

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

June 23, 2000

TO: K. Fortenberry, Technical Director

FROM: M. Sautman and S. Stokes, Hanford Site Representatives

SUBJ: Activity Report for the Week Ending June 23, 2000

A. Plutonium Finishing Plant (PFP): PFP has completed thermally stabilizing 5 plutonium metal items and removing excessive corrosion products and recanning an additional 8 items. This completes the disposition of the higher risk items with excessive weight gains or which were believed to be packaged in direct contact with plastic. An additional 20 items will continue to undergo enhanced surveillance until the bagless transfer system (BTS) begins to operate later this year. The first BTS has arrived and the site rep observed a test run which went well.

During the last two weeks, an additional three plutonium metal ingots oxidized when they were exposed to air in preparation for thermal stabilization or recanning. Each of these reactions involved items with excessive weight gains, including the item whose inner can had been breached (see April 21 report). The oxidation reactions, which can last several hours, cause the metal to glow like charcoal and to spark. A small amount of plutonium metal melted during one reaction and a few small pieces of plastic ignited during another. Plutonium hydride is believed to have been present and driven the reaction, especially for one item which reacted until it was completely oxidized. The source of the hydrogen is likely due to radiolysis of the plastic bag surrounding the 2nd innermost can. The item that completely oxidized not only had the highest weight gain (40.9 g), but its plastic bag had degraded to a fine, black powder. Radiolysis of this plastic bag may have contributed to the severe corrosion of the cans that used to surround the plastic bag. The tomato can had been breached in several locations due to pitting corrosion while the slip lid can had extensive general corrosion. Operators kept each reaction under control and there has reportedly been no damage to the trays and cans used to contain the reaction. It is anticipated that future reactions will occur during upcoming repackaging efforts, but the 13 items handled so far are believed to be the worst ones due to their weight gains. (3-A)

B. Spent Nuclear Fuel Project. Testing of the Integrated Water Treatment system (IWTS) in automatic mode was successfully conducted this past week. However, additional leaks in the underwater hose connections were experienced. This has driven further engineering evaluation of the flexible hose/pump connection. At the Site Representative's suggestion, SNFP is reviewing with CH2MHill Hanford Group their lessons learned from the successful use of flexible hoses in the SY-101 transfers and the flexible hose design to be used in the upcoming transfers from S and SX farms for interim stabilization purposes.

After review of the history of the flexible hose leaks associated with the Integrated Water Treatment System it is clear that poor engineering, specifically, poorly development of engineering specifications and the lack of credible design reviews resulted in the selection and installation of the inappropriate hose on the ion exchange filters. These mistakes originally occurred during the design and build stage of the project however, on two separate occasions

during construction of the system, opportunities were missed by construction engineering to correct the original mistake. In practice, this type of error is likely to occur again unless future design and build contracts address the quality of engineering specifications and insist upon adequate design reviews. Additionally, the engineering culture here at Hanford is not sufficiently mature to overcome these types of problems especially if they develop early in the design process. For example, during discussions with SNFP engineering personnel to understand how the above situation occurred and the mistake perpetuated, it was stated that equipment specifications are not questioned once developed by the design engineer even in this case where multiple engineering changes involved this hose design. (1-C)

cc: Board members