

Draft Advice re: Double-Shell Tank AY-102 and Leaking Single-Shell Tanks

Background:

The U.S. Department of Energy – Office of River Protection (DOE-ORP) announced at the Tank Waste Committee meeting on April 10, 2013 that the cause of the leak in the bottom of double-shell tank AY-102 was due to corrosive materials on the tank floor. This waste has now leaked into the annular space in contact with the thinner secondary tank. This is a concern due to the short design service life for the thinner secondary tank and the inability to monitor the conditions of waste that may have leaked under the tank. As occurred with the primary tank, there were extensive weld repairs required on the secondary tank.

Tank waste at Hanford has a history of undergoing chemical change that results in the waste going out of specification and becoming corrosive. There is no possibility to directly assess the condition of the secondary tank bottom, the chemistry of the waste there, or to adjust that chemistry. As a result, corrosion protection cannot be assured. The most recent Ecology inspection field monitoring report (AY-102 201303-14 Riser 83 Field Monitoring Report) indicates that the waste in the annulus space has continued to slowly increase over time.

The RPP-ASMT-53793 Rev 0, *Tank 241-AY-102 Leak Assessment Report* indicates that the contents of AY-102 have not been sampled since 2005. Given the history of ongoing chemical changes in tank waste and lack of sampling of waste in contact with the bottom of the tank, with the occurrence of a leak in the floor of a double-shell tank, a more aggressive chemistry and corrosion monitoring program may be appropriate.

The RPP-ASMT-53793 Rev 0, *Tank 241-AY-102 Leak Assessment Report* indicates that the waste in the tank is thermally hot from the waste added from C farm and is evaporating up to 72 gallons of water per day. Based on previous history, the waste liquids alone cannot be pumped out of the tank to minimize leakage as that would cause the remaining sludge to overheat, chemically react and possibly lead to flammable chemical generation and other problems. Therefore, when waste is removed, all of the waste must be pumped, both liquids and sludge. Sluicing the waste may also lead to increased leakage. If pumping is delayed, the rate of leakage may increase through additional corrosion. Urgent pumping is required.

The Washington State Department of Ecology and DOE-ORP have agreed to pump out the contents of AY-102. The receiving tanks will need to be carefully assessed to assure transfer of AY-102 waste to these receiving tanks does not lead to additional tank failures. Many of these tanks will exceed their design lives and failures must be expected over time; therefore, contingencies must be built into this process. Systematic solutions need to be developed that will

look at the options available in the tank farms. The Hanford Advisory Board (Board) believes that pumping leaking tanks must not be delayed.

Advice¹:

1. The Board advises DOE to urgently pump the drainable liquid from known leaking single-shell tanks, or if DOE lacks the technology to do that, to fully retrieve known leaking single-shell tanks as soon as possible to prevent further leakage to the environment.
2. The Board advises DOE to make the necessary space and other adjustments in other double-shell tanks to receive the waste from AY-102 and pump the waste out of AY-102 as soon as practicable.
3. The Board advises DOE to evaluate why and how the detection of a leak in AY-102 failed and why the emergency pumping guide was not followed when the leak was first detected in 2011. Corrective Actions should be issued as a result of the investigation to include revision of procedures, retraining of operations and management as necessary.
4. The Board advises DOE to obtain samples from the bottom of AY-102 to identify the chemicals in contact with the bottom of the tank both to assess the reasons for the failure of this tank and for evaluation of receiving tanks and other tank wastes with potential to cause additional double-shell tank failures; and to assess and implement any necessary chemical additions or other changes to tank operations needed to minimize corrosion damage.
5. The Board advises DOE to evaluate the expansion of the sampling program to first include the six double-shell tanks of similar age and design, and then possibly to all double-shell tanks; and to increase the routine sampling frequency as needed. The sampling program may need to be adjusted depending on the response indicators and chemistry of the tanks. DOE should consider seeking independent expert advice on defensible sampling frequencies and locations. This recommendation expands on HAB Advice #263 *Double-Shell Tank Integrity*. The Board recognizes that sampling is expensive and difficult; however, the potential costs of a double-shell tank failure are much higher.
6. The Board advises DOE to annually update the integrity assessment documents for the double-shell tanks (as applicable), describing sampling in the double-shell tanks and their annuli detailing the sampling event(s), temperature variations, ventilation issues, abnormal findings, and corrective actions taken.
7. The Board advises DOE to evaluate lessons learned from the AY-102 event to improve safety culture, especially regarding reporting and investigation of abnormal events and conduct of operations.

¹ **PLEASE NOTE:** *These 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.*