

**Site:** Hanford Site - Office of River Protection (ORP)**Subject:** Office of Environment, Safety and Health Assessments Activity Report for the Informational Visit to the Waste Treatment and Immobilization Plant (WTP)**Dates of Activity :** April 2-10, 2014**Report Preparer:** Robert E. Farrell**Activity Description/Purpose:**

The Office of Independent Enterprise Assessments, Office of Environment, Safety and Health Assessments (Independent Oversight), conducted an informational visit to WTP to review the Bechtel National, Incorporated (BNI) response to Quality Assurance (QA) Program Effectiveness issues and to evaluate the status of the U.S. Department of Energy (DOE) ORP review of the High Level Waste (HLW) Facility heating, ventilation, and air conditioning (HVAC) systems.

**Result:****QUALITY ASSURANCE (QA) ISSUES**

Independent Oversight met with the ORP WTP Performance Assurance Manager and also with the ORP QA Division Director and members of the ORP QA Division. The ORP QA audit of BNI last summer identified two Priority Level 1 findings. The findings encompassed several previously identified issues concerning WTP QA:

- Issue one: Implementation of the BNI Corrective Action Program is not effective.
- Issue two: Implementation of the BNI QA program is not effective.

BNI responded with Corrective Action Plans (CAP) to both findings (CCN-261849, dated February 20, 2014, and CCN-265644, dated March 27, 2014, respectively).

ORP had comments with the CAP for the Corrective Action Program, and BNI must resubmit the CAP after making adjustments.

ORP made several comments on the draft CAP for QA Program Effectiveness. Once the ORP response is completed, BNI will be required to address the comments and resubmit the CAP.

BNI also submitted a Managed Improvement Plan for ORP review (CCN-262441, dated March 27, 2014). ORP has just begun reviewing that document.

ORP QA noted to BNI that the last time the BNI QA program was considered effective was in 2010. Per the proposed BNI CAP, their corrective actions addressing BNI QA Program Effectiveness will not be fully implemented until 2016. ORP QA has asked BNI to explain to ORP what methodology they propose to use to confirm the acceptability of WTP work performed between 2010 and 2016.

**HVAC SYSTEMS**

The DOE WTP Project HVAC Subject Matter Expert (SME) briefed Independent Oversight on the technical issues concerning the HLW HVAC systems. The processes in these facilities actively move and mix process fluids, and there is a potential for fluid spray leaks and aerosol releases to vent systems due to sparging. The Pre-treatment Facility (PTF) and HLW High Efficiency Particulate Air (HEPA) filters and associated fans have a credited active safety function to provide secondary confinement in those facilities. The HVAC HEPA filters and fans are credited with maintaining a negative pressure relative to ambient inside the facilities and purifying building air prior before it is released.

BNI is currently addressing issues which include: filter loading and plugging resulting from sparging in vessels, spray leaks, design basis seismic event, and ash fall. The requirement for the system to survive and function following a natural phenomena hazard (NPH) event includes continuing to operate when the ambient air is clouded with volcanic ash from Mount St. Helens, or following a seismic event, when several non-seismically rated pieces of equipment within the facility are presumed to fail and spill their contents, exacerbating HEPA loading. The primary stage HEPA filters cannot be rapidly changed during or following NPH events because they can only be changed remotely with a crane in order to minimize radiation dose. Complicating the ash fall solution is the need to provide clean intake air for air compressors serving vessel mixing needs, emergency turbine generators, and equipment cooling systems when the outside air is clouded with ash. BNI and the DOE project team are evaluating the possibility that HEPA filter loading due to NPH events will require additional filters exceeding the current facility's capacity.

The WTP project is testing prototype radial HEPA filters at the Mississippi State University Institute for Clean Energy Technology. Initial tests indicate that a filter redesign is required to obtain filters that will perform to facility design requirements. WTP plans to review tests on prototype filters from two competing manufacturers to find a filter that meets WTP system environmental requirements.

An additional issue currently under evaluation is chemical hazards to workers from off gas leaks. Of particular concern are hazards associated with ammonia and nitrogen oxides. One of several possible solutions currently under evaluation is separate, ventilated enclosures to protect personnel from process ammonia leaks.

Another significant problem facing the HVAC design is the requirement to demonstrate 99.99% efficiency for destruction and removal of organics from off gas. Demonstrating the 99.99% efficiency requires the off gas system to process higher concentrations of organics than will be contained in actual off gas during operation. However, processing gas containing sufficient organics to allow measurement of the required efficiency raises the temperature of the carbon filter beds to unsafe levels. The expected organic concentration in off gas during operation is 30 parts per million. The required concentration to allow a detectable downstream measurement, proving the mandated removal efficiency, is 10,000 parts per million.

The WTP SMEs identified problems with the HLW airlocks. Specifically, because of zone differential pressure and the in bleed assembly design, airlock egress doors require more opening force than the Life Safety Code allows. In addition, opening these doors may disrupt HVAC system operation.

Another issue under review is the pressure pulses within the pulse jet ventilation systems resulting from operation of the pulse jet mixing vessels. For some major components of the HLW Melter off gas system, the design margin is inadequate. Similar concerns have been identified in other areas of WTP. The DOE WTP project team continues to find lower level issues while working with BNI to resolve the identified major issues.

HSS Participants	References
1. Robert E. Farrell (lead)	

Were there any items for HSS follow up? Yes No

**HSS Follow Up Items**

1. Continue to follow resolution of HVAC design issues.
2. Continue to follow BNI response to QA Program Effectiveness issues.
3. Follow BNI implementation of Corrective Action Program.
4. Follow the HLW and PTF Authorization to Proceed processes to understand how the DOE WTP project mitigates risk while issues are resolved.