EA Operational Awareness Record	Report Number: OAR-EA-LAWPS-2017-02-13	
Site: Hanford	**Subject:**	Observation of the Low-Activity Waste Pretreatment System 60% Design Review Meeting
Dates of Activity: 02/13/17 – 02/16/17	**Report Preparer:** Charles R. Allen	

Activity Description/Purpose:
The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), observed the 60% design review meeting for the low-activity waste pretreatment system (LAWPS). The purpose of the LAWPS is to take low-level liquid radioactive waste from the tank farm, process it to remove suspended solids and dissolved cesium compounds, and forward the remainder to the Waste Treatment and Immobilization Plant (WTP) Low-Activity Waste (LAW) Facility for disposal. This meeting was conducted by Washington River Protection Solutions (WRPS), the contractor responsible for design of the LAWPS facility.

Several weeks prior to the design review, a library of engineering documents was made available for examination by the participants. The 60% design review meeting consisted principally of detailed presentations by the WRPS engineering contractor, AECOM, and included discussion of key engineering output documents (piping and instrument drawings (P&IDs), piping layout drawings, system descriptions, calculations, general arrangements, cause and effect diagrams, etc.) and system design features. Representatives of WTP, the DOE Office of River Protection (ORP), DOE Environmental Management headquarters, and other interested parties attended the meeting.

ATTACHMENTS: None

Result:
Both the facility layout and the systems presentations reflected a fairly mature design, with additional detail and updates incorporated based on issues raised in the 30% design review last year. EA noted the following observations for consideration by the ORP project team:

Positive Observations

1. Although LAWPS does not use system design description (SDD) documents as design input for other engineering work, those documents have been prepared and are being maintained as collections of information for each system, including vendor information on procured items as that information becomes available. These SDDs continue to be a valuable resource for the project.
2. AECOM has generated mechanical equipment lists, line lists, valve lists, etc., that are very comprehensive and a valuable tool for project use and for maintaining configuration control.
3. It was apparent from the design review that attention had been given to operational and maintenance considerations such as accessibility.
4. Engineering deliverables reviewed were of consistently high quality. EA noted no deficiencies.

Other Observations

1. Skids to be pre-fabricated elsewhere for drop-in installation have dimensional tolerances for piping and components of ±1/16 inch. This tolerance is very tight and will be difficult (if not impossible) and expensive to attain.
2. The support plan for some valves requires welding a skirt to the valve body. The actual weld would likely be to an extended superstructure. This configuration could be problematic for valve extensions that are cast and may result in eliminating some potential vendors.

3. The waste transfer lines are stainless steel but are surrounded by an outer pipe for leak detection that is carbon steel (CS). This CS pipe is to be coated externally to protect against corrosion. Given the length of buried

pipe involved in this project, it is likely that, at some point, through-wall corrosion will occur requiring expensive repair. Although there may be some cost differential between the two materials, it is not clear that nuclear safety is served by using CS pipe instead of stainless steel pipe for the outer pipe, considering the potential for degradation and leakage during the 40-year life of these lines.

4. The presentation on waste transfer piping revealed that the leak detection pipes containing the waste transfer lines are open ended where they terminate in the LAWPS building. These and the other transfer lines are sloped, requiring leak detection capability only at the lower end. It was not clear from the presentation that these lines are closed/capped at the upper end to prevent air flow into or out of the LAWPS structure. The same comment would apply to lines for which the LAWPS is the high point, such as the waste transfer line from lag storage to the WTP LAW. (**See OFI-WRPS-1.**)
5. P&ID H-16-000022, Filter Feed Tank Vault, was revised for the 60% design review to replace manual vent valves on the cross flow filter tanks with power-operated valves. The presenter stated that this change resulted from an Operations and Maintenance request. These vent lines go from the CFF tanks to the Cesium Product Tank, and the P&ID does not show that there is any flow detection on these lines. It was also not apparent that venting of these tanks would occur frequently enough to justify power-operated valves.
6. During the discussion on the ion exchange system, the AECOM presenter described a calculation done by AECOM to estimate how much the resin tanks would pressurize (from internal heat buildup) in the event of power loss and total isolation of the pressure boundary. The presenter noted that recovery would occur using the gas removal system (GRS). This recovery would require that the appropriate GRS valves be capable of opening against the estimated 110 pounds per square inch (psi) pressure differential. EA noted that this capability will likely become a defining factor in establishing performance specifications for these valves.
7. WRPS and AECOM are considering reducing the piping/component structural requirements to SDC-2/NDC-2 from SDC-3/NDC-3 based on Pacific Northwest National Laboratory testing that may provide a basis for reduced dose impacts from pipe leak/water spray events. No apparent return, in terms of either technical simplification or financial consideration, was presented to justify this downgrade. However, incorporating this change will eliminate a potentially valuable source of design margin at a point in the project where the need for that design margin cannot be foreseen. In the absence of significant, predictable return, this classification downgrade does not appear justified. (**See OFI-ORP-1.**)
8. Calculation 31269-16-CALC-0800 was performed to estimate loads on buried piping from a 75 ton crane parked on the surface above the pipe. Although it contains conservatisms, the results of this calculation indicate that the applied weight could cause damage to pipe insulation in the absence of sufficient overburden. (Minimum burial depth requirement is 3 feet.) Limitations on crane placement may be warranted; however, it was not clear that any such limitations were being considered.
9. The worker dressout facility is located on the north side of the facility, separated from the weather enclosure by a covered walkway. The assumption is clear from this design that areas inside the weather enclosure may become contaminated, requiring use of anti-contamination clothing. Drawing H-16-000253 identifies a step-off area for removal of anti-contamination clothing when exiting the building. Use of that step-off area will result in the worker exiting the building just north of the Resin Dewatering Control Room. From this location, the worker (now in modesty clothing) would have to walk across an uncovered outdoor parking area to return to the dressout facility, which may be seasonally inappropriate.
10. During one presentation, a questioner asked whether pipe supports in the vaults would be made from CS or stainless steel. The response, clarified after the meeting, explained that, in some vaults, CS structural members will be used in the overhead, and embeds/sleeves above the secondary containment liners will be CS. However, all pipe support steel in pits and vaults will be stainless, as will any embeds below the top of the liner. Structural steel will be stainless in the ion exchange pit for the columns and break tanks, and all the valve skids. EA noted that the vaults and pits are designed to have few or no moving parts and extremely limited personnel access. At other DOE facilities similar in nature, use of CS is avoided in these applications whenever possible to limit the potential for long term corrosion degradation.
11. AECOM mechanical disclosed that the GRS pump skid would likely be shake-tested for seismic qualification and then the same skid would be installed in the facility. This procedure would not be normal practice when the shake-tested skid contains rotating components; this skid includes a pump. Pump vendors usually qualify

a like component or use an analytical approach. Good engineering practice would not support placement of a shake-tested pump into service unless a replacement pump is on hand.

12. Piping specification 16-2-001 Appendix B material specification P10 calls for use of PVC material for fire protection piping. This approach was used at the Waste Isolation Pilot Plant (WIPP) with very poor results. WIPP has had multiple failures that have degraded fire protection system performance and caused expensive repairs. One possible alternative is to use high density polyethylene pipe (American Water Works Association C906). It has been used in similar applications, including buried firewater pipe applications on the DOE Mixed Oxide Fuel Fabrication Facility Project.

Opportunities For Improvement

OFI-WRPS-1 Consider capping the outer leak detection pipe for the waste transfer line from lag storage to the WTP LAW at the LAWPS wall to limit air flow into the outer pipe. Consider capping or sealing any other guard pipes that might provide an uncontrolled flow path into a LAWPS confinement zone.

OFI-ORP-1 In the absence of defined, measurable return to the project, consider maintaining the current SDC-3/NDC-3 design criteria for the LAWPS.

EA Participants	**References (Key Documents, Interviews, and Observations)**
1. Charles R. Allen	**1.** P&ID H-16-000022 **2.** Piping Material Specification 31269-16-2-001 **3.** 31269-16-LST-0001 Line List **4.** H-16-000253 **5.** 31269-16-CALC-0800 Maximum Weight Calculation

Were there any items for EA follow-up? ☒Yes ☐No

EA Follow-Up Items	
1. Follow the design completion and open item resolution for LAWPS. Observe the 90% design review scheduled for early December 2017.	