

System Planning Assumptions

At the March 2018 Hanford Advisory Board (Board) meeting, John Price of WA Ecology challenged the Board to provide the TPA agencies with a preferred scenario based on System Plan 8. This challenge is associated with the ongoing milestone negotiations between the Tri-Parties related to the Hanford tank waste retrieval and treatment mission. The system planning options we present are based upon long standing, key, fundamental principles that reflect some of the Hanford Advisory Board's most important values related to the Hanford cleanup:

Contributing Values

The Board has created values and principles related to tank waste treatment over the years and stuck by those values and principles in our advice. The following values supported this proposal.

In addition to the values described in HAB Advice #295, the Board identified the following values that provided a basis for this proposal:

1. All Hanford tank wastes must be stored safely until treatment. No preventable leaks to the environment are acceptable.
2. Any "bad actors" (e.g., mobile long-lived radionuclides) removed from waste should be disposed offsite in a suitable facility.
3. The Board has a preference to retrieve all SSTs to the extent practicable.
4. The Board considers DFLAW to be a priority.
5. If new tank capacity is added to the system, tanks should be designed to safely store and facilitate retrieval of wastes. Tanks should also be designed to improve sampling opportunities for surrounding soil and groundwater and the contents of the tanks themselves.

Guiding Assumptions for Future System Plan Scenarios

Upon review of the System Plan, and in consideration of risks and vulnerabilities in the analysis described in HAB advice #295, the Tank Waste Committee of the Board has developed the following list of modeling assumptions that may help to guide development of scenarios for System Plan 9. These assumptions could be considered individually or in different combinations, depending on continued discussions between the HAB, DOE, and Ecology. It should be noted that not all listed assumptions represent consensus among members of the Tank Waste Committee, but were included to stimulate further analysis and discussion among agencies and the public.

The Tank Waste Committee has chosen to not proffer a single preferred scenario as originally requested by Ecology. Instead, the Committee intends for the list of recommended modeling assumptions to provide the basis for a Sounding Board discussion among the HAB at the September Board meeting.

#	Assumption to Consider	Rationale	Purpose
1	Direct-Feed LAW proceeds on schedule per the Consent Decree.	The Board supports initiation of tank waste treatment as soon as possible.	Commit necessary resources to achieve DFLAW as a top priority.
2	Additional Double-Shell Tank failures will continue to occur randomly.	The Board has low confidence that all existing DSTs will be serviceable for the duration of the longer mission represented in System Plan 8, especially considering a flat funding scenario. See accompanying HAB advice XXXX.	Provide a validated risk assessment that includes a projected retrieval schedule and identifies the “inflection point” when DST failures interfere significantly with retrieval/treatment. Estimate the optimal number of DSTs needed (including potential new DSTs) to ensure no significant mission delays, and account for costs of DST failure response in planning.
3	The 11 identified tanks with TRU waste can be retrieved and sent to WIPP for disposal.	The Board prefers that these wastes are disposed offsite rather than onsite or through the WTP to a deep geologic repository. However, given that these tanks are among the lowest identified risk tanks in terms of their contents and the prospects of potential leaks, this work should not in any way interfere with work necessary to get DFLAW up and running or to complete construction and begin operation of the WTP.	It will reduce demand on the WTP and may achieve earlier offsite disposal of tank waste.
4	Defer physical closure of Single Shell Tanks after retrieval to accommodate other activities.	Tank closures divert funding away from waste treatment and are not a near-term health/safety priority.	Preserve site funding that would otherwise be dedicated to maintaining min-safe conditions or treating tank waste.

5	At best, ORP will have flat funding from 2018 levels, plus a projected escalation, through the duration of the tank mission.	A comment from Brian Vance at the 4/10/18 HAB Committee of the Whole meeting expressed that flat funding is DOE ORP's expectation going forward.	Provide more realistic schedule expectations to compare against funding-unconstrained scenarios shown in System Plan 8. It will also assist in communicating site funding needs. This assumption should not guide future ORP budget requests.
6	Expect reduced throughput for WTP operation and SST retrieval	Reduced throughput seems like a likely possibility based on the 36% efficiency of the vitrification facility at Savannah River and the 17% efficiency of the vitrification at the West Valley Demonstration Project ¹ . Retrieval efficiency is still uncertain and may be hindered by the need for supplied air for tank farm workers. (Note: this assumption is consistent with Scenario 7 of System Plan 8)	This assumption provides a bounding case for providing projected availability based on the complexity of Hanford tank waste and estimating the consequences of other unanticipated project delays.
7	Early U Farm Retrieval	Completion of 16 SST retrievals instead of 8 from the tank farm in the same time span, as well as retrieval of 4 assumed leakers instead of 1, are worth the risk of solids buildup in the DSTs. The latter risk may be mitigated by incorporating additional DST construction. (Note: this assumption is consistent with Scenario 8 of System Plan 8)	Provide cost/schedule information on an accelerated retrieval schedule.
8	Offsite Treatment of WTP Secondary Waste Effluents (if waste is disposed offsite)	The modeling tells us this scenario saves both time and money. It further benefits the overall mission by allowing more SST retrievals during DFLAW, extending the life of glass melters, and accelerating the ability to remediate "Group A" tanks. Due to the potential for Tc-99 to be retained in effluents in significant quantities to make long-term performance of grout at the IDF uncertain, the Board only supports this scenario if grouted waste forms are disposed offsite in a suitable facility. (Note: this assumption is consistent with Scenario 9 of System Plan 8)	Provide cost/schedule information for an offsite effluent treatment scenario.

¹ https://www.hanford.gov/files.cfm/15-WTP-0151.LAW-D_O-report-sm.pdf

9	Retrieval Contingency – Additional Double Shell Tanks	<p>See accompanying HAB Advice #XXXX regarding potential DST failure. When considering the model outcomes of System Plan 8 and the expected further lengthening of the mission schedule under the assumptions provided herein, the Board believes that additional DST failures are a near certainty. A reduction in total DST capacity not only poses potential risk to the environment, but it risks limiting the SST retrieval rate and thereby delaying the whole tank mission. The Board recommends that these DST failure-related risks be proactively managed with additional storage capacity, even if it costs additional time before full WTP treatment starts.</p> <p>Note: This assumption is consistent with Scenario 10 of System Plan 8. The Board accepts that fewer than the 12 new DSTs evaluated in System Plan 8 may be acceptable for contingency storage. A final amount of necessary tank capacity should be determined based on an analysis consistent with the assumptions in this document.</p>	Provide cost/schedule information for retrieval and treatment with the benefit of new DSTs.
10	Retrieval Contingency – Accelerate and Enlarge the planned Tank Waste Characterization & Staging Facility	As an alternative to new DSTs, the Committee is interested in the possibility of accelerating and enlarging the storage capacity of the planned Tank Waste Characterization & Staging (TWCS) facility in lieu of constructing new standalone DSTs. TWCS would add potential emergency storage capability, is a critical component in treating HLW, and could potentially provide future support for the Supplemental LAW facility ² .	Understand the optimal size and configuration of the TWCS facility to provide WTP feed and also act as supplemental retrieval storage space in the event of additional DST failures. Estimate cost/schedule impacts and opportunities of an enlarged TWCS versus new DST construction.
11	Retrieval Contingency – Above-ground tank capacity for LAW following TSCR pre-treatment.	Once Low Activity Waste has been treated to remove Cesium, Strontium, and solids, the associated dose may be low enough to allow for above-ground storage of those wastes.	Estimate whether cost/schedule savings may be gained by adding additional storage capacity in between the TSCR system and the LAW vitrification facility. This scenario could potentially include additional TSCR units and/or be combined with a grouting scenario for LAW.

² At the 2/28/18 National Academies of Sciences meeting in Richland focused on Hanford’s Supplemental LAW, members of the FFRDC recommended the addition of a lag storage capability upstream of the Supplemental LAW facility to support consistent treatment flowrate.

12	Retrieval Contingency – Sludge-only storage capacity	The current DSTs have a limited capacity to store sludge wastes due to hydrogen buildup concerns, therefore the ability to retrieve sludges from SSTs may be constrained by the WTP operating efficiency to vitrify HLW sludge. The addition of tank capacity with alternative configurations and geometry specially designed to store sludges could potentially ease future constraints on SST retrieval.	Understand the cost/schedule impacts of additional sludge-only storage options, and potentially support the development of a sludge-only storage tank design.
13	Treat Low Activity Waste to remove long-lived mobile radionuclides (Tc-99 and I-129), then grout the LAW for offsite disposal. Incorporate the extracted radionuclides in the WTP HLW feed.	If the long-lived, highly mobile radionuclides can be extracted from the LAW waste stream prior to disposal, it is possible that these wastes may be disposed safely via a grouted waste form offsite.	Understand the cost/schedule impacts of an alternative disposal pathway for Low Activity Waste.
14	Treat Low Activity Waste to remove long-lived mobile radionuclides (Tc-99 and I-129), then grout the LAW for offsite disposal. Incorporate the extracted radionuclides in grout for out of state disposal.	The availability of the Waste Control Specialists Federal Disposal Facility in Texas, which has more suitable characteristics for long-term disposal and which does not have restrictions on disposal of Tc-99 and I-129, offers a potential opportunity to reduce cost and overall risk to the public.	Understand the cost/schedule impacts of an alternative disposal pathway for Low Activity Waste.

15	With the State of Washington's concurrence, evaluate delaying the retrieval of SSTs for a negotiable number of years.	Temporary hiatus of SST retrieval could potentially allow prioritization of constructing sufficient mission-scale tank capacity and commencement of treatment sooner than currently possible under a constrained funding outlook.	Understand the potential further tank integrity degradation and cost/schedule impacts resulting from a temporary hiatus on SST retrieval.
16	In-place closure of selected SSTs without retrieval.	Some members of the Board may entertain a scenario wherein select SSTs are closed without prior retrieval, but such a decision should be made on the basis of residual cumulative environmental risks rather than an arbitrary percentage of remaining curie content.	Revise and hone Scenario 4 of System Plan 8 based on projected risk to future receptors instead of curie content and/or residual volume.
17	Manage the non-elutable Cs-137 ion exchange resins from LAW treatment via "greater confinement" disposal in an offsite facility.	The Crystalline Silicotitanate ion exchange resin planned for use in the TSCR pre-treatment system does not have a clearly defined disposal pathway, and there is uncertainty about the feasibility and methodology of extracting the resin from its canisters for vitrification in the WTP after decades of onsite storage.	Understand the cost/schedule and feasibility of disposing the spent ion exchange columns offsite instead of through the WTP.