

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 27, 1998

TO: G. W. Cunningham, Technical Director

FROM: R. F. Warther, M.T. Sautman

SUBJ: RFETS Activity Report for Week Ending March 27, 1998

Metal and Oxide. RFFO met this week to decide how to address issues with the PuSPS system and metal and oxide processing. RFFO plans to issue a letter next week to K-H tasking them to install the packaging end of PuSPS and two furnaces in B371. RFFO and K-H believe that the stabilization end of the prototype PuSPS will not meet 94-1 schedules because of a combination of reliability, cycle time, and other uncertainties. B371 has been selected rather than B707 because this will accelerate the exit from B707, and the stripout of J module will be applied toward deactivation goals. B371 will be the last nuclear facility decommissioned at the site under all scenarios, and installation of this capability in this facility is not expected to materially affect existing schedules and milestones.

Residues. During the staff's brief to the Board last May it was noted that many of the combustible residues did not require processing. Despite discussion with RFETS management, they had chosen not to pursue these options until recently. Construction for the wet combustible lines has fallen 8 months behind schedule and the estimated cost for completing construction has quadrupled. As a result, K-H is recommending curtailing all construction except for limited work on the organic line. The contractor is examining how segregation and characterization could significantly reduce the volumes to be processed. The staff has told SSOC the characterization data that would be required to show that most of the combustibles are low risk. The Site Reps and Staff have found the contractor proposals to be justified and are encouraging RFETS to take full advantage of the option outlined in the Board's January 29, 1998 letter to the Secretary. RFETS has also been receptive to the idea of shipping combustibles to WIPP as a high priority to reduce the hazard from fires.

The Site Reps attended the RFETS/LANL/PNNL meeting on residue demonstration and testing. As discussed in Attachment 1, the Site Reps question the safety and need for some processes.

Residues that do not require processing will be repacked as TRU waste in B707 and B776. Schedules for both buildings have been improving. B776 operations are to begin in May with B707 following in June.

TRU Waste. The DOE Carlsbad Area Office (CAO) has conducted 3 audits of the RFETS TRU waste certification program. On Friday, CAO granted authority to RFETS to characterize and certify retrievably-stored debris waste and transportation authority for the use of the TRUPACT-II. Additional audits are still required for other waste streams, including residues.

Reactive Materials. In response to the Hanford explosion, all RFETS employees were sent letters and long-term employees interviewed in order to identify potentially reactive material still at RFETS. K-H has issued a report summarizing the issues mentioned and results of investigations to dates. Issues associated with depleted uranium metal chips in B444 and

contaminated equipment buried in B776 have been previously discussed in weekly reports. (See 5/17/96, 6/14/96 and 7/3/96 reports). Ground penetrating radar has been used to check out buried equipment in B776 and sealed rooms in B881 and B991. One interesting anecdote was that an employee claimed that he observed sparking when he walked on several inches of dust in the B444 ventilation plenum, which has not been cleaned for 10 years. If true, one cause could be depleted uranium metal fines from previous machining operations there.

Attachment 1 Residue Demonstration and Testing

Ash Immobilization. If RFETS is unable to demonstrate the adequacy of their safeguards controls, they plan to vitrify incinerator ash. Past results have indicated that calcination may be required beforehand to prevent excessive foaming during vitrification. PNNL has found that it takes 4 hours to adequately calcine ash at 700°C using pure oxygen inside the furnace. When air was used instead, calcination was not complete even after 9 hours. The Site Reps are very concerned about the safety of any process using pure oxygen, especially at elevated temperatures. The SSOC Residue Project Manager shares these concerns. Another issue is that the above times do not include the time to cool the furnaces nor the vitrification cycle times.

It takes extremely small amounts of water (0.054 g) or carbon (0.027 g) to cause swelling during vitrification. SSOC has developed a can inside can process that uses one furnace for both low temperature calcination (425°C) in air followed by vitrification in a nitrogen atmosphere. Initial results look promising, even if plastics are present. This process is expected to generate more H₂ and CO than the other calcination processes. A third project is testing screw-feed and rotary calciners. It does not appear that screw-feed calciners allow enough contact of the ash with the air. In all the processes, HCl vapor is generated during calcination. This has already caused significant corrosion of some calcining equipment.

A fourth process being examined is cold ceramification. Although the waste form results seem promising, preliminary recoverability tests indicate that the matrix can only contain up to 3 percent plutonium by weight.

The current safeguard termination limit for ash is 2%. Considering the safety issues and long processing times required just to raise this to 3 or 5%, diluting the ash would be much safer and quicker. SSOC's response to this suggestion was that dilution would be considered as a last resort.

Combustibles. The Site Reps questioned whether organic-contaminated combustibles needed to undergo steam oxidation after thermal desorption. If testing is finding that plutonium metal in the matrix was not able to be oxidized after being exposed to steam for several hours (1 to 18 hours), it is probably not going to oxidize in air at room temperature. SSOC is examining this since it could greatly increase the throughput rate.

The Site Reps and RFFO have been questioning the contractor about the need for an automated planer for acid-contaminated filter frames and its safety. LANL tests confirmed that there was little difference in the thermal stability between acid-contaminated and normal wood. K-H has since canceled this project.