and decommissioned. A conceptual design was issued for the storage of these HLW canisters in a commercially designed dual purpose canister (DPC) system with a planned design life of 50 years. The service life of these systems is unknown. Plans are to inspect the DPCs during service to determine if the storage period can be extended beyond 50 years. The HLW canister relocation work has been put on hold due to budget constraints.

Typical Dual Purpose Cask

Savannah River Site (SRS)

Through March 2010 SRS had produced about 2900 HLW canisters or about 45% of their expected total. These canisters are a 300 series low carbon stainless and will be stored within three Glass Waste Storage Buildings (GWSB) in individual storage tubes. Glass Waste Storage Building number three has not been built and will be sized to accommodate the upper range of the projected inventory. The original design life of each GWSB was 50 years but they are expected to last 100 years and perhaps beyond with periodic maintenance. SRS expects to complete the glass production mission in about 20 years.

SRS GWSB and Transporter

Idaho National Laboratory

U.S. DEPARTMENT OF ENERGY

Hanford

The HLW production facility is scheduled to come on line in 2018 and is expected to produce ~10,000 canisters of vitrified HLW at a rate of ~400 per year. An interim canister storage system that will hold 4,000 canisters is scheduled to be operational by FY-2017. Given the likelihood of extended storage, Hanford will need additional capacity for storing all HLW on site until the availability of a disposal system. This storage will be needed by 2028. The design and service life of the required HLW storage facilities has not been determined.

Idaho National Laboratory

Idaho has about 4,400 cubic meters of HLW. The HLW exists as calcine which is a dry free-flowing solid. Current plans assume that the calcine will be converted to a monolithic waste form using the HIP process to prepare it for disposition. The HIP process will require ~2,900-4,600 HLW canisters or DOE Standardized Canisters. Facilities will be required to store these HLW canisters until a disposal system becomes available. The design and service life of the required HLW storage facilities has not yet been determined.

Clearly, extended storage of DOE HLW is achievable but will require active aging management programs to ensure very long term storage is technically justified. Staff from the National Spent Nuclear Fuel Program (NSNFP) are active participants in storage initiatives by the Office of Nuclear Energy's Used Fuel Campaign and the EPRI/NRCs' efforts to develop a technical justification for very long term storage of used fuel. Because spent fuel and HLW storage systems are very similar in design and aging mechanisms, the information and research gleaned from these activities will be shared with DOE EM and HLW sites to use in their planning for very long term storage.