Minimum Beryllium TQ (Metal or Oxide) for a Low Chemical Hazard Categorization at MDA-B

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During excavation of a 1940's landfill, Material Disposal Area (MDA) B, that had received hazardous and radiological contamination, on February 22, 2011, operators excavating a trench (15 ft W x 15 ft deep) in Enclosure #9 observed a significant quantity of Beryllium (Be) in 16 glass (mason) jars. A conservative estimate of 20 lb was used as a bounding amount to evaluate the impact of the discovery on MDA B's chemical hazard categorization (CHC). MDA-B was categorized as a Low CHC, based on 170 chemicals, including one lb of Be inventory. At LANL, a facility is considered to be a **Low** hazard, if the chemical quantity, based on consequences, is below the PAC-3 TQ at 100 m, a **Moderate** if the quantity exceeds the PAC-3 TQ at 100 m, and a **High** if the quantity exceeds the PAC-3 TQ for the public at the site boundary (SB). LANL justified adjusting the TQs for Be upward based on data summarized by Mishima et al that presented lower ARF/RF values for encased Be metal than those used earlier.

The SB distance is 20 m which presents a unique situation as compared to 100 m. The TQs of a chemical based on PAC-3 value at 20 m for the public are about 9 times lower than the TQs at 100 m. EPIcode, an approved code in DOE "Toolbox", was used for spill, fire, and explosion scenarios to evaluate consequences assuming 90% Be metal and 10% BeO as conservative. Due to the about two order of magnitude difference between the ERPG-3 values for Be oxide (11.1 mg/m^3) and Be metal (0.1 mg/m^3) in the TQ for determining a High (public) or Moderate (100 m) CHC, a parametric analysis was performed for each form of material varying from no oxide to 100% oxide up to no metal to 100% metal. An Explosion (6 lb TNT) was determined to be the bounding scenario limiting MAR, because of its high ARF/RF.

Using a hazard index (HI) approach, results show that 100% Be metal yield a TQ of 32 lb and 100 % BeO yield TQ of 50 lb to maintain a Low CHC. Other % distributions of Be metal and oxide lie in between. The Low CHC was also verified by evaluating an aircraft crash impact plus fire. NNSA/LASO approved new limit of 32 lb for Be metal. This exercise provides important information in establishing an operational procedure to limit the amount that can be exposed in future excavation in order to maintain Low CHC. The findings and results from modeling will be presented at the meeting.