DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 23, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

FROM: J. Kent Fortenberry / Joe Sanders

SUBJECT: SRS Activity Report for Week Ending May 23, 1997

Accelerated Clean-up Plan - EM's 10-Year Plan, now called the National Accelerated Clean-Up Plan, will be issued for public comment on May 29. Based on a fixed level of funding, the SRS site specific component of this plan purports to address compliance agreements, meet DNFSB commitments, and ensure viable options for stabilizing materials from other sites as well as for meeting the needs for future material disposition activities. Unfortunately, **36%** of the SRS work identified ($4.3 billion) is to be funded by productivity enhancements. This seems unlikely. The work most likely impacted by funding deficiencies includes the SNF alternate Technologies Project, Consolidated Facility (CIF) operation, the phased canyon strategy, the plutonium vault (APSF), and DWPF operations.

DWPF Melter Pour Spout Insert - An inconel insert was installed in the melter pour spout last week which seems to have corrected a primary cause of melter wicking. The insert creates a new knife edge to achieve glass stream separation from the wall of the pour spout. During installation, it was discovered that the old knife edge was significantly eroded. This dull edge is likely to have created or significantly enhanced wicking. Since installation of the new insert, DWPF has poured about one can per day with little or no wicking. Future inserts will likely be required assuming the knife edge continues to erode.

Functional Classification of Safety Equipment - DOE-SR has been looking for a way to control components that provide significant risk reduction but are not needed to meet the current SRS evaluation guidelines for safety class and safety significant classification. In general, DOE- SR is proposing that additional components be identified to provide incremental risk reduction below the evaluation guidelines based on an ALARA-type principle to achieve lowest reasonable risk consistent with overall cost and programmatic effectiveness. These additional components and the estimate of risk reduction would be documented in the AB such that proposed changes to these items would require USQ evaluations. DOE-SR is also considering how to assure reliability and/or availability of these additional components. A DOE-SR Board brief on this subject has been scheduled for June 24, 1997.

Tritium Extraction Facility (TEF) Scope Changes - Scope changes that eliminated the "hot" analytical cells (which allowed detailed examination of potentially damaged target rods) and eliminated the requirement to extract tritium from damaged (water filled) rods have raised questions about the likelihood and impact of a damaged rod being extracted. A brief discussion is attached to address these questions.

Attachment to May 23, 1997 SRS Weekly Report

Likelihood and Impact of Extracting a Damaged Rod at the Tritium Extraction Facility

The likely failure mechanism for target rods is a cladding breach causing waterlogging. Zircaloy clad fuel rods generally have a small cladding failure rate, but there are currently no estimates of expected failure for the stainless steel clad tritium target rods. In the event of a cladding failure, the tritium is expected to remain in the target rod (bound in the target or the tritium getter) and increased levels of tritium in the coolant are unlikely. It is also unlikely that extensive examination of rods will occur at the reactor site after removal from the core. Once at the Tritium Extraction Facility, the absence of pressure in the rods during rod puncturing might indicate a damaged rod, but it has not yet been determined whether this pressure will be monitored.

Similar to the current tritium extraction facility at SRS, uranium and zeolite beds will be used to treat water vapor. The uranium beds crack water vapor, releasing the hydrogen isotopes and chemically combining with the oxygen. The zeolyte beds then adsorb any remaining moisture in the extraction gas stream. Because the uranium bed reaction is exothermic, a slug of water could cause the bed temperature to increase extremely rapidly. According to analysis for the existing SRS extraction facility, it is possible for the high temperature resulting from excessive water to lead to a reaction of uranium with the stainless steel of the bed container forming a weak spot in the wall of the bed container. The existing SRS extraction facility utilizes a water trap as well as an interlock to isolate the bed inlet valve at high temperature and prevent water from entering the bed.

Eliminating the requirement to extract tritium from damaged rods (filled with water) is manifest as a reduction in the facility's capacity, rather than ability, to handle water vapor in the extraction gas stream. Reducing the facility's capacity is achieved by reducing the number of uranium beds and zeolyte beds. As such, the facility should be able to handle water-filled rods which go undetected, but at the expense of throughput.

In summary, failure rates of the tritium target rods will likely be small, but a failed, waterlogged tritium target rod would probably not be detected. The extraction system should be capable of dealing with the high moisture from a damaged rod, similar to the current extraction system at SRS, but the scope reduction in the number of uranium and zeolite beds will undoubtably increase the recovery time following inadvertent extraction of a damaged rod.