



SRS Citizens Advisory Board

Salt Processing Focus Group

Meeting Summary

December 5, 2000
Aiken Federal Building
Aiken, SC

The Salt Processing Focus Group met on Tuesday, December 5, 2000, at 5:00 p.m. at the Federal Building in Aiken, SC. Attendance was as follows:

Bill McDonell	Jerry Morin, WSRC
Mike French	Bob Hinds, WSRC
Wade Waters	Kelly Dean, WSRC
Rick McLeod	Steve Piccolo, WSRC
Lee Poe	Chuck Keilers, DNFSB
Bill Lawless	Ken Rueter, WSRC

R&D Results

Ken Rueter, WSRC, briefed the group on the technology selection work status for each of the alternatives. He reminded the group that there are two elements to the program, one is to resolve high risks and the other is to provide data to support the down selection criteria. No technologies will be included if there are open high risks. This program addresses high risk and produces data for the Technical working group to execute those criteria.

Alpha Removal

There are four risks relative to alpha removal; MST PU Removal Performance, MST/Sludge equipment scale, equipment size, and filter feed rate. The status as of 12/5/00 is as follows. SRS looked at Honeywell sodium nonatitanate, which failed to meet the target specifications. A consultant suggested that SRS request a new lot to ensure this was a performance, and not a manufacturing QA issue. The testing of alternate materials has been started with no results yet.

Moving on to solid liquid separation studies, mainly with MST, Mr. Rueter noted that the filtration tests have been started and alternative solid-liquid separation technologies are being studied. Mr. Rueter summarized that the MST PU Removal performance, the equipment size, and the filter feed rate are closed, while the MST Sludge equipment scale remains open.

CST Non-Elutable Ion Exchange

Mr. Rueter moved on to a quick summary of the risks, which are resin stability, resin handling and sampling, and gas generation. He emphasized that SRS has made some real progress in the last three months in all of the areas regarding CST kinetics. There was minor or no effect on CST resin loading capability. The irreversible sorption observed at ORNL could not be duplicated by SRS. Leaching of various elements from CST resin in a column configuration is underway right now. There has been some particle clumping observed within the columns. The contract with UOP specified, and they have delivered, the first allotment of remanufactured resin. The baseline sample showed less leaching of key components. The resin performance and bead constructions are important elements of quality. There are

plans to revise their recipe to put columns even on larger scale. SRS is the only user for this resin. The FG was concerned about the manufacture of the resin and its importance, and questions arose about the company going out of business. Mr. Rueter answered that these concerns have been addressed.

Mr. Rueter continued with the bench scale ion exchange studies. He indicated that the gas generation tests and modeled case showed no cesium removal performance issues when gas was present. The problems in earlier tests were due to human error. SRS achieved the expected results and addressed the quality issues.

The physical property data includes investigation of the thermodynamics of the waste pollution in synergy with the resin. The bottom line is that the wastes are supersaturated predominately with aluminum and silica. They do reach equilibrium, which is a kinetic limiting situation. The seeding of the supersaturated waste does promote crystallization of aluminum, silica, and niobium. Two things could be done to handle this, reduce leeching or increase free hydroxide level.

Thermo-hydraulic and Transport Properties - SRS has done pre-operation testing of tall column design baseline with gas-disengagement equipment modifications complete and the independent operation readiness review completed. There is a punch list that is being addressed. The ORR is a graded approach. Anything working at scale requires a readiness review.

Sampling and Material Handling - The status is that CST behaves like sludge in the sampling system once the size is reduced and hydraguard re-circulation rates in valve opening times do not affect results. In closing on CST, there has been good progress. There are no outstanding resin handling and sampling or gas generation high risks. There are 6-8 weeks worth of work here in this program as it pertains to high risk. SRS won't use a process if it has a high risk.

Caustic Side Solvent Extraction

Mr. Rueter continued. The status as of December 5, based on portioning results, is as follows. Solvent washing will be used as part of real waste; and extended 5-day tests and real waste batch contacts have been started for 5 tank wastes and bounding feed compositions. There is much challenge to performing batch tests. Stability of the solvent system—the annual dose calculation has been completed for CSSX flowsheet, which is about 92K RAD/year. This will allow SRS to determine equivalent year doses. SRS had to get very aggressive with the solvent regarding dose to get any to break down and get a detection limit with SRS instruments. SRS had to get upwards from 40-100 year dose to see any degradation products at all. No loss of solvent performance was seen.

Based on results, the current baseline was to replace solvent once every year. With the new data, that changes to once ever four years. This batch type experiment of exposing solvent to internal radiation has produced no observable issues. The large-scale tests are continuing with the contactor test system designed and fabricated. The hot cell installation is complete and hot operations have begun. The physical properties work has been finished. A strong percentage revolved around solubility.

Much work has been done in the degradation product area. To date SRS has defined the super saturation limits for the extractant. The extractant is a solid and the modifier is oil. This extractant and modifier must stay in solution. A key point is that a very strong percent of the degradation products are partitioning to the aqueous phase. There are no physical property issues.

Technology Transfer -The government holds the patent. Crown Colistrix is used by the French. IBC is a company that specializes in these chemicals. This company synthesizes crowns for several companies. Their extractants are used in extracting 50% of the palladium in the world. The solvent has been produced and the QA is sitting on shelf. The real waste testing has been done.

Proof of Concept Tests -These tests are done in open and closed loops and are required to prove the baseline performance of throughput, yield, and concentration factor. The key with the concentration factor

is the less water sent to DWPF, the less evaporation burden it has after it turns around to melter feed. This test was a precursor to real waste testing. The two positive lessons-learned to come from this testing are the rotor confirmation and the temperature management. All the proof of concept tests have met the concentration factor. There are no concentration factor issues and the Technical Working Group has closed this risk. What remains? The batch tests are ongoing and SRS is closing the hydrodynamic radiation question. The real waste tests will take place the first week of February 2001.

Small Tank TPB Precipitation

Mr. Rueter continued with his presentation. The remaining high risks are catalytic product decomposition, predominately the identification of the catalyst mechanism, its formation, and why it acts as it does in real wastes, and foaming relative to the issues being experienced in real waste tests last year. Regarding catalytic behavior, these materials are as active as palladium when they are reduced. They aren't easily reduced in this waste. The Palladium and the palladium/mercury clusters do form in the simulated waste. Systems with mercury have higher reaction rates. Systems without mercury still react.

There are two types of clusters that have been identified. One is the palladium clusters and the other larger clusters that look like long fingers. The key is that little amounts of palladium can result in high reaction rates. High reactivity usually makes one think there is lots of surface area.

There are two major steps in getting into a active catalytic system; one is reduction of palladium (called a Suzuki Coupling Reaction) and how intermediates play into that, then the nanocluster formation can take place. The 20-L CSTR runs demonstrated that design decontamination factor for cesium can be obtained and then maintained during active catalyst decomposition of TPB at both 25 degrees C and 45 degrees C. It held the DF factor and there were no problems.

Mr. Rueter continued. Anti foam B52 was a success under catalytic conditions. One thing being addressed is the PCB washing and recovery step. The anti foam is producing some type of crystal that is difficult to wash. This situation is being discussed. There are no high risks any longer.

Salt Waste Processing Facility Cost Data - Path Forward

Bob Hinds, Salt Processing Operations Director, gave an overview of the costs involved. In 1998, detailed cost and schedule estimates were performed as part of the selection phase final report. Each option also had costs involved if DWPF were adapted. In 1998, the price was \$3.5B for Caustic Side solvent Extraction (CSSX), \$2.9B for ion exchange, and \$3.5B for Small tank TPB precipitation (TPB). The estimates have contingency offsets. The process gave a rough estimate range of highest impacts (if everything goes wrong at once) and lowest impacts (if there are no problems at all). (Software program used the Monte Carlo method). Uncertainties and delays that have a time and cost impact were taken into consideration. Using this process, the highest range for CSSX was \$3.9B; the lowest was \$3.4B; for ion exchange the highest was \$3.7B and the lowest was \$2.8B, and for TPB, the highest was \$3.8B and the lowest was \$3.4B.

Risk is established now by using the same Monte Carlo program. This spring, technical and programmatic risks will be evaluated. In order to finish life cycle cost estimates, the results of the R&D must be known. The R&D is currently in progress. In 1998, SRS took all the risks, which could drive costs up and did a box and whiskers plot showing the estimated highest costs. The plot was follows: \$5.7B for CSSX; \$5.1B for CST non-elutable ion exchange, and \$5.5B for Small tank TPB precipitation

Basically cost estimates haven't changed in two years. Next spring, new financial assumptions will be completed. Down select criteria and life cycle costs of modifications to existing infrastructure are also a criteria. This process is the same used in the commercial world for building dams and tunnels. The biggest difference is the technical and programmatic risks.

Mr. Rueter clarified that in April, the Technical Working Group will read, discuss, and act on the R&D report. In parallel, Mr. Hind's team will produce new whiskers. The month of May will be used to apply data to the selection criteria and to brief respective secretaries on results.

EIS Schedule

Mr. Poe commented that Wade Waters, Chair of the Waste Management committee, would like for the Salt Processing Focus Group to comment on the Tank Closure EIS, as well as the Salt Processing EIS. The group believes that they will not have enough time to read the Tank Closure EIS and comment on it by the end of the comment period, which is January 23, 2001. Therefore, Mr. Waters plans to write a letter (to be sent by Karen Patterson, CAB Chairperson) to the Office of NEPA Policy and Compliance. The letter will request that the CAB's comments on the Tank Closure EIS be considered, even though they will come after the end of the comment period. Meanwhile Mr. Poe requests that the Salt Focus Group be briefed on waste removal, tank cleaning (water and oxalic acid) and annulus cleaning. He pointed out that these topics were omitted from the EIS.

Also Rick McLeod has completed a second draft of the Annulus Cleaning Recommendation that the WM Committee plans to present to the CAB in January 22 and 23. Mr. Poe asked that the group provide comments and edits to Mr. McLeod as soon as possible.

Larry Ling, Tank Closure Manager, DOE, updated the group on the EIS schedule. The internal review copy of this Alt. Salt Draft EIS was completed last September (1999). Plans were to send it to Headquarters, specifically EH-1, for comment. However, the Tank Closure EIS reached Headquarters about the same time. EM-1 made the decision that Tank Closure was the priority at this time; therefore, the Alt Salt EIS schedule has slipped. Informal comments have come back from EH, but no comments from General Counsel yet. Mr. Ling said that he hopes HQ would review and comment on the Salt EIS in late February or March. He hopes to begin the 45-day comment period in April. The comments would be incorporated to the draft in Mid June. The EIS would then go back to HQ for approval on the final. Mr. Ling would like to see final approval sometime toward the end of fiscal year 2001.

Mr. Poe clarified that the technology decision was to be made by June 1. His question was if this decision needed to be documented in the ROD; and if it does, then does a delay in the EIS impact the Alt Salt Project implementation schedule. Mr. Poe asked if a slippage in the contract award or in the start up of the Alt Salt processing would occur if the EIS were delayed? Mr. Grainger answered that if it appeared that the EIS could cause a delay in the down select process, then the priority for this EIS would go up. He does not believe that this scenario would be allowed.

Mr. Grainger reminded that group that the alternative will be named in the final EIS and the final decision in the Record Of Decision (ROD). There is no preferred alternative named in the draft EIS. There was discussion led by Mr. Lawless about the environmental impacts for each of the alternatives. It was clarified that environmental impacts will be done on each alternative.

After the draft is distributed, there will be 6-8 weeks of comments, then a final EIS will be issued. Then there is another 30-day comment period before the ROD comes out. The significant issue as pointed out by Mr. Poe is that the documentation of the selection of the technology is going to be delayed if this EIS gets delayed any longer. He reiterated that the decision is to be made by June 1.

The discussion moved to cleaning of HLW tank annuli as part of HLW tank closure. Mr. Lawless questioned the definition of "clean" pertaining to annulus cleaning. Is 70% of the waste removed considered clean? Mr. Ling answered that one could call it annulus cleaning or waste removal, but cleaning the annulus is a part of tank closure. He outlined the various avenues SRS has used to acquire funding for annulus cleaning research. However, because funding is available only if it would benefit more than one site, SRS has not had much luck finding money.

When asked about closure criteria, Mr. Ling answered that it is written in the FFA that DHEC has to approve tank closure. Mr. Ling continued that SRS must do everything economically feasible to remove the waste. The dilemma is if the waste is classified as HLW or incidental waste. Mr. Ling stated that after a reasonable attempt to get the waste out, DHEC reports that the tank can be closed if the waste left is proven to be waste incidental to reprocessing. The focus group would like to see a demonstrated process on shelf by 2006.

When asked about total curries in the waste, Mr. Ling responded the model Performance Assessment (PA) assumes there are 1000 gallons of waste left in each closed tank. Mr. Poe responded that this would be 500 curries of cesium. Mr. Ling answered that 20% of all waste is in the annulus. Mr. Poe asked if SRS could neutralize the waste to a non-dissolvable form?

Mr. Lawless reminded the group of a CAB motion made several years ago about closure of the first "four pack" of tanks. Mr. Lawless asked about closing Tank 19 and the 1F evaporator. Mr. Ling answered that Tank 19 should be closed in 2001. Then 1F would be closed in 2002, Tank 18 scheduled for closure in 2004. A sample plan is being written to tackle the 1F system. Closure of the first four pack will be up to Environmental Restoration (ER).

Mr. Poe asked for further discussion. There being none, he dismissed the meeting at 8:45 p.m.

Meeting handout may be obtained by calling 1-800-249-8155.