

**Office of Enterprise Assessments  
Operational Awareness Record**

**Report Number:** EA-WTP-HLW-2015-02-02

**Site:** Hanford Site

**Subject:** Review of Waste Treatment and Immobilization Plant High Level Waste Facility Concentrate Receipt/Melter Feed/ Glass Formers Reagent Hazards Analysis Event Tables

**Dates of Activity:**

02/02/15 - 02/12/15

**Report Preparer:**

James O. Low

**Activity Description/Purpose:** Bechtel National, Incorporated (BNI) is implementing a Safety Basis Development Project Execution Plan (PEP) for the Waste Treatment and Immobilization Plant (WTP) High Level Waste (HLW) Facility (Ref. 1). The PEP provides a disciplined process to resolve technical issues, upgrade the HLW Facility preliminary documented safety analysis (PDSA), and begin aligning the safety basis with the ongoing engineering design. The PEP includes safety basis activities that are planned to be performed through fiscal year 2016, as aligned with the BNI engineering work scope. The hazard analysis (HA) activities for the HLW concentrate receipt process (HCP), HLW melter feed process (HFP), and glass formers reagent systems (GFR) are a resumption effort to support the HLW PDSA upgrade.

The Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), reviewed updated portions of the HCP/HFP/GFR HA event tables and met with BNI personnel to discuss their responses to EA comments. This EA operational awareness visit and draft document review is part of a planned multi-phase review (Ref. 2) for assessing the process and results of the HLW PDSA upgrade. EA's multi-phase review will evaluate select portions of the HLW PDSA upgrade, including system descriptions; hazards analysis; accident analysis; controls selection; and functional classification of safety structures, systems, and components.

**Result:**

During this visit, EA reviewed the completed HLW HA event tables (Ref. 3) related to the HLW HCP/HFP/GFR systems. The BNI HA team (HAT) used the "what-if" analysis methodology to identify potential hazard events and perform the analysis, dividing the system into five study nodes: external HCP transfer piping, GFR external to HLW, GFR internal to HLW, internal HCP transfer piping, and HFP (i.e., the internal HCP and HFP transfer piping, including jumpers between vessels, jumpers from the vessels to the melters, and HFP vessels). EA completed review of the draft HA event tables for the updated part of the internal HCP transfer piping (Node 4) and the HFP (Node 5).

As previously noted in EA reports (Refs. 4 & 5) for the HLW HA activities, the HCP/HFP/GFR HAT analysis focused on identifying and evaluating potential events (i.e., process upset conditions that lead to adverse consequences to facility workers, collocated workers, or the public). The HAT analyzed the hazard events based on unmitigated event sequences, which led the HAT to identify generally reasonable sets of causes and candidate controls for bounding HA events (exceptions are noted below).

EA provided comments on the HCP/HFP/GFR systems HA event tables to BNI for written response. After reviewing the BNI responses, EA met with BNI personnel to establish a mutual understanding of the responses, which led to their subsequent revision. The final BNI responses identified a number of actions to re-evaluate the HA event tables and resolve the EA comments (Ref. 6).

EA noted some positive aspects of the HLW HA process, specifically:

- What-if checklists were comprehensive in identifying potential events that were appropriate for the HA.
- The HAT systematically identified and analyzed the appropriate hazards in the draft HA event tables.

- None of the EA team comments are related to previously identify potential concerns.
- The EA team identified no new potential concerns.
- The EA team did not identify additional hazards that would need to be developed into new hazard events.

EA’s review of the HLW HCP/HFP/GFR hazard event tables identified some sporadic discrepancies that were communicated to BNI. These discrepancies are summarized as follows (the parenthetical entries relate to Ref. 6) :

- Some specified controls were ineffective for the identified safety function (comments 2 and 3).
- Some event descriptions lacked sufficient detail to clearly understand the application of the selected controls (comments 9, 10, 11, and 12).
- Two engineering controls (coaxial piping alarms and interlocks) were inconsistently applied to a number of events (comment 18).
- Some controls identified a safety function that was not clearly defined (comments 1, 4, and 17).
- Some events are missing potential candidate controls (comments 6 and 14).
- Some events underestimated the unmitigated radiological consequence to the collocated worker (comment 7).
- One candidate control had an assigned safety function that was not part of its design basis (comment 13).

BNI communicated to EA their intent to implement corrective actions.

EA Participants	References
1. James O. Low (lead)	1. BNI Document Number: 24590-HLW-PL-ENS-12-0001, Rev. 1, <i>Safety Basis Development Project Execution Plan for the High-Level Waste Facility</i> , June 2014
2. Kevin E. Bartling	2. DOE/HQ EA-31, <i>Plan for the Independent Oversight Review of the Hanford Site Waste Treatment Plant High-Level Waste Facility Preliminary Documented Safety Analysis Upgrade</i> , July 2014
3. Roy R. Hedtke	3. E-mail BSII eRoom, Oak Ridge <a href="mailto:s-er_okr@bechtel.com">s-er_okr@bechtel.com</a> to James Low, <i>LBL SBRT eRoom report, 23 Jan 15, 1/24/15 12:04 AM</i>
	4. DOE/HQ EA-31 Report Number: IEA-WTP-HLW-2014-08-18, <i>Operational Awareness Record for the Observation of Waste Treatment and Immobilization Plant High Level Waste Facility Radioactive Liquid Disposal (RLD) Hazards Analysis Activities</i>
	5. DOE/HQ EA-31 Report Number: EA-WTP-HLW-2014-10-20, <i>Observation of Waste Treatment and Immobilization Plant High Level Waste Facility Concentrate Receipt/Melter Feed/Glass Formers Reagent Hazards Analysis Activities and Review of the Radioactive Liquid Disposal Hazards Analysis Event Tables</i>
	6. E-mail Craig Martin (BNI) to James Low, RE: <i>Amended Comment Responses – HCP/HFP/GFR HA, 2/10/15 6:47 PM</i>

Were there any items for EA follow up?  Yes  No

1. Conduct an independent assessment of the final Hazard Analysis Report for the HCP/HFP/GFR systems to determine conformance to DOE-STD-3009 requirements.