Confederated Tribes and Bands
of the Yakama Nation ERWM

Established by the
Treaty of June 9, 1855

August 3, 2011

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Re: Review Comments on the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Revision 0.*

Dear Mr. Holten:

The Yakama Nation ERWM Program appreciates the opportunity to review and provide comments on the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Rev 0.*

The Confederated Tribes and Bands of the Yakama Nation is a federally recognized sovereign pursuant of the Treaty of June 9, 1855 made with the United States of America (12Stat. 951). .

There is no issue of greater importance to the Yakama Nation than protection of, and respect for the treaty-reserved rights. The Hanford Site lies within ceded area of the Confederated Tribes & Bands of the Yakama Nation. Within this ceded area, the Yakama Nation retains the rights to natural and cultural resources including but not limited to areas of ancestral use, archaeological sites and burial grounds. These resources are sacred and sensitive to the Yakama Nation, and must be managed to preserve, protect and perpetuate the resources that are inseparable from our way of life. Our concerns were previously identified in our March 2011 letter to DOE on this subject. These concerns remain valid. The ERWM Program identified several areas that have significant concerns.

Mixed Low-Level and Transuranic Mixed Waste Cleanup: Most of the waste sites in the 200-PW-1 and 200-PW-6 OUs have transuranic contaminants (or transuranic constituents) in the soil at various depths. The contaminated soil and debris excavated from these sites that contain alpha-emitting transuranic isotopes with half-lives exceeding 20 years in concentrations that exceed 100 nCi/g require disposal offsite at WIPP. Remedies that may generate transuranic waste must be planned and implemented in coordination with the Hanford Transuranic Waste Certification Program – a step that should be documented during the remedial design phase. The ERWM Program does not support construction of waste storage facilities that are in violation of USDOE Orders or RCRA or CERCLA regulatory obligations and/or will result in long-term/permanent storage of such wastes on the Hanford site. The ERWM Program considers removal of a significant portion to be at least 90% to 96% waste removal. We request USDOE edit RTD options to reflect a more stringent risk level and to define 'remove significant portion' as *removal of at least 90% of waste.* We request all structural and piping components to be similarly remediated along with their associated waste sites.

Sampling and Modeling: Migration of contaminants, including plutonium, from the waste sites to groundwater should be considered and addressed in the proposed plan. Data acquired within the last 5 years indicate that significant plutonium contamination remains within the 200 Area and, in particular, in the vicinity of the 216-Z-9 covered trench. In less than 50 years, plutonium has migrated to depths of approximately one hundred and twenty (120) feet at concentrations that exceed EPA standards for geologic disposal (100 nCi/g). Such data provide strong evidence for the need to include plutonium as a contaminant of concern in the vadose zone and groundwater at these Operable Units (OUs). Moreover, DOE's draft Tank Waste EIS (Appendix U, Table U-2) indicates that plutonium migration in groundwater from the Central Plateau will reach the near shore of the Columbia River at levels more than three times the EPA drinking water limits.

Institutional Controls: The FS makes statements about USDOE retaining institutional controls over these waste sites for 1,000 years (High and Low Salt Waste Sites) and 350 years (Cs-137) Waste Sites), where residual risks would remain above acceptable levels. IC may be feasible in the short-term, but to assume long-term institutional control (over 1000 years) is in conflict with U.S. Nuclear Regulatory Commission regulations in 10 CFR 61.59 which limit reliance upon ICs to 100 years after transfer of radioactive disposal facility property to a new owner.

Cancer Risk: USDOE indicates excess cancer risk is unacceptable if it is greater than the CERCLA risk range of $1x10^{-4}$ to $1x10^{-6}$ and continues on to say cumulative excess lifetime cancer risk from non-radiological carcinogens greater than $1x10^{-5}$. The ERWM Program requests clarification as to why there is not a more stringent cancer risk used for radionuclides given that it is unacceptable to have a risk greater than $1x10^{-5}$ for multiple non-radiological contaminants.

- Proposed RTD Options 3A & 3B: Ecological direct-contact exposure to non-radionuclides is to be evaluated at fifteen (15) feet below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations). Neither of these options reflects this requirement nor was a complete baseline risk assessment conducted. Post-ROD confirmatory sampling does not substitute for a complete ecological assessment. Delay of sampling until development of a Work Plan is inconsistent with the CERCLA process which requires a baseline risk assessment (human health and environmental receptors) during the Remedial Investigation phase.

- ELCR of 1 X 10^{-4} is for individual and is presented as EPA's target risk threshold; however EPA uses the general 10^{-4} to 10^{-6} risk range within which the Agency strives to manage risks as a part of a CERCLA cleanup, with a preference for cleanups achieving the more protective end of the range (i.e., the point of departure, 10^{-6}). Human health direct-contact exposure to non-radionuclides within fifteen (15) feet of ground surface risk to multiple carcinogens cannot exceed 1 X 10^{-5} in compliance with WAC 173-340. The more stringent values should be used.
- Table 5: Human Health (Industrial Exposure Scenario) does not include Carbon Tetrachloride, Methylene Chloride, Technetium-99, or Nitrate. We do not support USDOE's use of risk threshold of 10^{-4} for these contaminants.

Summary of Remedial Alternatives (disposal costs): The disposal costs at WIPP and ERDF are listed as $44,000 per cubic meter and $100 per cubic meter, respectively. There is no backup for these unit costs, but it seems that the substantial difference presumably introduces a strong bias to disposing of contaminated material onsite. The basis of the costs should be presented to demonstrate that a reasonable comparison can be made. The Yakama Nation supports disposal of TRU waste at WIPP or a similar offsite, deep disposal facility.

Evaluation of Remedial Alternatives (cost estimates): The cost estimates presented in Tables 7 through 10 are confusing and problematic. In all cases, the O&M costs are discounted to present worth values, which, while typical for FS-level evaluations, are problematic for a 1,000-year assumed time frame for O&M activities. Due to the long time period, costs past 100 years have a net present value near zero. For example, the difference between 100 years and 1,000 years of O&M, assuming an equal annual outlay, is only 5 percent. Conceptually, this introduces a bias into the alternative evaluation process to select long-term "low-cost" alternatives that require essentially no financial commitment beyond 100 years. This characteristic has the tendency to mislead decision makers and the public into selecting an alternative that may in fact be less protective over time (decades and centuries) as the collective memory of the waste location fades and DOE's mission focus shifts elsewhere.

The cost tables are also very difficult to understand. In some cases the total cost is less than the capital cost (see the RTD alternative on Table 7); in other cases the total cost exceeds the capital cost when the O&M cost is zero (see Table 11). The FS reports, where these costs are developed, are not particularly helpful in understanding how the costs were built up. Detailed cost documentation should be provided.

The Yakama Nation ERWM Program looks forward to dialog on these concerns and comments. If you have any questions, please contact me at (509) 945-6741, or Dave Rowland at (509) 582-3466 or (509) 945-4488.

Sincerely,

Russell Jim, Manager
Yakama Nation
ERWM Program

Attachments 1 & 2:

cc: Paula Call, U. S. Department of Energy
Ken Niles, Oregon Department of Energy
Gabriel Bohnee, NPT
Stuart Harris, CTUIR
Wade Riggsbee, Yakama Nation ERWM
Dave Rowland, Yakama Nation ERWM
Jean Vanni, Yakama Nation ERWM
John Beckstrom, Yakama Nation ERWM
Marlene Shavehead, Yakama Nation ERWM
Kristian Callahan, Ridolfi Engineering, Inc.
Administrative Record

Attachment 1: Review Comments on the *Feasibility Study for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Draft A*

The Yakama Nation ERWM Program identified several areas that have significant concerns.

Characterization: There is considerable uncertainty associated with how sampling and data represents contaminant conditions in the vadose zone. Issues include:

- Assumption of similar and/or maximum future concentration values and lack of quantification and uncertainties in estimations.
- Spatial and temporal difference may have influenced sample bias.
- Plutonium and Americium radionuclides have been located at depths below 37 meters, indicating mobility not clearly defined.
- Limited or no data identified regarding the concentration or distribution of nonradiological contaminants in soils at some waste sites. The quantity of nitrate received some sites suggest it probably contributed in the past, and could have future impacts, to nitrate contamination in the unconfined aquifer.
- It is suggested that, rather than attempt to reduce uncertainties through design of alternatives which include groundwater impact mitigation efforts, efforts should focus on additional post-ROD site-specific vadose zone sampling with adjustments to the selected alternative. This is over-simplistic. Changes to alternatives cannot simply be done using this approach. Should decisions regarding whether the soil is protective of groundwater require changes be made to the chosen remedy, is USDOE going to follow the CERCLA modification process with an ESD or ROD amendment? Both would require Tribal/public review opportunities. The ERWM Program requests clarification on this issue.
- Sampling and Modeling: Generally stated, there appears to be a reliance on professional judgments to decide on the need for action that will be refined with additional characterization (confirmatory sampling) activities planned during remedial design and implementation of chosen alternative. Additional post-ROD sampling for mobile contaminants is suggested to improve the approximations of the distribution of these contaminants in the vadose zone and to improve estimates of the potential threat to groundwater.
    - Use of the 'analogous site' approach is only appropriate when the representative sites have been thoroughly characterized. Admittedly, the 216-Z-9 Trench did not have complete sampling.

To reduce uncertainties regarding the long-term reliability of management controls (including ICs) for providing continued protection from residuals, the ERWM Program requests USDOE perform necessary soil sampling within this Feasibility Study's activities.

The ERWM Program requests USDOE conduct sampling at waste sites where none were done and that analysis include Technetium-99, nitrate, PCBs, boron, mercury, TCE, hexavalent chromium as well as carbon tetrachloride and methylene chloride.

Groundwater: The RI and FS evaluations concluded that the majority of the waste sites pose a current or potential risk to human health and the environment (plants, animals, or groundwater) via direct contact or contaminant migration into the underlying groundwater from

unrestricted land use. The National Contingency Plan expectation for groundwater is that usable groundwater will be returned to the highest beneficial use (i.e., drinking water) "...wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site" (40 CFR 300.430[a][1][iii][F]).

- It was stated that the majority of sampling and data uncertainties stem from the estimation of source term amounts, from sparse data, difficulties in understanding contaminant release/retention in the vadose zone, and/or data bias resulting from the tendency for preferential sampling of the more contaminated portions of contaminant plumes and associated sampling and measurement frequency bias.
- Statements are made that some remediation of some contaminates (i.e. Nitrate and Technetium-99) will be addressed under the Deep Vadose Zone OU, 200-DV-1.
- Clarification needed as to why soil concentration value for Carbon Tetrachloride (.0031 mg/kg) was not used in place of less stringent groundwater values of 3.4ug/L.
- Borehole C3427 (DOE/RL-2006-51, 2007, Rev. 0) was drilled adjacent to the 216-Z-9 covered trench from February to May of 2006. At the time of construction, a maximum concentration of 254,000 pCi/g plutonium-239/240 was measured in Borehole C3427 at a depth of seventy (70) to seventy-two (72) feet below the ground surface. In less than fifty (50) years, plutonium has migrated to depths of approximately one hundred and twenty (120) feet at concentrations that exceed EPA standards for geologic disposal (100 nCi/g). Such data provide strong evidence for the need to include plutonium as a contaminant of concern in the vadose zone and groundwater at these Operable Units (OUs).

The ERWM Program requests USDOE perform additional groundwater site-specific sampling on the 200-PW-1, -3, -6, and 200-CW-5 waste sites under current Feasibility Study actions. Additionally, as filtered data for metals potentially underestimates the concentrations present in the groundwater, the ERWM Program requests USDOE perform unfiltered groundwater sampling to reflect a more accurate risk assessment.

The ERWM Program does not support deferral of remediation of contaminates to the Deep Vadose Zone OU. We request USDOE include remediation of all contaminates associated with the 200-PW-1, -3, and -6 OUs within the same decision document (DOE/RL-2009-117, Draft A).

We reiterate our concern that USDOE still lacks a comprehensive, integrated approach to the vadose zone. We believe that USDOE should perform interim and concurrent actions concerning the groundwater and the vadose zone to ensure that the cleanup of the source sites reduces risks to levels that are protective of Tribal subsistence uses without relying on long-term stewardship and permanent institutional controls.

We reiterate our recommendation that USDOE consider the following in developing a systematic approach to vadose zone cleanup:

- Potential future impacts from the deep vadose zone to groundwater and to the confined aquifer in 200 areas
- Use of more publically available and advanced models for doing modeling to determine potential level of risk to human health and the environment.
- Pursue an independent review of treatability technologies to apply to the deep vadose zone contamination problem.

- DOE should ensure that sufficient and additional funding is directed to address the vadose zone contamination problem.

  Human Health Risk: Risks to Native American populations from both soil and groundwater exposure indicates exceedances. Results indicate Yakama Nation non-cancer hazards would remain above 1HQ for the tap water and produce pathways due to hexavalent chromium and TCE, and risks would remain above 10^{-4} for the produce pathway due to technetium-99.
- The contaminant of potential concern list is too limited, and requires further explanation as to the process for how they were selected.
- Native American exposure scenarios should be applied to the development of Preliminary Remediation Goals (PRGs). The proposed plan provides no indication that Native Americans are factored into the decision-making process.
- Irrigation should be included in the evaluation, as the irrigation scenario will affect contamination in soil and groundwater beneath the waste sites.
- Particulate inhalation and dermal contact should be included for the soil pathway, not just ingestion.
- 100% risk to the Yakama Nation from waste sites, soils, and groundwater, is unacceptable and should be addressed in the proposed plan. Appendix G, Native American Human Health Risk Assessment, from the Feasibility Study for the 200 Area Process Water (DOE/RL-2007-27, Draft C) concluded (page G-vii) that *"Risks to Native American populations are at the maximum risk possible (approaching 1, or 100 percent), indicating that exposures to soil at the two waste sites and groundwater beneath the waste sites represent a significant risk should they occur in the future."*

  Cancer Risk: USDOE indicates excess cancer risk is unacceptable if it is greater than the CERCLA risk range of $1x10^{-4}$ to $1x10^{-6}$ and continues on to say cumulative excess lifetime cancer risk from non-radiological carcinogens greater than $1x10^{-5}$. Why isn't there a more stringent CERCLA cancer risk value for radiological contaminants given that it is unacceptable to have a risk greater than $1x10^{-5}$ for total excess cancer risks for non-radiological contaminants?

- Proposed RTD Options 3A & 3B: Ecological direct-contact exposure to non-radionuclides is evaluated at 15 ft below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations). Neither of these options reflects this requirement nor was a complete baseline risk assessment conducted. Post-ROD confirmatory sampling does not substitute for a complete ecological assessment. Delay until development of a Work Plan is inconsistent with the CERCLA process.
- ELCR of $1 X 10^{-4}$ is for individual and is presented as EPA's target risk threshold; however EPA uses the general 10^{-4} to 10^{-6} risk range within which the Agency strives to manage risks as a part of a CERCLA cleanup, with a preference for cleanups achieving the more protective end of the range (i.e., the point of departure, 10^{-6}). Human health direct-contact exposure to non-radionuclides within fifteen (15) feet of ground surface cumulative risk to carcinogens cannot exceed 10^{-5} in compliance with WAC 173-340. The more stringent values should be used.

  The ERWM Program disagrees with the statement that there are no significant differences in risks or hazards between the subsistence farmer and the two Native American exposure scenarios. They have unique exposure pathways and exposure rates, and much higher risks (as shown in DOE/RL-2007-27, Draft C, Appendix G). Furthermore we disagree with the statement

'Although not quantified, future concentration reductions will be significant for all contaminants due to the planned groundwater remediation activities.'

A disconnect appears between industrial worker and future subsistence farmer scenario exposure durations. Text states industrial worker scenario long-term duration is from 25-70 years and future subsistence farmer scenario occurs in 150 years. The ERWM Program requests USDOE recalculated future subsistence farmer scenario risks as occurring in 50 years. Include the inhalation pathway along with direct contact and ingestion.

Ecological Risk: The Executive Summary states that there is no identified or projected ecological risk. Other text states a screening level ecological risk assessment (SLERA) ruled out further consideration of sites with regard to ecological risk potential; therefore no final COPCs were identified by the ecological risk assessment process. Yet, discussion in Section 3.3 states ecological exposures are likely present at twelve of the sixteen waste sites.

- The working hypothesis for the purposes of the SLERA is that biological activity at these 200-PW-1, -3, and -6 waste sites are limited largely to the top eight (8) to ten (10) feet. This is an erroneous assumption. We do not agree that the biologically active zone is limited to ten (10) feet below ground surface or to an alternate point of compliance for protection of human health or the environment. Ecological direct-contact exposure to non-radionuclides is to be evaluated at fifteen (15) feet below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations).
- Statements are made that at least one of the remedial alternatives would address contaminants potentially posing a threat to ecological receptors (i.e., RTD of soils to a depth of 4.6 meters [15feet] for protection of human health or groundwater) and that demonstration that remediation will also protect ecological receptors will be addressed as a part of the remedial design/remedial actions post-ROD. Unless USDOE intends to RTD soils to at least fifteen (15) feet at each waste site, this assumption is invalid.
- Furthermore, delay of sampling until development of a Work Plan is inconsistent with the CERCLA process which requires a baseline risk assessment (human health and ecological receptors) during the Remedial Investigation phase. Identifying ecological screening values or preliminary remediation goals (PRGs) in the Work Plan is unacceptable.
- We also request USDOE clarify the decision-making process and what is the screening level for Tc-99.

The ERWM Program requests USDOE perform a complete ecological risk assessment, identify all pathways, and characterize current and potential threats to the environment and ecological receptors, and include results in this Feasibility Study. Consider animals consuming contaminated plants in the assessment. Note Federal maximum contaminant levels (MCLs) are NOT risk levels. Although an evaluation of how MCLs compare to risk levels can be made (and MCLs may be used for screening) they are not the same as risk levels.

Cost Analysis: Costs are not fully represented. Several proposed alternatives will include post-ROD sampling activities. These costs are not included. Uncertainty regarding the extent of contamination at each waste site is so high; impact is expected to affect both costs and duration of remedial alternatives. The ERWM Program requests USDOE revise cost analysis to include sampling activity costs where alternatives state they would be required. We would like to see a realistic life-cycle cost analysis (1000 years) which includes IC failures.

Remedial Alternatives: Statements that implementation of remedy(s) will require careful planning due to waste site location or infer that some technologies will have additional implementability issues is mute. Please provide just the facts. Issues of concern include:

- Use of terminology of *'remove significant portion of plutonium based on an evaluation of soil contaminant concentration with depth'* is misleading. It appears that USDOE has decided removal of a significant portion can be only 51% waste removal.
- Piping components are presented as separate waste site groups.
- None of the RTD options presented clearly identifies excavation depths to meet requirement of no cumulative excess lifetime cancer risk from multiple non-radiological carcinogens greater than $1x10^{-5}$ risk levels.
- Transuranic Waste Cleanup: We note that the SVE system would continue to operate at present waste sites containing transuranic wastes (216-Z-1A Tile Field, 216-Z-9 Trench, and 216-Z-18 Crib) yet RTD activities would not commence until after completion of SVE.
- Preliminary Remediation Goals: It is not adequate to calculate PRGs based only an industrial worker exposure scenario. PRGs should also be determined for Native American and other residential scenarios to properly factor these groups into the decision-making process.
- What is an individual HQ? Does that refer to an individual species, contaminant, etc.?
- It is not clear when screening or background concentrations are used; these may be very different values. Clarify the usage and be explicit about the uncertainty associated with selecting these values.
- The calculation of PRGs is inadequate. It is not appropriate that certain contaminants are not calculated / presented (Table 5) because they were either not detected, not above screening levels, or did not exceed EPA's less-protective target risk threshold of 10^{-4} for the subsistence farmer scenario because:
    - This does not represent (and therefore) protect Native Americans.
    - Some contaminants were not even evaluated at certain sites.
    - It is not clear whether detection limits were below screening levels.

The ERWM Program considers removal of a significant portion to be at least 90% to 96% waste removal. We request USDOE edit RTD options to reflect a more stringent risk level and to define 'remove significant portion' as *removal of at least 90% of waste.* We request all structural and piping components to be similarly remediated along with their associated waste sites. Additionally, we request USDOE use an observational approach to sampling and removal contaminated soils with greater than a 10^{-6} risk level for individual hazardous substances.

It is not acceptable to the ERWM Program that RDT activities would not commence until after completion of SVE as this could jeopardize completion of the M-16 milestone requirements.

The preferred alternatives for this feasibility study should place little or no reliance on evapotranspiration barriers or institutional controls for long term protection. In some instances, barrier components would include impossible to replace components (i.e., physical concrete component). It is unclear how there can be any reliance on the long-term effectiveness and performance of maintaining an alternative which requires institutional controls for a thousand 1000 years. The five (5) year CERCLA reviews should be conducted to evaluate the effectiveness of the remedy selected not simply to evaluate the need for continued ICs as implied.

The ERWM Program requests any future land use decisions will need to assume that the Yakama Nation ERWM will exercise its treaty rights on the land.

NEPA Evaluation: The Feasibility Study for the 200- PW- 1, -3, -6 waste sites for which this evaluation was performed is incomplete. Whether there are significant impacts remains questionable. The ERWM Program does not believe sections 6.6.2.3 *Natural, Cultural, and Historical Resources* and 6.6.2.7 *Irreversible and Irretrievable Commitment of Resources* have adequately met the NHPA (and other Acts) or NEPA requirements. There is no discussion provided in previous sections which detail how compliance with ARARs will be met or source of backfill soils. The ERWM Program requests USDOE prepare an Environmental Assessment on these actions to assist decision-making.

Waste Groups Specific Comments:

216-Z-Ditches Waste Group: The ERWM Program requests the preferred alternative be RTD of all shallow zone contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.

216-Z-1D Ditch (Northern Portion): Our review of the *Feasibility Study for the 200-CW-5 Cooling Water Operable Unit*-DOE/RL-2004-24, Draft C, REISSUE, found high values near the northern head wall of the ditches which may indicate that Plutonium metal particles were included in one or more of the area's accidental releases. Figure 6-2 from the Feasibility Study (DOE/RL-2004-24, REV 0), shows a significant quantity of plutonium and/or americium at the north end of the Z-Ditches. The remedy should include these soils in the RTD remedy. The plutonium and americium concentrations shown on the figure indicate that this material should be transported to WIPP for disposal as TRU waste. Figure 6-2 also summarizes sample results that exceed the ERDF disposal criteria of 100 nCi/g, and reference "statistical outliers" that are orders of magnitude above the ERDF criteria. Rather than dismiss these sample results as outliers, DOE should resample these areas to investigate the nature and extent of the highly contaminated material. Additionally, Figure 2-4 in the FS (DOE/RL-2004-24, REV 0) shows borehole C3808 and describes releases that may have traveled vertically to the Cold Creek unit and moved laterally on that unit. The nature and extent of such contamination should be further evaluated so that an appropriate remedy can be developed.

The proposed No Action alternative for this portion of the 216-Z Ditches does not support unrestricted use and unlimited exposure; IC would be required to ensure this. Combine this with concerns regarding the incompleteness of chemical contaminate data and USDOE's stated need for confirmatory sampling, the ERWM Program requests the preferred alternative be RTD of all shallow contaminated soils should confirmatory sampling indicate exceedances of industrial cleanup levels.

Remediation of the U-Pond is unclear. The ERWM Program requests clarification. The ERWM Program requests RTD of shallow zone contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.

Cesium-137 Waste Group: The USDOE preferred alternative, is a modified barrier as the remedy for the Cesium-137 waste sites, leaving contamination in place. The ERWM Program does not

support this alternative The ERWM Program requests the preferred alternative be RTD of all shallow contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.

High-Salt Waste Group: The USDOE preferred alternative is RTD Option A, removal of the highest concentration of contaminated soils two (2) feet below the base of the waste site and a barrier. Characterization information presented in DOE/RL-2007-27, DRAFT C indicates excavation of the 'mass' source of long-lived radionuclide wastes to a depth of forty (40) feet removes approximately ninety-six (96) percent of wastes. The ERWM Program requests the RTD Option 3C-removal (to at least forty (40) feet below ground surface) of contaminated soils. We anticipate removal of structures associated with these waste sites, placement of an appropriately designed soil barrier, and continuation, as needed, of the SVE system will be included in this option.

Low-Salt Waste Group: The USDOE preferred alternative is RTD Option C, which removes a significant portion of plutonium contamination, two (2) feet beyond that for Option A.

No soil characterization was performed for some of the cribs. Given this uncertainty, the ERWM Program does not support this alternative. We request the preferred alternative is Option 3C with modification, i.e., removal to at least forty (40) feet below ground surface of contaminated soils. We request USDOE conduct soil sampling within the crib boundaries to identify the type, concentration and extent of the contaminants. We anticipate removal of structures associated with these waste sites, placement of an appropriately designed soil barrier, and as needed, a SVE system will be included in this option.

Settling Tanks Waste Group: Investigation information identified no significant contamination in the soil column, suggesting that no leaks occurred. However, this remains uncertain. The preferred alternative only removes contaminated tank contents but would require long-term IC to prevent intrusions. The ERWM Program does not support any actions (i.e. tank stabilization) which preclude decontamination and removal of tanks on the Hanford Facility. The ERWM Program supports characterization and removal of tank contents and its disposal either at WIPP or in ERDF. We request subsequent tank(s) removal(s) (including associated tank systems equipment) with soil sampling beneath the tanks to confirm no leaks.

Other Waste Sites Group: Although there are no direct measurements of plutonium concentrations available, the 216-Z-10 Injection/Reverse Well received significant amounts of plutonium containing liquids. The 216-Z-8 French Drain received several magnitudes less volume of plutonium. Characterization data indicates the transuranic constituents are located within sixteen (16) feet of the bottom of the drain structure. The preferred No Action Alternative ignores requirements that the implementations of remedies that eliminate, reduce, or control the risks to human health and the environment. The ERWM Program requests removal, treatment, and disposal of the 216-Z-8 French Drain and associated structures and pipeline. The ERWM Program recommends further technical evaluations of reverse well closure alternatives and plutonium stabilization (e.g. jet grouting)

Attachment 2: Yakama Nation Comments on the *Native American Human Health Risk Assessment* for the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units (Appendix G of DOE/RL-2007-27 Revision 0, Feasibility Study, as cited in DOE/RL-2009-117 Revision 0, Proposed Plan)

As part of the Yakama Nation's review of the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units* (DOE/RL-2009-117 Revision 0), the Yakama Nation reviewed the *Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit* (DOE/RL-2007-27, Draft C) Appendix G, which is the *Native American Human Health Risk Assessment,* and offers the following comments. These issues ultimately affect conclusions made in the Feasibility Study, which are carried forward into the Proposed Plan (DOE/RL-2009-117 Revision 0).

GENERAL COMMENTS

1. The assumption that the target risk level (10^{-4}) is the only important factor to be derived from a risk assessment is misleading. To fully inform decision makers, it is important to characterize risks for all users, including Native Americans and the general public, from all chemicals, all pathways, and all routes of exposure in a clear and transparent manner. The authors conclude that eliminating contaminants from the risk assessment would not change the "risk assessment conclusions." This is not entirely appropriate since preliminary remedial goals will be set for clean up based on cumulative chemical exposure from all pathways. These chemicals may be in areas that do not include the "risk drivers." The authors are making risk management decisions which should not be included in the baseline risk assessment.

2. Native American risks are not just a reflection of exposures. The risks to Native Americans from contamination and physical disturbances as a result of hazardous substances at the Hanford Site include lifestyle losses that may not be quantified. This is not a "hypothetical" Native American population. DOE was provided data on tribal lifeways that are specific to the Yakama Nation. The statement that "cleanup concentration goals and decisions will not be based on potential Native American future exposure, consistent with the current industrial nature of the site" should be deleted. The statement reflects a risk management decision and not appropriate for the risk assessment.

3. The use of subjective and value-laden language in describing the risk estimates is misleading and misrepresents the state of knowledge regarding risks to Native American populations from exposure to contaminants at the Hanford Site. When there is little knowledge of the processes being assessed, risk assessors cannot state whether risks have been over- or underestimated. The risk assessors should discuss the relative merits of each of the assumptions and parameters with a qualitative or quantitative statement of confidence in the measured or modeled value.

   The risks for Native American exposures are estimated to exceed 1/100 or 0.01 probability. These high risks that are projected for the Native American exposures require the risk assessor to use an alternative model. The linear multistage model that is normally used for estimating carcinogenic risks is not appropriate for risks that exceed

a probability of 0.01. The authors of this assessment paraphrase the EPA guidance incorrectly. They should quote the exact language from the guidance:

> "However, this linear equation is valid only at low risk levels (i.e., below estimated risks of 0.01). For sites where chemical intakes might be high (i.e., risk above 0.01), an alternate calculation equation should be used. The one-hit equation, which is consistent with the linear low-dose model ... should be used instead" (*Risk Assessment Guidance for Superfund Volume1 Human Health Evaluation Manual (Part A): Interim Final* [EPA/540/1-89/002]).

4. The outcome of a risk assessment is strongly influenced by the site characterization. In this case the weaknesses in the site characterization greatly exceed the uncertainties in the Native American data on exposure patterns. Some of the weaknesses in site characterization, discussed below, are:

   - Selection of Chemicals of Concern
   - High detection limits
   - Inadequate sampling and data analysis of soil (and soil gas)
   - Inadequate sampling and analysis of groundwater
   - Elimination of exposure pathways without adequate documentation

   Selection of Chemicals of Concern. The authors acknowledge that the screening methodology used to select chemicals of concern may not have been adequately protective for Native American exposures. Certain chemicals may have been eliminated from the risk assessments that are relevant to Native American exposures.

   a. Discussions in the uncertainty section do not include the list of chemicals that were eliminated. Therefore, it is not possible to ascertain the impact on the risks to Native Americans from these additional exposures. The authors state that "safety factors" in the screening criteria should protect Native Americans. However, this is not known. These factors were included to address limitations in toxicity or exposure but not with respect to alternative scenarios. The authors should have calculated screening factors with the Native American exposures that were provided to them. They could then state with some certainty what chemicals were eliminated that may be relevant to risks to Tribal members.

   b. All groundwater target levels should be risk-based. Use of MCLs, other regulatory limits, or proposed cleanup levels is not appropriate for risk assessment. MCLs and/or MTCA cleanup levels are not appropriate for screening in the risk assessment. Risk-based screening levels should be used for screening.

   c. Background concentrations should not be used for screening out contaminants. All contaminants should be evaluated in the risk assessment. The discussion of appropriate actions relevant to background concentrations may be discussed in the uncertainty section and in the RI/FS.

High detection limits. Detection limits should have been based on risk-based screening values for exposure. Thus, they would have been designed to assure that the measured concentrations were adequate for estimating risks.

Inadequate sampling and data analysis of soil and soil gas. Sampling is inadequate because of biased soil sampling, the lack of soil gas data, and incomplete vapor migration considerations.

a. Biased soil sampling: Risk estimates were based on small areas specific to operations or perhaps clean up decisions; however they do not address the likely exposure that should be considered in a baseline risk assessment. Stating that soil sampling locations were biased is a true statement. However, the conjecture that health risks have not been underestimated is misleading. The contaminant distribution will vary depending on a number of factors, including but not limited to known sources.

   The authors state that "selected waste sites were too small to support significant amounts of wild game or plants..." Thus, they acknowledge the weakness in the risk estimates for populations that may inhabit this site (people, animals, or plants). Tribal people do not rely on small management units for their quality of life. They rely on the natural habitats that will remain after this site is "cleaned up." These site boundaries are not realistic for evaluating ecological or human health risks. A site-wide cumulative assessment is more appropriate. Thus, the risk estimates do not provide an accurate assessment of risks to Native peoples or anyone who may move about this site. Without addressing all of waste sites with broad area exposure point concentrations, this is not a complete assessment. Cleanup levels cannot be set for areas where samples were not collected. This risk assessment is not an assessment of Native American peoples since it was limited to small management units.

   Since shallow soil characterization was limited, it is not clear whether data showed lower concentrations in the surface soils, or the assumption was made that surface soils had "not been impacted," or the assumption was made due to early removal of contaminated surface soil. Please explain how you interpolate samples for depths that were not sampled. Explain why the excavated soil concentrations were modified by mixing. Use the soil concentration at maximum exposure since this provides the best estimate of how much needs to be treated.

b. The lack of soil gas data is a serious weakness in the risk assessment. This would suggest that risks may be underestimated for Native Americans who may inhabit this site.

c. The vapor migration section is very confusing. There is a soil vapor extraction system operating, so there must have been significant concentrations that needed to be removed or reduced. If a soil vapor extraction system has been operating, how were the operating parameters determined for the extraction

system? How is the vapor extraction system operating without determining a level of protection?
How did you calculate the vaporization rate for non-volatile contaminants? This is inconsistent with previous discussions of the difficulty of calculating the vaporization rate

Inadequate sampling and analysis of groundwater. The authors state that the groundwater data are robust because of the number of samples. However, they do not address the sample locations, sample frequency, quality of wells, and other factors that affect the groundwater measurements.

Using filtered data for groundwater is a major weakness in the risk assessment. The estimates of risk for people who drink the water cannot exclude chemicals that may adhere to particulate matter. Thus, the risk assessors cannot state that the risks are overestimated for the drinking water pathway.

The exposure point concentration for groundwater is expressed as a percentile rather than the 95% upper confidence limit (UCL). The data should have been characterized with the 95% UCL estimate. The percentiles may be used to illustrate the variability in the data, but they are not the appropriate measure for risk assessment.

Elimination of exposure pathways without adequate documentation. The risk assessors determined that certain exposure pathways were insignificant (e.g., irrigation, dust inhalation, inhalation during showering). However, there are no data or evidence to support this conclusion. Unless there is supporting documentation, all pathways should have been included in the risk assessment.

There is uncertainty in the risk estimate based on exposure to contaminants during sweatlodge activity. Discuss the relative merits of each of the assumptions and parameters with a qualitative or quantitative measure of confidence in the measured or modeled value. When you have little knowledge of the processes that you are assessing, you cannot state whether you have over- or underestimated the risks. If you specifically exclude a pathway (e.g., non-volatile inhalation) you may be underestimating risks.

5. A presumption of remediation is not appropriate for a baseline risk assessment. Importantly:

    a. Institutional controls are not a remedy and should not be referenced in a baseline risk assessment (according to EPA's definition of baseline risk).

    b. Natural degradation is not a remedy. Remediation should not be discussed in the baseline risk assessment. The assumption that groundwater will be treated and, therefore, the risks will be reduced is not appropriate. Eventually, remedial actions will ultimately reduce risks from all possible pathways. Groundwater should not be treated any differently than other pathways in the baseline risk assessment. The purpose of a baseline risk assessment is to provide decision makers and the public with information

regarding risks from exposure to contaminants at the site under current and future non-remediated conditions.

SPECIFIC COMMENTS

1. Page G-v, lines 2-5. Explain the in detail how soil gas data were evaluated "semi-quantitatively".
   "In addition to soil data, screening-level soil gas data collected from the subsurface of the 216-Z-1A Tile Field were evaluated semi-quantitatively ...."

2. Page G-vi, lines 6-7 and Page G-20, lines 38-40. Explain "minimally exposed" related to native plants and animals. The site should be assumed to be open to residential exposures throughout the contaminated areas. This restriction to "minimal exposure" is not consistent with the presence of contamination.
   "...were assumed to be minimally exposed...."

3. Page G-xiii, lines 17-26. This statement regarding the need to use an alternative model to estimate risks from exposure to carcinogens at very high doses is very important. It is also illustrates the extremely high exposures that Native Americans may experience at this site.

4. Page G-11, lines 42-43. Describe and give the reference for the uranium "health-based levels" that were compared to concentrations detected in groundwater.
   "...radioactive isotopes of uranium have either not been detected in recent groundwater monitoring rounds or have been detected at concentrations well below health-based levels..."

5. Page G-20, lines 3-4. Describe in detail the assumptions and parameters that were used to model the groundwater plumes that may reach the Columbia River.
   "...conservative modeling indicates that groundwater plumes may reach the Columbia River in 75 years..."

6. Page G-20, lines 12-13. The size of the site cannot act as a buffer. Contamination may spread to the edge and beyond the Hanford facility, such as into the Columbia River.
   "The large overall size of the Hanford Site...provides a buffer..."

7. Page G-21, line 41. Give the justification for using Oregon and Alaska State documents (ODEQ 2000 and ADEC 2005) as references for surface soil horizons.

8. Page G-23 lines 22-23. Describe the evidence supporting the conclusion that cattle would not be exposed to contaminated soil.
   "...cattle are not pastured on impacted soil but do eat fodder that has been watered with groundwater."

9. Page G-27 lines 17-18. Regarding use of half the MRL for non-detects, what about the previous discussion of the model for estimating non-detects provided on Page G-24? Connect the two discussions.

10. Page G-30, lines 34-35. Expand on the concept of Henry's Law not holding true to a sweatlodge, including an explanation of the assumptions that are needed for calculating the vaporization rate for non-volatile chemicals.

    "...Henry's Law approach does not hold true in a sweatlodge. A large portion of the humidity is likely due to aerosols."

11. Page G-31, lines 40-42. The data for this exposure scenario were provided by the Yakama Nation based on the survey of their people. You cannot dispute this value in this Native American risk assessment.

    "...7 hours/day does not appear to be a reasonable maximum over a 70-year exposure time, but more likely represents more of a worst-case value."

12. Page G-32, lines 32-33. Since there was no percentage given for the fraction of fruits and vegetables from the site, it is more appropriate to create a range, whereby an understanding of the affect of 100% vs. 50% could be described; 50% is probably too low.

13. Page G-33, lines 1-7. Since the CTUIR did not report a fraction of beef ingestion from the site; a range of rates should be used to reflect uncertainty.

14. Page G-93, lines 15-25. Define "conservative." The terminology used to describe the uncertainty in the risk estimates is confusing. The "type I error" is usually discussed when describing statistical inferences.

15. Page G-94 line 2-3. The authors assume the data from 1992 and 1993 are adequate for a risk assessment in 2010. Explain the uncertainty in the sampling and analytical methods employed during the 1992 and 1993 sampling events.

16. Page G-94 line 6. Sampling just for "known sources of constituents" limits the adequacy of the data. There may be break-down products or other compounds that were used at the site. It is important to do a full characterization of all possible contaminants (e.g., contract lab priority pollutants).

17. Page G-95 lines 1-3. One detected value in a small sample size is significant. Aroclor and thorium data cannot be excluded from the risk estimates.

    "...would not significantly change the cumulative risk totals."

    "... the total sample numbers are only 10 and 4..."

18. Page G-103 lines 28-29. Describe the data that exceed the 90th percentile. The risk estimates are not complete without addressing these high end values.

    "Because only 10 percent of the data exceed the 90th percentile values, these very high concentrations are few and represent a very limited areal extent."

19. Page G-104, lines 31-32. The statement that "...the greater the UFs and tendency to overestimate the toxicity..." is misleading. Uncertainty factors are designed to recognize a lack of knowledge or variability in toxicity estimates. They are not designed as an overestimate of toxicity. The guidance states:

These uncertainty factors take into account the variability and uncertainty that are reflected in possible differences between test animals and humans (generally 10-fold or 10x) and variability within the human population (generally another 10x); the UFs are multiplied together: 10 x 10 = 100x. If a LOAEL is used, another uncertainty factor, generally 10x, is also used. In the absence of key toxicity data (duration or key effects), an extra uncertainty factor(s) may also be employed (EPA, IRIS).

20. Page G-105, lines 3-5. Provide the complete references for Health Canada and the Netherlands.
    "...through a genotoxic mechanism (e.g., Health Canada and the Netherlands)."

21. Page G-106, lines 32-34. The risk assessment is not a decision-maker. This decision should have been vetted through EPA since the authors are deviating from the EPA recommended value. The assessment should include estimates with CalEPA and EPA recommended values.
    "because of the criticisms that the health assessment document has received, this risk assessment has selected the CalEPA SF values as more appropriate..."

22. Page G-109, line 41. This paragraph should be deleted: *"...a third consideration regarding large dose estimates is the effect of multiple contaminants..."* It is judgmental and not based on an objective review of the uncertainty of multiple chemical exposures. There is justification for summing chemicals with similar mechanisms of action or disease outcomes, such as carcinogenesis and neurotoxicity (EPA/630/R-00/002August 2000 Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures).

23. Page G-129, line 32. Explain in detail how the list of chemicals derived in the Remedial Investigation was refined in the risk assessment.
    "The risk assessment refined the RI list using only the last 5 years of data (2001 through 2005) to represent current conditions..."