

## **Hanford Advisory Board Draft Advice**

**Topic:** DOE's Use of Modeling versus More Characterization

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**Originating Committee:** River & Plateau

**Version #1:Color:** \_\_pink\_\_yellow\_X\_green\_\_buff\_\_purple\_\_blue\_\_goldenrod

### Background:

The role of the Hanford Advisory Board (Board) is to advise the Tri-Party Agreement (TPA) Agencies on concerns and issues related to Hanford cleanup, environmental restoration and waste management where the Agencies would not otherwise have in-depth stakeholder input. Based on a summary evaluation of many recent U.S. Department of Energy (DOE) documents, the HAB River and Plateau Committee (RAP) and others have developed a list of base assumptions that are being used universally across the Hanford Site by DOE and the contractors in cleanup analysis, planning and decision-making processes. Based on the discussion at the December 16, 2009 Base Assumption Committee of the Whole (COTW) meeting, the Board has decided to issue this first piece of advice generated from this COTW.

### Commentary:

Many instances over the years have proven that good is the best tool to understand the extent of contamination and, therefore, the associated risk. Past Board advice has consistently emphasized a preference for good characterization over using other methods (like simulations) to select appropriate cleanup remedies. The only exception may be when it is less costly to simply Remove-Treat-Dispose a waste site than it is to spend dollars to characterize the waste site. The Board would like more clarification about the circumstances, rationale, and technical basis under which it is appropriate to use modeling in lieu of further characterizations for determining cleanup levels.

The DOE response to this question referenced the characterization of groundwater contamination, and provided impressive numbers for wells drilled, samples taken and analyses performed. While the question about whether enough characterization of groundwater is being done is one aspect of this issue (e.g., past surprise plumes of uranium at 300-Area and chromium-bearing upwellings in the Columbia River bottom); another facet to this problem is the characterization associated with the Remedial Investigation/Feasibility Study (RI/FS) process. The cleanup process is based on assessing the risk attached to each waste site due to the uncertainty of the quantity and type of materials that are disposed of there. There appears to be an increasing reluctance by DOE to do as much characterization as the U.S. Environmental Protection Agency (EPA) or Washington State Department of Ecology would like to see (e.g. DOE would like to forego characterization sampling of the 200-Area solid waste burial grounds). Ecology asserts that with more characterization, which costs more, the uncertainty is reduced and cleanup is then easier and costs less. The Board does not advocate completion of characterization to the point that it will cost more and take more time than the remediation.

Another troubling aspect of this issue is the increasing usage of modeling (numerical simulation) to substitute for actual characterization sampling. Models can be used to predict expected analyses numbers for samples not taken. However, this has been demonstrated to

not work reliably. A single badly estimated parameter or invalid assumption can drive the simulation to invalid conclusions. Generalized assumptions that do not recognize the varied nature of the Hanford sediments, for example, do not simulate reality well. A single hydraulic conductivity value applied for all of the Hanford gravels over the 586 square mile extent of Hanford is not reasonable.

An example of questionable modeling includes where samples taken from aquifer tubes and wells in the 300-Area indicated that as much as 200 kg of uranium was getting into the river, but simulation results predicted that only 2 kg made it that far. Using modeled results to drive decisions is another dangerous strategy. In some of the 100-Area RI/FS documents, sampling of some areas was eliminated because modeled results reported that contamination wouldn't be found there. Past Board advice<sup>1</sup> has consistently emphasized a preference for doing good characterization over using simulations (and other methods) to drive cleanup decisions and to select appropriate cleanup remedies.

#### Draft HAB Advice:

- The Hanford Advisory Board (Board) urges DOE to employ, and the Regulators to insist upon, an amount of waste site characterization that is truly adequate to understand the contaminant amount and location, and to make reasonable and protective cleanup decisions. The Board suggests that having enough information to be prepared before decisions are made is more appropriate than is reliance on post-record of decision characterization.
- The HAB urges DOE and the Regulators to exercise extreme care in the use of modeling to guide cleanup at Hanford. HAB advice consistently emphasizes a preference for doing good characterization over using simulations to drive decisions and for the selection of cleanup remedies. The Agencies must make sure that the model simulations being used reflect reality, and aren't creating a virtual reality that may mislead decision-makers.
- The HAB suggests that great care should be taken to correctly select the right model for the right application, that the correct chemical, ground and water flux assumptions are used and parameters should be carefully selected, and that sensitivity analyses should be liberally employed to assure that these selections have been properly done and the results of modeling can be relied upon.

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<sup>1</sup> The Following is a partial listing of past Board advice relevant to Base Assumptions. A complete listing of past advice can be found website, [www.Hanford.gov/hab](http://www.Hanford.gov/hab):

- #157, "Final Hanford Solid Waste-EIS"
- #170, "Hanford Buried Waste"
- #185, "Tank Closure Waste Management Environmental Impact Statement"
- #202, "Clarity and Readability of Agency Reports"
- #214, "System Criteria to Guide Selection of Optimum Paths for Treating Hanford Waste"