

# HANFORD ADVISORY BOARD

*A Site Specific Advisory Board, Chartered under the Federal Advisory Committee Act*

**Advising:**

US Dept of Energy  
US Environmental  
Protection Agency  
Washington State  
Dept of Ecology

February 5, 2010

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Re: DOE's Use of Modeling versus More Characterization

Dear Mr. Brockman, Ms. Olinger, Mr. Faulk and Ms. Hedges,

## **Background**

The role of the Hanford Advisory Board (Board) is to advise the Tri-Party Agencies on concerns and issues related to Hanford cleanup, environmental restoration and waste management. Based on a summary evaluation of many recent U.S. Department of Energy (DOE) documents, the Board's 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 its 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.

Many instances over the years have proven that good characterization 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 other methods (like simulations) to select appropriate cleanup remedies. The only exception may

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be when it is less costly to 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.

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 (Ecology) would like to see (e.g. DOE would like to forego characterization sampling of the 200-Area solid waste burial grounds). With more characterization, which costs more, uncertainty can be reduced; however, the Board does not advocate implementation of characterization to the extent that it will cost more and take more time than the remediation.

Another troubling aspect of this issue is the increasing use of modeling (numerical simulation) as a 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 always 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, or the geologic complexity, will not accurately simulate reality. A single hydraulic conductivity value, applied for all of the Hanford gravels over the 586 square mile extent of Hanford, is not reasonable.

One example of questionable modeling happened when simulation results predicted that only 2 kg/year made it to the river, but samples taken from aquifer tubes and wells in the 300-Area indicated that as much as 200 kg/year of uranium was actually getting into the river. 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 rather than simulations (and other methods) to drive cleanup decisions and to select appropriate cleanup remedies.

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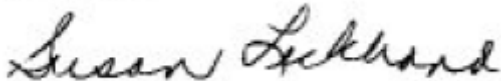
1 The Following is a partial listing of past Board advice relevant to Base Assumptions. A complete listing of past advice can be found at <http://www.hanford.gov/page.cfm/hab>:

- #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"

## Advice

- To support reasonable and protective cleanup decisions, the Board urges DOE to employ, and the regulators to insist upon, waste site characterization that is truly adequate to understand the contaminant volume and location. The Board suggests that having enough characterization data prior to decisions is more appropriate than reliance on post-record of decision characterization.
- The Board urges DOE and the Regulators to exercise extreme care in the use of modeling to guide cleanup at Hanford. Rather than relying on simulations to support the selection of cleanup remedies, Board advice consistently emphasizes a preference for doing good characterization, the Tri-Party Agencies should make sure that the model simulations being used reflect reality, and are not creating a virtual reality that may mislead decision-makers.
- The Board recommends that great care be taken to select the right model for the right application. Correct chemical, ground and water flux assumptions should be used and parameters carefully selected. Additionally, sensitivity analyses should be employed to ensure that the parameters are appropriate such that the results of modeling can be relied upon.
- The Board encourages DOE to recognize the synergistic and relative roles of modeling and characterization. Modeling should be used to guide the optimum characterization and to help define the boundary limits.

Sincerely,



Susan Leckband, Chair  
Hanford Advisory Board

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*This advice represents Board consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.*

cc: Steve Pfaff, Co-Deputy Designated Official, U.S. Department of Energy, Office of River Protection  
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