DEFENSE NUCLEAR FACILITIES SAFETY BOARD

January 10, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

FROM: J. Kent Fortenberry / Joe Sanders

SUBJECT: SRS Activity Report for Week Ending January 10, 1997

SRS Layoffs - A layoff of 875 employees was announced this week. Individuals will probably be notified January 20-21. Following the layoffs this week, SRS employment will be 14,925, down from a high of 25,180 in 1992.

Proposed WSRC Spin-off Company- WSRC is considering setting up a separate subsidiary to provide services in the area of Safety Management Systems, Worker Safety Programs and D&D (Rollback Planning & Processes). This spin-off company, in addition to providing these services to SRS, would expand this work within DOE as well as pursue similar business elsewhere. About 200 people would be involved.

Taiwan Reasearch Reactor and EBR-II Spent Nuclear Fuel - Of the 143 canisters of TRR fuel stored in RBOF, 81 contain fuel that was damaged prior to shipment to SRS. Failure and rupture of some of these failed fuel canisters convinced DOE to process this failed TRR fuel in the F-Canyon, scheduled to begin next week (see Board letter dated August 3, 1995, and the SRS IMNM EIS). The other 62 canisters of TRR fuel were thought to be undamaged, and were designated as stable and suitable for continued storage in RBOF until a suitable disposition could be determined.

This December, operators at RBOF observed bubbling from canisters containing the TRR fuel designated as "stable." Two canisters in particular have been identified as exhibiting significant bubbling (indicating hydrogen release from corrosion). There is general agreement that these newly identified failures should be included in the upcoming processing campaign. Furthermore, DOE-SR and WSRC apparently agree that it seems reasonable to stabilize all of this vulnerable TRR fuel during this processing campaign. However, discussions with DOE-EM HQ indicate a reluctance to pursue this course of action due to the potential NEPA entanglement, preferring instead to deal with the TRR fuel as it fails.

During 1996 DOE-HQ assembled experts (J. Devine, et al) to identify all potential alternative technologies for the treatment, packaging and disposal of aluminum-based fuel. For some of the fuel types, this group of experts could not identify a reasonable alternative. One of the recommendations from this group was that "DOE should utilize the existing SRS processing capability for those few fuel types for which processing clearly is the most cost effective and timely treatment method." Topping the list of these fuel types (referred to as Table 5.2.1 fuel) is the aluminum-based metallic uranium fuels (i.e., TRR fuel, declad EBR-II fuel, and declad sodium reactor experiment fuel).

SRS Spent Nuclear Fuel Environmental Impact Statement - The Notice of Intent for the SRS SNF Management EIS appeared in the Federal Register December 31, starting a 60-day public scoping period. This EIS will address actions to manage about 62 metric tons of fuel and targets assigned to SR (aluminum-based

fuel), including placing these materials in forms suitable for disposition. This EIS will evaluate the new technologies (J. Devine et al, see TRR fuel above) that the Department of Energy elected to pursue in the Record of Decision for the Foreign Fuel EIS. The spent fuel transfer facility will be included in this EIS.

F-Canyon Vessel Eruction - A brief description of this event is attached.

Tour of DWPF Replacement Melter - The site reps toured DWPF melters 2 and 3. Melter 2, which will replace the current operating melter (when it fails), is undergoing final system testing and should be "task ready" (procedures for installation and in-situ startup testing complete) near the end of FY97. This is important because the operating melter is nearing the end of its design life and melter-replacement is a complicated, time-intensive task. The design of melter 2, including the pour spout, is very nearly the same as the current melter. Only the stainless steel body of melter 3 has been fabricated. A redesigned pour spout could be incorporated, if necessary, into melter 3 to improve pour characteristics. Chicago Bridge and Iron, the fabricator of the 3 vessels, has closed down its large fabrication shop; WSRC will have to identify a new vendor for melter 4.

Site Process and Control Technology Upgrades - An effort has been initiated onsite, known as the "Year 2000 Initiative," to identify those process control (ie., DCS), engineering, and database systems which are essential to the site mission and should be upgraded before the technology becomes obsolete and the parts become hard to replace. The systems currently identified for upgrading (including the ITP Distributed Control System) are estimated to cost approximately $14 Million. On a related note, there is some concern about the impact of the changeover in century on the operability of the process control systems.

Board Members.

Attachment to 1/10/97 Weekly Report: Eruction of Tank 17.5 in F-Canyon

Tank 17.5 is used as a sump receipt tank in the warm side of F-Canyon . Prior to transferring material from various sumps to tank 17.5 chemicals are added to ensure criticality safety. About 650 lb Fe-sulfamate / hydroxylamine nitrate (FS/HAN) is added to ensure that the plutonium will be reduced and will remain in the aqueous, and an amount of 50% Nitric Acid equal to twice the amount of sump material plus 500 lb is added to neutralize any caustic sumps. After material is transferred to Tank 17.5, the tank is sampled and analyzed for density, plutonium, reducing normality (to verify amount of reductant present), and nitric acid concentration. These samples are only evaluated to ensure greater than 1M free acid and greater than 0.02N reducing normality. There are no limits on maximum nitric acid or HAN concentration.

In addition to tank sampling, temperature readings are required from Tank 17.5 every 4 hours, with an acceptable temperature range of 10C to 40C. Cooling water is used to maintain the tank temperature within these limits. The System Operating Procedure SOP 221-F-40780 (Handling Warm Canyon Sump Solution in Vessel 17.5) also requires cooling water be used to maintain Tank 17.5 temperature below 45C. The reason for these temperature limits are not specified.

On December 28, 1996 an eruction of Tank 17.5 contents occurred as a result of an auto-catalytic decomposition of hydroxylamine nitrate in the presence of strong nitric acid. Tank 17.5 was well vented. About 2500 lbs of Tank 17.5 contents were expelled from the tank as a result of this reaction. At the time of this event, the HAN concentration was calculated to be about 0.1M, and the nitric acid was at about 4.5M. At these concentrations, the HAN - Nitric Acid reaction initiation temperature is approximately 40C. Tank 17.5 is located in the same cell as the 17.7 evaporator, which had been operating. Operation of the 17.7 Evaporator caused Tank 17.5 temperature to increase to a maximum of 42C.

Material has been transferred to Tank 18.7, and floor flushes have been performed. Tank 17.5 temperature is now being limited to 30C or less. WSRC is evaluating limits on acidity for sump receipt tanks, and possible

substitutes for FS/HAN. More importantly, concentrations of HAN and Nitric Acid are being reviewed in other Canyon and Outside Facilities vessels, as well as in H-Canyon. The HAN - Nitric Acid reaction does not appear to be considered in any process hazard analysis or other safety documentation. WSRC maintains that the accident analysis "Chemical Reactions" covers the HAN - Nitric Acid reaction, and is bounded by the red oil explosion.