DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 26, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director
FROM: J. Kent Fortenberry / Joe Sanders
SUBJECT: SRS Report for Week Ending September 26, 1997

Joe Sanders was on annual leave this week.

ITP Distributed Control System (DCS) Upgrade - ITP is installing a major DCS upgrade, but plans to conduct a human factors evaluation in accordance with NUREG-0700 (Human System Interface Design Review Guideline) only after the system is installed and operating. Discussions with WSRC personnel revealed no effort to incorporate lessons learned from previous DCS problems. As an example, faceplates used to operate equipment are still identical to the type that have caused problems at DWPF such as the inadvertent sludge transfer and the accidental shutdown of melter offgas (see 2/14/97 and 6/6/97 weekly reports). Labeling of DCS schematic items (tanks, pumps, etc.) are sometimes inconsistent with associated instrument loop labels. Also, a cursory review found several errors in the DCS instrument loop numbering. DOE-SR has been informed of these observations.

Deformed Plutonium Storage Cans - During routine inspections this week, three Pu oxide storage cans were found 'sucked in.' The cans were not breeched and no contamination was detected. Depletion of air within a storage container has been experienced in the past with Pu metal, but not oxide. With metal, PuH_x is formed from hydrogen generated from plastic packaging material. The PuH_x catalyzes direct nitration of the Pu, removing nitrogen from the can atmosphere and reducing the internal pressure. The catalyzed Pu-N reaction is temperature dependent, consistent with its being seen to date only with high Pu-240 content (i.e., high temperature) metal ingots. The oxide in these collapsed cans came from 'burning' and sieving weapons-grade plutonium metal chips/shavings, and was packaged in a plastic screw-top container, double plastic bags, and an outer food pack can. The cans were packaged at LLNL in 1982-84, and shipped to SRS in 1984-85. LLNL is reviewing records to determine the details of how the metal was oxidized, but the SRS expectation is a low temperature oxidation leaving 0.5 to 1.0 percent unreacted metal in the form of metal fines. WSRC has estimated that this is enough metal for the hydride catalyzed depletion of nitrogen to cause the can to collapse. Being in direct contact with plastic provides hydrogen, but the relatively low Pu-240 content of the weapons-grade material isn't consistent with the elevated temperatures needed for substantial Pu-N reactions. This lack of significant heat generation may be offset by the insulating effect of the oxide and packaging and/or by the kinetics of metal fines versus ingots.

Plutonium metal at SRS in direct contact with plastic has already been repackaged. This material was characterized as weapons grade oxide and was to remain in storage pending transfer to the APSF for high temperature stabilization and DOE-STD-3013 packaging. Because the oxide was known to be packaged directly in plastic, it was subjected to more frequent inspections (once/6 months for cans in the storage rack). The three deformed containers have been temporarily placed in heavy plastic bags as a precaution, and will likely be repackaged within the next two weeks in a typical SRS can-bag-can arrangement. An argon purge may be used during packaging. WSRC will then have to schedule the repackaging of the remaining cans from LLNL. LLNL is aware of this occurrence. Preliminary review of records indicate similar material may be at LLNL and RFETS.