

Transuranic Waste Assaying at Hanford's Waste Receiving and Process Facility

MG. Cantaloub, LF Wardrobe and TJ Southworth. WRAP Facility MSIN T4-52, Fluor Hanford, PO Box 1000, Richland WA 99352

The Waste Receiving and Processing Facility (WRAP) facility located on the Department of Energy's Hanford Site, is a key link in the certification of transuranic (TRU) waste for shipment and disposal at the Waste Isolation Pilot Plant (WIPP). Waste characterization, verification and packaging are all performed at the facility. Nondestructive assay (NDA) measurements of TRU waste containers is one of the two primary methods for waste characterization. The WRAP utilizes two NDA techniques: gamma energy analysis (GEA) and passive/active neutron measurement (IPAN). Both techniques Pu

GEA is performed in one of two Canberra designed vaults capable of accepting 55 and 85-gallon containers. The vault contains six HPGe coaxial detectors: four segmented detectors (SEGe) for direct activity quantification and two low energy detectors (LEGe) for acquiring Pu/Am isotopic ratios. A typical assay sequence involves moving the waste container thru three positions while it rotating at ~ 6 rpm. Two measurements are performed at each platform position. The passive assay is typical gamma spectroscopy while during the active assay, the waste container is exposed to four Eu-152 sources. The sources are positioned directly across from each of the SEGe detectors. Attenuation of the Eu-152's signal provides matrix attenuation correction for the SEGe signal over a full energy range. The drum is rotated at approximately 6 rpm during the entire assay.

NDA characterization with the IPAN units is also a 'two-pass' process. During the first pass or active measurement, the waste container is interrogated by a thermal neutron flux originating from deuterium-tritium fusion. Passive neutron looks for spontaneous fission neutron of the even transuranic isotopes (i.e Pu-240, Cf-252). The thermal induced fission neutrons are reported as an equivalent Pu-239 value while the passive mode produces a Pu-240 equivalent value. The remaining suite of Pu/Am nuclides is derived from isotopic data.

The WRAP facility recently completed over one year of assays in support of WIPP waste characterization. During this time, over 1500 assays were performed on a heterogeneous debris waste stream originating from Hanford's Plutonium Finishing Plant (PFP).