

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 10, 1999

TO: G.W. Cunningham, Technical Director
FROM: Paul F. Gubanc and David T. Moyle, Oak Ridge Site Representatives
SUBJ: Activity Report for Week Ending December 10, 1999

Technical Director Woody Cunningham was at Y-12 on Thursday in response to the chemical explosion that occurred in building 9201-5 on December 8, 1999. Staff member Joel Blackman was in Oak Ridge on Thursday for a 50% design review of a transuranic waste processing facility.

A. Chemical Explosion in Building 9201-5: Building 9201-5 houses an arc-melt process for depleted uranium. One step of the process occurs in a furnace which melts the metal into a large copper crucible. The crucible is cooled with a liquid metal eutectic called NaK which is 22% sodium and 78% potassium. NaK remains liquid between 9 and 1445 °F, and is a very effective coolant for this operation. Unfortunately, NaK is also very reactive with air and water and must be handled carefully.

Last week, when operators were preparing to replace the crucible, some NaK spilled from the chamber surrounding the crucible and into the furnace enclosure. This week, recovery efforts were underway to remove the spilled NaK from the furnace. At approximately 9:30 Wednesday morning, during this recovery operation, an explosion occurred which resulted in three injured workers being admitted to the hospital. The site acted quickly to respond to the 911 call, remove injured workers from the facility, and transport them to the hospital. In response to the accident, three entries were made to verify that the situation was stable and to obtain video footage of the scene.

The type A investigation team lead by David Stadler from DOE headquarters arrived Friday afternoon. Mr. Gubanc joined the investigation team on an entry into the 9201-5 building late Friday to inspect the accident scene. As the accident investigation progresses we will be particularly interested in understanding the role of job hazard analyses and chemical safety in job planning.

Details are still dynamic, and the exact cause of the explosion is unknown. Pure NaK can react with either water (liberating hydrogen) or air. These reactions can produce potassium superoxide (KO_2) which may decompose violently, particularly if exposed to hydrocarbons (mineral oil was used to wash down the furnace walls during the NaK cleanup operation). Additionally, argon was used to inert the furnace during this operation, but it is not clear yet how pure the argon atmosphere was. While the current situation is believed to be stable, recovery from this incident may be complicated by the presence of NaK, mineral oil, and byproduct compounds remaining in the furnace. (1-C)

B. Enriched Uranium Operations (EUO): The new EUO vice president, Harold Conner, is still creating his management structure. To date, several key positions essential to the success of EUO are undetermined. Both Dave Beck and Bob DeGrasse from DOE headquarters will be at Y-12 on December 17 to discuss the EUO schedule. LMES expects to present three different potential paths forward and a preferred alternative. These include 1) complete restart of all Phase B processes, 2) start up focused on solutions processing and completion of an inventory, or 3) startup focused on metal production (including the HF system) to support national security needs. We will be examining these alternatives for their relative impact on safety. (2-A)

cc: Board Members