



Confederated Tribes and Bands  
of the Yakama Nation ERWM

Established by the  
Treaty of June 9, 1855

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August 11, 2014

Dennis Faulk, Hanford Project Manager  
U.S. Environmental Protection Agency  
309 Bradley Blvd., Suite 115  
Richland, WA 99352

Kim Ballinger, U.S. Department of Energy  
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Subject: Review of the Proposed Plan (DOE/RL-202-41, Rev 0) 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units and Remedial Investigation/Feasibility Study (DOE/RL-2010-98)

Dear Ms. Ballinger and Mr. Faulk:

The U.S. Environmental Protection Agency (EPA) anticipates issuing the Record of Decision (ROD) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units Operable Units this year. The Confederated Tribes and Bands of the Yakama Nation appreciate the opportunity to review and provide comments on these documents.

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 (12 Stat. 951). The U.S. Department of Energy Hanford site was developed on land ceded by the Yakama Nation under the 1855 Treaty with the United States. The Yakama Nation retains reserved rights to this land under the Treaty.

The Hanford Reach is one of the most cultural resource-rich areas in the western Columbia Plateau. Pre-Hanford uses of the area included agriculture and use by Native American tribes. Archaeological evidence demonstrates the importance of this area to Native American tribes, whose presence can be traced for more than 10,000 years. The near-shore area of the rivers (Columbia, Snake, and Yakima) contained many village sites, fishing and fish processing sites, hunting areas, plant-gathering areas, and religious sites. Upland areas were used for hunting, plant gathering, religious practices, and overland transportation.

Chinook salmon, sockeye salmon, coho salmon, and steelhead trout use the river as a migration route to and from upstream spawning areas and are of economic importance. The Treaties of 1855 provide for the peoples of three Nations to "live along" and fish the River Corridor.

The Yakama Nation's vision for the cleanup and closure of the Hanford Site includes meeting the following objectives:

1. Compliance with Yakama Nation Treaty Rights, including full access to cultural (and natural) resources by the Yakama Nation and its members within its ceded land and aboriginal territory, including on the Hanford Site.
2. Official recognition that Native Americans living near the Hanford site are the most vulnerable people to environmental contaminants, as underscored by EPA's Columbia River Fish Contaminant Survey.
3. Protection of the health of Yakama Nation tribal members and the environment so that the Hanford Site and all its resources (including the Columbia River, its islands, other surface waters, geologic resources, groundwater, air, and biological resources such as plants, fish, and wildlife) are safe for all exposure scenarios and tribal uses.

The Yakama Nation supports cleanup actions that are complete, permanent, and are based on proven technology. We do not support remedial actions that leave large quantities of long-lived radionuclides or dangerous waste in place and rely on long-term stewardship or institutional controls to address future potential exposure scenarios. Long-term stewardship and institutional controls will not be effective for wastes that remain dangerous for hundreds or thousands of years. Assuming that contaminants remain in place implies that a Long-Term Stewardship Program Plan must be implemented which will remain effective longer than most human institutions have ever existed.

The Yakama Nation further supports the following key principles for all remedial actions that are completed on the Hanford Site:

1. Cleanup decisions that follow the CERCLA RI/FS process and requirements through the finalization and approval of CERCLA documents (including risk assessments and supporting secondary documents) prior to development of Proposed Plans and final RODs.
2. Cleanup decisions based on adequate site-specific characterization, including for the vadose zone and groundwater.
3. Cleanup actions that comply with all applicable or relevant and appropriate federal and state regulatory requirements.
4. Cleanup actions that are compatible with clean closure criteria.

As mentioned above, the Yakama Nation does not support remedial actions that leave significant quantities of contamination in place at the Hanford Site, nor do we support remedial actions which would preclude clean closure.

We look forward to discussing our vision of cleanup and our concerns regarding the current cleanup plans for Hanford with you further.

Sincerely,



Russell Jim  
Yakama Nation ERWM Program Manager

Attachment: #1

cc:

Douglas Shoop, Acting Manager, US Department of Energy

Ken Niles, Oregon Department of Energy

Stuart Harris, CTUIR

Gab Bohnee, Nez Perce

Marlene George, YN ERWM

Administrative Record

**Attachment #1: Yakama Nation ERWM Comments on the  
100-F Area Proposed Plan & Remedial Investigation / Feasibility Study:**

**1. Protection of Yakama Nation treaty rights, including full access to cultural resources on the Hanford Site by the Yakama Nation:**

Ensuring Treaty compliance is a critical intergovernmental concern. By and through this document, USDOE supports the participation of Yakama Nation in activities related to remediation and restoration of resources affected by Hanford and implements its trust responsibility and enforceable obligations to the Yakama Nation. From the YN ERWM's perspective, efforts to include the tribal program in the development of the RI/FS/PP were weak.

- a. The Treaty, which reserves specific rights and resources for the Yakama Nation, should be acknowledged as an ARAR or a "must comply" standard for cleanup decisions. This includes the right to practice in full subsistence activities in Yakama usual and accustomed use areas. All future Interim and Final Record(s) of Decision(s) should be in harmony with treaty rights of the Yakama Nation under the Treaty of 1855 including upland treaty rights.
- b. The Proposed Alternatives do not fully comply with the Treaty of 1855 between the Yakama Nation and the United States of America. Land Use & Protection of Yakama Nation treaty rights, including full access to cultural resources on the Hanford Site by the Yakama Nation is not ensured through this Proposed Plan, nor are DOE's trust responsibility and enforceable obligations to the Yakama Nation evident. All potential impacts to treaty-reserved rights and resources should be thoroughly evaluated and considered in a revised RI/FS and Proposed Plan and supporting documents. The preferred alternative should be consistent with the USDOE's American Indian Policy, with the federal trust responsibility, and with the terms of the Treaty of 1855. YN believes the preferred alternative is lacking this consistency.
- c. Protection of the health of Yakama Nation tribal members and ensuring sustainable habitability of Hanford for Yakama Nation Tribal members including their safety and welfare or trust resources is a major concern of the Yakama Nation Environmental Restoration and Waste Management Program. Accumulated scientific evidence demonstrates that Native Americans are, as a statistical cohort, subject to the highest risk of disease and cancer from exposure to environmental contaminants. The Columbia River Basin Fish Contaminant Survey is a technical report that assesses the amount of chemical pollution in certain species of fish, and the potential health risks from eating fish those fish. The study is based on fish samples collected between 1996 and 1998 from tribal fishing waters in Washington, Oregon and Idaho. EPA funded the study which was coordinated by the four member tribes of the Columbia River Intertribal Fish Commission (CRITFC).

YN believes there should be official recognition that Native Americans living near the Hanford site are the most vulnerable people to environmental contaminants, as underscored by EPA's Columbia River Fish Contaminant Survey. Adults in CRITFC's member tribes who eat fish frequently (48 meals per month) over a period of 70 years may have cancer risks that are up to 50 times higher than those in the general public who consume fish about once a month.

- d. The 100-F Area site boundaries include the Columbia River and its shorelines. Portions of the site are within the boundaries of the National Monument. Interactions among media (i.e., soils and groundwater) at the 100-F Area are important. As such, the effect of source control actions on the remediation levels or time frames for other media should be evaluated. Data should *not* be selective (e.g., excluding waste sites or contaminants) but should include all data sources applicable to evaluating current and future conditions at all upland, riparian, and nearshore operational and non-operational areas. A holistic approach would ensure that protective decisions are made for the site in its entirety.
- e. It is the belief of the YN that a Federal interagency committee composed of the Department of Interior, the EPA, and USDOE convene to define mutually the terms and conditions of habitability for native people of the Columbia River Basin (including residual contamination standards) and to establish an agreement with the Yakama Nation.
  - i. Porewater and aquifer sampling data shows exceedances of water quality cleanup standards.
- f. None of the Alternatives were evaluated against the nine balancing criteria based on effects on traditional cultural properties (TCP). Currently, there are several projects and major decisions that will be made that effect the entire Hanford site, yet still a comprehensive TCP study has not been performed. Site wide undertakings and decisions such as clean up levels, restoration, vegetation management, land use plans, the use of barriers and institutional controls need to take into consideration the effects on TCPs. It is the obligation of DOE under the National Historic Preservation Act (NHPA), Section 110, to inventory and evaluate properties to determine eligibility under the agency's jurisdiction. DOE has not been holding up to their Section 110 obligation of identifying cultural properties on the Hanford site. There are known TCP that have not been evaluated such as, White Bluffs, Coyote Rapids, the Columbia River, Wahluke Slope, as well as other known and potentially unknown TCPs in the Hanford area. Cultural properties are only being addressed through the Section 106 process, on a project by project basis, which is entirely ineffective. This piecemeal method does not allow for a comprehensive landscape study and does not allow for proper consultation with YN. Full compliance with government-to-government requirements are not fulfilled by the vague statements found in the Proposed Plan (example: page 2). The YN expects a discussion of the culturally sensitive areas with reference to both historic and prehistoric Native American use within the Proposed Plan. Implied agreement with implementation of a ROD change rather than an MOA is misleading to the public. The YN requests consultation with DOE on this issue.
- g. The Proposed Plan, while identifying the physical presence of Gable Mt. or Gable Butte, it does not include discussion of the TCP or the ongoing deliberations to extend the TCP boundaries. Nor does it discuss implications/effects of final ROD decisions upon these areas or the area known as West Lake. The discussion of these areas needs to be more robust.
- a. It is unclear as to what is in place to ensure compliance with the Antiquities Act of 1906. Under the Antiquities Act of 1906, the Hanford Reach National Monument (HRNM) was created by Proclamation 7319 in 2000. The Proclamation lists the resources that are to be protected including: riparian, aquatic and upland shrub stepped habitats, native plant and animal species as well as archaeological, historic and sacred sites throughout the monument. While the majority of the HRNM is managed by USFWS, the river corridor lands underlying the Hanford reactors and operational areas are managed by DOE, the

current land owner. The DOE-managed portions of the HRNM include the 100-F Area addressed in the Alternatives. These lands contain high levels of contamination and significant cultural resources. For example there is an identified archaeological cultural resource site located within the boundaries of the 100-F-59/128-F-2 waste site for which the impacts are unknown or quantified.

- b. It is recognized in the Proclamation (HRNM) that DOE has the responsibility to clean up hazardous substances and the restoration of natural resources. The Proclamation further states, "As Department of Energy and US Fish and Wildlife Service determine that lands within the monument managed by the Department of Energy become suitable for management by the US Fish and Wildlife Service, the US Fish and Wildlife Service will assume management by agreement with the Department of Energy." Clearly it was the intent of the President that the HRNM land would be cleaned, restored and then managed by the USFWS.

The entire HRNM would then be managed according to the mission of the USFWS guided by the HRNM Comprehensive Conservation Plan (CCP), which states a primary purpose of, "Protect and restore biological, cultural, geological and paleontological resources." Areas in the River Corridor 100 Areas are some of the most contaminated, and it remains the obligation of DOE to clean and restore these areas within the HRNM and areas that could affect the HRNM in consultation with the Department of Interior. Anything other than complete cleanup and restoration of the HRNM would be in direct conflict with the Antiquities Act, Proclamation 7319, and the HRNM CCP.

## **2. Land Use:**

Language in the Proposed Plan and selected Preferred Alternatives indicates that DOE is not considering cleanup to unrestricted use and is striving toward a less stringent cleanup based on the Comprehensive Land-Use Plan (i.e. use of Method A-Industrial Standards for Arsenic vs. Method B-Unrestricted Standards). While cleanup decisions may ultimately be defined by management boundaries, the risk assessment should be based upon actual human behaviors.

- a. It is stated that cleanup actions will support reasonably anticipated future land uses consistent with the Hanford Reach National Monument and "Record of Decision: Hanford Comprehensive Land-Use Plan Environmental Impact Statement (the "CLUP") (HCP EIS) (64 FR 61615). CLUP is designated for 50 years operational and 100 years for institutional controls. Beyond that time period, the site could be used for any and all types of land use; including irrigation. The Preferred Alternative for groundwater with ICs for extended time periods is inconsistent with the CLUP. It is known that there will be continued releases above cleanup levels for over 100 years. Yakama Nation ERWM remains concerned that any remedy reviews (i.e. 5 year ROD reviews) will not include appropriate sampling actions or technological systems review to confirm performance of these IC.

- b. Furthermore, the final CLUP did not include any suggestions, or address any concerns provided by the Yakama Nation.<sup>1</sup>
- c. The CLUP was a Federal undertaking that determined what type of activities could occur within the Hanford landscape, yet traditional cultural properties (TCP) were never addressed. Areas designated for industrial use, research and development, and conservation mining could have significant impacts on the landscape, and adversely affect a TCP should one be present

### 3. Cultural Resources & Institutional Controls:

The philosophy underlying the cleanup of Hanford should be guided explicitly by the goal of allowing Native Peoples to safely live the lifestyle to which they are entitled. This way of thinking will be particularly important when considering how to incorporate non-quantitative elements into the Preferred Alternative such as the spiritual or cultural value of a site.

There is the assumption of, and over-reliance on, the use of Institutional Controls to ensure protectiveness rather the primary objective which is protectiveness of the environment and human health through selection of remedies that employ treatment technologies that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants. The use of institutional controls can be an adverse effect to cultural sites, particularly traditional cultural properties. The effects of institutional controls on cultural sites were not evaluated in the RI/FS or the PP.

- a. Currently, there are several projects and major decisions that will be made that affect the entire Hanford Site, yet still a comprehensive Traditional Cultural Property (TCP) study has not been performed so that the effects can be determined. Site wide undertakings and decisions such as clean up levels, restoration, vegetation management, land use plans, the use of barriers and institutional controls need to take into consideration their effects on TCPs. It is the obligation of DOE under the National Historic Preservation Act (NHPA), Section 110, to inventory and evaluate properties to determine eligibility under the agency's jurisdiction.
- b. Cultural resources have not been adequately addressed in either of the 100-F documents (RI/FS and PP). Please refer to the EPA document, CERCLA Compliance with Other Laws Manual: Part II<sup>2</sup> (hereafter referred to EPA Guidance), where it details out how to be in compliance with the NHPA during the CERCLA process in Section 4 (attached). Section 4.1.3 clearly states efforts should be made to identify cultural resources. Generally DOE carries out these efforts during the Section 106 process for each project, however between 2003 and 2011, 127 projects were carried out under the "no potential to cause effect" classification in the 100-F Areas. This means these projects were completed

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<sup>1</sup> Yakama Nation letter to John Wagoner, Manager, Department of Energy, Richland Operations Office, June 30, 1998.

<sup>2</sup> RPA, CERCLA Compliance with Other laws Manual: Part II. Clean Act and Other Environmental Statues and State Requirements, EPA/540/G-89/009, OSWER Directive 9234. 1-02, August 1989

without proper Tribal consultation, and did not have a full Section 106 cultural review. Research has indicated the Section 106 process for many projects in the F-Area is suspect and needs to be reviewed to ensure DOE was compliant with the NHPA.

- c. As outlined in the EPA Guidance document Section 4, once cultural properties are identified it needs to be determined if they are eligible and if the proposed actions will have an adverse effect on the eligible properties. Institutional controls on TCPs/cultural sites can be an adverse effect. Further the EPA Guidance states any **adverse effects to eligible properties must be mitigated, “this mitigation plan should be included in an MOA signed by the consulting parties (page 4-10)”**. EPA Guidance 4.1.4.2 states “The remedial design process should provide for scheduling and funding of the development and implementation of a detailed cultural resources mitigation plan”.
- d. The EPA Guidance 4.1.5 (page 4-11) details proper documentation, “Compliance with the NHPA requirements should be documented in the RI/FS report, describing, as appropriate, the determination of whether cultural resources are or are not present; the results of the Cultural resource survey (CRS) process and recommendations on the eligibility of the identified cultural resources for the National Register; the impact, if any, on such resources; and the associated mitigation measures to minimize potential “no adverse” or “adverse” effects. When cultural resources are present, the ROD should identify the NHPA as an ARAR. For each alternative, the ROD should identify whether the alternative will comply with substantive NHPA requirements. **For the selected remedy, the ROD should also include a brief statement describing what compliance with NHPA entails, e.g. that there will be no impact on cultural resources or what mitigation measures will be required.**”
- e. The 40 CFR 300.435(b)(2) states; “During the course of the RD/RA, the lead agency shall be responsible for ensuring that all federal and state requirements that are identified in the ROD as applicable or relevant and appropriate requirements for the action are met.”
- f. It is evident the RI/FS and Proposed Plan documents do not meet EPA guidelines. DOE has not performed the necessary tasks to determine effects to cultural resources, **in consultation with the YN ERWM to determine effective avoidance, minimization, and/or mitigation measures.** The **final ROD must reflect compliance with NHPA**, which will be impossible with current data.
- g. YN ERWM requests EPA and DOE to complete the necessary task of **“describing what compliance with NHPA will entail” and if necessary based on proper field evaluation complete a necessary MOA to mitigate for any adverse effects to the newly discovered TCPs, in consultation with YN ERWM.** The YN ERWM expects a discussion of the culturally sensitive areas with reference to both historic and prehistoric Native American use within the Proposed Plan. Implied agreement with implementation of a ROD change rather than an MOA or outlining actions within the ROD is misleading to the public.
- h. THE YN ERWM program requests consultation regard decisions for D-Island. We remain concerned as it is as bounded by a casual recreational user scenario)

(page 8-37, RI/FS) which is not protective of YN tribal members.

- i. Although the report speaks of ethnographic studies by PNNL, there has been no attempt to identify new cultural properties or traditional cultural properties in many years, as mandated under Section 110 of the National Historic Preservation Act. The Hanford Cultural Resource Management Plan outlined a process for identifying one TCP per year; however this has not been done. DOE has not been meeting their Section 110 obligation of identifying cultural properties on the Hanford site. There are known TCP that have not been evaluated that include:
  - i. White Bluffs
  - ii. Coyote Rapids
  - iii. Columbia River
  - iv. Wahluke Slope
  - v. Other known and potentially unknown TCPs in the Hanford area.

Cultural properties are only being addressed through the Section 106 process, on a project by project basis, which is entirely ineffective. This piecemeal method does not allow for a comprehensive landscape study and does not allow for proper consultation with YN ERWM. None of the Alternatives were evaluated against the nine balancing criteria based on effects on a TCP. The YN ERWM Program requests this be done.

- j. It is unclear as to what is in place to ensure compliance with the Antiquities Act of 1906. Under the Antiquities Act of 1906, the Hanford Reach National Monument (HRNM) was created by Proclamation 7319 in 2000. The Proclamation lists the resources that are to be protected including: riparian, aquatic and upland shrub stepped habitats, native plant and animal species as well as archaeological, historic and sacred sites throughout the monument. While the majority of the HRNM is managed by USFWS, the river corridor lands underlying the Hanford reactors and operational areas are managed by DOE. These lands contain high levels of contamination and significant cultural resources.

#### 4. Institutional Controls

Use of institutional controls must be addressed in light of, and with appropriate deference to, Yakama Nation treaty rights which guarantee use of the land for specific purposes which are considered inseparable from the Yakama way of life.

- a. Table 5 of the Proposed Plan (page 35) and Table 9-1 (DOE/RL-2010-98, Draft A; RI/FS) indicate indefinite IC to prohibit irrigation for waste site 116-F-14 (107-F liquid Retention Basin) based on cost and previous use of a dilution factor for groundwater-to-river is not compliant with WAC 173-340-720(8)(d)(i)(C) or 173-340-730(6)(b). Nor does it give consideration of all nine CERCLA balancing criteria.
- b. Section 300.430 (CERCLA-Remedial investigation/feasibility study and selection of remedy) states the use of institutional controls shall not substitute for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives

that is conducted during the selection of remedy. RTD should have been evaluated in at least one of the alternatives and was not. Indefinite ICs due to hexavalent chromium contamination at the 116-F-14 waste site (107-F liquid retention basin) is unacceptable.

- c. Regarding the use of institutional controls at DOE waste sites, the National Research Council pointed out: “While there is typically a tacit recognition that engineered barriers and waste stabilization approaches have limited periods of effectiveness, these technologies are frequently employed with inadequate understanding of, or attention to, the factors that are critical to their success. These include the need for well-conceived plans for performance monitoring that identify and correct potential failures and plans for maintenance and repair, including possible total system replacement” (NRC, 2000). YN ERWM requests this level of detail be included in the Proposed Plan and ROD.

This level of planning, both technical and financial, does not appear to have been included in the cleanup planning. Cost estimates need revision to include these elements.

- d. Text within the document discussing “residual contamination” at depths below remediation actions is misleading to the public. Contamination is occurring; the ‘deep zone’ [vadose zone] has not been demonstrated to meet cleanup levels. Again, there is the assumption of and over-reliance on use of Institutional Controls to ensure protectiveness rather the primary objective which is protectiveness of the environment and human health through preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants as a principal element.

YN remains concerned that any remedy reviews (i.e. 5 year ROD review) will not include actual sampling actions or technological systems review to confirm performance of these IC.

- e. The use of institutional controls as part of proposed remedial alternatives does not comply with unrestricted access to the site or Yakama Nation Treaty Rights, and is likely an adverse effect to cultural sites. DOE’s use of institutional controls as a means of preventing, without fail, exposure to residual contamination in the subsurface and groundwater remains both troubling and ultimately unproven. The Nuclear Regulatory Commission adamantly favors Institutional Controls for only 100 years.
- f. All statements included in the Proposed Plan and RI/FS documents that convey the USDOE’s “beliefs” or “positions” regarding the extent of tribal treaty rights, including statements that it is the USDOE’s position that Hanford is not “open and unclaimed land,” should be removed from the documents. All potential impacts to treaty-reserved rights and resources should be thoroughly evaluated and considered in a revised RI/FS and Proposed Plan and supporting documents. The preferred alternative should be consistent with the USDOE’s American Indian Policy, with the federal trust responsibility, and with the terms of the Treaty of 1855.

## **5. Evaluation of Comparative Analysis of Alternatives:**

- a. We do not believe the Preferred Alternative of MNA as a remedy for the groundwater meets the selection criteria, in particular in its ability to demonstrate no adverse impacts

to drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources.

- i. YN remains concerned the health of Yakama Nation tribal members as there will be continued effects and potential new COCs from the Tank Farms and the 100-F Area Reactors which are not considered in this Proposed Plan. CERCLA (*EPA/540/G-89/004-Guidance for Conduction Remedial Investigations and Feasibility Studies Under CERCLA*) asks that all primary sources of contamination be included in RI/FS evaluations. The reactors and adjacent waste sites are and will remain principal threat sources for decades. Soil contamination should be documented in both vertical and horizontal directions from all potential sources. None of the Alternatives fulfill this requirement as none included sources underlying the reactors or adjacent waste sites.
  - ii. As upland plumes enter the river, we are concerned that any remedy reviews will not include actual sampling actions or technological systems review to confirm performance or to consider these missing source area contaminants.
  - iii. YN ERWM Program recommends the 100-F Area ROD includes a detailed schedule for completion of the reactor removal, and the event that removal does not occur, a contingency to address the remaining soil contamination.
- b. **YN requests consideration of modification of Alternative S-2 for soil remediation:** RTD of the 116-F-14(107-F) waste site to eliminate need for un-ending IC restrictions against unrestricted use of groundwater and the use of an Apatite Barrier (Permeable Reactive Barrier [as tested and used at 100-N]) is a successful technology currently employed in the 100-N to capture/remove Strontium-90 from the groundwater (see comments under Groundwater). Both actions will aid in the prevention of ongoing Strontium-90 and probable hexavalent chromium transport into the Columbia River.
- i. On page 21, it is stated that the 116-F-14 waste site (the 107-F liquid retention basin near the Columbia River) contains hexavalent chromium at levels *exceeding the soil levels necessary for protection of surface water subject to groundwater discharge*. This non-compliance is later dismissed (i.e., the need for further remediation) with the claim that indefinite ICs (prohibiting irrigation) will suffice. Use of indefinite ICs is not acceptable; nor achievable. This site should be further remediated as well as the 118-F-6(with its shallow as well as deep contamination) and 118-F-8:3 (with its 264 years of excavation restriction ICs).
  - ii. None of the Preferred Alternatives included this option. Simply stating that *“the in situ treatment for Alternative GW-3 does require specialized biological reagents but it is a proven technology”* does not relieve DOE from the obligation to develop and consider all reasonable alternatives. As stated, the apatite barrier is a proven technology and should have been identified in an Alternative. (see “EPA expects to consider using innovative technology when such technology offers the potential for

comparable or superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than demonstrated technologies” Section 300.430 (CERCLA-Remedial investigation/feasibility study and selection of remedy).

- iii. Samples from several aquifer tubes immediately adjacent to the Columbia River have detected rising strontium-90 levels. The preferred alternative’s 150 years of MNA is not a reasonable timeframe for remediation of the strontium-90 plume. Allowing strontium-90 to decay is inappropriate when tested technology is available to address the plume.
- c. There was no consideration of the adequacy and reliability of controls factor during the evaluation of the Long-term Effectiveness and Permanence of the alternatives. There was no apparent assessment of the reliability of management controls for providing continued protection from residuals over the length of use of ICs. Avoiding such evaluation and assessment of the potential need to replace technical components of the alternatives, such as a cap, a slurry wall, or treatment systems (e.g., Sr-90 barrier, groundwater wells/treatment systems) and the potential exposure pathway and risks posed should the remedial action need replacement does not present a realistic cost estimate.
- i. The cleanup and restoration of the River Corridor 100 Areas within the Hanford Reach National Monument (HRNM) remains DOE’s obligation. Transition F-Area out of its cleanup contract with Washington Closure Hanford and into a long-term stewardship contract under Mission Support Alliance has been completed. This transition happen before the final Record of Decision was approved and does not require public involvement.
  - ii. Declaring that F-Area clean-up is complete and transitioning the site to long-term stewardship before the final cleanup plan has been reviewed by the public and the final decision has been made about what needs to be done to complete the cleanup is misleading to the public. F-Area will not be “cleaned-up” until groundwater standards have been met and remediation of the Reactor site and associated wastes sites is complete. The environmental consequences of doing this action or not doing it have not been evaluated. It is clear that none of the Alternatives were evaluated against the nine balancing criteria based on what happens with the soil operable unit’s transition to Long-term Stewardship prior to completion of full remediation (including reactor and associated waste sites and groundwater plume) under the Record of Decision (e.g., Was a cost benefit analysis of remedy costs including long-term stewardship costs done?) This evaluation should be done as this action will clearly need to be reflected and integrated into the final ROD.
6. **Groundwater: General Comments:** The Tri-Party Agencies’ goal for Hanford groundwater should be to restore it to its highest beneficial use (per MTCA) to protect human health, the environment, and the Columbia River as stated in the MTCA regulations (Proposed Plan, page 18 and reference to CERCLA - The NCP (40 CFR 300)). The groundwater beneath Hanford is a valuable resource that will likely be much-needed in the future. It should be

cleaned up and restored to the highest beneficial use – as drinking water, for irrigating crops, and for all other uses. Contamination sources within the vadose zone that will likely contribute to future groundwater contamination must be removed, treated as necessary, and disposed in an appropriate disposal facility.

Caution is appropriate if young children might be exposed, such as in the Nonresident Tribal scenario, because they are particularly at risk for methemoglobinemia, the critical effect for nitrate exposure (IRIS 2009). **YN supports Alternative GW-4 for groundwater remediation and the use of an apatite barrier to capture the Sr-90.**

- a. The Preferred Alternative (GW-2, ICs and Monitored Natural Attenuation [MNA]), for remediation of the 100-F Area Groundwater plumes fails several of the specific statutory requirements for remedial actions that must be addressed in the ROD as supported by the FS. Among these statutory requirements, the remedial actions must attain ARARs, utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent possible, and satisfy the preference for treatment that CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants as a principal element. MNA does not treat or remove, or reduce the toxicity and mobility. The Preferred Alternative GW-2, ICs and Monitored Natural Attenuation (MNA), does nothing to reduce toxicity mobility or volume of the hazardous substances or reduce the associated risks
- b. Rather than employ technologies to do so, there is an apparent preference to rely on the daily and seasonal Columbia River stage fluctuations which result in a groundwater/surface water mixing and the “significant reduction in contaminant concentrations before groundwater enters the river (DOE-RL-2010-98 DRAFT, pg. 861, line 24[ Chapter 8-98]). YN does not believe the Preferred Alternative of MNA as a remedy for the groundwater meets the selection criteria, in particular in its ability to demonstrate no adverse impacts to drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources.
- c. Current designation of long-term effectiveness and permanence should be higher for Alternative #4 than the other Alternatives. The weight applied to ranking of the effectiveness of the alternatives to be incorrect. Alternative GW-4 (with the exception of strontium contamination for which there is no proposed remediation) far better meets this definition than the other alternatives (i.e., The NCP (40 CFR 300) defines effectiveness as the “degree to which an alternative reduces toxicity, mobility, or volume through treatment; minimizes residual risk; affords long-term protection; complies with ARARs; minimizes short-term impacts; and how quickly it achieves protection.”). Adjust the evaluations for Alternatives 2&3 downwards appropriately.
  - i. Groundwater extraction and injection wells are also used to contain the Contaminants of Concern plumes, preventing their migration into other uncontaminated areas (like the Columbia River).” Clearly this alternative addresses both the northern and southern parts of the plume, and provides the most protectiveness of any of the alternatives.
- d. There is no reasonable way to ensure that ICs will effectively protect human health for the projected 175 years that the proposed plan identifies will be required for the

attenuation of the waste sites with deep vadose zone contamination (Table 2). YN requests additional waste site remediation (see comment 'e' below).

- i. Migration of elevated concentrations of contaminants is not only occurring today, but has been estimated to be even greater in the future. The Preferred Alternative overly relies upon institutional controls that cannot be confidently relied on during the extended time period long-lived radionuclides (including those in the soils and the GW plume beneath the F-Reactor) will remain toxic.
- e. The Proposed Plan and the RI/FS both state there are no soil groundwater contaminant sources (with the exception of hexavalent chromium contamination from the 116-F-14 waste site) from within the 100-F/IU OUs and that groundwater contamination underlying the 100-IU-2 and 100-IU-OUs originating from the Central Plateau source OUs (i.e., see TC & WM EIS) will be addressed by the CERCLA decisions for the groundwater OUs (200-PO-1 and 200-BP-5) associated with the Central Plateau.
- i. These include iodine-129, nitrate, and tritium. These decisions are decades in the future. These COCs (and others; cesium -137, cobalt-60, europium-152 and -154, nickel-63, and strontium -90 from the 100-F waste sites with deep vadose zone, i.e. below 15ft) will continue to flow untreated/remediated into the Columbia River adding further unaccounted residual contamination to the 100-F Area.
  - ii. CERCLA asks that all *primary sources* of contamination be included in RI/FS evaluations. As upland plumes enter the river, the YN is concerned that any remedy reviews will not include actual sampling actions or technological systems review to confirm performance or to consider these missing source area contaminants. YN requests how this upland contamination plume will be evaluated and that these details are included in the proposed plan and ROD.
  - iii. The decision to address groundwater contamination only from where the contamination is considered to have originated begs the question of whether the treatment process (i.e. the final ROD remedy) at a waste site disassociated from 100-F or 100-IU will adequately address current 100-F or 100-IU groundwater contamination issues.  
  
YN requests details of this interconnectedness to be included in the proposed plan to ensure continuity and protection of HHE at 100-F Area and the Columbia River.
    - The question remains as to whether all localized upland/offsite vadose zone contaminants will continue to be removed in the future should the remedy for groundwater OU at the *originating source* be discontinued or determined not to be protective of human health and the environment.
  - iv. The presence of hexavalent chromium was noted in pore water at locations with corresponding concentrations in bulk sediment samples and implications for possible sediment transport. Additionally hexavalent chromium was found in pore water at locations within the Hanford

Townsite study area where previously unknown as well. (*Field Summary Report for Remedial Investigation of Hanford Site Releases to the Columbia River, Hanford Site, Washington: Collection of Surface Water, Pore Water, and Sediment Samples for Characterization of Groundwater Upwelling* November 2010 4-2 (WCH-380 Rev. 1).

Discussions of what actions DOE intends to take to resolve the issue of Hexavalent Chromium transport are not and should be included in the alternatives presented in the proposed plan.

- v. Discussion of contaminate fate and transport modeling states Cr(VI) concentrations to attenuate to less than water quality standards for surface water of the state of Washington within 35 years. YN requests clarification as to whether this includes consideration of potential source of groundwater contamination from the 116-F-14 waste site vadose zone.

This site is unrealistically identified to need indefinite ICs to prohibit irrigation because it will contaminate the groundwater. To not consider the concentration levels of the 116-F-14 soils is to underestimate the length of time needed for the groundwater to achieve cleanup levels. YN requests consideration and inclusion of the concentration of Cr(VI) and its fate and transport in estimation of attenuation rates for Cr(VI) in the 100-F area groundwater.

- vi. Discussions of human health soil risks, contaminate fate and transport modeling, groundwater risks, and Alternative S-2 and GW-2 convey to the public the impression that within a very short time period (*estimated time to achieve cleanup levels: 3 to 5 years*) to maximum 150 years, the 100-F Area will be available for unrestricted use and will not have contamination concerns. In reality ICs will be needed for an estimated time of up to 264 years for soil excavation and 150 years to indefinite at 116-F-14 for irrigation. Merely referencing a chapter in the RI/FS does a disservice to the public YN requests edits to these sections to clearly detail the risks and required ICs.
- vi. Clearly the discussions within these documents (and other reports; aquifer tube samples) supports the need to define the Columbia River adjacent to the Hanford site boundaries as an Operable Unit. YN ERWM program requests clarification as to what consideration is being given to establish an operable unit for the Columbia River.

- f. YN disagrees with the statement of no unacceptable risks posed to groundwater quality or surface water quality in the other waste sites that make up the 100-FR-1, 100-FR-2, 100-IU-2, and 100-IU-6 OUs due to soil contamination (see page 21 of the Proposed Plan). Use of Method A is identified in the Summary of 100-F/IU Proposed Soil Cleanup Levels Based on Human Health PRGs. Any application of Method A along the River Corridor is not appropriate and contradicts previous DOE and EPA commitments. All waste sites with COCs/COPCs evaluated under Method A should be reevaluated to determine compliance with unrestricted use; Method B standards.

- i. Provide clarification as to the regulatory authority and decision-making process for use of Method A standards in an otherwise unrestricted (Method B) area and how its use achieves the highest beneficial use of the groundwater.
  - ii. Figure 8, page 15, PP: The shape of the Nitrate plume appears inconsistent with previous figure (draft Figure #10) flow directions and size. Provide clarification as to the re-shaping of the nitrate plume.
  - iii. The following COCs were removed from Table 1-Soil and Groundwater COC without justification/clarification: Carbon-14, Cobalt-60, Iodine-129, Technetium-99, Cadmium, Chromium-Total, Cobalt, Copper, Nickel, Silver, Zinc, Aroclors-1016, 1221, 1242, and 1248. Clarify if the following hydrocarbons are included under the clarification of TPH: Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(K)fluoranthene, Chrysene, Dibenz(a,h) anthracene, Indeno(1,2,3-cd)pyrene, Pyrene. Include. Boron, Selenium, and Vanadium should be retained as COCs for F-Area and their risks evaluated.
  - iv. Provide the public a reference link or document identification number for agreement of Tri-Parties to Uranium Kd value used; discuss retention of Uranium as a COC.
- g. It is known that under the EPA tap water scenario used to provide quantitative risk and hazard contributions from all measured contaminants in groundwater for the 100-FR-3 OU, the noncancer aggregate HI for the 100-FR-3 is greater than one. Yet this information is not included in the PP and it is seemingly dismissed through the process of individually segregating them. Clarification is requested on why these individual COCs/COPCs were not reduced such that the aggregate HI would be less than one per the process outlined under MTCA.
- h. Statements within the Proposed Plan are confusing to reader. It is stated that Cr(VI) has not be determined to be an ongoing risk for aquatic communities within the area of discharge of the 100-F/IU OUs yet the plume has been and is noted to have moved to groundwater and been identified in some porewater samples and within the river channel. More sampling is needed to make a clear determination and this should be included in the RI/FS and developed further in the ROD to ensure risk from transport of Cr(VI) into the Columbia River is not occurring at levels above standards. See previous comment.
- i. The Preferred Alternative (or Proposed Plan) does not include the required description of the contingency measures that will be implemented should the monitoring show that natural attenuation is unable to confirm the natural attenuation processes are reducing COC concentrations in accordance with expectations and a timeline for achievement of defined, measurable reductions in concentrations levels to achieve the cleanup goals.
  - i. Conditions that would trigger the contingency should also be specified (e.g., continued plume migration or contaminant levels are well above levels predicted for a specified time) (EPA 540-R-98-031). The Proposed Plan and Preferred Alternative should incorporate remedial actions that will meet these thresholds and state explicitly the contingency measures and additional actions that will be taken should CERCLA monitoring

demonstrate the Preferred Alternative has not worked as planned. YN ERWM requests DOE update the Proposed Plan to provide details for public review including cost of implementation of contingency measures.

- ii. Use of natural attenuation as a component of a groundwater remedy requires contingencies for additional or more active remedial actions to be incorporated that are triggered by specific contaminant concentration levels in the site groundwater monitoring network (or other criteria as appropriate).<sup>3</sup> These contingencies were not developed or included in the RI/FS or the Proposed Plan.
- j. The basis given in support the consideration for MNA included the statement that the 'source of the observed contamination is no longer contributing to the plume' is inconsistent with the statements elsewhere for the need of ICs due to residual contamination and the statement that the 'remaining source control recommended will address sources contributing to groundwater contamination'. Correct or clarify as needed.
- k. Costs: The proposed plan does not include the needed robust discussion of the required performance monitoring component. Cost estimates should also be presented. Existing groundwater plumes near the reactor, the retention basins, the cribs, and the cooling water head houses should be considered for specific monitoring of potential future vadose zone contributions.
- l. The use of an Apatite Barrier (Permeable Reactive Barrier [as tested and used at 100-N]) is a successful technology currently employed in the 100-N to capture/remove Sr-90 from the groundwater. None of the Preferred Alternatives included this option. Simply stating that "*the in situ treatment for Alternative GW-3 does require specialized biological reagents but it is a proven technology*" does not relieve DOE from the obligation to develop and consider all reasonable alternatives. As stated, the apatite barrier is a proven technology and should have been indentified in an Alternative. (*see* "EPA expects to consider using innovative technology when such technology offers the potential for comparable or superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than demonstrated technologies" Section 300.430 (CERCLA-Remedial investigation/feasibility study and selection of remedy).
- m. The Preferred Alternative puts at risk the TPA groundwater cleanup requirements in Milestone M-016-110-T02. Exceedence is known. (e.g., Statements in PP: Groundwater contaminants at levels that exceed federal and state standards in the 100-FR-3 OU are nitrate, Cr(VI), trichloroethene, and strontium-90; While the plume exceeds the 10 µg/L water quality standard in the groundwater, aquifer tubes and pore water sampling indicate infrequent exceedances of this level near the surface water interface.).
- n. There are areas of uncertainty within the groundwater modeling approach (STOMP-1D), and its application is inappropriate until all issues are resolved. The graded approach to evaluating groundwater protection and STOMP-1D modeling has many uncertainties (e.g., what criteria will be used to assess the validity of the Preliminary Remediation Goals [PRGs] as they apply to site conditions).

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<sup>3</sup> EPA; Directive 9234.2-25

- i. Application of this model for making cleanup decisions is inappropriate until all issues are resolved. These resolutions should be presented to the public for clarity of understanding.
- o. YN believes there are some noted incorrect applications of regulations which need correction and re-evaluation of risks to the groundwater (e.g. as noted in an earlier WA State Department of Ecology comment: The text states “the surface water standard applies where protection of surface waste subject to groundwater discharges to the Columbia River.” WAC 173-340-720(4)(b)(ii) (2007) indicates that WAC 173-340 Method B for potable groundwater applies for the protection of surface water beneficial uses, and references WAC 173-340-730; in this way, water quality standards are incorporated in WAC 173-340-720. WAC 173-340-730(3)(b)(i) also gives the relationship of water quality standards and WAC 173-340.) YN supports use of the aquatic water quality criteria to apply to the ground water because the property abuts the surface water.
- p. Miscellaneous comments: YN requests edits to groundwater contamination section to clarify that wastes sites in the 100-FR-1 & 2 OUs that were sources of groundwater contamination have been remediated to meet cleanup standards for unrestricted use to depth of 15ft and met MTCA Method B standards. To state source waste sites *were removed* is to improperly imply to the public that no contamination remains below in the vadose zone.
- q. Clarify reduction in the various plume sizes from Draft A to Rev. 0.
- r. Include date range for plume data on Figure 8.
- s. Finish sentence “Cr(VI) concentrations are generally below the..”
- t. Figure 8 seems to indicate the TCE plume is also beneath 100-IU-2/6. Clarify why TCE is not a contaminant plume beneath 100-IU-2/6.
- u. Include discussion and details for “Non-operational Lands.” Simple reference to RI/FS will not be sufficient.
- v. Better clarify relationship between DOE and USFWS with regards to control of land use, ownership, and management of River Corridor and the HRNM. (See page 18)

## 7. Comments Regarding Human Risks:

- a. There remains unacceptable risk to the YN tribal members from both chemical and radiological contaminants. Much of the risk assessments are based on the RCBRA and other supporting documents. See following excerpts (and risk values) from the RCBRA (River Corridor Baseline Risk Assessment Volume II, Part 1: Human Health Risk Assessment August 2011), the Proposed Plan, and 100-F & UI 2/6 RI/FS.
  - i. Volume II, Part 1: Human Health Risk Assessment August 2011pg 7-34: For the Nonresident Tribal scenarios, the total cancer risk estimates exceed  $10^{-4}$  and HIs exceed 1.0 for all ROD areas, mostly due to exposures that are associated with ingestion of plants assumed to be

gathered from the Hanford Site. A large proportion of Nonresident Tribal cancer risk and HI is related to arsenic soil concentrations that are approximately equivalent to levels in areas unaffected by Hanford Site activities. When cancer risk estimates are calculated without the contribution of arsenic, the total cancer risk estimates still exceed  $10^{-4}$  for all six ROD areas. The key risk drivers other than arsenic are technetium-99, carbon-14, strontium-90, benzo(a)pyrene, and Aroclor-1254, predominantly by the plant and game ingestion pathways.

- ii. Because the Native American resident scenarios include very high food ingestion rates, strontium-90 continues to play a significant role in food-related exposures at year 2075. By year 2150, however, Native American resident cancer risks above  $1 \times 10^{-4}$  are also dominated by arsenic exposure from ingestion of garden produce. Average arsenic concentrations at remediated waste sites range between 1.1 and 17.3 parts per million. Some of these arsenic concentrations exceed the Hanford Site background value of 6.5 parts per million (DOE/RL-92-24). However, all of the RME values for arsenic are less than the IAROD cleanup value of 20 parts per million, which is based on the MTCA Method A unrestricted cleanup level. YN does not support the proposed cleanup value for arsenic.
- b. G4.2.1 Use of Groundwater as a Potential Drinking Water Source: The total ELCR is  $9.3 \times 10^{-4}$  for nonradiological analytes and  $5.0 \times 10^{-5}$  for radiological analytes. The HI 6.6, which is greater than the EPA target HI of 1.0.
- c. G4.2.11 Use of Groundwater to Generate Steam for Sweat Lodge Use: The total ELCR *with* contributions from aerosolized nonvolatile analytes is  $1.0 \times 10^{-1}$  for nonradiological analytes and  $1.1 \times 10^{-3}$  for radiological analytes, which are both greater than the EPA upper target risk threshold of  $1 \times 10^{-4}$ . The HI *with* contributions from nonvolatile analytes is 80, which is greater than the EPA target HI of 1.0.
- d. G4.3.1 100-FR-3 Groundwater OU: The total cumulative ELCRs for the CTUIR and Yakama Nation exposure scenarios are  $9.1 \times 10^{-4}$  and  $9.8 \times 10^{-4}$ , respectively. The total cumulative ELCR for the EPA tap water scenario is  $2.3 \times 10^{-4}$ .
- e. All scenarios are greater than the EPA upper target risk threshold of  $1 \times 10^{-4}$ . Major contributors to risk for the Native American scenarios and the EPA tap water scenario are trichloroethene, strontium-90, and tritium. The total HI is 5.1 for both the CTUIR and Yakama Nation exposure scenarios. The HI for the EPA tap water scenario is 2.4. Lithium is the primary contributor to the non-cancer HI for the Native American scenarios.
- f. Caution is appropriate if young children might be exposed, such as in the Tribal and Nonresident Tribal scenarios, because they are particularly at risk for methemoglobinemia, the critical effect for nitrate exposure (IRIS 2009). The Preferred Alternative does not actively address Strontium-90 or far-field Nitrate and should.
- g. Risks to the YN Tribal members should also be calculated and included in the Alternative selection decision-making process using the YN risk scenario post 150 years of remedy selection.

- h. YN disagrees with the following RI/FS text: “The PRGs are calculated using a target cancer risk level of  $1 \times 10^{-4}$ , which is comparable with the cleanup achieved through the interim actions as established by the interim action RODs.” The point of departure for CERCLA remediation is stated as  $1 \times 10^{-6}$ . Every effort should be made to meet this standard. (USEPA, 1997; see bullets below).
- i. Alternatives should be identified to establish remedies which meet or exceed the combined excess lifetime cancer risk level of  $1 \times 10^{-5}$ . PRGs for individual radionuclides based on a  $1 \times 10^{-4}$  target cancer risk are not supported by EPA guidance as outlined in bullets below.
- i. EPA’s Regulatory risk ‘Point of Departure’ (target risk cleanup value) is  $1 \times 10^{-6}$ . Although a risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  is permissible, to state that the ‘regulatory risk target threshold of  $1 \times 10^{-4}$ ’ has met is misleading to the public. Edit language throughout document to clearly clarify that the preferred risk target is  $1 \times 10^{-6}$ . Based on the requirements of MTCA and CERCLA regulations the radiological and nonradiological cancer risks should be combined and compared to the standard that Washington State has determined is protective of human health. This standard has an upper limit of lifetime risk for combined carcinogens of  $1 \times 10^{-5}$ .
- ii. While the USDOE’s practice has been to apply MTCA risk requirements only to nonradiological contaminants, MTCA defines radionuclides as hazardous substances. Although MTCA does not include cleanup levels for individually named radionuclides, it clearly states that “radionuclides are hazardous substances under the act.” [Washington Administrative Code (WAC) 173-340-200]. Radionuclides are carcinogens, and MTCA defines the maximum allowable incremental cancer risk level for individual carcinogens as  $1 \times 10^{-6}$ . It defines the maximum allowable incremental lifetime cancer risk level for multiple carcinogens and multiple exposure pathways as  $1 \times 10^{-5}$ .
- iii. MTCA’s inclusion of both chemicals and radionuclides in assessing cancer risks is consistent with U.S. Environmental Protection Agency (USEPA) guidance on establishing cleanup levels for CERCLA sites with radioactive contamination (USEPA, 1997). That guidance states that:
- The USEPA is aware of “no technical, policy, or legal rationale for treating radiation risks differently from other risks addressed under CERCLA.”
  - The USEPA uses a consistent methodology for assessing cancer risks at CERCLA sites no matter the type of contamination.
  - The USEPA classifies radionuclides as known carcinogens.
  - Cancer risks for radionuclides should generally be estimated using the slope factor approach.
  - Cancer risks from radiological and non-radiological contaminants should be summed to provide risk estimates

for persons exposed to both types of carcinogenic contaminants.

- j. Radiation exposure risk from the National Academy of Sciences (BEIR VII Report, 2005), from which acceptable risk levels are supposed to be updated, indicates 15 millirem of annual exposure is projected to cause a lifetime cancer risk of 8 fatal cancers in adults for every 10,000 exposed – this is 8 times the CERCLA maximum risk level and 80 times the state MTCA level.
  - i. Annual exposure values would be more representative if reduced to approximately 5millirem. YN requests use of 5mrem standard.
- k. The YN has unresolved concerns (presented previously to DOE and EPA) with the use of River Corridor Baseline Risk Assessment and its ‘sub-documents’ [i.e. *Tier 1 Risk-Based Soil Concentrations Protective of Ecological Receptors at the Hanford Site* (CHPRC-00784) or *Tier 2 Terrestrial Plant and Invertebrate Preliminary Remediation Goals (PRGs) for Nonradionuclides for Use at the Hanford Site* [ECF-HANFORD-11-0158]] as a major supporting document in cleanup decisions for the River Corridor Areas. YN does not support use of without public review opportunities. Inclusion of secondary documents within a primary document necessarily requires public review and comment opportunities. These documents are not finalized or approved nor have our comments and concerns been addressed.<sup>4</sup>
- l. Use of the words medium and low to categorize risk is incorrect (see RI/FS Page 1-53). Risk that is not between the ranges of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  simply exceeds the regulatory standards for cleanup. As stated, this last paragraph and the above paragraphs, is misleading the public. Clearly under ‘frequent-use’ [understood to be equated to unrestricted] risk exceeds cleanup standards.
- m. The Proposed Plan discussion of Ecological Risks at Riparian and Near-Shore Areas indicates is a risk for exceedances of hexavalent chromium to discharge to surface waters. Values used to determine estimated porewater concentration to surface water screening values (cited in Appendix L; Table L-73) uses an incorrectly proposed Kd of 0.8 for hexavalent chromium. If corrected to a more representative Kd value of 0.0, it is evident that maximum concentration values will be greater than surface water screening values in all categories (i.e. for metals near waste site; metals in slough areas, metals in northern shore, metals in the 128-F-2 Area C/aka 100-F-59).

YN requests recalculation of risk using a Kd of 0.0 for hexavalent chromium and additional soil remediation at all waste sites with exceedence of risk.
- n. Appendix L; Table L-72 indicates Chromium and Hexavalent Chromium exceedances of maximum soils and sediment concentrations for riparian soils, sediments, and Columbia River background sediments for the 128-F-2 Area C (aka 100-F-59). Furthermore, discussions throughout Appendix L regarding this waste site report other chromium/hexavalent chromium exceedances.

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<sup>4</sup> See our February 28, 2011 letter to the Tri-Party Agencies (DOE-Matt McCormick, EPA-Dennis Faulk, and Ecology- Jane Hedges

The statement is made that “confirmation and verification sampling at the 100-F-59 site (128-F-2 Area C) is not included in the riparian soil summary tables which only included RCBRA samples. The verification sampling chromium results from the 100-F-59 waste site are displayed in Figure L-12 and L-13 and included detects as high as 671 mg/kg within what is referred to as Area C. The slough area south of the waste site also had concentrations up to 371 mg/kg. In total the 100-F-59 soil samples had 12 samples that exceeded terrestrial invertebrate ESLs and 19 that exceeded aquatic invertebrate ESLs. The 100-F-59 area also included samples above the wildlife ESL of 109 mg/kg.”

Obviously there is an issue with Chromium/Hexavalent Chromium at this site. Presenting the site in such terms that it appears not subject to either terrestrial ecological or aquatic receptor standards completely misses the point of being protective of HHE. Clarification is needed. Furthermore, YN requests additional ecological sampling be performed at 128-F-2 Area C (aka 100-F-59) waste site and additional seep and aquifer tube sampling be performed nearby.

YN requests additional details or a MOA for the 128-F-2 Area C (aka 100-F-59) waste site to be included in the proposed plan and ROD for these sites.

- n. These documents are basically ‘cookie-cutter’ documents, similar to the 100 D/H Area RI/FS/PP. As such, YN see our similar applicable comments on the risk assessment process (e.g., determination of EPCs, comparison of EPC to PRGs for elimination, etc).
- q. YN concerns remain regarding the methodology used to calculate the EPCs. EPA’s ProUCL methods were identified yet in some instances a 95UCL was not calculated (a maximum value used instead). Use of the max ignores most of the information in the data set. When the number of measurements is small (e.g.,  $n < 5$ ) or the detection frequency is low ( $< 5\%$ ), ProUCL ultimately recommends collection of more samples to compute defensible statistics.<sup>5</sup> Collection of additional samples was not done. Some unremediated waste sites may have exceedances of PRGs, which would provide the basis for remedial action or further evaluation. YN requests clarification on this issue.

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<sup>5</sup> quotes from EPA sources, supporting use of the 95% UCL:

1) Dec 2002 OSWER 9285.6-10 (<http://www.hanford.gov/dqo/training/ucl.pdf>)

“It is important to note that defaulting to the maximum observed concentration may not be protective when sample sizes are small, because the observed maximum may be smaller than the population mean.... The use of the maximum as the default EPC is reasonable only when data samples have been collected at random from the exposure unit and sample size is large” (p. 20).

2) ProUCL Ver. 3.0 (Singh et al, 2004)

(<http://www.epa.gov/nerlesd1/tsc/images/proucl3apr04.pdf>)

“It is recommended that the maximum observed value NOT be used as an estimate of EPC.... It should be noted that for highly skewed data sets, the sample mean indeed can even exceed the upper percentiles (e.g., 90%, 95%), and consequently, a 95% UCL of the mean can exceed the maximum. This is especially true when dealing with log normally distributed data sets of small sizes” (p. 55).

- r. Reasonable Maximum Exposure (RME) Modeling: YN requests clarification on how the RME modeling proposed in this plan & the methods to develop it are consistent with WAC 173-340-702(14) and WAC 173-340-747 criteria.

## 8. Soil Remediation:

- a. The statement that “residential cleanup levels also allow for conservation and preservation uses and minimize the need for IVs and long-term monitoring is misleading to the public and incorrect. Covering three difficult to understand concepts in one 20 word sentence does not provide the level of details necessary for reader understanding. Delete sentence or fully develop the topics.

Residential use is an activity allowed under MTCA Method B. MTCA Method B values for unrestricted use covers all land uses. The terms *conservation and preservation* (as defined by the CLUP and used throughout this document, include mining and grazing) combined with Method B makes no sense as MTCA Method B assumes no excavation below 15 ft, which could occur with mining. YN requests edits to this document, as needed, to include details on how and where EPA and DOE intend to meld the two differing land uses.

- b. Conservation land use is the basis for the preliminary remediation goals (PRGs). YN disagrees with this land use designation to develop PRGs. Our Treaty rights guarantee unrestricted land-use. All PRGs should be calculated based on unrestricted land-use, Method B standards at a minimum. Additionally, see YN referenced letter regarding use of CLUP.<sup>6</sup>
- c. Soil contamination should be documented in both vertical and horizontal directions from all potential sources (*EPA/540/G-89/004-Guidance for Conduction Remedial Investigations and Feasibility Studies Under CERCLA*). Contamination underneath the reactor is not addressed or considered. None of the Alternatives fulfill this requirement.

YN requests risks from soil and groundwater contamination beneath the reactor are included in the risk calculations for human health and environment.

- d. Text within the document discussing “residual contamination” at depths below remediation actions is misleading to the public. Contamination is occurring; the ‘deep zone’ [vadose zone] has not been demonstrated to meet cleanup levels. Rewrite discussions in the Human Health Soil Risks and Groundwater Risks sections to clearly state that further removal, treatment, and disposal would be required should contamination be brought to the surface.
  - i. Statements on pages 20 and 21 appear contradictory (“There were no unacceptable risks posed to groundwater quality or surface water quality in the other waste sites that make up the 100-FR-1, 100-FR-2, 100-IU-2, and 100-IU-6 OUs.’). The 118-F-6 site had residual strontium-90 contamination above risk thresholds at a depth of 2 to 4 m (6.6 to 13.1 ft) bgs. This indicates Sr-90 is present at the 15ft depth - the required depth to demonstrate

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<sup>6</sup> YN letter to John Wagoner, DOE, dated June 30, 1998.

compliance. It too remains a soil source of contamination to groundwater along with the 116-F-14 site. YN requests additional site remediation.

- ii. Additionally, the statement in the Ecological Risks at Upland Areas section, page 21, that ‘once human health cleanup levels are achieved, residual contamination would not be sufficient to adversely impact population and communities of ecological receptors’ is not supported by the proposed PRG for Mercury (see CHPRC-00784, *Tier 1 Risk-Based Soil concentrations Protective of Ecological Receptors at the Hanford Site*; CHPRC-01311, *Tier 2 Risk-Based Soil Concentrations Protective of Ecological Receptors at the Hanford Site*; ECF-HANFORD-11-0158, *Tier 2 Terrestrial Plant and Invertebrate Preliminary Remediation Goals (PRGs) for Nonradionuclides for Use at the Hanford Site.*) .
- e. YN requests deletion of the following section 6.2.2.2.9 (and elsewhere as needed) text; “As a result, risks are overstated because the UCL and the EPC do not take credit for the existing clean backfill that covers the remediated waste site.” Risk is calculated based on residual contamination and this statement is or may mislead the public.
- f. YN requests deletion of the following RI/FS text (and similar text throughout the RI/FS/PP documents) to state the actual cumulative value and identify the risk drivers and contaminants: “The risk assessment for the 116-F-4 Pluto Crib (shallow and deep decision unit) reports a cumulative total ELCR within the EPA risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ ”.

MTCA requires a cumulative risk of no more than  $1 \times 10^{-5}$ . YN requests clarification as to whether all waste sites cleanup met the MTCA cumulative risk value of  $1 \times 10^{-5}$ . If not, YN requests clarification as to what further remedial actions will be taken.

- e. YN requests the proposed cleanup levels listed in Table 6 be revised to lower PRG for mercury from 24mg/kg to 0.30mg/kg to be most protective.
- f. YN requests PRG for TCE of 2.7ug/L for soil cleanup levels for protection of surface waters be included given the time frame for MNA and to ensure the protection of HHE.

YN requests clarification to be included in the RI/FS/PP documents as to how the process of degradation of trichloroethylene to vinyl chloride was considered in the decision of MNA to remediate TCE.

YN requests clarification to be included in the RI/FS/PP documents as to how MNA prevents further migration of contaminate plumes; determination of the rates(s) of attenuation and how that rate is changing with time (EPA 9200.4-17P).

- g. Text within the document identifying 20mg/kg for arsenic as an unrestricted land use clean up value is misleading. It implies Washington State Department of Ecology concurrence with use of this value on the Hanford site as background. The 20mg/kg cleanup level is the WAC 173-340 (1996) Method A value. The YN believes it is inappropriate to apply Method A on the complex Hanford site as it is used for sites which contain a small number of hazardous substances.

Its application has resulted in residual levels for arsenic which do not reflect the Unrestricted Land Use Soil Cleanup Standards WAC 173-340-740(3)) 2007 Method B value (0.67 mg/kg) and the MTCA ("Deriving Soil Concentrations for Groundwater Protection" [WAC 173-340-747(3)(a)]), groundwater protection value (0.00737 mg/kg) cleanup values (which would default to site background levels of 6.5mg/kg). This 20 mg/kg value for arsenic exceeds the  $1 \times 10^{-6}$  individual cancer risk based on the MTCA.

- i. YN requests the proposed cleanup levels listed in Table 6 be revised to lower PRG for arsenic from 20mg/kg to 6.5mg/kg to be most protective.
- ii. In simple terms, the risk analysis showed that casual users of the River Corridor as it is have low enough risk to be safe. However, all of the residential user scenarios have unacceptably high risk. Some of the risk was associated with uranium, mercury, chromium, cadmium, and radiological contaminants. But a major part of the high risk levels found in the residential scenarios is from consumption of arsenic contaminated plants, animals and water.

While much of the arsenic is assumed to be from pre-Hanford agricultural practices, there was a portion that could be attributed to Hanford operations. YN requests that amount of the Hanford process arsenic load should be determined, and the cleanup of that arsenic should be a part of the Hanford cleanup plan.

- iii. The arsenic contamination and related risk issue is not incorporated in the proposed RI/FS studies. The YN believes and requests there be a more global evaluation of arsenic contamination on the Hanford site.
- g. The Proposed Soil cleanup levels for Hexavalent Chromium to ensure protection of groundwater should be set at 0.2 mg/kg. This value is found using a Kd value of 0 mL/g and more accurately depicts movement of this contaminant through soils. Furthermore, fate and transport simulations presented in DOE/RL-2010-98 should be recalculated using 0.0 Kd value.
- i. YN requests concentrations in the groundwater and along the shoreline and the subsequent timeline for decline in concentration are re-evaluated using a zero kd value.
  - ii. YN requests the proposed cleanup levels listed in Table 7 be revised to lower PRG for hexavalent chromium from 2.0mg/kg to 0.2mg/kg to be most protective.
- h. The Proposed Plan lists only 16 waste sites which will require use of IC to prevent exposure to contaminated groundwater. Of these 16 sites, only 4 were evaluated in the RCBRA.
- i. Clarification is requested as to whether the remaining sites had risk assessments performed.
- i. A review of CVP documents (most dating 2001-2008) for a number of waste sites raised concerns. YN requests clarification as to whether each waste sites' cleanup documentation was re-evaluated against current standards.

- i. Several indicate the use of outdated standards or as of yet agreed to (by the Tri-Parties) values (i.e. the 100 Area Analogous Sites RESRAD Calculations (BHI 2005a) to calculate non-radiological COCs,[e.g. copper, lead, selenium, TPH; Aroclor-1254].
  - ii. Many state use of MTCA 1996 values or soil RAGs based on “100 time groundwater cleanup rules and 100 times dilution attenuation factor times surface water quality criteria.
  - iii. Cross-contamination of asphalt from nearby roadways is given as a reason for elimination of PAHs from waste sites RAO determinations and it is unclear why this was allowed.
  - iv. Some CVPs (e.g. 116-F-5 crib & 100-F-2/-11/15/16, 116-F-10 French drains) indicated need to prevent deep zone soil intrusion and are not listed as such in Table 5 of the proposed plan. YN requests clarification as to why these areas listed on Table 5 of the proposed plan.
  - v. There were inconsistent values given for some Columbia River Protection RAGs (e.g., Sr-90) between some CVPs and clarification is requested by the YN.
- o. YN requests a review of the determination made for waste sites 100-F-59/128-F-2. We have concerns as this area also known to have an identified cultural site. The proposed plan does not discuss how impacts to this site are to be mitigated. YN requests details or an MOA to be included in the proposed plan and ROD for these sites.
  - i. Review of the determination made for waste sites 100-F-42/-43 and 116-F-16 is requested as well. Both sites were not remediated below the OLWM and they clearly entered the River.
  - ii. Furthermore, chromium concentrations were evaluated using RESRAD at the 100-F-45 site. The vadose zone is ~7ft. It seems improbable that this will not migrate to groundwater/river within 1000 years. Recalculate.
- p. ‘ARCL’ sites are identified and discussed in Section 6.5.2 of the RI/FS. It appears these sites were only evaluated using the casual recreational user exposure scenario. YN request the risk associated with these sites be recalculated using the unrestricted scenario.
- q. Statement is made on several CVP (e.g. 100-F-45) “ All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site. It is unclear where this information is to be found. Clarification is requested.
- r. YN disagrees with many of the scientific management decision point (SMDP) reasons given for elimination of a waste site from the being carried forward into the FS. YN requests review and clarification of this process within the RI/FS/PP.
- s. YN disagrees with approach used in some ecological risk evaluations that suggest protection of ecological receptors (i.e., no sufficient or adverse impact populations and communities) based on size of remedial actions relative to receptor home ranges or other available habitat. It results in underestimates of affects and risks.
- t. YN requests all sites with the status of ‘no further action’ and requiring IC for deep soil zones be evaluated against current MTCA 2007 standards while not backsliding from

previously more stringent IROD cleanup values. The YN requests DOE include a table within the PP to include the cleanup numbers that were generated for each Interim closed/closed waste site in the RI/FS and compared to MTCA 2007 clean up numbers.

- u. Although DOE states they have evaluated these sites using a slightly different risk approach, how the determination that these sites require no further action is unclear. YN requests DOE include this evaluation in the Proposed Plan and tables that list the interim ROD cleanup values and the Proposed Plan cleanup values for each contaminant.

**9. Orchard Lands:** The Proposed Plan makes no mention of waste sites to be addresses under a separate CERCLA decision as a part of the Orchard Lands OU. The only clear language for discussing the relationship between the 100-F/IU/FS scope and the Orchard Lands is found on pages 4-3 to 4-4 in the RI/FS.

- a. Similar language needs to be included in the PP to discuss the overlap between these two projects.

The RI/FS makes the statement “An RI of the 100-OL-1 OU will be conducted to determine if actions are needed to mitigate potential environmental or human health impacts. If results from the RI indicate a need for action, an FS will be conducted to identify and evaluate a range of remedial alternatives.”

- a. Clarifying text needs to be inserted regarding the evaluation of impacts to known/unknown cultural resources within the Orchards Lands OU.

**10. NEPA:** The relationship of NEPA and NEPA values to related information is not fully presented.

- a. Rewrite for clarity and include discussion that some of the required assessments supporting NEPA values are not yet made until after the RI/FS is approved. The statement, “NEPA values were incorporated into the FS” gives the impression that NEPA values were done in the FS, and that is the end of NEPA values. This is incorrect. Many of NEPA values are incorporated and enforce implementation of applicable laws and regulations into later phases of the CERCLA documentation process, including the ROD and RD/RAWP. For example, applicable cultural, historic, and ecological resources are evaluated for, and implemented through *Hanford Cultural Resources Management Plan* (DOE/RL-98-10) and *Hanford Site Biological Resources Management Plan* (DOE/RL-96-32) at a time closer to the actual remediation activities.

**11. General Comments on the Remedial Action Objectives:**

- a. The purpose of Remedial Action Objectives (RAOs) is to explain and address site risks and to include an action (and specifics/details) to be taken achieve the objective. RAOs are the measurement tools for evaluating the success of the ROD remedy during the CERCLA 5 year review process. Without a specific action, the metrics for measurement are filled with subjectivity and uncertainty.

- i. Five of the seven RAOs do not have a definitive task or standard to be met. An Example of a specific action to include using RAO#3: Prevent COCs migrating and/or leaching through the soil that will result in groundwater concentrations exceeding federal and state standards and risk-based thresholds for protection of surface water and groundwater *by treatment of the contaminated soils or RTD.*
- ii. Clarify all RAOs with specific action(s) to be performed and/or standard(s) to be met.

## 12. Acronym List:

YN requests DOE not employ the acronym or terms UU/UE (unlimited use/unlimited exposure). These terms are not familiar and need additional clarification and justification for application defined in the Proposed Plan. Method B is unrestricted use. Unlimited use/unlimited exposure may not have the same connotation or legal status.

## 13. Glossary:

YN requests the following edits to the definitions of these terms:

- a. **Environmental Restoration Disposal Facility (ERDF):** The Hanford Site's onsite state and federally approved facility for the disposal of hazardous (radioactive and nonradioactive) waste and contaminated environmental media in accordance with RCRA and CERCLA response action decision documents and ERDF waste acceptance criteria.
- b. **Interim safe storage:** The first stage of final disposition of a Hanford site reactor. It consists of (1) ensuring that facility hazardous substances are and will remain safe and secure; and (2) reducing the footprint of the reactor building to the primary shield wall, and sealing all openings such that the facility is in an environmentally safe and secure condition prior to initiation of disposition.
- c. **Limited field investigation (LFI):** LFIs are an initial step in characterizing the nature and extent of contamination in the vadose zone, structures, and debris that received radioactive liquid effluent discharges.
- d. **Operable unit (OU):** A discrete portion of the Hanford Site, as identified in Section 3.3 of the *Tri-Party Agreement* Action Plan (Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*). An OU at Hanford is a group of land disposal sites and groundwater plumes placed together for the purposes of performing a RI/FS and subsequent cleanup actions. The primary criteria for placement of a site into an OU include geographic proximity, similarity of waste characteristics and site type, and the possibility for economies of scale.
- e. **Preliminary remediation goal (PRG):** An ARAR-specified or risk-based concentration for a contaminant that is protective of HHE for a specified exposure pathway. PRGs are established during the Feasibility Study (FS), are based on scientific information, and are used as a target for remedial cleanup levels during the remediation of a site. Alternatives are developed in the FS and evaluated based on how well they meet PRGs. PRGs are often proposed as final cleanup levels which are set in the ROD.
- f. **Proposed Plan:** A document that briefly describes the remedial alternatives analyzed, proposes a preferred remedial action alternative, and summarizes the information relied

upon to select the preferred alternative. The public is provided with an opportunity to comment on the preferred alternative, as well as the other alternatives under consideration as presented in the Proposed Plan.

- g. **Pump-and-treat:** The extraction of contaminated groundwater and treatment of contaminants with one or more of an assortment of technologies designed to meet cleanup standards.
- h. **Record of Decision (ROD):** The CERCLA document identifying the remedy to be implemented at a site after the RI/FS/Proposed Plan process has been completed.
- i. **Remedial action:** Action(s) performed to prevent, remove, or mitigate the release or threatened release of a hazardous substance into the environment and to protect HHE.
- j. **Remedial action objective (RAO):** An RAO is a medium-specific (e.g., soil) or operable unit-specific goal for protecting human health and the environment that specifies the contaminants of concern, exposure routes, and receptors.
- k. **Removal, treatment, and disposal (RTD):** A cleanup method where soil and debris are excavated in such a way that no contaminants above the approved remedial action cleanup levels or concentration remain. Excavated material is treated (if required for disposal) and sent to an onsite or offsite engineered facility for disposal.
- l. **Tri-Party Agreement:** DOE, EPA, and Ecology signed the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) on May 15, 1989. It is a legally binding document. The general purposes of the agreement are as follows: to ensure that environmental impacts are thoroughly investigated and appropriate response actions taken as necessary to protect HHE; to provide a framework for permitting of treatment, storage and disposal units; ensure compliance with the *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Washington Hazardous Waste Management Act* for treatment, storage, and disposal units; to establish a procedural framework and schedule for developing, prioritizing, implementing and monitoring appropriate response actions at the Hanford Site in accordance with CERCLA, the NCP, Superfund guidance and policy, RCRA and RCRA guidance and policy; and to facilitate cooperation, exchange of information and coordinated participation of the parties in such actions.

**14. Miscellaneous Comments:** YN requests the following:

- a. Descriptions of activities are not robust enough to allow the reader to put into perspective the expanse of the impacts and the cleanup efforts or the deliberations of the Tri-Party Agencies in their decision-making processes. Throughout the entire Proposed Plan, Rev 0, YN identified the deletion of much of the necessary and informational details (e.g. text, references, and figures) provided in Draft A and requests its inclusion.
  - i. Example: Discussion of site background (pg 4 & 6) needs more depth for better reader understanding of the Hanford site area background and F-Area facilities and operations which affected human health and the environment.
  - ii. Groundwater flow direction discussions
  - iii. Draft A figure #6.
  - iv. Ecological Risks

- b. Our previous comments on Draft A led to of removal questionable text rather than the solution to the concern voiced. See our previous concerns regarding Cultural Resources. Why was the next removed and our concerns not addressed. YN ERWM request original concerns be addressed.
- c. Edit or delete following text: "...if it were brought to the surface." Deep contamination (below 15ft), if brought to the surface, would require RTD, not just ICs. ICs are proposed to prevent this from occurring at waste sites which have identified residual contamination exceeding cleanup levels.
- d. Previous number of waste sites in the OUs was listed as 400, now listed as 304. Clarify reason for difference and if these did or did not have contamination requiring remediation. Include in proposed plan more depth of details as presented in Draft A.
- e. Retain discussion of Remedial Alternatives as detailed in Draft A, page 3. This discussion clarifies choice of the preferred alternative and presents a better flow of information to the reader's understanding. Simply jumping to Alternative #s S-2 and GW-2 without explanation only saves a half of a page of paper.
- f. Figure 2: Suggest use of Draft A figure 2. Better title, better definition all around. Figures 8 & 9 define the groundwater plumes better and.
- g. Additional details as to the remediation of the remaining active facilities and infrastructure within the 100-IU-2 and -6 OU.
- h. Identify RI/FS data tables as reference source for Table 1 in PP. Include previously included and now deleted COCs from Table 1 in PP.
- i. Delete new statement that implies dilution is a solution; "The Columbia River rapidly dilutes groundwater contaminants to low concentrations, so the primary concern for ecological risk to aquatic biota is from exposure to groundwater via upwelling through the riverbed gravel, cobbles, and sand."
- j. Discussion of preliminary remediation goals (PRGs) in Draft A provides a more robust discussion. YN suggests inclusion of more details and use of the word *cumulative* as opposed to *total*.
- k. YN requests inclusion of information regarding ecological receptors PRGs, etc as provided in Draft A text and Summary table for PRGs for the Protection of Ecological Receptors. Clarify reason for no freshwater sediment PRGs.
- l. YN requests more depth to ICs discussion and reference to RI/FS chapter/sections.
- m. Edit and clarify Alternative #3 to state 'incidental' in situ treatment of hexavalent chromium.
- n. Include 'potential chemical/action/location' sections from Draft A.
- o. Clarification needed. Edit to state 'achieve cleanup levels' or delete sentence: "At the end of the remedial time frame, the COC concentrations under each of the alternatives will be

reduced to levels that are protective of HHE.” Concentrations should achieve or be below cleanup levels at end of time frame. Clarify if this was intent of statement.

- p. Clarify source of proposed soil PRGs for protection of groundwater and surface water for Nitrate.