



# Oregon

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Mathew S. McCormick  
Assistant Manager for the Central Plateau  
U.S. Department of Energy - Richland Operations Office  
PO Box 550, MS A5-11  
Richland, Washington 99352

Subject: Review of the "Remedial Investigation Report For The Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes The 200-PW-1, 200-PW-3, And 200-PW-6 Operable Units," DOE/RL-1006-51, Rev. 0. and Draft A of the Feasibility Study and Proposed Plans

Dear Mr. McCormick:

Oregon appreciates the opportunity to review this remedial investigation report (RIR) and the follow on feasibility study and proposed plan.

We submitted mainly favorable comments on the prior version of this report (draft A) on December 14, 2006. Although our comments noted that some additional work was still needed on the conceptual models that form the basis of the investigation, our review suggested that the project was generally headed in the right direction – that the models recognized that waste movement was far more complex than simply in a vertical direction.

Our review of the latest version of this document suggests that, except for correcting some erroneous data values that we pointed out, DOE has gone back to a simple vertical flow model, which we believe does not accurately reflect the manner in which water and contaminants move in the subsurface. The concern we have is that significant decisions are being made based on these erroneous conclusions.

Perhaps the most significant is the decision to leave substantial contaminants in place in these Operable Units.

In July 2005, the Oregon Hanford Cleanup Board and the State of Oregon provided detailed recommendations to the Department of Energy on capping. While the Board recognized that capping will be necessary in some cases, it urged that capping not be considered as a substitute for cleanup. Not only do they require extensive, long-term maintenance and monitoring commitments, in time – a few decades at most – they will fail. They are also themselves significant natural resource injuries. Therefore, they commit DOE to making the significant natural resource restorations legally required to offset those injuries.

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tetrachloride and other wastes beneath the site, requiring more costly and difficult cleanup work later.

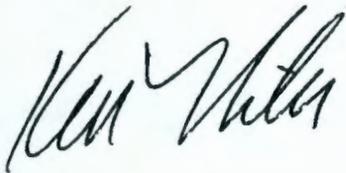
We therefore recommend you retract the draft A of the feasibility study and proposed plan as premature and complete work on the remedial investigation report using accurate and valid conceptual models that are based on the known historical data, which shows rapid transport of all of these contaminants via preferential pathways to groundwater.

We further recommend you convene a new team (including regulators and independent external members) to re-evaluate and develop these conceptual models and perform additional data quality objective and field sampling work to define the fundamental nature of the wastes' movement and the fate and extent of that movement.

Please refer to the attachment for specific examples and comments detailing the sorts of problems we find in the RIR.

If you have questions regarding our comments or would like more details, please contact Dirk Dunning at (503) 378-3187.

Sincerely,



Ken Niles  
Assistant Director

Attachment - Detailed comments focused on the Z-9 crib as an example

Cc: Dennis Faulk, U.S. Environmental Protection Agency  
John Price, Washington Department of Ecology  
Sandra Lilligren, Nez Perce Tribe  
Wade Rigsbee, Yakima Nation  
Ted Repasky, Confederated Tribes of the Umatilla Indian Reservation  
Hanford Natural Resource Trustees  
Susan Leckband, Chair, Hanford Advisory Board

### Detailed comments focused on the Z-9 crib as an example

Revision 0 of the remedial investigation report (RIR) changes the conceptual models from the RIR draft A, which noted the preferential pathways for movement of contaminants and water. Inexplicably, Rev. 0 discards this more accurate representation and instead returns to a more strictly vertical concept of contaminant movement used in earlier documents and uses the RESRAD computer code to evaluate protectiveness.

Neither the concepts nor the model are valid for these waste sites and neither are protective of public health or the environment. Using these invalid concepts and models leads to proposals for barriers (caps) and long-term institutional control actions that provide little or no real long-term protection.

In the RIR draft A, DOE recognized the movement of plutonium and other contaminants via preferential pathways present in the subsurface beneath these sites. More work was and is needed to characterize this movement to establish the extent of waste movement and to understand the fate and transport of the wastes. The data quality objective process did not complete that work, nor identify the limits of waste movement laterally to the south or southeast from the Z-9 crib. It did clearly show that the previous assumption (that lateral transport was not a major issue) was and is wrong.

In the revision 0 to the RIR and subsequent documents, DOE presumes again that lateral and vertical transport via preferential pathways is unimportant. In doing so, DOE ignores the historical record showing rapid movement of plutonium and americium in mobile forms under the Z-1A tile field, first noted four decades ago and analyzed in 1967, information we and others have brought to DOE's attention.

The presumption that preferential pathways for transport of water and contaminants do not exist and do not dominate flow is contradicted by the historical records and by field investigations and analyses. Given the substantial lateral flow of water beneath the waste sites, simple and unproven surface barriers are of little to no value. Surface water infiltrating from areas not covered by barriers will move beneath the barriers, mobilizing the wastes. Thus these invalid, no-preferential-transport presumptions mislead decision makers into falsely believing something is being done to limit the movement of wastes although the barriers in reality do nothing of the kind. They certainly provide no long-term protection.

When we examine the RIR we find:

- Plutonium levels are relatively uniform and exceed 100 nanocuries per gram from 13 to 36 meters in depth, with the highest concentrations often occurring in the bottommost 2 meters.
  - ❖ If the plutonium was tightly sorbed by the soil, the plutonium contamination would be concentrated at the top of the soil column and would not extend to such great depths. Clearly a significant fraction of the plutonium is highly mobile and is moving to groundwater, in direct conflict with the RESRAD and other models.

None of this is or should be a surprise. Bechtel noted all of the issues about preferential pathways in BHI-01311 when writing about the hydrogeological conceptual models for the 200 West Area (p. 9, § 2.1.3):

*“Liquid movement is dependent on the degree of cementation, the amount of fines in the formation, initial saturation, and the characteristics of the solution pathway. A liquid entering the strata at the surface will disperse in a relatively narrow, cone-like pattern through the gravel and/or sand facies of the Hanford formation. This distribution will persist until a low permeability silt or sandy silt is encountered, where movement along the vertical path will be restricted or slowed. The liquid will then travel laterally to where the unit pinches out or intersects a clastic dike with a sand to granule infilling, where it will again migrate vertically, or alternately sufficient hydraulic head will build up until breakthrough and the liquid moves through and below the fine-grained unit. At the contact with the Plio-Pleistocene unit, the liquid will be retarded and will tend to accumulate (historically this horizon has locally produced perched water, especially during the active discharge years when the major processing plants were in production). At this layer, the liquid will move laterally to clastic dikes or other fractures, or possibly to wells that have penetrated the formation and created a preferential pathway to the underlying Ringold Formation and/or the water table, or will again build up sufficient hydraulic head for movement through this unit.”*

Many other researchers have repeatedly documented these same or similar findings throughout the 200 West and 200 East Areas. We will provide references to these reports if you do not have them.

More importantly, this isn't new information. DOE has known that plutonium and americium are not tightly bound to the soil since at least 1967, when DOE noted that the measured Kd for plutonium in the soils was about 1.4 – 2.7 (very low retardation).

*BNWL-CC-649, June 10, 1966 Battelle-Northwest  
Disposal Characteristics of Plutonium and Americium in high salt acid waste*

- *“Previous research by Battelle-Northwest indicated that soil can imbibe this waste (including slugs of organic) almost as readily as water; however, **uptake of plutonium by soil was low and of americium negligible.**”*
- *“This study confirmed that **adsorption of plutonium and americium on soil material from the surface to ground water was minor from AAW waste and showed that soil neutralization or complexing agents would not satisfactorily improve adsorption**”*
- *“Laboratory studies show that disposal of AAW waste to ground will result in plutonium and americium contamination of all soil material wetted by the waste. Both column and batch equilibrium data show that soil adsorption of plutonium and americium is low between the surface and ground water. Thus, **any assumption that plutonium and***