Supernate Separation - DWPF Vitrification

In the proposed process, the concentrated supernatant liquid (free and interstitial liquor in saltcake) would be separated and transferred directly to the DWPF and vitrified with sludge waste. Sludge actinides do not need to be removed from the concentrated supernate. The salt cake will be dissolved and transferred to the Saltstone Facility for vault disposal. The vaults presently used in the Saltstone Facility meet current regulations for NRC Class C disposal, although the current permit restricts the average Ci content in a disposal unit (cell) to be within NRC Class A limits for disposed saltstone. Treatment of salt solution from salt cake is required to remove entrained sludge and Hg so that soluble alpha activity is no greater than 100 nCi/g and Hg concentration is less than 260 mg/l in the final waste. Substantial shielding must be added to the Saltstone facilities.

Unit operations for the proposed process would include the following steps: (1) separate and transfer concentrated supernatant from salt tanks, which would contain at least 90% of Cs-137 in inventory, into a single tank for feed to DWPF; (2) dissolve residual salt cake and transfer the salt solution to a tank; (3) treat dissolved saltcake solution with MST to reduce Sr, Pu, and U; (4) filter to remove insoluble solids; (5) transfer salt solution from filtrate storage tank to Hg removal (GT73); (6) transfer salt solution to grout production unit in a shielded facility.

Variations:

1) Build a new shielded grout production facility

Merits:

1) Simplicity - no separation process
2) No hazardous materials added