

Potassium Removal followed by TPB Precipitation

The proposed process would use a potassium-specific resin to remove most (~90%) of the potassium from salt solution prior to precipitation with TPB anion. This would drastically reduce the quantity of TPB used and delivered to the DWPF. Precipitation would occur in Tank 48 with concentration and washing as necessary. Decontaminated salt solution would be produced as in the current flowsheet and combined with the acidic eluate from the potassium removal resin.

The process would include these steps: Filtration to remove sludge solids from the salt solution and prevent plugging of the IX column. The solids would be transferred to DWPF with the sludge stream. Then treatment in an IX column to remove most of the potassium. The potassium would be eluted with nitric acid. Precipitation of the remaining potassium and Cs (and soluble Hg) with TPB anion in Tank 48. Add MST to Tank 48 to remove Sr, Pu, U. Concentration of the slurry producing decontaminated salt solution. The decontaminated salt solution would be combined with the potassium IX eluate, made caustic and sent to Saltstone and disposed as Class A waste. Wash the precipitate as required to remove the required alkali and transfer to the DWPF.

Variations:

- 1) Send TPB directly to melter rather than Salt Cell
- 2) Simulated moving bed in place of fixed column
- 3) Flat bed in place of fixed column

Merits:

- 1) Approximately 10 fold reduction in organic inventory and benzene generation
- 2) Reduced volume of glass based on potassium going to the Saltstone Facility

