Tritiated Water Task Force Follow-up

(C. Negin, March 2014)

Question from:

Hirofumi Shibata the day before the task force meeting:

At Hanford a report on tritiated water disposition makes it appear that the options were evaluated every few years based on the tabulated enclosure shown below to a status report. Is this in fact what was done, and if so, why?

Answer: What is shown in the table is a running update to show changes from information searches, evidently as a result of a commitment to the local regulators to do so. It does not indicate re-evaluations at Hanford.

The abstract of a report, DOE/RL-2009-18, Revision 0, 2009 Evaluation of Tritium Removal and Mitigation Technologies for Wastewater Treatment, copied below, explains the table; in particular the second paragraph below. The last paragraph below indicates that isotopic separation is not feasible for the Hanford application.

> Since 1995, a state-approved land disposal site (SALDS) has received tritium contaminated effluents from the Hanford Site Effluent Treatment Facility (ETF). Tritium in this effluent is mitigated by storage in slow moving groundwater to allow extended time for decay before the water reaches the site boundary. By this method, tritium in the SALDS is isolated from the general environment and human contact until it has decayed to acceptable levels.
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> This report contains the 2009 update evaluation of alternative tritium mitigation techniques to control tritium in liquid effluents and groundwater at the Hanford site. A thorough *literature review was completed and updated information is provided on state-of-the-art technologies for control of tritium in wastewaters. This report was prepared to satisfy the Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Milestone M-026-07B (Ecology, EPA, and DOE 2007). Tritium separation and isolation technologies are evaluated periodically to determine their feasibility for implementation to control Hanford site liquid effluents and groundwaters to meet the Us. Code of Federal Regulations (CFR), Title 40 CFR 141.16, drinking water maximum contaminant level (MCL) for tritium of20,000 pCI/L and/or DOE Order 5400.5 as low as reasonably achievable (ALARA) policy.
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> Since the 2004 evaluation, there have been a number of developments related to tritium separation and control with potential application in mitigating tritium contaminated wastewater.
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> These are primarily focused in the areas of:
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> 1) tritium recycling at a commercial facility in Cardiff, UK using integrated tritium separation technologies (water distillation, palladium membrane reactor, liquid phase catalytic exchange, thermal diffusion),
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> 2) development and demonstration of Combined Electrolysis Catalytic Exchange (CECE) using hydrogen/water exchange to separate tritium from water,
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> 3) evaporation of tritium contaminated water for dispersion in the atmosphere, and

4) use of barriers to minimize the transport of tritium in groundwater.

Continuing development efforts for tritium separations processes are primarily to support the International Thermonuclear Experimental Reactor (ITER) program, the nuclear power industry, and the production of radiochemicals. While these applications are significantly different than the Hanford application, the technology could potentially be adapted for Hanford wastewater treatment. Separations based processes to reduce tritium levels below the drinking water MCL have not been demonstrated for the scale and conditions required for treating Hanford wastewater. In addition, available cost information indicates treatment costs for such processes will be substantially higher than for discharge to SALDS or other typical pump and treat projects at Hanford. Actual mitigation projects for groundwater with very low tritium contamination similar to that found at Hanford have focused mainly on controlling migration and on evaporation for dispersion in the atmosphere.