Acid-side Ion Exchange - DWPF Vitrification

There are several highly effective Cs ion exchange resins which can operate only in the acidic range to perform properly. The proposed process would acidify the salt solution stream so that a ammonium molybdophosphate on polyacrylonitrile resin can be used. The eluate or the loaded resin in the case non-elutable resin would be vitrified at the DWPF. The 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: Monosodium titanate (MST) addition to remove Sr, Pu, U. Filtration to remove sludge and MST solids from the salt solution and prevent plugging of the IX columns. Acidification with nitric acid. This step would require NOx abatement/scrubbing. The pH would be low enough that Al would not precipitate. Treatment in an IX column(s) using one of the acid-range resins. The decontaminated salt solution would be neutralized and go to the Saltstone Facility to be made into a Class A grout after treatment to remove Hg.

Variations:

1) Partially destroy nitrates electrochemically in place of caustic addition

Merits:

1) For elutable resin, reduced volume of glass based on potassium going to the Saltstone Facility