Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY
625 Marion St. NE
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.Oregon.gov/ENERGY

July 10, 2009

Matthew S. McCormick
Assistant Manager for the Central Plateau
U.S. Department of Energy
P.O. Box 550, A5-11
Richland, Washington 99352

Dear Mr. McCormick:

Oregon appreciates the opportunity to review the *Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2007-27, Draft B, Reissue* received on June 22, 2009. There are a couple of important points Oregon would like to comment on.

Comments about Modeling
We submitted comments for the Remedial Investigation Report (RIR, Draft A and Rev. 0) on December 14, 2006 and November 15, 2007. Although our mostly favorable comments to Draft A noted that the project and models used were headed in the right direction, our review of the later version (Rev. 0) showed that DOE has reverted to a simple vertical flow model which we believe is based on erroneous assumptions and does not accurately reflect the manner that water and contaminants move in the subsurface. Our concern is that significant cleanup decisions are being made based on these erroneous modeled predictions. This latest version (Draft B, reissue) repeats the use of the erroneous modeling.

The major obstacle with modeling the hydrologic state that exists within the Hanford-Cold Creek-Ringold sediments, unfortunately, is that the actual subsurface conditions are not spatially consistent nor easily definable. Compounding this problem is the dramatic heterogeneity in distribution of sediment particle sizes and hydrologic properties in the subsurface that creates a corresponding distribution of microenvironments where solution chemistry, sorption partitioning, and ligand exchange capacity vary from one sediment package to the next, from foot to foot. DOE's own documents indicate that interbedded fine grained layers act as significant flow barriers, slowing the downward progress of the waste fluids, redirecting the flow horizontally and changing the hydrochemical character of the microenvironment (PNNL-SA-58953). The formation of radionuclide-containing nanoclusters and colloidal particles and transport of radionuclides in vadose zone water are just a part of that waste solution-soil interaction that needs to be included in Hanford modeling.`

The lateral movement of contaminated water at these sites has been documented in more than 40 years of work (e.g., BNWL-CC-649). According to *Item 1, Document Review and Comment Form from DOE to ODOE about RI/FS, Draft A,* the inclusion of lateral spreading of vadose zone transport at geologic contacts in the subsurface into the PW-1-3-6 models was to be clarified. This clarification was not done.

The installation of engineered barriers over waste sites is modeled in this RI/FS as protective. Engineered barriers over waste sites redirect intercepted precipitation away from each capped waste site to adjacent areas where they encounter laterally moving contaminant plumes. Therefore, barriers should not be considered or modeled as protective against the liberation or movement of contamination by the lateral flow of vadose zone water. Without recognizing the lateral movement of contaminants in the vadose zone, the modeling that drives the conclusions and alternatives in the RI/FS fails to accurately understand the lateral and vertical distribution of contamination. The flawed assumptions lead to errors in assessments as to protectiveness, particularly in the case of the use of barriers.

Comments about Remediation Alternative Selection
The 200-PW-1,3,6 waste sites that received acidic, high salt waste streams from Z-Plant (PFP), including the 216-Z-9 trench, 216-Z-A tile field and 214-Z-316, represent significant sources of plutonium and americium contamination. For example, 216-Z-9 trench received an estimated 50-140 kilograms (3,600-11,000 Curies) of plutonium 239 and plutonium 240, and 8,580 Curies of americium, along with around 500 tons each of carbon tetrachloride and nitrate. In two wells drilled near and under the Z-9 trench (299-W15-46 and -48), anomalously high concentrations of plutonium as high as 400,000 picocuries per gram have been found as deep as 118 feet. The other Z-Plant disposal sites (200-PW-1 and -3) received similar acidic, high salt wastes although at a reduced radionuclide input and disposal volume.

It is true that the solution conditions that existed at the time the liquid waste streams were discharged to the cribs and trenches are different than what is found in the soil today. However, it is also true that the chemistry that permitted plutonium, americium and other contaminants to be transported in solution or in suspension are still in the soil and in soil solution, and are still interacting with the contaminants and with soil chemistry. The transport of radionuclides in vadose zone water and formation of radionuclide-containing nanoclusters and colloidal particles are just a part of that waste solution-soil interaction.

Knowing that significant plutonium and americium contamination has been detected at depths of up to 118 feet below the PW-1 and PW-6 waste sites, and cesium contamination at the PW-3 waste sites, Alternative 1 that simply caps the waste sites is not protective. We believe that these Operable Units fail the Oregon Hanford Cleanup Board's criteria for capping. The statement "*Alternative 1, 2 and 3 are protective*" fails to acknowledge that installation of engineered barriers over waste sites does not prevent the liberation or movement of contamination by the lateral movement of vadose zone groundwater, nor prevent infiltration of surface water into the vadose zone from intercepting laterally-moving contamination plumes.

Alternative 2, using In Situ Vitrification (ISV) to immobilize contamination, encapsulates contaminants in glass to a limited depth (5 to 15 feet). ISV could not possibly be used to contain the contaminants in the soil that have been detected to 118 foot depths as would be required to remove the threat these contaminants pose (PNNL-SA-58953).

While the footprint, soil stockpile, contaminated soil volume handled, backfill volume required, impacts to workers, and costs all increase with RTD depth in Alternative 3, the removal of the source of potential ground water pollution sources is always preferred to reduce risk. The lack of a contamination source improves the long-term effectiveness and permanence of the solution.

Oregon prefers Alternative 3E, consistent with CERCLA, to remove contaminated soils with greater than 10^{-4} risk level so that long term institutional controls would not be necessary. Alternatives 3C and 3D (removing a significant portion of plutonium contamination based on an evaluation of soil contaminant concentration with depth or removing contaminated soils which contain greater than 100 nCi/g of transuranic radionuclides, respectively) are the next tier of acceptable options which would remove a part of the soil contamination and thereby increase protectiveness. We dislike these alternatives that leave some residual contamination above acceptable risk levels, because they would require institutional controls and capping barriers (DOE/RL-2007-27) adding costs and stewardship requirements.

"Industrial Land Use" as it is being used in alternatives like these needs to be redefined. At present, a depth of 4.6 meters (15 feet) below current ground surface is being used as protective. As a pertinent example, in the construction of the new EM-Sciences building near the 300 Area, a 45-foot deep excavation was made to pour the foundation footings. This depth is quite typical and more representative of a normal, realistic and protective industrial excavation depth. Significant contamination should be removed to or below that depth in any land use area designated as "industrial use." Therefore, Alternative 3B, with 4.6 meters of soil removal depth, would not be protective to direct contact risk in industrial land use.

DOE's own policies recommend that long-term institutional controls are to be avoided. Institutional controls are to be used as a short-term tool while other techniques are being emplaced or allowed to operate. It has been recognized that the protectiveness of long-term controls cannot be assured beyond the point that enforcement is actively provided to ensure they work. Long-term institutional controls are used repeatedly in these alternatives as a protective solution.

We look forward to working with DOE to find an acceptable approach for cleanup of these waste sites that is effective, efficient and economical.

If you have any questions or comments about our recommendations, please contact Dale Engstrom of my staff at 503-378-5584.

Sincerely,

Ken Niles
Assistant Director

cc: Dennis Faulk, U.S. Environmental Protection Agency
Jane Hedges, Washington Department of Ecology
Russell Jim, Yakama Nation
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Sandra Lilligren, Nez Perce Tribe