

Tank Waste Committee Draft Advice

Topic: Double-Shell Tank Failures

Authors: Bob Suyama, Jeff Burright, Shelley Cimon

Originating Committee: TWC

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The Department of Energy's (DOE) Baseline Scenario contained in Revision 8 of the River Protection Project System Plan¹ (System Plan) to vitrify the 56 Million gallons of tank waste will depend on the continued usability of the Double-Shell Tanks (DST) for 27 to 68 years past their respective design lives². The Hanford Advisory Board (Board) believes that it would be prudent for the Washington State Department of Ecology (Ecology) and DOE to consider the growing risk of multiple DST failures, given that the tank waste mission is now expected to span beyond 45 more years.

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 release of highly radioactive and highly mobile waste into the environment that could migrate to the Columbia River. Furthermore, the loss of additional DSTs could hinder or halt DOE's mission to retrieve single-shell tanks, operate the Direct Feed Low Level Waste (DFLAW) system and the Waste Treatment Plant (WTP). It would also divert critical mission resources to address the DST failure; e.g., the retrieval of AY-102 alone cost \$107 million and took nearly a year to complete after several years of preparation.

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.

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. For example, 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, and an inability to eliminate uncertainty about the spatial extent of corrosion. Finally, 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 or other factors.

Current planning for the use of the Tank Side Cesium Removal (TSCR) system would utilize a number of the AP Tank Farm DSTs to process and store waste before being vitrified as low-level waste as a part of the DFLAW process. This action would remove the storage capacity of several DSTs from the overall available waste storage should additional tank failures occur. The Board is concerned that this approach further reduces the ability and willingness to remove waste from Single-Shell Tanks in a timely manner. In addition, the waste currently stored in these tanks will have to be moved to other DSTs further reducing the available DST capacity.

The Baseline Scenario of the System Plan does not consider 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

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

² 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

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analyzes the potential of multiple future DST failures throughout the life of the tank mission, it brings into question, for the Board and the public, any confidence in the System Plan projections of the future.

In the Board's Consensus Advice #263³, #271⁴ and #275⁵, 288⁶, 294⁷, 297⁸ the Board has repeatedly advised DOE and Ecology to construct or initiate actions to acquire additional waste storage tank capacity.

Advice:

- The Board advises DOE and Ecology to test its preferred scenarios for tank waste treatment for its resilience to unexpected conditions. Specifically, this evaluation should include mission impacts, system vulnerabilities, and response capabilities when the additional DST failures occur.
- The Board advises DOE to anticipate new DST failures, and also advises DOE to perform a system engineering-based risk assessment of potential tank failures and options for addressing replacement capacity. This risk assessment could provide valuable insights that currently do not appear to exist.
- 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, the Board also advises that DOE should immediately initiate the design, siting, permitting and any other statutory and/or regulatory approval; as well as any procurement actions necessary to obtain replacement waste tank storage capacity. This preparatory work would greatly reduce the time necessary to complete tank construction in the likely event when new tank capacity is deemed to be necessary.

³ HAB Consensus Advice #263, Double-Shell Tank Integrity, November 2, 2012

⁴ HAB Consensus Advice #271, Leaking Tanks, September 6, 2013

⁵ HAB Consensus Advice #275 Path Forward on Tank Waste, March 7, 2014

⁶ HAB Consensus Advice #288 FY2017 Budget and FY2018 Input Request, April 14, 2016

⁷ HAB Consensus Advice #294 Hanford Site Budget, November 14, 2017

⁸ HAB Consensus Advice #297 FY2020 Hanford Budget Priorities, June 7, 2018