

Site: Hanford Site**Subject:** Office of Enforcement and Oversight's Office of Safety and Emergency Management Evaluations Activity Report for Follow-up of Waste Treatment and Immobilization Plant Low Activity Waste Melter Process System Hazards Analysis Activity Review**Dates of Activity :** 03/18/13 - 03/21/13**Report Preparer:** James O. Low**Activity Description/Purpose:**

The Office of Health, Safety and Security (HSS) staff observed a limited portion of the restart of the Hazard Analysis (HA) for the Waste Treatment and Immobilization Plant (WTP) Low Activity Waste (LAW) Melter Process (LMP) System. The primary purpose of this HSS field activity, on March 18-21, 2013, was to observe and understand the revised approach implemented by Bechtel National, Inc. (BNI), the contractor responsible for the design and construction of WTP for the U.S. Department of Energy (DOE) Office of River Protection (ORP), to conduct system-by-system HAs as part of developing the Documented Safety Analysis (DSA) for the WTP LAW, Balance of Facility, and Analytical Laboratory (collectively known as "LBL") nuclear facilities. Another purpose of this HSS activity was to understand ORP's revised plan for LBL safety basis review and to scope the next potential HSS independent oversight activities relative to the development of the DSA for LBL facilities.

BNI paused in conducting system HAs on November 6, 2012, based on its evaluation of feedback on the adequacy of its HA methodology for the LMP system, including HSS observations and Opportunities for Improvement (OFIs) from a previous HSS field review (October 1-18, 2012) of the LMP system HA (Reference 1). BNI personnel indicated that the pause allowed BNI to improve the HA process and provide additional guidance to the HA teams. During the pause, BNI also made revisions to improve the consistency and quality of the documentation of HAs for several LBL systems (e.g., LAW Container Handling and Melter Feed Systems, and Analytical Laboratory Auto-sampling System) in the hazard evaluation database (URS Professional System LLC - INSIGHT).

BNI resumed the LMP system HA on March 13, 2013, introducing the Hazards and Operability (HAZOP) Analysis technique, rather than the What-If Analysis technique used previously.

Result:

Summarized below are the status of BNI's response to the HSS report (Reference 1), preliminary observations on BNI's implementation of the revised methodology for the LMP HA, and other highlights.

BNI has designated the LBL DSA Production Manager to develop a response to the HSS observations (Reference 1) on the LMP system HA performed in October 2012. ORP formally transmitted the HSS report to BNI on March 7, 2013 (Reference 2). The DSA Production Manager met with the HSS team to outline BNI's efforts during the pause in developing HAs. Copies of the key BNI briefings and training given to core HA team members prior to HA resumption were provided to the HSS team. The DSA Production Manager explained that a BNI disposition cross-walk to the methodology and technical issues identified in the HSS report was in development. Conceptually, BNI intends to address the HSS issues in two parts: (1) Address the HA methodology issues identified in the 11 OFIs within the next several weeks, and (2) address the approximately 30 technical issues once the LMP system HA has completed internal technical review, which is targeted for mid-June 2013.

Based on observation of part of the initial event identification phase of HAZOP Analysis, the HSS team notes that the process provides a systematic identification of LMP system process upsets and events that could lead to one or more of the pre-defined types of undesirable consequences (e.g., uncontrolled release of radiological or hazardous materials), and that should be evaluated in the subsequent hazard evaluation process. Due to schedule constraints, the HSS team did not observe the next phase of the HA process where each of the identified hazard events is evaluated to characterize the scenario parameters, such as likelihood (unmitigated and mitigated), consequences, and candidate controls.

Considering that the LMP system HA is BNI's first application of the HAZOP Analysis technique for developing the DSA for LBL facilities, this technique appears to present several challenges. In the closeout discussions with the HSS team, BNI indicated that it will pursue further HAZOP technique refinements and procedural updates and will formally revise the HA procedure and handbook to incorporate lessons learned from the LMP system HA. The challenges to establishing the revised HA methodology include the following:

- While the HA team leads have experience with HAZOPs, the core team members participating in the various HA teams have very limited training in this technique. (The BNI Safety Analysis Manager informed the HSS team that BNI is evaluating proposals by vendors offering formal training in the HAZOP Analysis technique.)
- BNI has not yet revised its HA procedure, handbook, or desk instruction to address the detailed HAZOP Analysis technique, since it will be customized and implemented for the HAs supporting the LBL DSA development.
- While the LMP system HA team is appropriately customizing the application of the HAZOP Analysis technique, it is not clear from a procedural perspective whether the modifications will be formalized, adopted for other HAs, or standardized for other LBL HAs. Some examples of the tools or methods that appeared to evolve during the LMP system HA include the adhoc team approach to defining the nodes and sub-nodes for identifying potential events; identifying the HAZOP guidewords for a particular sub-node using its system functions; and organizing the information developed from applying HAZOP guidewords into an informal Event Identification Table developed during team discussions.
- The level of preparation and participation of all team members in the HA team meeting sessions appeared to be inconsistent. The HA team meetings were dominated by discussions between the HA team lead and the melter design subject matter experts, but the interactions and contributions of other HA team core members generally were limited.
- The HA team discussions were not unduly constrained by time, but BNI's schedule for completing the HAs appears to be very optimistic; more time may be necessary to conduct the HA using the HAZOP Analysis technique in a technically defensible manner. For example, three weeks were allocated to the repeat of the LMP System HA, two of which were used for the hazard event identification for the normal operations mode and at least four additional weeks may be needed to conduct the subsequent hazard evaluation for the identified events. Additional hazard event identification and evaluation activities are planned for four other LMP modes: shutdown, idle, and startup; maintenance; installation and testing; and decontamination and decommissioning. Thus, the LMP system HA will require significantly more time than scheduled. Further, the LAW Melter Offgas system, which is significantly more complex, may be expected to require considerably more time than the LMP system HA, but is also allocated only three weeks.

The DOE/ORP Safety Basis Review Team is actively monitoring HA development and providing timely feedback to BNI on areas of potential concern related to the HA process and results for both LAW and Analytical Laboratory facilities (Ref. 3).

HSS Participants	References
1. (lead) James O. Low 2. Shivaji Seth 3. Robert Farrell	1. DOE/HQ HS-40 Letter, JS Boulden III to SL Samuelson, <i>Independent Oversight Review of the Hanford Site Waste Treatment & Immobilization Plant Low Activity Waste Melter Process System Hazard Analysis Activity</i> , dated 12/21/12.
	2. DOE/ORP Letter, WF Hamel to JM St. Julian, <i>Contract No. DE-AC27-01RV14136 – Transmittal of December 2012, Office of Health, Safety and Security Independent Review of the Hanford Site Waste Treatment & Immobilization Plant Low Activity Waste Melter Process System Hazard Analysis Activity</i> , dated 3/07/13.
	3. DOE/ORP Letter, WF Hamel to JM St. Julian, <i>Contract No. DE-AC27-01RV14136 – Evaluation by the US Department of Energy, Office of River Protection, Safety Basis Review Team of the Adequacy of the Waste Treatment and Immobilization Plant Low Activity Waste Facility and Analytical Laboratory Hazard Analysis Meetings</i> , 3/26/13.

Were there any items for HSS follow up? Yes No

HSS Follow Up Items

1. Review ORP/BNI response to HSS report (Ref. 1).
2. Review the Hazard Analysis Report appendix on the LMP system HA.
3. Observe additional HAs; e.g., LAW Offgas Systems.