

Selected Examples of Federal Identification of Issues Missed by Contractor Personnel

National Nuclear Security Administration Sites

The Board sent letters to Ambassador Brooks (April 4, 2003) and Dr. Beckner (July 9, 2003) regarding implementation of Department of Energy (DOE) Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, at National Nuclear Security Administration (NNSA) sites. In the resulting reviews, four of the eight NNSA sites were found to have inadequate training and qualification programs.

Y-12 National Security Complex

Conduct of operations performance at Y-12 National Security Complex (Y-12) has been of concern to the Board for several years. Y-12 Site Office (YSO) intervened to correct the failing trend in the contractor conduct of operations program in mid-July 2003, when the monthly review of performance (June) was red-flagged. The basis for this rating was a significant number of field reviews and observations provided by YSO Facility Representatives and YSO subject matter experts. The unsatisfactory rating continued through July to October.

A NNSA YSO Facility Representative found evidence of hundreds of inadequate welds site-wide. As stated in the Board's August 24, 1998, letter: "The Board would like to take this opportunity to commend the efforts of YSO Facility Representative, Michael Glasman, in taking the initiative to perform the inspection that initially identified the welding problems with the HF [hydrogen fluoride] system. The Board considers his efforts to be an example of the benefits of the YSO upgrading of personnel competence and capabilities during the past several years."

In August 2003, a YSO Facility Representative determined that the minimum staffing levels required by the safety basis had not been met during a fissile material handling activity in Building 9720-5. One individual served as both the required shift manager and the required shift supervisor, and only one material clerk who was fully certified for Warehouse operations was present out of two clerks required (other material clerks present were not yet certified for that facility). BWXT reported this occurrence as a safety basis violation.

In late 2002, YSO Facility Representative intervention was required to ensure that BWXT personnel in Building 9212 at Y-12 accounted for the fire system gauge inaccuracy for safety class and safety significant fire system pressure surveillances. BWXT personnel had not been accounting for fire system gauge accuracy when checking minimum fire suppression system pressure. A similar problem was noted in Building 9204-4 in April 2003 by another YSO Facility Representative.

In June 2003, the Board's staff reviewed the work planning for a maintenance evolution on a 150-Ton Press in Building 9212 at Y-12. The review revealed that the Y-12 screening protocol

was deficient for determining whether to perform a formal activity hazard analysis (Job Hazard Analysis). The Y-12 protocol employed a series of questions, many of which do not directly deal with the hazard level of the work or consider the non-routine versus routine nature of the work. Those questions that did directly deal with hazards of the work scope established an inappropriately high threshold hazard level, below which no formal activity hazard analysis was required.

The Board's staff identified inadequate long-term storage conditions for pyrophoric depleted uranium chips in Building 9204-4 at Y-12.

In June 2003, the Board's staff noted the substantial amount of combustible, excess/unnecessary materials in several sections of the E-Wing basement area of Building 9212 at Y-12 containing a significant number of mechanical and electrical equipment. Combustible materials (i.e., piles of trash) were noted directly in front of an electrical control panel. A review of the three most recent BWXT monthly fire safety inspection reports indicated that such conditions had been noted, but no corrective action was apparent. Corrective actions have been taken since the Board's staff review.

In October 2003, the Board's staff identified issues with the work planning effort to vent unvented drums containing depleted uranium chips with a remotely-operated brass punch, in Building 9204-4. Specifically:

- (1) BWXT Y-12 had not obtained the results of the investigation of an August occurrence involving a deflagration in the head-space of a transuranic waste drum being vented at the Idaho National Engineering and Environmental Laboratory. (Subsequently, BWXT decided to incorporate certain recommended controls to electrically ground the drums and have fire department personnel on-scene for quick response.)
- (2) The activity was inappropriately screened from evaluation under the Unreviewed Safety Question Determination (USQD) process.
- (3) The approved job hazard analysis for the chip disposition activities was deficient.

Pantex Plant

In January, 2003, a hoist malfunction occurred at the Pantex Plant during nuclear explosive operations. The Pantex Site Office intervened to prevent the contractor from resuming operations prior to conducting a root cause analysis of the event. It was eventually discovered that the repair effected by the contractor did not address the root cause of the failure, which was tied to a deficiency known to the manufacturer and identified to all purchasers.

During a review by the Board's staff in March 2003, BWXT Pantex were not aware of the significant risks and potential safety issues associated with a planned computerized nuclear explosive procedure system because the software development process did not conform to industry standards. Seven months later, BWXT Pantex is performing a failure modes and effect analysis (FMEA) on the system and has identified the need for independent software peer

reviews and potentially necessary in design changes.

Neither NNSA nor BWXT Pantex were willing to acknowledge the safety inadequacies in the implementation of the computer program that controls nuclear explosive and high explosive material called “Move Right,” until the Board’s staff performed a review in March 2003.

Lawrence Livermore National Laboratory

In 2001, Lawrence Livermore National Laboratory (LLNL) submitted a Safety Analysis Report (SAR) for Building 251. The Livermore Site Office (LSO) reviewed the SAR and found it was inadequate in terms of identification of safety systems. Despite technical interactions between LLNL and LSO, the final SAR submitted by LLNL was still inadequate. Therefore, LSO had to direct LLNL (in the Safety Evaluation Report) to add three additional safety systems: the Underground Storage Vaults, the Continuous Air Monitors, and the Mosler Safes.

Inoperable ventilation equipment in the Building 231 Vault at LLNL was not evaluated using the required USQ process. Despite LLNL’s knowledge of inoperable safety significant ventilation equipment, LLNL facility management did not understand their responsibility to evaluate the condition using the USQ process. LSO had to instruct facility management in the application and use of the USQ process.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) submitted and NNSA approved the Probabilistic Hazard Analysis for the Pu-238 Scrap Recovery Line. The Board identified several significant safety issues with the LANL scrap recovery line: (1) inadequate controls on radiation dose to prevent degradation or ion exchange resin; and (2) lack of evaluation of safety implications of reformulation of ion exchange resin. The Board has intervened (letters of April 23, 2002, July 1, 2002, and August 1, 2003) to ensure Los Alamos Site Office (LASO) does not allow the contractor to start the ²³⁸Pu Aqueous Scrap Recovery Line with inadequate hazard controls.

In late September 2003, LASO communicated to LANL that immediate action was required to address a continuing trend of significant worker safety incidents. In response, LANL, with LASO participation, initiated an intense one-month effort to develop effective interim work control improvements. In November, LANL began a phased implementation, to be completed in two-to-three months. Also in November, LASO increased their level of participation by providing LASO Facility Representatives as members of six LANL teams that are deployed to the facilities and assisting in implementation. LASO is continuing to assist LANL in the development of longer-term improvements that will factor in lessons learned from this effort.

In August 2003, LANL had a Pu-238 release and personnel uptake event in the Plutonium Facility (TA-55). Based on the initial estimated doses, LASO initiated a Type B accident investigation per the DOE Orders. In mid-investigation, the NNSA Type B accident

investigation team identified to LANL senior management safety issues with the residue/waste storage containers being used. As a result, LANL curtailed Pu-238 operations that generate residues and wastes until these issues can be resolved. At the conclusion of the investigation, the NNSA Type B accident investigation team identified several deficiencies in LANL abilities to conduct self-assessments and implement previously identified corrective actions and in NNSA abilities to conduct effective federal oversight.

In July 2003, the Board identified to NNSA and LANL that new temperature-based scrams under design for the Critical Experiments Facility (TA-18) were designated as Safety Class (i.e., important to public safety) but had not undergone independent design reviews nor been shown to be able to perform the safety function with high confidence. As of mid-November, LANL had nearly completed installation of the new temperature scram systems in two of five assemblies but still had not performed independent design reviews. At that time, the NNSA Site Office began action to launch an NNSA independent design review of the first two systems.

Rocky Flats Environmental Technology Site

It was a Rocky Flats Environmental Technology Site (RFETS) Facility Representative who first reported the defacing of Building 771 high efficiency particulate air (HEPA) filters in May 2003.

In February 2001 at RFETS Building 707, unusual glovebox pressure fluctuations were observed during thermal stabilization of plutonium-bearing residue (to prepare the material for short-term storage). The Board's staff identified to DOE Rocky Flats Field Office (DOE-RFFO) and the contractor that an authorization basis safety control to characterize feed material for reactive constituents to avoid an over-pressurization or explosion was not being implemented for the operation and several failures in safety management were evident. Several corrective actions were forthcoming by DOE-RFFO and the contractor.

Savannah River Site

WSRC proposed a change that would downgrade the hazard category of Saltstone Facility from Hazard Category-3, which requires a documented safety analysis (DSA), to a radiological facility that does not require a DSA. DOE line management concurred with the change and sent the downgrade proposal to the Site Manager for approval. This proposal would have been approved if the Board's staff had not identified that the technical basis for the downgrade was not consistent with the applicable DOE requirements.

In Spring 2003, Westinghouse Savannah River Company (WSRC) proposed to air sparge the Defense Waste Processing Facility (DWPF) Slurry Mix Evaporator tank to remove frit that was impeding operations. Site Office High Level Waste Engineering personnel intervened when they discovered that WSRC intended to start the air flow before the sparge assembly was submerged, which would cause a significant aerosol hazard.

Hanford Site

In May 2003, the DOE Richland Operations Office (DOE-RL) Oversight Division noted significant safety issues with the K-East Basin Sludge Water System design and safety basis documents. Examples included safety relief valves set at pressures above system design pressures; inadequate Unreviewed Safety Question (USQ) reviews; equipment designed, installed, and tested to parameters different than the construction specifications. DOE-RL has withdrawn approval of the authorization basis. The site contractor corrected and resubmitted the authorization basis, which has subsequently been approved by DOE-RL.

The Board's Hanford Site Representative reviewed an approved K-Basin Sludge Water System Authorization Basis and identified valves with the potential to bypass safety significant equipment that were not being adequately controlled. Additionally, the definition of the operability for a safety-significant Argon Inert Ventilation System was inadequate given the system design. The project was revised to include administrative controls for the valves, and the operability of the Argon Inert Ventilation System is being redefined.

Office of River Protection

Prior to the CH2MHill Hanford Group performing a radioactive waste transfer, an Office of River Protection Facility Representative identified that an engineering evaluation that allowed use of an increased tank waste level, above the maximum limit, should not have been approved. The engineering evaluation had analyzed the level increase based on the tank's structural integrity, but had not evaluated the impact of increased hydrogen gas concentration due to the decreased tank headspace volume, which would have violated the Technical Safety Requirement to maintain the tank headspace hydrogen gas concentration below flammability limits.

The Board sent a letter to DOE (March 7, 2003) identifying that the failure rates associated with modular cabling used in high radiation areas for the Office of River Protection's Waste Treatment Plant had not been technically justified in an adequate manner.

The Board's staff identified multiple errors in design basis event calculations for Waste Treatment Plant. Furthermore, the Board's staff identified that the published times to reach the lower flammability limit for nearly every tank were inaccurate. These issues led to extensive contractor assessments of the quality of their calculations.

In a letter of November 4, 2002, the Board identified that Bechtel National was using an older revision of a hydrogen generation model without accounting for temperature and chemistry changes that occur during processing at the Waste Treatment Plant. Bechtel National was also inappropriately using a model for how pulse jet mixers affect hydrogen gas retention. Bechtel National's current flooded column design for the cesium ion exchange column may be overwhelmed by the total gas volume being generated.

