Tank Waste Committee Draft Advice

Topic: Double-Shell Tank Failures
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Originating Committee: TWC
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The Hanford Advisory Board (Board) is concerned that, although some scenarios contained within Revision 8 of the River Protection Project System Plan[1] (System Plan) evaluate the construction of new Double-Shell Tanks (DSTs), there are no scenarios that evaluate the specific systemic effects of additional DST failures.

The first of 28 DSTs (AY-102) has already failed and will not be repaired. Recent investigations have determined that three additional DSTs have held waste with similar chemistry to that suspected of corroding the bottom of the inner shell of Tank AY-102. Additionally, investigations are ongoing to determine whether the outer liner of another DST (AP-102) has also failed, and further determinations have found notable thinning in the outer liners of nine of the 11 DSTs evaluated so far. These findings appear to affect the performance of one third of the DSTs available at Hanford.

Current planning for the use of the Tank Side Cesium Removal (TSCR) system would utilize three of the AP DSTs to process and store waste before being vitrified as low-level waste as a part of the Direct Feed Low Level Waste (DFLAW) process. This would remove the storage capacity of three DST from the overall available waste storage should additional tank failures occur. In addition, the waste currently stored in these tanks will have to be moved to other DSTs further reducing the available DST capacity.

Meanwhile, the Baseline Scenario of System Plan 8 appears to discount the likelihood of additional DST failures occurring between now and the newly expected treatment mission end-date of 2063. Other scenarios could extend the tank mission to as late as 2126. Without the addition of a planning assumption that analyzes the potential of multiple future DST failures throughout the life of the tank mission, it brings into question, for the HAB and the public, any confidence in the System Plan 8 projections of the future.

The Board appreciates DOE's efforts to identify and remedy corrosion problems in the DSTs, but it seems too often that significant damage occurs before a problem is discovered. The Board is concerned that the risk of corrosion in tank bottoms cannot be mitigated by any of the methods currently being pursued, due to uncertainty in the layering of tank waste chemistry, heterogeneity in waste composition throughout tanks, an inability to eliminate uncertainty about the spatial extent of corrosion. There is also a lack of mitigation options for tanks that have corrosive bottom chemistry and nowhere else for the waste to go. The Board remains concerned that DOE appears to be only in the beginning stages of understanding and addressing the ongoing corrosion of DST outer liners due to moisture intrusion from the environment.

A major concern of the Board is that a DST failure, with no method of rapid retrieval and no place to put waste, could result in a massive uncontrolled release of highly radioactive and highly mobile waste into the environment and ultimately the Columbia River. Furthermore, the loss of additional DSTs could hinder or halt DOE's mission to retrieve single-shell tanks and operate the DFLAW system and the WTP. It would also divert critical mission resources to address the DST

[1] River Protection Project System Plan, Revision 8, ORP-11242, October 31, 2017

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failure; e.g., the retrieval of AY-102 alone cost $107 million and took nearly a year to complete after several years of preparation.

In the Board's Consensus Advice #263[2], #271[3] and #275[4], the Board has repeatedly advised the Department of Energy (DOE) and the Washington State Department of Ecology (Ecology) to construct additional waste storage tank capacity.

As it stands, DOE's Baseline Scenario is proposing to conduct a mission that will depend on the continued usability of the DSTs for 27 to 68 years past their respective design lives, depending on the specific DST[5]. The Board believes that it would be wise for Ecology and DOE to consider, in future new tank waste treatment milestones, the growing risk of multiple DST failures, given that the tank waste mission is now expected to span beyond 45 more years.

Advice:

- The Board advises that DOE and Ecology acknowledge and address the growing risk of multiple DST failures over the next 45+ years of the tank waste mission, by evaluating the mission impacts, system vulnerabilities, and response capabilities should additional DST failures occur.

- The Board advises the Tri-Party Agencies to anticipate new DST failures. Given that the System Plan estimates an 8-year time span between the decision to build new tank capacity and the completion of tank construction, DOE should immediately initiate the siting, design, regulatory approval, and procurement actions necessary to obtain additional waste tank storage capacity. This preparatory work would greatly reduce the time necessary to complete tank construction if new tank capacity is deemed to be necessary.

- The Board advises DOE to test its preferred scenarios for tank waste treatment for its resilience to unexpected conditions.

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2 HAB Consensus Advice #263, Double-Shell Tank Integrity, November 2, 2012
3 HAB Consensus Advice #271, Leaking Tanks, September 6, 2013
4 HAB Consensus Advice #275 Path Forward on Tank Waste, March 7, 2014
5 United States Government Accountability Office GAO-15-40, Hanford Cleanup, Condition of Tanks May Further Limit DOE's Ability to Respond to Leaks and Intrusions, November 2014