Spent Fuel and Waste Management Activities For the Cleanout of the 105F Fuel Storage Basin at HANFORD

Mark R. Morton, Tomas J. Rodovsky, Sun Kee Lee*
Polestar Applied Technology Inc., 601 Williams BLVD, Suite 3A, Richland, Washington, USA
*Hyundai Engineering Company Ltd., Mok-dong, Yangcheon-gu, Seoul, Korea
MMORTON@POLESTAR.COM

Abstract

Cleanout of the F Reactor Fuel Storage Basin (FSB) is an element of the FSB decontamination and decommissioning (D&D) and is required to complete interim safe storage (ISS) of the F Reactor. Following reactor shutdown and in preparation for a deactivation layaway action in 1970, the water level in the FReactor FSB was reduced to approximately 0.6 m (2 ft) over the floor. Basin components and other miscellaneous items were left or placed in the FSB. The item placement was performed with a sense of finality, and no attempt was made to place the items in an orderly manner. The F Reactor FSB was then filled to grade level with 6(20of local surface material (essentially a fine sand).

The reactor FSB backfill cleanout has the potential of having to remove spent nuclear fuel (SNF) that may have been left unintentionally. Based on previous cleanout of six water-filled FSBs with similar designs (i.e., the B, C, D, and DR FSBs in the 1980's), it was estimated that up to five SNF elements could be discovered in the F FSB (1). In reality about 17 full SNF elements were found in the excavation.

This paper covers the technical and programmatic challenges of performing this decommissioning effort with some of the controls used for SNF management. The paper also will highlight how many various technologies were married into a complete package to address the issue at hand and show how no one tools could complete the job, but combined, good progress is being made.

Introduction

Cleanout of the F Reactor Fuel Storage Basin (FSB) is an element of the FSB decontamination and decommissioning and is required to complete interim safe storage (ISS) of the F Reactor. Following reactor shutdown and in preparation for a deactivation layaway action in 1970, the water level in the FReactor FSB wasreduced to approximately 0.6 m (2 ft) over the floor. Basin components and other miscellaneous items were left or placed in the FSB. The item placement was performed with a sense of finality, and no attempt was made to place the items in an orderly manner. The F Reactor FSB was then filled to grade level with 6(20of local surface material (essentially a fine sand).

This paper describes the process used to locate and remove any SNF that is discovered during cleanout of the FFSB for placement in safe, compliant storage at the 105-K Fuel Storage Basins (K Basins). In addition, the characterization, removal and disposition of the fill material, contaminated and activated metal items found in the basin and disposed of at the Environmental Restoration Disposal Facility (ERDF) will also be covered.

To meet retrievability capabilities, SNF is defined (2) as pieces of fuel confirmed in accordance with project procedures and greater than or equal to a 2.5-cm (1long by 3.8(1.5ameter fragment. The portable Universal Radiation Spectrum Analyzer (URSA) which is a gamma spectrum multi-channel analyzer (MCA) is used to

provide information on types and amounts of radioactive material which will identify irradiated SNF. Pieces with dimensions less than those defined above for SNF will contain less than 0.5 g of plutonium-239 fissionable material and will be handled as non-SNF radioactive waste and properly packaged for disposal (4).

conclusions

The F FSB offered many unique challenges and the work, although slow at times, was completed in a safe manner. The level of unknowns was reduced every day as more experience was gained in the search and recovery of SNF and the segregation and packaging of the activated metal and sludge that remained. This project exemplifies the need for a good plan and the ability to make many and rapid mid course corrections while the work proceeds. The flowcharting of the various steps and decision making processes could have been the biggest single item that has contributed to the success of communicating, training, approving and performing this complex work scope.