Elutable Ion Exchange - DWPF Vitrification

The proposed process would use two regenerable resins to remove Cs and Sr, Pu, U. The radionuclides would be eluted with 0.5 M nitric acid. If necessary, the dilute acid could be concentrated by evaporation. It would then be added to sludge in the DWPF. After treatment to remove Hg, the decontaminated salt solution would go to Saltstone Facility to be made into a Class A grout.

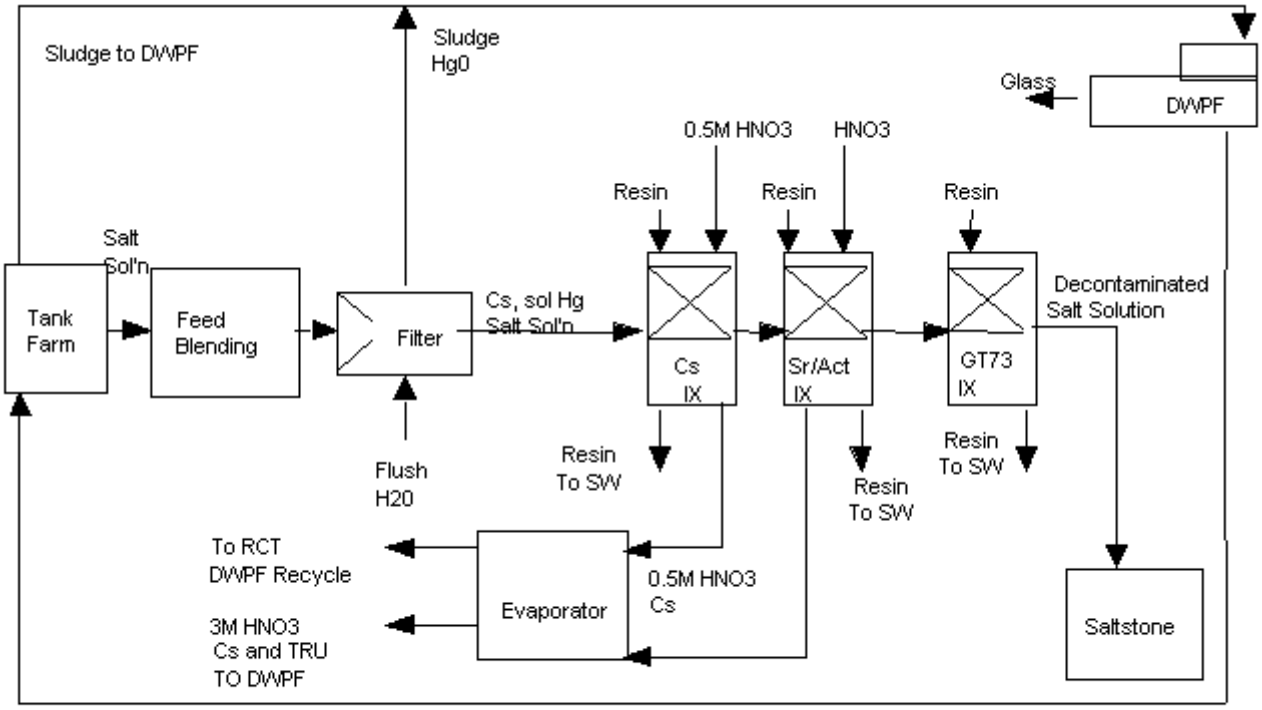
The process would include these steps: Filtration to remove sludge solids from the salt solution and prevent plugging of IX columns. The solids would be transferred to DWPF with the sludge stream. Then treatment in a crown-ether-based IX column(s) followed by treatment with an actinide resin to remove the Sr, Pu, U. The radionuclides would be eluted from both resins using a 0.5 M nitric acid solution. If necessary, an evaporator would be used to concentrate the eluate before transfer to the DWPF. Eventually the resin performance will degrade such that it must be replaced. The concentrated eluate would be transferred to the DWPF. Depending on the quantity of nitric acid in the eluate, some further chemical adjustments may be required for melter redox balance. The decontaminated salt solution would be transferred to Hg removal (GT73) and then to the Saltstone Facility to produce a Class A waste.

Variations:

1) MST addition in feed blending could be substituted for the Actinide resin column(s)
2) Resorcinol formaldehyde resin in place of crown-ether
3) Simulated moving bed in place of fixed column
4) Flat bed in place of fixed column

Merits:

1) Nitric acid eluate compatible with DWPF flowsheet
2) Reduced volume of glass based on potassium going to Saltstone
3) Elminates DWPF Salt Cell Operation



DWPF Recycle