

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 6, 2002

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 December 6, 2002

Staff Activities: Staff members D. Nichols, J. Contardi, and V. Anderson were on-site this week. Dr. Nichols reviewed the status of current operations in the Tritium Facilities as well as safety bases and start-up plans for future tritium activities. Mr. Contardi and Ms. Anderson observed readiness assessment evolutions for the Highly Enriched Uranium (HEU) Blend Down project.

Americium/Curium: Preliminary SRTC analyses of simulant flow degradation focused on elevated temperature and extended agitation as the likely causes; however, initial tests were unable to reproduce the problems observed in the original F-Canyon simulant material (site rep weekly 11/5/02). Subsequent analyses have provided a more thorough understanding of simulant rheology and demonstrated that the flow degradation observed in F-Canyon was primarily due to over-concentration of depleted uranium (DU) precipitate.

Recent SRTC testing has demonstrated that slurries of depleted uranium will experience sharp flow rate decreases once a threshold solids concentration is reached. The threshold solids concentration is a function of particle size (smaller particles yield lower threshold concentrations) which is in turn a function of the neutralization rate of the slurry (slower neutralization yields smaller particles). The threshold concentration was also shown to increase as the fraction of non-DU solids in the precipitate increased.

The threshold solids concentration for the F-Canyon simulant was determined to be approximately 3 wt%. During the first cold run, this simulant was inadvertently concentrated to over 4 wt% due to a steam leak which has subsequently been repaired. To preclude future flow-rate problems through the waste header, a solids concentration limit of 3 wt% will be enforced for both the cold run next week and the actual Americium/Curium (Am/Cm) transfer in early-January. This limit is considered conservative for the actual Am/Cm transfer as the slurry will have a larger fraction of non-DU solids in the precipitate. Despite the increased confidence in preventing header flow problems, the capability to flush the waste header during transfers will continue to be implemented as a contingency measure. In addition, a second dip-tube level indicator will be added to address concerns about the reliability of instrumentation used to monitor waste header flow.

HEU Blend Down: Highly Enriched Uranium Blend Down operations will be initiated in three phases. The first phase covers the transfer of blend grade HEU to HA-Line Tank E4-2. The Readiness Assessment (RA) for this phase was completed in October 2002. The first transfer of HEU is expected to occur next week after additional vessel and transfer route flushing is complete (site rep weekly 11/29/02). The second phase of this project includes blending HEU with natural uranium to produce Low Enriched Uranium (LEU) that meets the Tennessee Valley Authority purity specifications. Staff members J. Contardi and V. Anderson were on-site this week to observe RA activities for the second phase, which started this week. Procedure adequacy and operator performance were much better than during the first RA (site rep weekly 10/11/02). Field activities for the RA are complete and findings and observations are being developed. A DOE-SR oversight team also observed activities during the RA. The final phase of the project will include loading LEU into the transport containers for shipment to the TVA vendor. DOE-SR plans to perform an independent RA for this phase of the project.