

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 25, 2003

**MEMORANDUM FOR:** J. Kent Fortenberry, Technical Director  
J. J. McConnell, Deputy Technical Director  
**FROM:** R. T. Davis/ T. D. Burns  
**SUBJECT:** SRS Report for Week Ending July 25, 2003

**RBOF Activities:** Late last week, while repackaging the last of the Heavy Water Components Test Reactor (HWCTR) fuel for consolidation into L-Basin (9<sup>th</sup> of 9 over-packs), a significant amount of activity from degraded fuel was released into the RBOF basin. HWCTR fuel rods are comprised of a depleted uranium metal (sometimes alloyed with zirconium) fuel core and a zirconium alloy cladding. After their original irradiation during the time period between 1958 and 1961, they were destructively examined. The destructive examination involved sectioning of the fuel and thus compromised the fuel cladding. The sectioned fuel rods were placed in aluminum cans (Z-cans) to preclude discharge of activity from spent fuel oxidation products to the P and R basins where they were stored from 1961 to 1969. The lack of chemistry control in P and R basins during this time period led to corrosion of the Z-cans and necessitated over-packing. The Z-cans were placed into sealed A-5 over-packs and placed in the chemistry controlled RBOF basin for indefinite storage. Recent consolidation efforts require that the Z-cans be removed from the A-5's and repackaged into L-Basin compatible over-packs.

While removing Z-cans from the last A-5 container, operators observed that swelling due to oxidation of the HWCTR fuel had split open the Z-cans and allowed free release of the oxidation products into the basin. Subsequent basin water activity readings confirmed the release. The failed Z-cans were repackaged into the L-Basin compatible over-packs. The increased activity in the basin, though significant, did not exceed the safety envelope outlined in the RBOF authorization basis. Further, criticality implications of the release are minimal owing to the fact that the fuel is depleted uranium. However, the increased radio-nuclide inventory may complicate future efforts to deactivate RBOF and downgrade it to a radiological facility. WSRC is currently evaluating what, if any, additional cleaning may be required.

**HB-Line:** On Wednesday, operators in HB-Line inadvertently transferred resin from the NK-3 column to the Chemical Resin Makeup Tank in the cold feeds area. Operators were attempting to transfer resin to the Resin Catch Tank; however, a 3-way valve was mispositioned causing the inadvertent transfer. A field operator identified a level increase in the makeup tank and the first line supervisor subsequently stopped the transfer. The procedure was suspended and the cold feeds area was posted as a contamination and airborne radiation area.

WSRC estimates that the NK-3 tank contained approximately 55 grams of plutonium; however, only a limited amount of material was transferred to the makeup tank. Engineering analysis of the material in the makeup tank indicates that no criticality concern exists. In addition, WSRC analysis indicates that the time to the lower flammability limit is over 18 days. An engineering path forward is being developed to transfer the remaining material in NK-3 to the resin catch tank and to flush material in the makeup tank.

In early July, a similar inadvertent transfer occurred in HB-Line because of a mispositioned 3-way valve. In both cases, operators positioned the valves in the opposite direction. Based on these events, WSRC is reviewing all 3-way valves in HB-Line to ensure procedures are adequate. Engineering controls (e.g., locking valves in the appropriate position) will be implemented when possible. In addition, WSRC is developing training for operators on proper operation of these valves. Independent verification of valve position has also been implemented.