SRS Citizen's Advisory Board

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Consolidated Incineration Facility Focus Group

Meeting Summary

December 4, 2001
Aiken Federal Building
Aiken, SC

The Consolidated Incineration Facility (CIF) Focus Group (FG) met on Tuesday, December 4, 2001 at 5:00 p.m., at the Aiken Federal Building, Aiken, SC. Attendance was as follows:

FG Members

Wade Waters, CAB
William Lawrence, CAB
Karen Patterson, CAB
Bill Lawless, CAB
Bill Willoughby, CAB
Rick McLeod, CAB
Perry Holcomb, CAB

DOE/Contractors

Ray Hannah, DOE
Sonny Goldston, BNFL
Sachiko McAlhany, DOE
Kelly Way, WSRC
George Mishra, DOE
Michael Chandler, WSRC
Peter Hudson, BNFL
Marshall Looper, WSRC

Stakeholders

John Meyers, Chamberlain Group

Wade Waters welcomed the attendees. He then briefed the group on the many changes coming to the CAB and committees, and changes even at the Washington level that will impact SRS. Mr. Waters talked of his recent visit to Washington and his favorable impression of Jessie Roberson.

Consolidated Incineration Facility Update-Ray Hannah

Ray Hannah updated the group on the Consolidated Incineration Facility (CIF). The facility suspension is going well with surveillance and maintenance costs being less than anticipated. The lab scale testing of the options is complete, results are being finalized and compiled, and Savannah River Technology Center (SRTC) is developing draft reports. A CIF closure plan has been drafted, and DOE has devised a plan to purpose to South Carolina Department of Health and Environmental Control (DHEC) that would extend the closure date of CIF.

Mr. Hannah continued by asking the group to recall that at the time of the permit modification DHEC thought it was not appropriate to extend the closure date. DOE believes that it is not good business practice to shut down the facility without a demonstration of an alternative. DOE held a meeting with regulators to provide justification to DHEC for a date extension. The meeting was very positive and DOE is very close to reaching an agreement with DHEC.

Mr. Willoughby questioned if the 10% of the legacy waste definition included aqueous and liquids. The commitment in the Site Treatment Plan (STP) includes the aqueous and the organic. Mr. Looper said that we would treat the aqueous early and then demonstrate 10% of the organic. This is how the schedule is laid out.

After questioning from Rick McLeod about a closure plan and a timetable, Mr. Hannah stated that he could not offer the focus group a firm schedule until DOE has confirmed with DHEC.

He will offer dates when all the parties have come to an agreement. Mr. Hannah continued by stating that DOE plans to get a technical assessment of the viable alternatives first. Technical aspects would have to be combined with the financial and safety aspects to help DOE focus in on one option.

PUREX Waste Alternative Treatment Evaluation Status-Marshall Looper

Marshall Looper, Solid Waste-WSRC, presented to the group on the PUREX waste alternative treatment study. He outlined the purpose of the study which includes evaluating alternative treatments to the CIF for PUREX waste, using a Systems Engineering Approach to select and develop the best alternative treatments, and comparing the best alternative treatments with optimized CIF treatment. Using the systems engineering approach, the team was able to define the requirements, identify the options, screen out non-viable options, and grade possible options using criteria based matrix. The team is currently investigating a short list of treatment alternatives.

The short list contains both aqueous and organic waste alternatives. The aqueous waste alternatives include Saltstone treatment, stabilization and the HLW evaporator. Stabilization is challenging because of the organic, and the team isn't pursuing the evaporator option further because it is not technically viable. The organic waste alternatives include stabilization, which utilizes a new solidification process and offsite treatment with pretreatment onsite first to lower the alpha radioactivity. The onsite pretreatment step is needed because of transportation issues (only 13 gallons can be transported at a time without pretreatment) and because of sending high alpha activity waste to vendors who aren't equipped to deal with this material.

Mr. Looper then outlined a possible aqueous route which consists of Tank 50 to Saltstone and the organic route of waste stabilization which includes mixing the waste with a stabilizer, storing in a B-25 container or 55-gallon drum and disposing at SRS or Nevada Test Site (NTS). The PUREX waste has high iodine content, which may be an issue with SRS disposal. The pretreatment route includes decontaminating the bulk of the waste for transport to an offsite commercial vendor for treatment. A concentrated portion of the waste containing the majority of the radioactivity would either be sent to the Waste Isolation Pilot Plant (WIPP) or disposed of at SRS.

From these alternatives, SRS has initiated an R&D program with Savannah River Technology Center (SRTC). First, Mr. Looper outlined the Waste Stabilization Studies for the group. Under the organic waste treatment options, the group has worked with a clay material called Petroset II. This clay material was tested using both the powder and granular forms. In addition to the clay material, two different types of NOCHAR Petro Bond and Imbiber Beads in both regular and nuclear grade forms were also tested. The NOCHAR and Imbiber Bead products are polymer materials. The samples were prepared with a 1:1 and a 2:1 ratio of waste-to-media by weight and the group performed waste form durability testing in addition to the regulatory tests.

Mr. Looper showed photographs of all the options being considered before and after the waste had been added. SRS did analysis of the chemical make up of the polymers before and after waste was added. The pictures showed definite changes in physical characteristics of some of the media. Performance wise, each of the options did well except one of the NOCHAR products. This material did

not retain liquid when mixed at a 2:1 ratio.

Mr. McLeod questioned how the group would choose from all the options if several products performed equally well. Mr. Looper replied that after all tests have been performed, then the group will look at media costs, waste loading capability, and disposal cost to select the best media type.

Mr. Looper continued discussing the waste durability tests program. SRS tested radiation stability by simulating up to 10,000 years of radiation exposure. There was some slight polymer degradation with no liquid release and no effect on the clay media.

Mr. Lawless questioned whether the number of rads used in the tests was based on the highest dose rate since the two storage tanks have different radionuclide compositions. The dose rates were calculated for the organic waste in each tank, and the higher dose rate was used for the radiation stability tests.

SRS tested product aging with ultraviolet rays (UV). Mr. Looper explained that this is just another kind of radiation test that has to do with storage and transportation. The UV exposure simulates long-term exposure to sunlight. The polymers yellowed some only at the surface and there was no effect on the clay.

SRS also performed vibration cycling with no liquid being released. The microbial degradation tests are scheduled for completion by 12/10/01. Mr. Lawless questioned if hydrogen gas release would be a concern. Mr. Looper said that it would be difficult to fill up to a flammable situation because of the very slow hydrogen release.

All the waste forms passed the free liquid tests. In the thermal stability tests, the polymers started degrading after about 500° F, but no liquid was expressed. There was no problem with the clay. Since the liquid has a high iodine-129 content, tests to see how the iodine leaches out are scheduled for completion by 12/15/01. Tests were also done that saturated the polymers and clay with water; they were found to be water stable. Finally, tests were done to simulate the pressure of being underground. Once again, no liquid was released with either the polymers or the clay.

Mr. Meyers asked if SRS were looking at what the other sites are using. Mr. Looper replied that SRS has worked with the Mound, Rocky Flats, and Hanford sites, and stressed that each site has specific requirements and parameters, as does SRS.

Mr. McLeod questioned regulator interest in and preference for any of the agents tested thus far. Mr. Looper emphasized that the CIF Focus Group is the first to hear this information. SRS has informed the regulators in past discussions that different media are being considered and tested. Future updates and discussions will be held with regulators.

Mr. Looper continued by discussing the Radionuclide Pretreatment Study. The goal of this study is to remove most of the alpha-emitting radionuclides from the waste. Mr. Lawless asked if SRS needs to remove all the alpha radionuclides or if they were looking for a cut point. Mr. Looper responded that the team is shooting for a Decontamination Factor (DF) of 100 which means removing about 99 percent of the alpha radioactivity. The pretreatment process would generate an aqueous secondary waste containing the removed alpha radionuclides and this waste can be stabilized in Saltstone. If a DF of 100 could be achieved, then SRS could ship ~1200 gallons at a time of the decontaminated organic waste to a commercial vendor.

Two approaches being considered are solvent extraction (SE) and ion exchange (IX). Simply put, SE washes the radionuclides out of the organic. Some of the extractants being considered are HEDPA,

oxalic acid, potassium fluoride, EDTA/DTPA, and sodium carbonate.

The best multiple wash result was a DF of 7 or 8 total of all the washes. With the ion exchange tests, SRS used alumina and zeolite for the inorganic resins; and diphonix, diphosil, and amberlyst A26 for the organic resins. The best result was with the Amberlyst A26. The best result was with Tank 35 when a DF of 33 to 34 was achieved.

Mr. McLeod questioned how much secondary waste would be generated by pretreatment. The hope is that if it were a resin, the generated wastes would be TRU and sent to WIPP; and if it were a wash, the wastes would be a low-level aqueous solution. Probably two thousand gallons of aqueous volume would be generated with multiple washings.

Mr. Lawless asked if SRS had considered some sort of pretreatment before the stabilization process. Mr. Looper replied that SRS hadn't achieved that level of optimization yet. So far, it doesn't appear to be a benefit to pretreat before shipment to NTS. Once it is solidified, it can be shipped. If it is combustible, then there are limitations. For example, if the transportation vehicle ran into a gasoline truck, the polymer would burn.

Mr. Looper concluded with the PUREX Aqueous Waste Saltstone treatment evaluation. The PUREX aqueous waste exceeds waste acceptance criteria for organic content. The Dibutyl phosphate that washes out of the organic phase is in solution in the aqueous phase. These aqueous wastes will not process directly into Saltstone, so mixing is required with Tank 50 waste. Dilution tests with Tank 50 feed should be complete by 12/15/01. The required RCRA TCLP compliance test results are due 12/7/01. The technical review for adding aqueous waste to Tank 50 in H-area is complete. There was no technical issue other than high organic content for Saltstone because the Tank 50 Waste Acceptance Criteria (WAC) takes into account the Saltstone WAC.

PUREX Solvent-Michael Chandler

Mr. Chandler offered the group information on the solvent extraction, PUREX process, Solvent reuse, decontamination studies, disposition options and a path forward. SE is an industrial process for metallic element separation similar to extracting cobalt from nickel. It does work well with uranium and actinides. In this process, SRS separates metallic elements and they form an organic soluble complex compound that can then be extracted from the other materials. The uranium and actinides form these compounds easily. Tributyl phosphate (TBP) is the preferred complexant. Dodecane (very similar to kerosene) is the organic diluent that SRS uses for the complexed actinides to extract into. Another advantage of the SE is that the distribution of elements between the organic solvent and the aqueous can be adjusted. Mostly this is done as an aqueous acid adjustment.

When questioned by Mr. McLeod why this is called a PUREX process, Mr. Chandler replied that it is a plutonium uranium extraction process, thus the name. It is a process using the TBP organic phase. The PUREX process is the standard for uranium plutonium extraction. The process starts with the dissolving step. The head end process removes the silica that is present. The solution must be adjusted before it goes into solvent extraction. This has to be done in multiple phases. In this stage, organic and aqueous mix, then separate, and then go their separate ways; then this stage is repeated. The solution is adjusted at various stages in the process. SRS washes the solvent to remove solvent degradation material, more specifically Dibutyl phosphate, DBP. TBP is the desired compressant, not DBP. This is what is done in the entire canyon process.

Mr. Lawless asked about the non-radioactive waste that comes out of the PUREX process. He is interested in the PUREX itself, the degradation process, and the final plan for the materials being removed through the process. Mr. Chandler remarked that SRS uses a pure refined solvent. It's a very

well defined process on washing and cleaning. After questions from Mr. McLeod about the washings and where the PUREX is that is in the CAB motion, Mr. Chandler clarified that the solvent wash for each cycle is a continuous loop. SRS continues to try to wash out the "do-bads" maintaining a high quality PUREX solvent. This PUREX in this continuous cycle is the PUREX that the CAB is interested in.

In this PUREX solvent cycle, old degradation products are constantly being removed. There are possibly some compounds that are compressing the radioactive material and holding it in the solvent. This is one issue associated with the motion that has to be resolved.

Mr. Chandler continued. SRS recycles the solvent. Washing removes most of the solvent degradation products, which are di-butyl and mono-butyl phosphoric acid, in a carbonate wash. These washes take the slightly acidic degradation products out of the organic phase. After the carbonate is spent, it is discharged into the HLW system.

For decontamination studies, SRS needs to do a good job of characterizing contaminates that are in the solvents. To date, there is not a large body of information concerning the contaminates—iodine, metals, and radionuclei complexes. One goal is to sample different batches so SR can see what will be accomplished with washes. Mr. Holcomb asked if the site samples the feed tank to get analyses. Mr. Chandler responded that the site gets gross numbers and qualitative information back, but limited information on the after washed condition of the solvent.

Mr. Chandler continued by highlighting iodine issues. Iodine is one of the contaminates that forms a complex that's not readily removed. Also, alumina scrubbing is not removing the iodine. One of the things SR wants to do is demonstrate iodine removal using a silver impregnated carbon filtration method. One reason iodine is important right now is that a little bit of solvent that is soluble in the organic, remains in the acid or carbonate washings. During evaporation of the acid or carbonate wash, enough of the soluble organic with iodine is evaporated and goes to the Effluent Treatment Facility (ETF). At the ETF, the organic with iodine collects on carbon beds that are difficult to disposition as waste. The source of iodine-129 is coming from the solvent cycle. There is a separate issue for SRS to demonstrate that they can remove this iodine.

For a disposition evaluation, Mr. Chandler's team wants to do a cost benefit analysis within the CIF alternatives study. Is it more cost effective to decontaminate the solvent versus letting it follow the CIF process disposition alternative? The team is evaluating other disposition options.

Mr. Chandler discussed the path forward to complete the decontamination studies. The plans are to continue to integrate solvent disposition planning with F-Canyon Suspension Plan and to evaluate options for continued H-canyon solvent use.

The group then asked questions to clarify the motion that is under consideration. Mr. Lawless thought that it would be beneficial to have the solvents that are in the canyons in identifiable quantities. If it is conceivable to disposition the waste at a commercial site, then we wouldn't need to send it to CIF. Ms. McAlhany answered that these things depended on the option that is chosen. CIF may not be used in this case. She continued that the site is going to characterize what we have, then do a cost analysis. She added that the recommendation is consistent with what the site is already doing. The group agreed to continue work on the motion via e-mail.

Mr. Waters asked for public comment. There being none, he adjourned the meeting at 7:45 p.m.

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