SAVANNAH RIVER HIGH LEVEL WASTE SALT DISPOSITION

Larry Ling
John Reynolds

SAVANNAH RIVER HLW SALT DISPOSITION

- DOE- NRC Interface/Goal of Today's Meeting
- Overview of SR HLW System/History
- Salt Disposition Alternative Selection Process
- Evaluation Results of the Final Four Alternatives
- Exploration of Ways to Assure Success with Direct Disposal Option

SR HLW SYSTEM OVERVIEW

LEGACY HIGH LEVEL WASTE FROM COLD WAR WEAPONS PRODUCTION

34 MILLION GALLONS (49 TANKS)

2.9MILLION GALLONS SLUDGE

31.1 MILLION GALLONS SALT
- SALTCAKE
- FREE SUPERNATE
- INTERSTITIAL SUPERNATE

SR HLW SYSTEM OVERVIEW

1980'S

- DEVELOPED STRATEGY FOR STABILIZATION OF HLW WASTE IN GLASS
- DEMONSTRATED IN-TANK PRECIPITATION WITH SODIUM TETRAPHENYLBORATE
- STARTED CONSTRUCTION OF DEFENSE WASTE PROCESSING FACILITY (DWPF) AND IN-TANK PRECIPITATION (ITP) FACILITY

1990'S

- START UP OF DWPF ON SLUDGE FEED
- START UP OF ITP PROCESS
- SECURED ITP PROCESS DUE TO HIGHER THAN ANTICIPATED RELEASE OF FLAMABLE BENZENE FROM THE PROCESS

ALTERNATIVE SELECTION PROCESS

- A WSRC System Engineering (SE) Team was chartered to perform a structured evaluation of salt disposition alternatives using a formal systems engineering approach

- SE Team consists of:
  1) a WSRC team leader
  2) full-time members in the areas of Operations, Engineering, Science, Systems Engineering, Chemical/Waste processing, and Safety
  3) part-time members representing academia and the National Labs

ALTERNATIVE SELECTION PROCESS

The three phases of the Alternatives Evaluation Process include:

- **Phase I - Alternative Identification** - 130+ identified and evaluated. Eighteen processes identified for further investigation
- **Phase II - Alternative Investigation** performed to identify the four most promising options
- **Phase III - Alternative Selection** - Developed flow sheets, pre-conceptual design, and life cycle cost estimates for the four options

EVALUATION RESULTS

will not pursue this option.

Four alternatives reviewed for Cs disposal

1. Caustic Side Solvent Extraction

   Long lived activity separated by adsorption and filtration followed by solvent extraction of the Cs for encapsulation in glass at DWPF

Low Technical Maturity of Solvent results in high potential for cost increase and schedule slippage

DOE make recommendation by end of Nov.

EVALUATION RESULTS

2. Non Elutable Ion Exchange

   Long lived activity separated by adsorption and filtration followed by capture of Cs on ion exchange resin for encapsulation in glass at DWPF

Technical uncertainties surrounding thermal stability of resin, hydrogen generation from Cs loaded resin results in high potential for cost increase and schedule slippage

EVALUATION RESULTS

23 ton/year limit on benzene release to environment.

Westinghouse recommendation

3. Small Tank Tetraphenylborate Precipitation

   Long lived activity and Cs separated by precipitation and filtration followed by encapsulation in glass in DWPF

   Technical uncertainties surrounding catalytic decomposition of tetraphenylborate results in high potential for cost increase and schedule slippage

EVALUATION RESULTS

4. Direct Disposal as Grout

   Long lived activity separated by adsorption and filtration followed by stabilization of Cs in grout for disposal as class C low level waste.

Non technical programmatic uncertainties result in potential schedule slippage jeopardizing commitments to South Carolina and SR missions. Significant cost reduction possible if existing facilities can be utilized for separation of long lived isotopes.

OPTIONS TO ASSURE SUCCESS

CLEAR UNDERSTANDING OF THE TECHNICAL AND REGULATORY VALIDITY OF THIS APPROACH

CLEARLY DEFINED AND DOCUMENTED STRATEGY, PUBLISHED AND AVAILABLE TO MIMIMIZE POTENTIAL FOR INTERVENTION

(ESTABLISHED BEFORE AN INJUNCTION IS INVOKED)