Draft Advice re: Path Forward for Tank Waste

Background

Hanford's tank waste poses one of the greatest long-term risks to the environment and future generations. Performance Assessment studies of tank waste that has leaked into the soil and groundwater show additional unacceptable risks and demonstrates the urgency with which cleanup of Hanford's tank waste must be addressed. Effective removal, treatment, and storage of Hanford's tank waste is essential for the protection of the Columbia River, humans, groundwater, and the ecological health of this region. The Tri-Party Agreement (TPA) states that protection of human health and the environment requires successful treatment of Hanford's tank waste to a quality that is at least "as good as glass."[1]

The Hanford Advisory Board (HAB or Board) has provided advice about tank waste treatment at Hanford since its inception in 1993. The Board has addressed its concerns with the treatment of tank waste from a variety of positions including: openness and transparency (HAB Advice #273); funding and budget priorities (HAB Advice #266); the building of new tanks and tank integrity (HAB Advice #271, 263); safety culture (HAB Advice #258); transuranic (TRU) waste in tanks (HAB Advice #149); and systems planning (HAB Advice #238, 233, 209, 189).

On September 24, 2013, Secretary of Energy Moniz released the *Hanford Tank Waste Retrieval, Treatment, and Disposition Framework* (Framework). This document provides a high-level strategic framework to begin conversations about addressing challenges at the Waste Treatment Plant (WTP). The Board issued advice focused on openness and transparency in the Framework in December 2013 (HAB Advice #273).

In reviewing the Framework, HAB committee members identified a number of problems. The Framework was found to be lacking: details on technical problems, the sequencing of startup at the WTP, the findings of the Secretarial expert review teams, and supporting information used to develop the draft Framework's suggested approaches. In addition, the Framework did not include cost and schedule information, analysis of systemic design and quality assurance issues, or consideration of alternate glass forms such as iron phosphate glasses.

Vitrification of Hanford's tank waste was decided on and agreed to as part of the original Tri-Party Agreement. Efforts to design and build the vitrification and treatment systems have gone through many starts, stops, redesigns and restarts since the early 1990s. All the while, the tanks and infrastructure have continued to age and degrade. These missteps and delays have produced serious consequences.

The existing design of the pulse jet mixers might not work. The U.S. Department of Energy (DOE) has identified that some WTP piping may suffer serious problems with hydrogen explosions during operations. These and other equally serious unresolved technical issues, as well as the uncertain status and timeline for a safe and effective operational WTP concern the Board. In particular, in light of the deteriorating tank infrastructure, most evident in the active leaks in double-shell tank AY-102 and single-shell tank T-111, it is clear to the Board that additional double-shell tank storage capacity is urgently needed as an interim measure while solutions to the WTP's technical issues are developed and implemented.

[1] *IM comment:* As soon as we find it, we will insert the footnote here.

Due to the delays, the Board and DOE have proposed an early start of the low-activity waste (LAW) facility. The proposal for early LAW treatment appears encouraging, if it can be done safely. Early start of the LAW facility may help to relieve the urgent tank space needs, and allow continued retrieval of waste from single-shell tanks.

The Framework shows the intended path forward for completion and operation of the WTP. Construction on two principal facilities was halted in August of 2012 because of major problems with the process systems in those facilities that could prevent their safe and successful operation.

In addition, the Hanford tank wastes are comprised of greater than 99 percent inert chemicals[2] which were added during reprocessing and storage. The broad variations in the tank waste compositions are a poor match with the borosilicate glass. Alternate glass formulations that can better handle some of these constituents should be seriously considered for the second low-activity vitrification facility.

Finally, it must be noted that DOE has deliberated behind closed doors, excluding regulators, stakeholders, and the public from its review of the technical problems, possible solutions, and possible paths to resolve these, even going so far as requiring those involved to sign non-disclosure agreements, for more than a year. Going forward, the Board has advised and continues to advise DOE to proceed with open and transparent conversations and information sharing with the Board and public. This is absolutely essential for public trust, and for good decision making. This advice is written to provide DOE and Ecology with the Board's input on finding a safe and effective path forward for successful treatment of Hanford's tank waste.

Advice

(Please note: advice bullets are numbered for ease of editing; they do not reflect order of importance and will be revised to a bulleted list following the editing process)

1. The Board advises DOE and the Washington State Department of Ecology (Ecology) to revisit the Board's previous advice[3] as they work to solve problems related to vitrifying Hanford's tank waste at the WTP, in addition to considering the new advice points below.

2. Expanding on the Board's previous advice on openness and transparency, the Board advises DOE to clearly and thoroughly communicate technical and design problems with the WTP and any proposed solutions to the Board and public, and to engage the Board in dialogue about these issues and proposed solutions. This information should include:
    a. Detailed suggestions and findings by the Energy Secretary Chu appointed expert panel, and Energy Secretary Moniz expert panel
    b. Design and operational changes needed at the WTP and tank farms to allow direct feed
    c. Technical issues that could halt or slow the processing of tank waste
    d. Information on cost and schedule and detailed financial requirements for proposed facilities
    e. Impacts to ongoing work resulting from the funding and execution of new projects

[2] Agnew, S.F. 1997. Hanford Tank Chemical and Radionuclide Inventories (HDW Model Rev. 4). Los Alamos National Laboratory. Los Alamos, New Mexico. LA-UR-96–3860

[3] Previous advice includes: openness and transparency (HAB #Advice 273), funding and budget priorities (HAB #Advice 266), the building of new tanks and tank integrity (HAB Advice #271, 263), safety culture (HAB Advice #258), TRU waste in tanks (HAB Advice #149), and systems planning (HAB Advice #238, 233, 209, 189).

f. Impacts to pretreatment and high-level waste treatment
g. Assumptions made in the various analyses performed
h. Well-defined terms
i. Evaluation and identification of risks to workers, public health, and impacts to the environment

3. While DOE works to resolve technical issues at the WTP, the Board advises DOE to:
    a. Include more alternatives analysis on the technical issues
    b. Continue investigating the physics, chemistry and engineering issues and their resolution
    c. Update the systems plan and lifecycle cost analysis to allow evaluation of each of the major proposals

4. Once an implementation plan is developed, the Board advises DOE to:
    a. Create an easy to understand conceptual diagram for how to resolve the issues
    b. Create an operations plan that maps waste-flow-rates through the alternative routes over time
    c. Detail projected costs
    d. Estimate obstacles to implementation
    e. Communicate impacts to related TPA milestones
    f. Make this plan available for Board and public review

5. The Board advises DOE to begin an immediate, independent assessment of whether the contractor at the WTP is able to demonstrate that safety and quality assurance requirements can be met for the facility to operate meeting nuclear quality requirements (Nuclear Quality Assurance 1).

6. The Board advises DOE to use the systems plan and coupled lifecycle cost analysis to identify and evaluate alternatives, and for scenarios to be developed, and shared with the Board for timely input, that reflect proposals in the Framework.

7. The Board advises DOE to abandon any and all proposals to dispose of material in waste forms that do not perform as well as glass in shallow burial onsite, as this greatly increases the risk to humans and the environment. It is clear to the Board that these technologies either fail to meet required performance standards, are too immature, are too costly to implement, and/or compete with vitrification to the detriment of the mission.

8. The Board reiterates its advice to DOE to immediately initiate the process for funding and design of new regulatory-compliant double-shell tanks and support infrastructure, and to initiate an accelerated process for building new double-shell tank capacity. (September 6, 2013, HAB Advice #271, and November 2, 2012, HAB Advice #263).

9. The Board advises DOE to seriously consider the use of alternate glass formulations, such as iron phosphate, for the vitrification facilities to increase the capability and throughput of the entire system.

10. The Board advises DOE to first determine whether or not tank waste from the B and T-Farm tanks might qualify as TRU waste, before considering whether it may qualify as other than high-level waste. The Board advises DOE to await the analysis and determination of whether the waste might qualify as other than high-level waste until an assured pathway is in place to dispose of the

waste as TRU, should it qualify, similar to the precedent set by DOE in Idaho[4]. The Board advises DOE to clearly communicate the results of these analyses to the Board and the public. The Board is concerned that should DOE reverse these steps that the waste may become an orphan waste needing separate treatment in non-existent facilities in an undefined waste form in direct competition with the WTP and other facilities and work.

11. The Board advises Ecology and the U.S. Environmental Protection Agency (EPA) to take near-term action under their regulatory authority to direct DOE to:
    a. Empty the leaking single-shell tank T-111
    b. Build new fully compliant DSTs and infrastructure on a schedule with sufficient capacity to complete the mission
    c. Design all such new systems to allow complete and easy retrieval and clean closure
    d. Release to Ecology and make public all information DOE has relative to the path forward for waste treatment

[4] Letter from the United States Technical Review Board to Huizenga (DOE/EM), December 11, 2012, re: supporting DOE's proposal. http://www.nwtrb.gov/corr/rce004.pdf