Zeolite Ion Exchange - DWPF Vitrification

The proposed process would use a zeolite resin to remove Sr, Pu, U and a second zeolite resin to remove Cs from the salt solution. The radionuclides would be transferred to the DWPF on the zeolite resin where they would be combined with sludge and frit to produce borosilicate glass. The decontaminated salt solution would go to the Saltstone Facility to be made into a Class A grout after treatment to remove Hg.

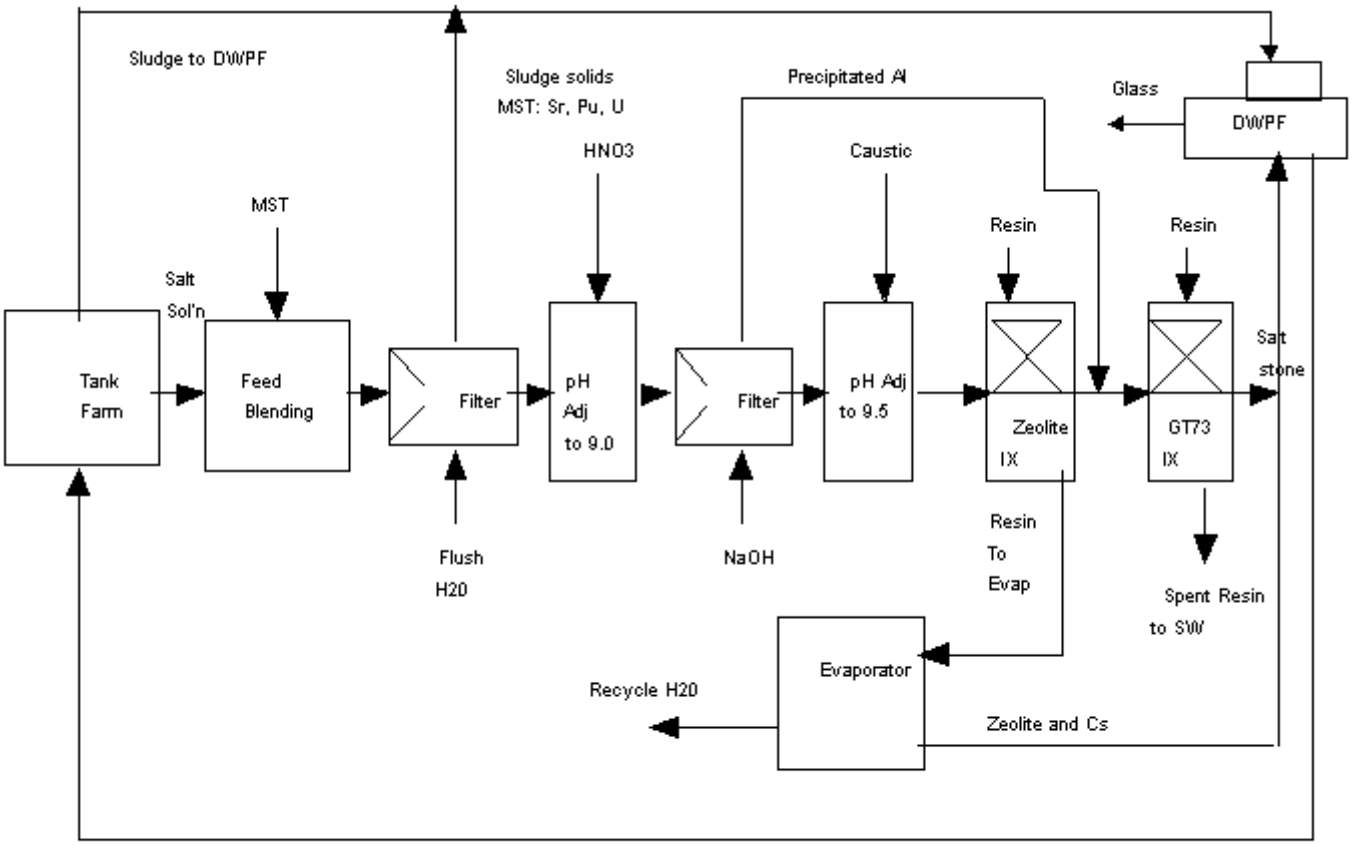
The process would include these steps: Filtration to remove sludge solids from the salt solution and prevent plugging of IX columns. The solids would be transferred to the DWPF via the sludge stream. For zeolite resins to perform properly, the pH must be < 12. The next step is acid addition to lower the pH followed by filtration to remove precipitated Al and then by caustic addition to prevent post-precipitation of Al. The filtered Al is redissolved in caustic and added back into the salt solution stream after the zeolite columns. Next, the pH adjusted salt solution is treated in a zeolite, e.g. TIE-96 IX column(s) to remove Sr, Pu, U and then in a zeolite, e.g. IE-96 column(s) to remove Cs. The zeolites are slurried to the DWPF to be incorporated into the glass. Additional waste glass will be produced in the DWPF compared to the current flowsheet. The decontaminated salt solution would be transferred to Hg removal (GT73) and then to the Saltstone Facility to produce a Class A grout.

Variations:

1) MST addition to feed blending could be used instead of a zeolite column to remove Sr, Pu, U.
2) A "batch & stir" option could be employed; this would require either several stages to achieve adequate decontamination or re-permitting of Saltstone to Class B or C waste.
3) Add zeolite directly to salt solution in a blend tank and separate solids.

Merits**:**

1) Non-hazardous inorganic reagent
2) Full scale radioactive operation demonstrated at West Valley



DWPF Recycle