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September 7, 2007

Mr. John Sands
U.S. Department of Energy
P.O. Box 550
Richland, Washington 99352

Re: Oregon comments on "Draft risk assessment report for the 100 Area and 300 Area Component of the River Corridor Baseline Risk Assessment, DOE/RL-2007-21, Draft A"

Dear Mr. Sands:

Oregon appreciates the opportunity to comment on the draft of the "Risk Assessment Report for the 100 Area and 300 Area Component of the River Corridor Baseline Risk Assessment." This assessment is important because it is intended to provide an analysis of risks to human and ecological health along the Columbia River. Results of the assessment will provide a key input to the decision process for final cleanup of the river corridor, and will help set the course for long-term health of the Columbia River ecosystem.

As a prelude to our comments on the draft report, we want to compliment DOE and its contractors on the open and transparent process followed in developing this assessment. Over the past three years, you have organized numerous workshops, field site visits and reviews, with frank, wide-ranging discussion at the meetings. As stakeholders, we have not always concurred with decisions made by DOE and contractors, but the process has been much appreciated and has led to substantive improvements in design and implementation of the assessment.

We also want to recognize and compliment your contractors, especially Neptune and Company, for their thoroughness in developing and evaluating a variety of risk scenarios for the human health risk assessment. We believe it important to understand how risk is affected by different land uses and by associated differences in exposure for individuals visiting, working at, and/or living in the river corridor. In addition to running several scenarios, Neptune also evaluated not simply the incremental risk from exposures from Hanford sources, but looked at risk from combinations of on- and off-site contaminants, looking for instance at cancer risks from Hanford-derived and other (e.g., natural background and fallout-derived) radionuclides. This approach provides important insight on the incremental and total risks associated with Hanford contaminants.

In stark contrast to the approach taken by Neptune of including multiple exposure scenarios, we are distressed by the disclaimer included in the executive summary regarding risk scenarios. On page 2, the executive summary downplays the significance of risk analyses for alternate exposure scenarios, stating that they were included only as a "sensitivity analysis to meet agreements" with stakeholders. This section closes by stating that "DOE neither agrees with nor endorses the premises of the risk

analyses for these hypothetical site uses." This assertion by DOE suggests that either the department does not understand EPA guidance regarding a baseline risk assessment (i.e., needs to include an assumption of no action [i.e., no institutional controls] and to consider "reasonable, foreseeable" future use of the site [e.g., alternative land use scenarios already proposed by the City of Richland, Native American tribes, and others]) or that DOE does not want to acknowledge scenarios that suggest high risk and that might require a higher level of cleanup. As in some previous documents, DOE seems to be using decisions made for the Comprehensive Land Use Plan as a cudgel to guide and constrain other kinds of decisions at Hanford, including levels of cleanup. This is not appropriate.

The scope of the assessment is limited and is not really a baseline risk assessment for the 100 and 300 Areas. The assessment does not include all of the 100 and 300 Areas and in uplands, it is limited to consideration of waste sites that have already been remediated. The assessment is also limited to a snapshot of current conditions, and does not consider potential future contaminant status. Finally, as noted above, DOE has clearly stated their disinterest in evaluating risks called for by EPA guidance including a "no action" alternative and risks associated with reasonable, foreseeable future land uses.

In terms of a technical appraisal of the risk assessment, we believe it was premature for the draft report to be released in its current form. We understand the pressure to release the draft at this time to meet a TPA milestone, but believe that the report has severe technical shortcomings. Because of those shortcomings, many of the analyses and conclusions of the assessment are not defensible and have little value for guiding the cleanup decision process. Reasons for this conclusion are outlined below.

The most substantive problem, in terms of the impact on risk estimates, is the high frequency of non-detects (i.e., samples with contaminant concentrations lower than the detection limits of the analytical method). By agreement during project workshops, inferred values equal to one half the detection limit were set for these samples. The end result is that inferred contaminant concentration for many samples, particularly for some organic compounds and radionuclides, are likely much higher than actual concentrations. When these numbers are used in risk analyses, resulting risk estimates appear to be enormously inflated for many of the waste sites and risk scenarios. The true concentrations of contaminants and of the actual risks they pose can only be determined by an extensive campaign of resampling and reanalysis. There is no quick, easy, or inexpensive means of resolving this problem. Concerns about detection limits were raised during the Data Quality Objectives and Sampling and Analysis Plan processes for this project. Better attention to detection limits at that time could have greatly reduced this problem.

For some scenarios (CTUIR scenario in particular and to a lesser extent other scenarios involving fish consumption), reported risks can be extremely high. In a few cases, it appears that actual risks are high, based on variability of risk among waste sites. In most instances, the high risks seem to result from extensive inclusion of inferred values for non-detect samples. The bottom line is that this assessment suggests a substantial range of risks among sites and scenarios, but that quantification of actual risk is poorly defined.

As a technical document, this report has extensive problems that compromise the soundness of reported results and their interpretation. Some examples include:

- Small sample sizes. These greatly reduce the statistical power of analyses and lead to Type II error in analyses (Type II occurs when a statistical analysis fails to identify a real difference between

data sets, such as a difference in concentration between waste sites and reference sites.). We did not see any discussion of the power of analyses reported here.

- Poor reference sites. Some aquatic reference sites have higher concentrations of contaminants in fish or sediments than in samples taken at reactor areas. Also, many of the reference sites do not meet EPA's criteria that such sites be "minimally disturbed" (e.g., borrow pits). This issue has been raised repeatedly during this and related studies, and while those questions led to selection of a few additional terrestrial reference sites, the underlying concerns were never effectively addressed.
- Inability, in some biological sampling, to collect adequate numbers of samples. This results in an inability to effectively assess exposure and risk. Examples include inability to collect any amphibian samples (tadpoles), and collection of fewer samples than planned for other exposure indicators such as terrestrial invertebrates and kingbirds.
- Use of un-representative samples. In many cases, samples for this project were collected during a very narrow sampling window that does not capture the temporal variability (seasonal or diurnal) in contaminant concentrations. This is a concern for surface water and especially for pore water samples. The primary sampling of "pore water" yielded samples that are essentially indistinguishable from river water, so analyses of those samples, and results of bioassays that used those samples are of little use.
- Often-faulty data analyses. As a few examples:
    - Analyses of terrestrial soils often combined data into two groups - "reference" and "operational" areas. Reference sites include two different kinds of soils from "undisturbed sites" and "borrow pits." These are fundamentally different kinds of sites and data from them should not be combined. Similarly, data for operational sites includes sites that were backfilled and sites with native soils. Again, these are fundamentally different soils and data for them should not be combined.
    - Analyses of soils compare statistical distributions of data for discrete samples and for multi-increment samples. These analyses are invalid.
    - Analyses of soil and biota typically compare average concentrations for all operational areas to the mean for reference sites. Notwithstanding the problem of combining data for different kinds of reference and operational sites as described in a preceding bullet, this analysis is interesting but ultimately of little value. Analyses should evaluate residual contaminant concentrations in individual waste sites to the average for reference sites to determine if there are high levels of waste at the individual sites.
- Inclusion of unsupported conclusions. As one example, low survival of aquatic invertebrates (*Hyalalla*) and clams (*Corbicula*) at chromium sites is attributed not to effects of chromium, but to differences in sediment particle size. This is an interesting statistical association, but it a statistical correlation only. Correlation does not establish "cause and effect," and in this case there was not any attempt to provide a causal explanation for the observed correlation.

Along with technical concerns, we note that review of this document was a very frustrating ordeal; the report frankly seems more like a rough first draft than something ready for external review. The text is obtuse, and syntax leaves much to be desired. The document lacks necessary explanatory material that would help readers, especially those not well-versed in risk assessment. Figures often have incorrect axis labels, or have values for the Y-axis that display one or a few extreme values but place virtually all other values along the X-axis (e.g., Figures 4-36 and 4-44). The text does a poor job of referencing Figures and Tables (e.g. pg. 4-25 notes that uranium data are shown in Figures 4-47 through 4-117, but

never follows with reference to specific figures). The draft also has the feel of a data dump. We appreciate that the report includes extensive data, but does the main body of text really need 71 figures describing distribution of uranium, when only a handful of these have truly important information? Figures need to be reviewed, and most shifted to an appendix. Moreover, many of the figures lack a key. As one example, Figure 4-2 has a lot of data that might be informative and important, but because there is no key it conveys no useful information. In other cases, figure legends refer to colors in figures that have been reproduced in black and white. I could list many similar problems, but the point should be clear – readability and interpretability are seriously compromised by the poor quality of the document.

We are not sure what to recommend as a path forward. The draft represents a substantial body of work and thinking, and is a good step toward risk assessment for the river corridor. For the many reasons noted above, however, the quality, completeness, and defensibility of the results of this effort are severely limited and do not reliably inform the decision process. We recommend that DOE and its contractors follow one of two paths:

- The preferred option would be to do extensive redesign and resampling for the project, designed in concert with stakeholders, to address the myriad sampling and analytical shortcomings of the material contained in this report. We understand the implications of such an approach, but believe it is the only way to develop a thorough, credible risk assessment that can meaningfully inform the cleanup decision process.
- An alternative approach is to recognize the many shortcomings of the data set and analyses reported here, do a limited amount of resampling to target a few crucial analytes and locations, then completely reanalyze the data set. This would need to be done in a way that fully recognizes the limitations of the existing data, and that acknowledges and describes the uncertainties of all data and analyses. This approach would provide a much more limited set of analyses, but with a more useful appraisal of risk than the current draft.

DOE has scheduled a workshop on October 30 to discuss resolution of comments on the draft risk assessment. We plan to participate in that workshop, and look forward to hearing from you and your contractors on how you plan to proceed with the assessment. We look forward to working with you and with the contractors to move ahead with this assessment. Should you have any questions or wish to discuss our comments, please contact Paul Shaffer of my staff.

Sincerely,

Ken Niles
Assistant Director

CC: John Price, Washington Department of Ecology
Larry Gadbois, U.S. EPA
Hanford Natural Resource Trustees