

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 27, 2012

**MEMORANDUM FOR:** Timothy Dwyer, Technical Director  
**FROM:** Jonathan Plaue, DNFSB Site Representative  
**SUBJECT:** LLNL Activity Report for Week Ending April 27, 2012

**Plutonium Facility:** For several months, Livermore Site Office (LSO) personnel have been discussing the adequacy of the safety basis for the HYDOX process (see weekly report dated December 9, 2011). This new process converts plutonium metal to oxide using hydride and nitride intermediates. The process is conducted using two different process vessels: (1) plutonium metal is converted to hydride and then nitride in the first vessel (known as the hydride/nitride furnace) and (2) the plutonium nitride is transferred to a pulsed bed reactor where supplies of pure oxygen and nitrogen gases are mixed and used for conversion to plutonium oxide (known as the oxidation furnace). Until this week, no credited controls were associated with the oxidation furnace. Furthermore, no hazard event scenarios explicitly and directly examined credible upsets for this furnace. For example, in the Site Representative's opinion, human error could result in the inadvertent introduction of plutonium hydride into the oxidation furnace or mechanical issues with a mass flow controller could result in the introduction of pure oxygen instead of the intended lean mixture. Either case could lead to an exothermic reaction that the furnace vessel had not been analyzed or otherwise demonstrated to withstand.

This week, LSO personnel determined and clarified in an email that an existing Specific Administrative Control applied to the HYDOX furnace. The control states, "Except for the MCG HYDRIDE/NITRIDE furnace, process vessels with the potential to generate ignitable mixtures of hydrogen shall only be connected to oxygen sources 4 % or less oxygen by volume." Previously, the contractor interpreted this control as inapplicable to the oxidation furnace. LSO and the contractor are now determining whether any changes are necessary to the plan of action for the readiness assessment, which is awaiting LSO approval.

**Training:** During follow-up discussions, the laboratory contractor indicated that a requirement existed for responsible individuals that conduct training on Operational Safety Plans (OSPs) to complete instructor training, contrary to what was previously reported by the Site Representative (see weekly report dated March 30, 2012). The requirement exists in the latest version of the *OSP Development and Implementation Guide* and is contained in the responsibilities portion of the document. Training office personnel confirmed that this requirement was not currently institutionalized as part of the laboratory's training needs identification software known as LTRAIN. Based on this information, training personnel indicated that they would pursue an update to LTRAIN. More broadly, complete implementation of other requirements in the *OSP Development and Implementation Guide* would likely resolve many of the other issues underlying the observations in the cited report. Separately, the training subject matter expert for LSO initiated a review of OSP training with observation of two training sessions conducted on Friday.