Development of a Safety Analysis
For the
Los Alamos National Laboratory Beryllium Technology Facility

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Jerry Bueck
Los Alamos National Laboratory
PO Box 1663, MS K489
Los Alamos, NM 87544
(505)667-1273
jbueck@lanl.gov

Los Alamos National Laboratory refurbished an existing industrial facility to house a state-of-the-art facility for consolidation of much of the research activities involving beryllium. During the course of this development the hazard classification of the facility was incrementally changed from industrial, to low, to moderate, and now perhaps high. The safety analysis process that accompanied the development was impacted by the changes in classification and DOE expectation.

As a significant non-nuclear facility, the Beryllium Technology Facility (BTF) posed interesting challenges for its safety analysis. Key to this challenge is the nature of the hazard, beryllium powder. Chronic beryllium disease is a non-recoverable illness leading to significant consequence including untimely death. DOE has established new expectations for beryllium safety including significantly reduced permissible occupational exposures. However, the analysis of upsets and accidents usually focuses in acute exposures that occur infrequently. Beryllium does not have an established "dose" based consequence as the worst case consequence is historically a chronic worker exposure problem.

How then are accidents assessed to determine the consequence of the event and the relative importance or worth of the controls? The lack of a dose metric makes it difficult to classify the effectiveness of control or to select those operations that pose the most significant potential for unwanted physical consequences. As concentrations of only milligrams per cubic meter exceed allowable exposures, it takes only grams of beryllium powder to produce these results. Consequently, the quantity of beryllium powder is a small driver in analyzing the conditions of interest.

Furthermore, the BTF is in the process of development and processes are not defined in detail. Most processes to be transferred to the BTF are currently performed in the DOE complex, with many of them presently operational at LANL. This results in a less rigorous analysis process than is possible for an existing facility as failures and errors are difficult to postulate except in gross terms. Such lack of detail is a difficult proposition for development of an authorization basis and has posed problems for both the Laboratory and DOE in their review processes.

The approach taken to identify key controls, establish objectives, and guide planning for safe operations provides some insight into the new problems that might be posed as we attempt to apply nuclear based analytical expectations to significant non-nuclear facilities.