



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
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February 13, 2012

K. Mike Thompson  
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U.S. Department of Energy  
Richland Operations Office  
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Re: EPA Comments on DOE/RL-2011-47, Draft A.1 and DOE/RL-2010-99 Draft A for the 300 Area Proposed Plan and RI/FS

Dear Mr. Thompson: *Mike*

Enclosed are comments from the U.S. Environmental Protection Agency on the two documents: "Proposed Plan for the Remediation of 300-FF-1, 300-FF-2 and 300-FF-5 Operable Units" DOE/RL-2011-47, Draft A.1, and "Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units" DOE/RL-2010-99, Draft A. If you have any questions on these comments you are welcome to call me at 509-376-9884.

Sincerely,

A handwritten signature in cursive script that reads "Larry Gadbois".

Larry Gadbois  
300 Area Project Manager

Enclosures

cc: Stuart Harris, CTUIR  
Gabe Bohnee, Nez Perce Tribe  
Russell Jim, Yakama Nation  
Rick Bond, Ecology  
Jane Hedges, Ecology  
Ken Niles, ODOE  
Martin Doornbos, CHPRC  
Susan Leckband, HAB  
Jack Bell, Hanford Natural Resource Trustee Council  
Admin. Record: 300-FF-1, 300-FF-2, 300-FF-5

**EPA Comments on “Proposed Plan for the Remediation of 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units.” DOE/RL-2011-47, Draft A-1**

General Comments

1	<p>CERCLA guidance for Proposed Plans can be located at <a href="http://www.epa.gov/superfund/policy/remedy/rods/pdfs/guide_decision_documents_071999.pdf">"http://www.epa.gov/superfund/policy/remedy/rods/pdfs/guide_decision_documents_071999.pdf"</a> “The Proposed Plan briefly summarizes the alternatives studied in the detailed analysis phase of the RI/FS, highlighting the key factors that led to identifying the Preferred Alternative.” (section 1.2.5) Pages 8 to 21 in the proposed plan are good areas for extensive cuts.</p>
2	<p>The PP as drafted is hard to follow, contains a lot of unnecessary information, yet in places is missing information called for in the PP Guidance. Deleting the unnecessary information and checking the draft against the Recommended Outline and Checklist for a PP at the end of Chapter 3 in the ROD Guidance will help the PP and eventual readers.</p>
3	<p>The relationship to other RODs and actions is lacking and where provided, confusing. The relationships need to be sorted out and clearly articulated early in the PP and again in the “Scope and Role” section of the PP. Examples of these problems with this draft include:</p> <ol style="list-style-type: none"> <li>a. Clarify the relationship of this proposed action to previous remedies and which sites have already been addressed in earlier decision documents (the same 277? A subset? Different sites?) and whether this ROD confirms, updates or replaces the RODs/response actions selected previously and the basis for doing so (and it is not acceptable to say as this draft does about the 43 sites on figure 13 that “DOE assumes that the ongoing interim actions will meet the PRGs so that no further action or costs will be required under this proposed plan;”</li> <li>b. It took until the “Waste Site Summary” text on page 35 to find text explaining that this ROD documents the “No Action” decision for 122 sites – and even then it fails to clearly explain the basis and rationale for doing so;</li> <li>c. It is not clear whether the proposed RAOs are the same as or different from RAOs selected in earlier Decision Documents, and if different, whether they are replacements for or additions to the earlier RAOs.</li> <li>d. Similar problems with the PRGs: are they the same as used in previous decision docs or different? Will the CULs selected in the ROD pertain to all actions in these OUs? And so on...</li> </ol>
4	<p>The text as written in many places suggests that site characterization is not adequate to support proposal of a final remedy at this time. At a minimum, the PP needs to make it clear (if true) that the characterization is adequate to support selection of a final remedy at this time;</p>
5	<p>The NCP and ROD Guidance call for RAOs to specify contaminants and media of concern, potential exposure pathways (including at least classes of receptors, such as people), and remediation goals. The draft RAOs are not clear as to the exposure pathways, receptors of concern, and the actions to which they would apply;</p>
6	<p>The RAOs seem to be written to limit actions in soils to the top 15 feet without explanation, and then later in the document there is language suggestion soils below 15 feet could or do pose unacceptable risks. The reference to depths should be removed from the draft RAOs (focus on the objectives and protectiveness) and then later in the proposed preferred alternative the text could explain why action limited to 15 feet depth (at least in most areas) would be protective and address RAOs (if you can, given the Alternative 2 description suggest otherwise with language such as the following: “If residual contamination exceeding cleanup standards in the soil column is found below 4.6 m (15 ft), the extent of remediation may require reevaluation by the Tri-Parties. Any decision to leave contaminants that exceed cleanup standards in place below 4.6 m (15 ft) would require a change to the ROD”;</p>

7	The end of the Waste Site Summary also introduces the idea of discovering additional sites, evaluating them in an unexplained way and then selecting and implementing remedies for them without compliance with CERCLA and the NCP, appropriate documentation or opportunity for public comment, etc.
8	Text needs to be clear as to the definition of Principal Threat Waste at this Site, whether any has been addressed by early actions, whether or not the selected remedy treats PTW, and whether or not it satisfies the preference for treatment as a principal element.
9	The determination of and basis for the Reasonably Anticipated Future Land and Groundwater Use has to be documented clearly. If the answer for Land is “industrial”, then the PP also needs to explain the apparent decision to include ICs in all the alternatives to ensure land use does not change to residential or otherwise allow for unacceptable exposures and risk where the estimated risk if use were to be residential exceeds 1E-06. Otherwise the PP is lacking the basis for selecting such ICs as part of the response.
10	The Cost discussion does not include cost tables breaking out capital, annual O&M and Total present worth as called for in the Guidance.
11	The Proposed Plan does not contain sufficient information or clarity for a knowledgeable technical reviewer to replicate calculations or to audit the results for the PRGs in Table 2, in particular for soil protection of groundwater. It should be clear to the reviewer what assumptions were used for the screening levels and preliminary remediation levels (PRGs). Add the summary table that allows the reviewer to understand the assumptions that were made in the modeling and what parameters were used along with justifications. The Proposed Plan should also lead the reviewer to locations in the feasibility study for detailed information.
12	The PP does not have a plume map that delineates 300-FF-5 from 200-PO-1. Provide information that clearly delineates the boundaries of nearby groundwater operable units. The boundary w/ the 200-PO-1 is unclear in text and figures. Insert plume maps for 300-FF-5 and delineate from 200-PO-1. Improve figure 5; figure 12-14 with explanation and/or legend.
13	<p>The PP states that the RCBRA assessed the human health risks associated with exposure to residual contamination at 17 wastes sites in the 300 area where interim remedial action have been completed. The RCBRA evaluated a rural residential scenario. State in the proposed plan how the FS evaluated the risk for both human health, ecological and the river. Lead the reviewer from the PP to the appropriate location in the FS.</p> <p>Since the RCBRA has more than 200 outstanding comments and was finalized as a secondary document. The PP should state how the FS risk assessment evaluated risk for both human health and ecological protection.</p> <p>Use an infiltration rate of at least <u>50 mm/y</u> for the natural recharge cases for post remediation and long term, based on the research of Gee et.al, 2005, Vadose Zone Journal, 4:32-40 and Gee et al., 2005, Vadose Zone Journal, 4:72-78.</p> <p>Additionally, add the amount of recharge from irrigation to that of the revised base and use the total recharge for determining PRGs.</p> <p>The tank farm/ solid waste Environmental Impact Statement (EIS) uses the infiltration rate of <u>50 mm/y</u> for natural recharge for cribs and trenches without barriers. That would be appropriate for the proposed industrial use areas in this proposed plan. The unrestricted use scenario in the proposed plan and FS includes crops and gardens that have to be irrigated. It is not protective and a valid analysis to ignore the impacts to groundwater from infiltration of irrigation water transporting contaminants to the groundwater and the Columbia River.</p>

14	<p>The assumption that the site will be mature shrub-steppe in 30 years (as implied by the assumption of 4 to 8 mm/y recharge after 30 y) is invalid. Soil horizonation that returns to the pre-disturbed condition would be at least 100 years (Birkeland, P.W., 1984,) in the unrestricted use areas, and industrial use areas should be expected to remain in a disturbed condition.</p>
15	<p>The PRGs conceptual site model is invalid for the 300 Area as much of the site will not be returned to shrub-steppe. If the 300 Area will be returned to shrub-steppe, the area will not qualify for the industrial scenario criteria in WAC 173-340-745(1).</p> <p>The conceptual site model for industrial area is incorrect, because it assumes shrub-steppe coverage. In reality, an industrial area would be a mix of impervious areas (roofs and parking lots) and naturally vegetated areas or even lawns.</p> <p>The total coverage by impervious surfaces in an area, such as a municipality or a watershed is usually expressed as a percentage of the total land area. In industrial and commercial areas, coverage rises above 70 percent.</p> <p>Develop an appropriate conceptual site model (CSM) for the industrial setting land use in the 300 Area and get concurrence with the EPA.</p> <p>Infiltration rate used to calculate soil cleanup levels to protect groundwater should be increased unless drainage controls are a specific component of the ROD.</p> <p>Without specific drainage controls it's reasonable to assume that runoff from industrial area roofs and parking lots would run off and concentrate in pervious areas.</p>
16	<p>Industrial areas typically have lawns. Irrigation should be assumed in industrial core, unless the proposed plan and subsequent ROD specifically precludes it. A typical expectation for industry is to have grass around buildings. Several buildings in the industrial core portion of the 300 Area have had and some still currently have a lawn.</p>
17	<p>The 300 Area industrial core should explain that industrial land use was used to establish the proposed cleanup levels, that unstricted land use cleanup levels have also been calculated, that the interim actions have shown that often cleanup at individual waste sites that require industrial use cleanup levels have often attained unrestricted land use cleanup levels, that many of the interim action cleanup sites have attained the unrestricted land use cleanup levels proposed, and that much of the 300 Area industrial core is not contaminated from waste sites and thus meets the unrestricted land use. It is important for the reader to understand that the proposal to use industrial land use cleanup levels in the 300 Area industrial core will result in a portion of the area only being cleanup enough for industrial use, but some of the waste sites and the areas in between waste sites will meet unrestricted use.</p> <p><b>Basis:</b>  City of Richland City of Richland Comprehensive Land Use Plan.  Ordinance No. 47-05/48-05 - December 6, 2005 titled:  Reclassification of the Hanford 300 Area from Industrial and Business Research Park Designations to a Mix of Land Use Designations Including Developed and Natural Open Space, Commercial, Residential, Business Research Park and Industrial.  Ecology has previously requested inclusion of a high-density residential use in the ROD</p>

18	Under the current scenarios, Ecology finds the alternative 4 to be most cost efficient, implementable and would provide best benefit among all the options. It seems the estimated clean up time of 12 years compared to the 18 years (under alternative 3) is a more appealing and acceptable option. The proposed plan does not adequately explain the disadvantages and uncertainty of alternative 5. Modify the report to reflect the comment if other evidences and information are not available to support other alternative.
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Specific Comments:

1	Page 2, line 3	The phrase “(final closed or interim closed)” should be removed. Closure is a RCRA term, and use of these terms add to the complexity of this document.
2	Page 2, lines 5-7 and Page. 27 Page and Line	<p>Text states: “In addition, this proposed plan addresses the localized groundwater contamination from uranium, tritium, hexavalent chromium, nitrate, gross alpha, trichloroethene, and cis-1,2-dichloroethene in the 300-FF-5 OU.” The use of the word “localized” to characterize groundwater contamination in the 300 Area is problematic for several reasons. The FS report indicates the process for identifying groundwater COPCs which inappropriately screens out COPCs. For example, Figures 6-9 and 6-10 include the following decision point question: “Is analyte associated with a specific location or trend?” Due to the numerous waste sites, on-going remediation, the groundwater monitoring network configuration, the inability to re-sample (for confirmation purposes) in a timely fashion, the likely dilution of measured contaminant concentrations due to groundwater monitoring well construction, and the bias attributed to 300 Area groundwater sampling times, it is inappropriate to apply this decision point question.</p> <p>For these significant reasons, it is difficult to characterize the nature and extent of contamination. Observations of groundwater contamination that exceed action levels should not be screened out, rather, the contaminants should be subjected to the risk characterization. Until the risk associated with contaminants has been properly evaluated, the contaminants should be identified as COPCs with corresponding remedies after the risk assessment for any COCs..</p> <p>Changes: 1) re-write the sentence to state: “In addition, this proposed plan addresses the groundwater contamination caused by the following contaminants:....” and 2) add the complete list of COCs for which groundwater remediation is required, to read: “In addition, this proposed plan addresses the groundwater contamination caused by the following contaminants: uranium, tritium, nitrate, gross alpha, trichloroethene, cis-1,2-dichloroethene. The FS should explain why these contaminants were not included in the groundwater COCs for the proposed alternatives: hexavalent chromium, carbon tetrachloride, tetrachloroethene, methylene chloride, benzene, chloroform, antimony, sulfate, silver, nickel, manganese, copper, cobalt, fluoride, zinc, arsenic, bromodichloromethane, and aluminum.</p>
3	Proposed Plan Pg. 2, lines 5-7,  Pg. 27, Table 1	<p>The action level for zinc (91 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-3-20, 399-1-17C, and 399-1-17A). The basis included in the FS report (e.g., page 4-124) is insufficient to exclude zinc as a COC.</p> <p>The process for identifying groundwater COCs, or COPCs which will be evaluated for risk, inappropriately screens out COPCs. For example, Figures</p>

	and FS report	6-9 and 6-10 include the following decision point question: “Is analyte associated with a specific location or trend?”
4	Proposed Plan Page 2, lines 5-7 and Pages 27, Table 1	<p>The action level for fluoride (960 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-1-10B, 399-1-9, 399-1-56, 399-1-17B, 399-1-54, 399-1-7, 399-1-18B, 399-5-2, 399-1-17C, 399-1-18C, and 399-1-16C). The basis included in the FS report (e.g., page 4-118) is insufficient to exclude fluoride as a COC.</p> <p>The action level for cobalt (4.8 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-3-12, 399-1-16A, and 399-4-14). The action level for silver (5 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-2-5, 399-1-21A, 399-1-1, 399-3-1, 399-1-6, 399-3-18, etc.). The action level for nickel (52 µg/L) has recently and historically been exceeded in 300 Area wells (i.e., 399-1-16A, 399-1-16B, 399-1-16C, 399-1-12, 399-1-21B, 399-1-17A, 399-1-18B, 399-1-7, 399-1-14A, 399-1-6, 399-4-11, etc.). The action level for sulfate (250,000 µg/L) has recently been exceeded at well 399-1-23. ).</p> <p>The action level for copper (9 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-4-12, 399-1-17A, 399-1-9, 399-1-64, and 399-1-62).</p> <p>The action level for manganese (50 µg/L) has recently been exceeded in numerous 300 Area wells (i.e., 399-1-8, 399-6-3, 399-6-5, 399-1-16B, 399-1-16C, 399-1-21B, 399-1-56, 399-3-2, 399-3-21, 399-1-61, 399-3-22, 399-3-12, 399-1-17A, 399-4-15, 399-1-9, 399-1-57, 399-1-59, 399-1-10B, 399-1-17B, and 399-8-5C). Chloroform has recently been detected in 300 Area wells (399-4-14, 399-3-11, and 399-6-5).</p> <p>The action level for bromodichloromethane (0.27 µg/L) has recently been exceeded in 300 Area wells (i.e., 399-4-12, 399-4-14, and 399-4-1).</p> <p>The action level for antimony (5.6 µg/L) has recently and historically been exceeded in numerous 300 Area wells (i.e., 399-3-22, 399-3-9, 399-1-8, 399-4-1, 399-3-18, 399-3-10, 399-1-14B, 399-2-2, 399-1-18C, 399-1-18A, 399-8-1, 399-4-14, 399-8-5A, 399-1-17C, and 399-3-9).</p> <p>The action level for benzene (0.80 µg/L) has recently and historically been exceeded in 300 Area wells (i.e., 399-1-1, 399-1-16B, 399-8-5A, 399-4-12, and 399-1-7).</p> <p>The action level for carbon tetrachloride (1 µg/L) has recently been exceeded in numerous 300 Area wells (i.e., 399-1-64, 399-1-17B, 399-1-18B, 399-3-37, 399-1-8, 399-18A, 399-2-5, 399-3-33, 399-6-5, 399-3-34, 399-3-2, 399-3-11, and 399-3-19).</p> <p>The action level for arsenic (0.018 µg/L) has recently been exceeded in numerous 300 Area wells (i.e., 399-1-18B, 399-4-7, 399-2-2, 399-2-3, 399-2-1, 399-4-10, 399-4-12, 399-1-10A, 399-4-9, 399-3-3, 399-3-11, 399-1-1, 399-8-1, and 399-3-6).</p> <p>The action level for tetrachloroethene (0.081 µg/L) has recently and</p>

		<p>historically been exceeded in numerous 300 Area wells (i.e., 399-4-12, 399-1-6, 399-3-9, 399-1-10A, 399-3-6, 399-5-1, 399-8-5A, 399-1-2, 399-4-7, 399-5-4B, 399-1-17B, 399-1-16A, 399-1-19, 399-2-2, 399-1-17A, 399-6-2, 399-3-2, 399-3-3, and 399-4-1).</p> <p>The basis for the COPC &amp; COC additions is located in the previous comment with italicized text.</p> <p>Include fluoride, cobalt, silver, nickel, sulfate, copper, chloroform, bromodichloromethane, antimony, benzene, carbon tetrachloride, arsenic, tetrachloroethene, aluminum, methylene and chloride as groundwater contaminants for which the proposed plan addresses. In addition, cobalt, silver, nickel, and sulfate should be identified as groundwater COPCs on Table 1 (page 27).</p>
5	Proposed Plan Page 2, lines 5-7 and Page 27	<p>HEIS indicates there are no aroclor groundwater sample results since 2006.</p> <p>A cursory review of FS report characterization soil data from borehole (later completed as wells) 399-1-54, 399-1-55, and 399-1-56 indicates the following aroclor observations:</p> <p>22.8 µg/Kg aroclor-1260 399-1-55 sample# B27CV4  17.1 µg/Kg aroclor-1260 399-1-55 sample# B27CV5  21.3 µg/Kg aroclor-1260 399-1-55 sample# B27CV8  9.16 µg/Kg aroclor-1260 399-1-55 sample# B27CV7  5.53 µg/Kg aroclor-1260 399-1-55 sample# B27CW2  4.91 µg/Kg aroclor-1260 399-1-56 sample# B27K32  5.99 µg/Kg aroclor-1254 399-1-54 sample# B25C45  3.81 µg/Kg aroclor-1254 399-1-54 sample# B25C44  3.79 µg/Kg aroclor-1254 399-1-54 sample# B25C49  3.93 µg/Kg aroclor-1254 399-1-55 sample# B27CV8</p> <p>Because aroclors have been detected in borehole sediment samples (from boreholes constructed through waste sites) and groundwater samples have not been analyzed for aroclors at these locations (boreholes completed as wells), there has been insufficient confirmation that aroclors are not COCs.</p> <p>The text and/or Table 1 should explain what other data is available at these sites to justify excluding PBSs as groundwater COCs.</p>
6	Page 3	<p>“Alternative 3 – RTD and Uranium Sequestration at Waste Sites and Groundwater Monitoring” should be “Alternative 3 – RTD at Waste Sites, Uranium Sequestration in the Vadose Zone and Top of the Aquifer, ICs, and Groundwater Monitoring.” This change clarifies that RTD is for waste sites only, uranium sequestration isn’t limited to waste sites because it includes areas such as the deep vadose zone in the vicinity of (not just beneath) waste sites, uranium sequestration applies to the PRZ and top of the aquifer, and the alternative includes ICs. The same changes should be added to all the alternatives throughout the Proposed Plan and the RI/FS report.</p>
7	Page 3, lines 14-19	<p>The document states “This alternative protects human health and the environment while meeting the statutory requirements for cost effectiveness, use of permanent solutions, preference for treatment, and compliance with</p>

		Applicable or Relevant and Appropriate Requirements (ARARs).” This should be change to “This alternative protects human health and the environment while also meeting the statutory requirements for compliance with Applicable or Relevant and Appropriate Requirements (ARARs), cost effectiveness, use of permanent solutions, and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. It also satisfies the preference for treatment as a principal element.”
8	Page 4	The first bullet regarding DOE states “selecting the preferred cleanup alternative in consultation with the EPA” should be “and cooperating with EPA as EPA drafts and finalizes the ROD.” [See section 7.3.8 of the TPA.]
9	Page 4, line 12	The statement “Ecology. Washington State Department of Ecology” should be “Washington State Department of Ecology.”
10	Page 4, lines 14-18	This paragraph should be rewritten to read: “The 300 Area work has been conducted in accordance with the CERCLA remedial action decision making process (Figure 3). Completion of the RI is the first major step in the process. The RI for this project was completed in 2011 and the RI/FS Report, which documents the RI and FS, was prepared in support of this proposed plan. Interested parties may want to review the RI/FS documents for more comprehensive information. These reports and other supporting information used to evaluate alternatives and develop the preferred alternative are available online in the Hanford Site Administrative Record. The Community involvement section of the Proposed Plan indentifies the Administrative Record website and lists the locations of public information repositories.”
11	Page 4, line 19	The document states “This proposed plan presents cleanup recommendations.” This should be changed to the proposed plan “briefly describes remedial alternatives, proposes a preferred alternative, and summarizes the information relied upon to select the preferred alternative .”
12	Page 4, line 24	“After the Tri-Party agencies consider the comments received” should be “After DOE and EPA consider the comments received.”
13	Page 4, line 22	The phrase “remedial actions conducted” should be “prior and ongoing remedial actions.”
14	Page 4, line 26	The phrase “for all waste sites and groundwater in the 300 Area” should be “for 300-FF-1 vadose zone protection of groundwater from uranium, 300-FF-2, and 300-FF-5.” A global search for similar phases should be made and this change applied to those instances, such as line 19 of this page. The proposed plan and FS need to be consistent in the statements that the only part of the 300-FF-1 ROD that is proposed for a change is for uranium remediation to be protective of groundwater.
15	Page 4, lines 26-28	The sentence “The remedy decisions for each OU will be documented in a ROD (and depending on the remedy decision for the 300-FF-1 OU, a ROD amendment, since a ROD already exists for this OU)” may be more clear if written “The remedy decisions will be documented in a ROD that will supersede the existing interim action RODs for 300-FF-2 and 300-FF-5, and will be documented in a ROD amendment for 300-FF-1 since a final ROD already exists for 300-FF-1.
16	Page 4, line 29	The sentence “The ROD and the ROD Amendment, if necessary, also will contain a responsiveness summary presenting Tri-Party agency responses to comments received during the public comment period” should be “A

		responsiveness summary presenting DOE and EPA responses to significant comments, criticisms, and new relevant information received during the public comment period will be made available with the ROD and the ROD Amendment, if an amendment is necessary.” [see 40 CFR 300.430(f)(3)(i)(F)]”
17	Page 4, line 31	Beginning with this section on “Previous Investigations” are about six pages that should be shortened and moved to later sections of the proposed plan. Please use section 3.3.1 and page 3-14 of EPA’s guidance in EPA 540-R-98-031 to structure revisions.
18	Page 4, list of Previous Investigations	The way this part of the document is structured, the reader may read this list of investigations that were published until 2007, and there are no more recent investigations, such as a current RI/FS to support his proposed plan. Consider restructuring this part of the document so doesn’t stop short of the most recent work.
19	Page 6, lines 1-2	The statement “A summary of 300 Area previous investigations and findings is presented in Appendix N (Table N-1) of DOE/RL-2010-99” would be better stated “A summary of 300 Area investigations and findings prior to the RI/FS is presented in Appendix N (Table N-1) of Remedial Investigation Feasibility Study report DOE/RL-2010-99.” Consider this idea to be a global comment. Where the title or an informative short version of the title can be included that is beneficial. Often the whole title is too long and would be disruptive rather than helpful, but “RI/FS report” is a meaningful shorthand for “Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units.”
20	Page 6, line 20	The statement “In 1996, as part of the final action” should be “In 1996, the final action.” At the end of the sentence “remedies were selected for 15 waste sites” should be “remedies were selected for the 15 waste sites in the operable unit.”
21	Page 6, lines 35-37	The sentence about the O&M plan is too specific for a proposed plan. That is not important information to briefly describe the remedial alternatives and propose a preferred alternative.
22	Page 6, lines 38-42	The statement “In 2001, as part of the interim ROD for waste sites in the 300-FF-2 OU (EPA/ROD/R10-01/119), interim remedial actions were identified for the known waste sites... newly discovered sites to be remediated under the 300-FF-2 OU interim ROD, pending approval by the Tri-Party agencies” is much too detailed for inclusion in the proposed plan and should be removed. It is not necessary in order to briefly describe the remedial alternatives and propose a preferred alternative.
23	Page 6, lines 32-35	The interim action RAOs for 300-FF-5 are mentioned but not for 300-FF-1 and 300-FF-2. It would be good to include the 300-FF-1&2 RAOs. This will make it easier for the reader to compare the historic to the proposed RAOs. Note you can find the 300-FF-2 RAOs in table 4 in the 2001 ROD, and as stated in that ROD, they are consistent with 300-FF-1.
24	Page 6	This page includes a summary of the previous remedial actions. The RODs are discussed, but the subsequent changes to the RODs are not. These ROD changes should be added. Note that some of the changes are listed on page xi of the RI/FS but that list is not complete. Be sure to add the 2009 and 2011 ESDs to 300-FF-2.

25	Page 8 and 1 <sup>st</sup> half of page 9	There is a section here describing the past five year reviews. This is extra information that should be in the RI report but not in the proposed plan. It is not necessary in order to briefly describe the remedial alternatives and propose a preferred alternative. There is a list of documents in this section that was not included in the list of previous investigations on page 4-5. That is confusing. Also, among the combined list of documents in these two sections, the RCBRA for ecological risk is not listed, whereas the RCBRA for human health is listed albeit in a section on “validated ecological consequences.” This is confusing.
26	Page 9, line 20	The document uses the term “uranium sequestration” without defining what this is. The public should not be expected to know what this is. Because it is key to understanding the preferred alternative, this term should be explained.
27	Page 9, line 20	Regarding uranium sequestration pilot testing, the document states “The findings from this work are presented in this section.” Are the findings (all of them) presented or are they summarized? The proposed plan should be informative but a succinct summary.
28	Page 9 lines 24-25	The proposed plan states “immobilize uranium in the vadose zone and/or aquifer offer the potential for reducing the continued input of mobile uranium to the groundwater.” This may confuse the reader who may think the aquifer proposal is also for treatment of all the groundwater. This should be clarified.
29	Page 9, lines beginning at line 27	This discussion is much too technical for a proposed plan, but this is appropriate information for the FS.
30	Page 9, lines 39-40	The statement “the outcome of the apatite formation part of the test was limited” is vague in the context of a proposed plan for remedial alternatives. Text does not provide enough detail for the reviewer. If text is to say the “outcome . . . of the test was limited” – it should explain the limitation. Need to explain if the outcome supports or does not support using the approach in a proposed alternative.
31	Page 10	The “Uranium Sequestration Pilot Testing” section describes efforts to emplace apatite in the aquifer via a single injection well and the challenges presented by groundwater flow velocities and alkalinity. It suggests that the only remaining alternative is to target the source uranium in the vadose zone and PRZ. It would be helpful to include a sentence or two indicating why ZVI/AFO/bone char PO4 barriers that were successful at other DOE sites (ie. Fry Canyon, UT) are not presented as a remedial alternative (perhaps on p.41).
32	Page 10, line 17	The statement “should react” is not a good assessment of the studies to date. The statement should be “do react.” Also the statement “limiting further leaching” is vague. Uranium leaching is limited without any treatment. The concept of reducing leaching should be presented in the context of the alternatives evaluation for implementability.
33	General comment	Based on initial informal comments from EPA to DOE in early January on the Proposed Plan, DOE revised alternative 3 in draft A.1 to include this phrase “Injection into the PRZ will be designed to also deliver treatment to the upper portion of the groundwater.” The EPA appreciates DOE being responsive to this important remedy element request from EPA, and understands it will take the document authors some time to propagate that change throughout the 300 Area documents. The following are several examples of where this change is

		<p>needed.</p> <p>Page 10, 2<sup>nd</sup> paragraph. “the remaining alternative is to treat the uranium source in the vadose zone and in the periodically rewetted zone (PRZ)” should be something like “the remaining uranium treatment alternative is to treat the uranium source in the vadose zone, in the periodically rewetted zone (PRZ), and the top of the aquifer.”</p> <p>Page 10, 2<sup>nd</sup> paragraph. “treating the lower portion of the vadose zone and PRZ using injection wells could be deployed” should be “treating the lower portion of the vadose zone, the PRZ, and the top of the aquifer using injection wells is included in the alternatives with uranium sequestration.”</p>
34	Page 10, lines 27-31	<p>The text beginning “and placement of documents in the Administrative Record” should be changed to “and making documents available via the Administrative Record.”</p> <p>The rest of the paragraph should be removed because it is confusing. For example it mentions that annual groundwater monitoring reports as if they are an important relevant document to this proposed plan, but it isn’t included in the lists on pages 4-5 and pages 8-9.</p>
35	Page 10, lines 32-33	<p>The phrase “in conjunction with issuance of the final action ROD for the 300-FF-1 UO and the interim ROD for the 300-FF-5...interim ROD for the 300-FF-2 OU” could be written more simply as “in conjunction with the previous proposed plans for 300-FF-1, 300-FF-2, and 300-FF-5.” Later in the paragraph the phrase “Amendments to these RODs” could be written as “Proposed plans for amendments to the operable unit RODs.”</p>
36	Page 10, line 44	<p>Consider adding “Tribal Nations were invited to participate in consultation on this proposed plan.”</p>
37	Page 11 Line # 23	<p>Description of 300 Area is inconsistent: Revise text:</p> <ul style="list-style-type: none"> <li>• Line 26 should be revised to read”4 waste sites in the 400 Area”</li> <li>• 2nd bullet on pg. 11 should be modified to read “Reactor, and its support facilities, and 4 waste sites included in this Proposed Plan.”</li> </ul>
38	Page 14, lines 14-19	<p>This paragraph discusses the FFTF reactor, explains that it isn’t a contaminated facility and thus is not part of this cleanup decision. Is it true that the FFTF reactor is not contaminated? There are four waste sites in this 400 Area that ARE part of this decision and those should be mentioned here. With that change this paragraph will be like the preceding paragraphs that introduce the waste sites in their respective areas.</p>
39	Page 14 Line#14-19	<p>Text is unclear and general. Provide detail on agreements. Rather than stating “and is addressed under a separate regulatory process” be more specific and state “DOE expects to establish a milestone date for disposition of the FFTF with a change package to be submitted to the regulatory agencies by 9/30/2012, in accordance with HFFACO milestone M-085-01.</p>
40	Page 14, lines 20-28	<p>This paragraph should be removed because it is not important to the proposed plan that is supposed to briefly describe remedial alternatives, propose a preferred alternative, and summarize the information relied upon to select the preferred alternative.</p>
41	Page 14, line 22	<p>The document introduces the seldom used initialism “OSE.” It would be best to just spell out this each time it is used. Also the last four lines of this paragraph that describe the history of the orphan sites evaluation process isn’t important content for this proposed plan and could be removed.</p> <p>Page 14 begins pages of in-depth discussion of site characteristics that is</p>

		<p>appropriate for the RI but not for a proposed plan that is supposed to briefly describe remedial alternatives, propose a preferred alternative, and summarize the information relied upon to select the preferred alternative. Some examples from the second paragraph of this section are the following: “unconfined aquifer, which includes the water table.” Is use of these terms important to understanding the alternatives? If both terms are important this document should explain the difference between the unconfined aquifer and the water table. “less permeable sands and gravels of Ringold formation (unit E/C). The Ringold formation lower mud unit is the aquitard...” Is unit E/C important for the reader to understand? Also the quote starts by stating the Ringold formation is sands and gravels, but then says the Ringold formation is mud. These paragraphs including figure 7 are vastly more complicated than appropriate for a proposed plan. To understand the alternatives the reader needs to understand that the upper part of the water table is an aquifer with very high water flow. Beneath this layer of high water flow is a layer with fine grain particles with extremely low water flow, so much so it is not considered usable for a groundwater well. That sets the context for the later discussion of contaminants in these different zones and the reason behind different alternatives proposed for uranium impacting the mobile part of the aquifer vs organics in the low flow zone.</p>
42	Page 15, line 22 thru page 16	<p>This section is the nature and extent of contamination for the 300 Area Industrial Complex vadose zone. There is a first paragraph about some 300-FF-1 sites (although they aren't identified here as 300-FF-1 sites). The second paragraph is about the 300-296 site beneath the 324 building. The third paragraph is about three burial grounds, with a passing reference to the process sewer. There is not one word about all the rest of the 300-FF-2 sites. Remediation of those sites is most of the cost of the preferred alternative. In contrast there are almost four pages (17-20) on groundwater in addition to the earlier pages on uranium in groundwater. A much more balanced description is needed. For example, the remedies include water management around the Battelle occupied facilities, but there is no mention of any 300-FF-2 contamination in this section. The proposed plan is supposed to summarize the information relied upon to select the preferred alternative.</p>
43	Page 16, lines 23-25	<p>The document states “The data suggests that groundwater mounding associated with the South Process Pond (316-1) liquid waste disposal sites has stranded low levels of uranium in the deep vadose zone at locations some distance away from the point of discharge, where it may be accessible to a fluctuating water table.” The EPA supports this conclusion from the data. This is a key feature of the site conceptual model. This contaminated deep vadose zone due to the groundwater mound rather than direct leaching from the waste site doesn't appear to have been fully considered in the alternatives. To do so may suggest several changes to the alternatives.</p> <p>For sequestration to work, the phosphate needs to be delivered quickly to the uranium before the phosphate has a chance to bind with the soil/sediment. Phosphate delivered into wells at the PRZ and top of the aquifer that receive a high flow rate injection can be expected to spread quickly because we know groundwater can flow at rapid rates such as 58 feet/day. Hanford has a long experience of successfully injecting solutions into the wells, currently with injection wells as part of the pump and treat systems, and historically for</p>

		<p>waste disposal.</p> <p>In contrast to our successful experience with wells, surface infiltration tests for phosphate treatment failed because water did not infiltrate sufficiently quickly to deliver phosphate to uranium at depth before the phosphate became bound to the soil it was passing through. It is reasonable to think that there may be areas in the proposed treatment area that are more amenable to infiltration than the previous test site. Such pervious areas would benefit from phosphate infiltration. But we don't have evidence that this would be a reliable part of the remedy. Therefore the remedies including surface infiltration of phosphate need to be clear that that is supplemental to injection of uranium into the PRZ and top of the aquifer.</p> <p>Surface application of a phosphate solution is very inexpensive compared to installing a high density of wells and injecting phosphate in the wells. Thus in those areas amenable to infiltration, surface application provides some treatment benefit of uranium that could otherwise reach the groundwater in future years. From a cost benefit point of view EPA supports keeping surface infiltration as part of the sequestration alternatives. Any area receiving surface infiltration will also require a PRZ plus top of aquifer treatment zone beneath these areas that will sequester any uranium that would move into this zone as a result of the surface water application.</p>
44	Figure 17	<p>Alternative 3 shows a much larger area for surface phosphate application compared to a small area with PRZ injection. The PRZ injection area needs to be at least as large as the surface infiltration area to catch and sequester any uranium that is flushed from the vadose zone due to the infiltration part of the remedy. Considering the historical lateral groundwater mound of uranium now in the more distant PRZ discussed on lines 23-25 of page 16, (and in much more depth in chapter 4 of the RI/FS), the grey zone should be the PRZ injection area. In addition to the targeted PRZ injection area, phosphate will slosh laterally with groundwater motion and thus there will be some amount of uranium treatment of adjacent areas. There is no way to quantify that benefit with existing information but it is a positive feature alternatives 3 and 4 have that alternative 5 (just digging, no sequestration treatment of uranium) does not.</p>
45	Page 17 Line s 1 -11	<p>Last sentence defers some contaminants to 200-PO-1 which is not shown. This paragraph needs to refer to a figure or definition of the boundary between 300-FF-5 and 200-PO-1.</p>
46	Page 17, line 6	<p>Where the document states "constituents that affect groundwater," it should use the term "contaminants." The reader may not know what a constituent is.</p>
47	Page 17, line 16	<p>The document states that "uranium concentration in the vicinity of the 300 Area range between the natural background concentration of 8 ug/L up to approximately 200 ug/l" should be "uranium concentration in 300 Area groundwater wells and river bed aquifer tubes range between the natural background concentration of 8 ug/L up to approximately 200 ug/l." Note that the general statement "in the vicinity of the 300 Area" includes groundwater water, river water, and porewater.</p>
48	Page 17, line 26	<p>The phrase "is suspected" suggests an inadequate RI.</p>
49	Page 17, lines 32-34	<p>The text says that the discharge of groundwater to the Columbia River is small compared to the flow of the river. Quantify the discharge and its significance. Please note that in spite of the small discharges, we see</p>

		contamination at the aquifer tubes and other down gradient locations adjacent to the 300 areas.
50	Page 17, line 39	The phrase “water quality that would be of concern to downstream users” should be “water quality for downstream users.”
51	Page 18, lines 1-11 Page 41, lines 22-23 Page 45, lines 15-45 and elsewhere Throughout the text	The text does not acknowledge all waste constituent indicators of contamination. The list of waste constituents that have recently exceeded action levels in the 300 Area include: uranium, tritium, hexavalent chromium, nitrate, gross alpha, trichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, tetrachloroethene, benzene, chloroform, antimony, sulfate, silver, nickel, manganese, copper, cobalt, fluoride, zinc, arsenic, bromodichloromethane, and aluminum. Include the omitted waste constituents here and throughout the text. Recommended wording: “In groundwater beneath the 300 Area, uranium, tritium, hexavalent chromium, nitrate, gross alpha, trichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, tetrachloroethene, benzene, chloroform, antimony, sulfate, silver, nickel, manganese, copper, cobalt, fluoride, zinc, arsenic, bromodichloromethane, and aluminum are waste effluent indicators that still persist in the unconfined aquifer.”
52	Page 18 lines 18-19	Recently, an anomalous elevated uranium result in groundwater from 399-1-17A collected in June, 2011 was reported by WA Dept. of Health. The anomalous result 2200 pCi/L is two orders of magnitude above typical activities which are around 60 pCi/L. Although USDOE is still looking into the anomalous result, the current thinking is that the uranium was remobilized by water used for dust suppression during cleanup of the 618-7 burial ground. Apparently, a small spike in uranium in earlier samples (about 150 pCi/L) was reported in the 2010 groundwater report with the following: “A relatively new area of uranium contamination in groundwater developed in early 2008 immediately downgradient from the former 618-7 Burial Ground. The contaminant plume is related to remediation activities conducted during 2007 and 2008 at the burial ground. Higher-than-expected uranium concentrations were first observed in January 2008, along with increased concentrations of chromium and constituents associated with soil fixative material (calcium and chloride). The impact to groundwater is likely the result of infiltration of dust-control water and soil fixatives during remedial action at the burial ground. By the end of 2010, concentrations at nearby downgradient wells continued to decrease, indicating passage of the contaminant plume (Figure gwf10210). New monitoring wells 399-6-3 and 399-6-5, which were installed during late 2010, will provide increased coverage of the downgradient migration of this plume.” The text does not acknowledge the conceptual site model of water/liquid infiltration mobilizing 300 Area contaminants. Include a description of the recent elevated uranium result in groundwater from well 399-1-17A. Also, include a description of an additional conceptual site model whereby water/liquid infiltration mobilizes 300 Area contaminants.
53	page 18, lines 12-31 FS Report Pages 4-100 through	The 2010 groundwater annual report identifies groundwater sample collection can affect the uranium concentration by the following: “As suggested by the rapid changes in groundwater concentrations that may be the result of changes in water table elevation and river stage, it is apparent that the timing of groundwater sample collection plays a significant role in

	4-104	<p>determining the uranium concentration for the sample. Thus, concentration patterns shown in groundwater plume maps contain bias in regard to representing aquifer conditions. Bias is also introduced by the different construction features of the various monitoring wells and aquifer tubes that make up the groundwater monitoring network. This bias was evident in recent monitoring results at the polyphosphate treatability test site, which is located at the southern end of the former 300 Area Process Trenches. Significantly higher concentrations of uranium were measured in samples from wells with 0.6-meter screens located in the uppermost portion of the aquifer than in samples from wells with typical 5-meter screens (“River-Induced Wellbore Flow Dynamics in Long-Screen Wells and Their Impact on Aqueous Sampling Results” [Vermeul et al., 2010]). An understanding of bias in monitoring data is important when (1) describing uncertainties associated with the conceptual site model, and (2) establishing criteria for remedial action performance evaluation and subsequent compliance monitoring.”</p> <p>Include an identification and corresponding explanation in the PP and FS report texts that groundwater plume maps contain bias in regard to representing aquifer conditions and that the bias is attributed to several factors (i.e., sampling timing and well construction). In addition, it is requested that the published article by Vermeul (River-Induced flow Dynamics in Long-Screen Wells and Impact on Aqueous Samples) be included in the administrative record and referenced in the FS with a discussion of relevance to the uncertainty of contaminant concentrations due to bias.</p>
54	Page 18 lines 26-28	<p>The text states: “Input of uranium from the lower portion of the vadose zone is suspected to continue at several locations, as revealed by relatively higher concentrations during high water table conditions in June.” As evidenced by Figure 9 (on pages 18 and 19 of the proposed plan), the uranium plume (groundwater concentrations greater than 30 µg/L) underlies a sizeable portion of the 300 Area. To characterize vadose zone contamination input as occurring “at several locations” can be misleading. A better metric may be to describe the total potential “input” in terms of area (i.e., square feet/meters) where “input” is calculated by summing areas where uranium has been disposed and/or managed (e.g., 316-1, 316-2, 316-3, 316-5, 681-7 Burial Ground, 618-2 Burial Ground, 618-4 Burial Ground, 618-5 Burial Ground, Sanitary Leach Trenches, and Treated Effluent Disposal Facility). Re-write the sentence to describe locations/areas of uranium “input” in a more definitive manner.</p>
55	Page 18, lines 41-42	<p>The text states: “The 10 subsurface regions, and the estimate for the inventory in each region, are shown on Figure 10.” The 10 subsurface regions are not shown on Figure 10 (page 20 of the proposed plan), but rather an estimated uranium inventory in 4 subsurface zones and the unconfined aquifer. Re-write the sentence to accurately describe Figure 10.</p>
56	Page 19, lines 4-7	<p>The text identified “key assumptions” of the inventory estimates. We have plenty of data where the inventory of uranium exists because we are moving forward with actual remediation at sites. Remove the concept of “assumption” and provide the actual facts based on the field observation and other available data.</p>
57	Page 19, lines 12-14	<p>The document states “The occurrence poses little threat of exposure, in that the sediment is not conducive to development as a water supply, nor is the</p>

		hydrologic unit incised by the Columbia River.” Figure 10 indicates there is too much uncertainty to make the claim that the hydrologic unit is not incised by the Columbia River.
58	Figures 9	This is an informative time series of groundwater plumes for uranium. In contrast there is no plume map for the other contaminants discussed. Other contaminant plume maps should be added.
59	Proposed Plan Page 20, lines 8-12  FS Report Pages 2-4, Table 2-1, Pg. 2-6, Table 2-1, and Page 2-17 Lines 2-32	<p>The text discusses data gap #4 (“The source is unknown for the original VOC(s) that have degraded to cis-1,2-DCE near well 399-1-16B, and there is the possibility that DNAPL remains undetected.”) and indicates a computer simulation of a tetrachloroethene release was conducted. The text also indicates a pump test of well 399-1-16B was not conducted. Furthermore, the text explains that it was determined that analysis of groundwater samples regarding microbes was not performed. Both the text and Table 2-1 conclude no data gaps remain stating: “While no evidence for a DNAPL remaining in saturated Hanford gravels is present currently (much higher concentrations of dissolved VOC would be seen in routine groundwater monitoring results), the rapid groundwater movement in the upper unconfined aquifer would likely have transported any such pool away from the secondary source area during the decades since release to the environment.”</p> <p>The text does not acknowledge alternative conceptual site model considerations. Furthermore, Table 2-1 inaccurately indicates data gap #4 was filled. Specifically, the explanation relies on rapid groundwater movement in the upper unconfined aquifer and does not address the conceptual site model that a chlorinated hydrocarbon plume exists at/near the bottom of the unconfined aquifer.</p> <p>Furthermore, the text does not acknowledge the 1,2-dichloroethene groundwater detections (of samples collected during the FS report characterization) at well 399-1-55 (borehole located closest to the head of the 300 Area Process trench).</p> <p>Requested changes: 1) change FS Report Table 2-1, page 2-4 to indicate the data gap has not been filled, 2) change FS Report Table 2-1, page 2-6 to indicate the data gap has not been filled, 3) acknowledge (in text on PP page 19 and FS Report page 2-17) the persistence of chlorinated hydrocarbon contamination in well 399-1-16B indicates the presence of a DNAPL plume near the bottom of the aquifer in the vicinity of the 300 APT and that conditions in the lower portion of the aquifer are highly reducing and groundwater flow rates near the bottom of the aquifer are probably relatively slow, 4) acknowledge (in text on PP page 19 and FS Report page 2-17) that the following conceptual site model considerations require additional characterization: a) The concentration of cis-1,2-dichloroethene observed in well 399-1-16B is well below its solubility limit. This may be a result of mixing along the flow path; however, a more likely explanation is that 399-1-16B does not lie on the plume axis and that higher concentrations exist in the vicinity. b) Discuss the organic degradation information and its completeness relative to degradation into vinyl chloride which has a lower solubility and much lower MCL. Degradation to vinyl chloride would result in contamination that has a longer life and that will be much more toxic. In</p>

		<p>addition, it is uncertain to what degree the cis-1,2-dichloroethene passing well 399-1-16B is degrading to vinyl chloride before it reaches the river. C) Contaminants migrating along the bottom of the aquifer will reach the river well off shore, where the river bed intersects the Ringold lower mud. This contamination will not be detected by monitoring the top of the aquifer along the river shore, and 5) acknowledge (in text on PP page 19 and FS Report page 2-17) the detections of 1,2-dichloroethene at well 399-1-55 during the FS report characterization.</p>
60	Page 20 lines 9-11	<p>The text states: “Cis-1,2-dichloroethene, a degradation product of TCE and tetrachloroethene, is present in the lower portion of the unconfined aquifer at a single monitoring well.” According to HEIS, cis-1,2-dichloroethylene has recently been detected at the following wells: 399-1-6, 399-6-5, 399-2-2, 399-2-32, 399-1-57, 399-3-34, and 399-1-55. <u>According to HWIS, all wells except 399-1-57 and 399-1-17B are screened at or near the top of the unconfined aquifer.</u></p> <p>Re-write the sentence to identify cis-1,2-dichloroethene has been detected <u>throughout the unconfined aquifer.</u></p>
61	Proposed Plan Page 20 Lines 13-14 FS Report Pages 2-4, Table 2-1 FS Report Pages 2-6, Table 2-1	<p>The PP states: “The occurrence poses little threat of exposure, in the sediment is not conducive to development as a water supply, nor is the hydrologic unit incised by the Columbia River channel.”</p> <p>WAC 173-340-720 defines potable groundwater. At this time, Ecology believes the groundwater meets the definition of potable groundwater for the following reasons: 1) the groundwater may be a potential future source of drinking water due to yield (note: pg. 2-4 of the FS report indicates a pump test of well 399-1-16B has not been conducted), 2) the groundwater is not situated at a great depth or location that makes recovery of water for drinking water purposes technically impossible, and 3) Ecology has not determined that hazardous substances will not be transported from the contaminated groundwater to groundwater that is a current or potential future source of drinking water.</p> <p>The FS and proposed plan discuss the low water yield of this unit in a qualitative sense. Quantitative data that is available should be stated, or explain why such data hasn’t been or can’t be obtained.</p> <p>Ecology believes several changes should be made: 1) On page 19, lines 12-14 of the PP, delete: “The occurrence poses little threat of exposure, in the sediment is not conducive to development as a water supply”, and 2) On page 2-6 of the FS Report delete: “(i.e., very low potential for use as a water supply aquifer, especially considering the nearby availability of more productive hydrologic units for supplying groundwater.</p>
62	Page 20 Lines 13-14	<p>The PP states: “The occurrence poses little threat of exposure, in the sediment is not conducive to development as a water supply, nor is the hydrologic unit incised by the Columbia River channel.” Although the hydrologic unit is not incised by the Columbia River channel, contaminants migrating along the bottom of the aquifer will reach the river (where the river bed intersects the Ringold lower mud – likely well off shore).</p> <p>Requested change: either delete: “nor is the hydrologic unit incised by the Columbia River channel” or indicate that contaminants migrating along the bottom of the aquifer will reach the river (where the river bed intersects the Ringold lower mud – likely well off shore).</p>

63	Page 21, Scope and Role section	This is an extremely short section in the proposed plan because most of the information that should be in this section is missing. See EPA 540-R-98-031.
64	Page 21, Figure 10	The uppermost delineation of the “finer-grained interval (very low permeability) should be extended with a dashed line (interspersed question marks) to show that it very likely intersects the river bed.
65	Page 21, Lines 3-11  FS Report Pages 2-6, Table 2-1	The PP states: “The likelihood of future consideration as a water supply for this area of the aquifer is very low due to the low water yield. The sediment interval is incised by the Columbia River channel, but given the low permeability, release to the river would be exceedingly slow.” Requested changes: 1) delete: “The likelihood of future consideration as a water supply for this area of the aquifer is very low due to the low water yield” and 2) change text to read: “The sediment interval is incised by the Columbia River channel and, releases to the river are expected to be occurring.”
66	Page 21, lines 7-8	Regarding groundwater below 618-11 the document states “Nitrate also exceeds its DWS near this burial ground, which is also impacted by upgradient sources.” The phrase “ <b>also</b> impacted” suggests both upgradient and 618-11 sources. Are there 618-11 sources? The 200-PO-1 OU decision is scoped to address the broad nitrate plume in this area that came from the 200 Area. If there is a 618-11 source that causes a DWS violation, then the 300 Area decision is responsible for the remedy for that nitrate. It is not clear in the existing sentence if there are multiple sources, and it is not clear which decision document will determine the remedial action.
67	Page 21 Lines 9-13	This section needs more explanation. It seems inconsistent to state that there are plumes in this area, then to conclude that waste sites in the 300-FF-2 are not contributing to the contamination.
68	Page 21, line 36	The phrase “the integrated decision may include an amendment to the 300-FF-1 OU ROD and final actions for the 300-FF-2 and 300-FF-5 OUs” should be changed to “the integrated decision may include an amendment to the existing 300-FF-1 OU ROD and a new ROD for the 300-FF-2 and 300-FF-5 OUs that will supersede the existing interim ROD.”
69	Page 22	The section “Principal Threat Wastes” should be moved up a page for inclusion as the last part of the site characteristics section. [See guidance section 3.3.3]
70	Page 22. Lines 1-8	This text does not accurately represent principal threat wastes. It does not state verbatim what is in the guidance (Superfund Publication: 9380.3-06FS) or state what is in the more recent guidance on writing PP etc. (EPA 540-R-98-031).  In the Superfund Publication: 9380.3-06FS it states that No “threshold level” of toxicity /risk has been established to equate to “principal threat waste.” However, where toxicity and mobility of source material combine to pose a potential risk of 10 <sup>-3</sup> or greater, generally treatment alternatives should be evaluated.  The text as written in the PP is not accurate. Rewrite the text to state verbatim what is in the guidance. See below: Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would

		<p>present a significant risk to human health or the environment should exposure occur. They include liquids and other highly mobile materials (e.g., solvents) or materials having high concentrations of toxic compounds. No “threshold level” of toxicity/risk has been established to equate to “principal threat”. However, where toxicity and mobility of source materials combine to pose a potential risk of <math>10^{-3}</math> or greater, generally treatment alternatives should be evaluated.</p>
71	Page 22, second paragraph of Principal Threat Waste	<p>There is extra content that distracts the reader from what is important. In particular the first four-and-a-half lines can be removed. The paragraph could begin “Waste containing long-lived transuranic radionuclides were placed...” Missing from this discussion is that waste from parts of the 618-10 and 618-11 burial ground are planned for treatment under the interim actions (VPU treatment, bottles of liquid at 618-10) and this should be identified in the alternatives including the proposed alternative. So stating that this waste will be shipped to WIPP without treatment is not what is planned for the interim actions and EPA didn’t think that was what DOE had in mind for the final action. Again, the description of the alternatives should be revised. Note too that the proposed plan contains a “Summary of the Remedial Alternatives” (guidance section 3.3.7) but much more description should be in the FS. Finally, the last sentence of this paragraph should be removed “With the exception of...”</p>
72	Page 22, line 7	<p>The Proposed Plan mentions that for principal threat waste, EPA guidance states that “treatment alternatives should be identified.” In this Proposed Plan no treatment alternatives are identified, other than generic RTD without any specific reference to treatment of the principal threat waste, or a citation to the appropriate portion of the FS. Note that a remediation plan including treatment for the high dose soil in 300-296 is available. Also there are treatment plans for some of the waste streams from 618-10 available as part of the ongoing interim action. Inclusion of those will partially address this clause in the EPA guidance.</p>
73	Page 22, paragraph starting on line 21	<p>This paragraph should be rewritten extensively. Consider this rewrite: Soil in the 300-296 waste site beneath the 324 building is a principal threat waste due to high radioactivity. The RTD component of the alternatives will treat the soil by mixing it with grout to reduce the dose rate and make it less likely to become airborne. This reduces the toxicity and mobility.</p>
74	Page 22, starting on line 28	<p>This is the beginning of the section titled “Summary of Site Risks.” This section begins with the statement “This section of the proposed plan provides information on the 300 Area land and groundwater use.” In contrast, the proposed plan guidance for this section states “The human health and ecological risks posed by the site determine whether or not a remedial action is warranted. This section of the Proposed Plan should briefly summarize information in the baseline risk assessment to describe the nature and extent of the risks posed to human health and the environment by the contamination at the site. This discussion should be broken into the following two subsections: (1) human health risks, and (2) ecological risks.” This part of the proposed plan should be rewritten to follow guidance.</p> <p>Page 22, line 33. The phrase “in this CERCLA decision document” is confusing because it appears the phrase is referring to the proposed plan that is not a decision document. This entire paragraph with the associated bullets</p>

		can be removed as unnecessary. Table 4 describes the waste sites that are included plus affected groundwater is included. Anything that isn't listed isn't included in the proposed plan.
75	Page 23 lines 5-12 should be removed	<p>This paragraph is misleading to the reader. It states that under 50 USC 2582 DOE holds express statutory authority to establish future land use for the Hanford Site. It is true that DOE is directed to develop future land use plans, but there are conditions built into that direction that DOE has failed to recognize in documents such as this Proposed Plan.</p> <p>50USC2582 states “Nothing in this section, or in a future use plan developed under this section with respect to a defense nuclear facility, shall be construed as requiring any modification to a future use plan with respect to a defense nuclear facility that was developed before September 23, 1996.” In fact DOE helped fund and participated in the Future Sites Uses Working Group in 1992. 50USC2582 also states “Nothing in this section may be construed to affect statutory requirements for an environmental restoration or waste management activity or project or to modify or otherwise affect applicable statutory or regulatory environmental restoration and waste management requirements, including substantive standards intended to protect public health and the environment, nor shall anything in this section be construed to preempt or impair any local land use planning or zoning authority or State authority.” The city of Richland is a local zoning authority and the city has a land use plan for the 300 Area Industrial Complex. Note that as stated in 50USC2582 DOE's land use activities DO NOT preempt or impair Richland's land use planning authority. CERCLA contains the statutory requirements for the environmental restoration for this project. This Proposed Plan is a CERCLA document. The guiding document for land use planning in CERCLA actions is “Land Use in the CERCLA Remedy Selection Process”, EPA OSWER Directive 9355.7-04.</p>
76	Page 23, lines 9-10	<p>Describing the CLUP this Proposed Plan states “This process was conducted in coordination with nine cooperating government agencies and resulted in...” That suggests the cooperating agencies supported the resulting ROD. To not mislead the reader, this Proposed Plan should have stated that every one of the nine cooperating agencies did not support the land use plan that DOE selected.</p> <p>EPA's preference, like we have expressed many time for many years on many documents, is that DOE remove misleading discussions of the CLUP. If this Proposed Plan were to identify the existence of the CLUP but not include a leading statement about the supremacy of the CLUP over other land use planning processes, that would be acceptable. This Proposed Plan states that “DOE involved Tribal Nations, and stakeholders” which is true but the rest of the sentence should be that all these participants have collectively denounced the CLUP and associated NEPA ROD. If DOE would stop presenting the CLUP in such a manner, then EPA wouldn't be compelled to write comments such as this one, and remind DOE what is stated in 50USC2582.</p> <p>The CERCLA process in accordance with guidance considers many factors in determining reasonably anticipated future site use. One of those inputs is federal facility land use plans. But CERCLA guidance requires us to consider much more than just the CLUP.</p>
77	Page 23 lines 24-25	The following phrase should be struck. “and land use considerations, such as consistency with the Hanford Comprehensive Land Use Plan.” If DOE is

		adamant about keeping this reference to a non-CERCLA document, then please add a reference to the CERCLA document for this topic that guides this CERCLA proposed plan. The document is “Land Use in the CERCLA Remedy Selection Process”, EPA OSWER Directive 9355.7-04.
78	Page 25, lines 9-10	This paragraph explains that the RCBRA evaluated a rural residential exposure. On these lines it states “The RCBRA determined that for hypothetical receptors” which appears to be referring to multiple receptors. It would be more clear to state “The RCBRA determined that for rural residential exposure.”
79	General comment	MTCA describes its scenario and cleanup levels as “unrestricted.” That is the scenario basis for the cleanup levels for chemicals in the non-industrial areas. In the interim action RODs and the large number of cleanup verification packages for waste sites, the standard statement is unrestricted use as bounded by a rural residential farmer scenario. It would be good to explain this to the reader early in the Proposed Plan and thereafter refer to either unrestricted or industrial. EPA’s 5-year review guidance uses the term “unrestricted use unrestricted exposure” so the suggestion in this comment is also consistent with the 5-year review term. The EPA risk assessment guidance generally considers a rural residential scenario, as done at Hanford, as a bounding scenario for unrestricted use. So again “unrestricted use” is an appropriate catch-all term.
80	Page 25	There is a summary of what the RCBRA determined for the 300 Area. There is no comparable summary for the Columbia River Component. This additional information should be added.
81	Page 25 last paragraph and page 27 section titled “Who are the potentially exposed populations...”	There are a few changes that would improve this section. This Proposed Plan identifies two sets of cleanup levels that were obtained from two exposure scenarios; unrestricted (MTCA’s scenario for chemicals and rural residential for radionuclides), and industrial. Those are the two scenarios worth explaining in a little more depth. Who believes what about land use doesn’t need to be brought up. There are no 300 Area waste sites within the monument so that isn’t relevant. The paragraph on page 25 could be rewritten as the following: “Exposure to contamination in the 300 Area is currently controlled via ICs and DOE’s site controls to prevent unacceptable exposure to humans. For purposes of assessing future potential risk various land use and human exposure scenarios were evaluated in the RI/FS Report’s risk assessment evaluation. From those scenarios, two were selected on which to develop PRGs and for evaluation of alternatives. The two selected land use human exposure scenarios were industrial, and unrestricted. Unrestricted has two scenarios. For chemicals, the unrestricted use scenario is from the State’s Model Toxics Control Act (MTCA). For radionuclides a rural residential family farm scenario was used to develop PRGs.” The scenario descriptions on page 27 should be revised. The Residential Scenario should be modified to point out that it was used to identify PRGs for radionuclides, and is a 30 year scenario. A new unrestricted scenario description should be added and include the statement that it is based on the State’s MTCA, is a 6 year child scenario, it does not include consumption of home-grown foods, and is used to identify PRGs for chemicals. The industrial scenario description is OK. The monument worker and recreational worker

		descriptions should be removed since they were not the basis for PRGs, or evaluation of remedial alternatives. The proposed plan is supposed to summarize the information relied upon to select the preferred alternative so the extra scenarios are distracting. It would be best to direct the reader to the appropriate section of the RI/FS document for more risk assessment information.
82	Page 26, table 1 and page 32 table 2	Asbestos needs to be added to these tables.
83	Page 26, table 1	<p>There is an end note that states “Bold indicates the contaminants that have been identified in the human health and ecological risk assessment evaluations and/or the fate and transport evaluations for the vadose zone and groundwater.” The term “identified” is used but its meaning is not explained. Does this mean “detected” or “quantified” in sample data, or does this mean a risk threshold was exceeded? Many of the metals listed are always detected and quantified because they are part of the earth’s crust. Most metals are not presented in bold text in this table. So does bold mean quantified above risk thresholds? Table 7-8 in the RI report lists other metals in the 300 Area that are not bold text in this Proposed Plan table 1. The meaning of the bold text is elusive to the reader. Arsenic is not presented in bold text, but even background concentrations are above risk thresholds, so again the meaning of bold text is elusive. Since the purpose of this table is to present the COPCs, it isn’t clear how bold or not bold affects being a COPC.</p> <p>Some of the COPCs listed are marked with a double asterisk that is defined as “Contaminants detected in groundwater that will be included in the Site-wide groundwater monitoring program.” This document is a proposed plan for public comment, not a statement of what will be done. This document can propose a sitewide groundwater monitoring as an element of the alternatives. That proposed part of the alternatives can include a list of contaminants and it should identify what the trigger will be for removal of the contaminant from mandatory monitoring.</p> <p>Some of the contaminants are marked with a single asterisk that is defined as the groundwater COPC. Several key 300 Area groundwater contaminants are not marked such as Uranium-233/234, Uranium-235, and Uranium-238. These should be noted as groundwater COCs.</p>
84	Page 27, Table 1	It appears the list of COPCs was taken from Table 8-3 in DOE/RL-2010-99. A comparison of tables indicates the following omissions: total PCBs, benzo(a)pyrene, and xylenes Requested changes: 1) for clarity, indicate the source is also from Tables 4-3, 4-4, and 4-5 in DOE/RL-2009-30, Revision 0, and 2) address the omission of benzo(a)pyrene and xylene.
85	Page 27, line 12	<p>The phrase “on a remediated waste site” should be changed to “on a waste site.”</p> <p>Page 27 lines 30-33. The sentences “Groundwater is currently....to beneficial uses.” These couple sentences are not relevant to the risk assessment.</p>
86	Page 27, lines 40 and 42	This paragraph uses some technical terms such as “desorption” and “equilibrium and kinetic sorption models” that should be avoided in a general public document such as this.
87	Page 27, line 38	The word “supports” in this line is confusing. Does “supports” mean that it was a sufficient evaluation to support a preferred alternative? Or is that

		statement meant to say that the risk assessment concluded that there was a risk above thresholds, i.e. there is need for a remedial action? This should be clarified.
88	Page 28, lines 7-15	These statements about statistical thresholds should be removed as this is not necessary to briefly describe remedial alternatives, propose a preferred alternative, and summarize the information relied upon to select the preferred alternative.
89	Page 28, lines 14-15	The statement “The methods to determine when groundwater cleanup levels for chemical and radionuclide contaminants are met will be documented in the ROD” should be removed. That is much too detailed for a proposed plan. Also defining the statistical test to use for this process is appropriate for the RD/RA Work Plan.” That is the appropriate place for that level of detail. Also EPA is working on national policy on just this topic but it likely won’t be done in time for the ROD but should be available when writing the Work Plan.
90	Page 28, line 23	The first paragraph begins “The RI/FS risk evaluation included the human health risks for the residential, industrial, residential monument worker, and casual recreational user exposure scenarios.” This should be rewritten as “The RI/FS risk evaluation included the human health risks for the unrestricted, industrial, residential monument worker, and casual recreational user exposure scenarios.” The next sentence “Additionally...” is too detailed for a proposed plan and should be replaced with “The results of the unrestricted and industrial scenario risk assessments are briefly summarized. Additional risk assessment information is contained in chapters ___ of the RI report.”
91	Page 28, line 30	The phrase “at four remediated waste sites” should be changed to “at four previously remediated waste sites.” As a general comment it would be good to do a global search and clearly distinguish “previously” vs “to be” remediated waste sites.
92	Page 28, line 44	The document states “These results indicate the need for controls to limit the potential for future exposure by restricting deep soil excavation and drilling activities within defined areas.” The section is supposed to be summarizing risk assessment results, not presenting a pre-set remedy. Instead this sentence should state – if it is true -- that the risk assessment identified unacceptable risk and therefore remedial alternatives were evaluated in the FS.
93	Page 29, first full paragraph	Irrigation topic: This paragraph presents results based on groundwater protection using no irrigation. Page 27 of this Proposed Plan points out that the resident scenario includes consumption of crops raised in a backyard garden and consumption of meat (beef and poultry) and milk raised on the pasture. In this climate such food production only happens with irrigation. A rural residential scenario including irrigation has been used as a basis for Hanford cleanup decisions and actions in the river corridor since the mid 1990s. The 300 Area Work Plan for this RI/FS effort included irrigation in the groundwater protection PRGs. See for example the SAP DOE/RL-2009-45 Table 2-2 that gives a groundwater protection PRG of 53 mg/kg for uranium. This irrigation based PRG of 53 mg/kg in this DOE & EPA approved RI/FS Work Plan SAP from April 2010 is in contrast to the non-irrigation 117 mg/kg PRG in this document. It would not be protective to ignore the impacts of irrigation water transport of waste site contamination into the groundwater when setting cleanup levels for waste sites. Industrial use areas may have

		<p>patches of irrigation unless specifically restricted in ICs specified in the ROD. Areas without irrigation can have an elevated infiltration rate of natural precipitation due to such things as gravel roads and parking lots, and paved roads draining onto gravel shoulders. Separate groundwater protection PRGs are necessary for the industrial and unrestricted use areas.</p>
94	Page 29, first full paragraph – Industrial Land use infiltration topic	<p>This Proposed Plan presents future industrial land use as the planning basis for PRGs in the industrialized core 300 Area as well as 618-11. EPA supports that proposal for public comment. The FS document describes the surface vegetation and associated infiltration rate assumptions DOE used to develop the groundwater protection PRGs for industrial areas. Industrial land use is what is going on today. For decades the industrial land use has been mostly gravel cover plus paved roads draining onto gravel shoulders. Such industrial use results in conditions for a relatively high infiltration rate of natural precipitation. This is shown as "Period 1" in table 5-4 of the FS, which matches the 1944-2010 column in table 5-3 of the FS. Those would be appropriate assumptions for future periods in the industrial land use areas. In contrast page 2-20 and nearby pages discuss future return of these areas to natural shrub steppe vegetation -- which is not consistent with industrial land use. Modeling groundwater impacts into the future should be consistent with the past few decades in the industrial areas. It is inconsistent and thus not appropriate to use the industrial scenario-derived surface direct exposure (relatively contaminated) cleanup numbers, IN ADDITION TO the minimal infiltration-derived groundwater protection cleanup numbers. It is true that the industrial scenario does not include irrigation but in contrast it does not have the high evapotranspiration rate of a shrub steppe habitat. When the groundwater protection PRGs are recalculated using irrigation for the unrestricted areas, and high infiltration of natural precipitation for the industrial areas, the corresponding parts of this Proposed Plan plus RI/FS report need to be changed.</p>
95	Page 29 Line# 6-7	<p>The statement that: “The groundwater PRG for uranium is calculated to be 117ug/g and is applicable to waste sites where groundwater contamination does not exist currently”, does not give enough information to explain the conclusion. First, it appears the statement is speaking to a groundwater “<u>protection</u>” value as the ug/g is a soil metric. Since no further harm should be done to the groundwater, state how the PRG takes into account the contamination that is already in the aquifer. Rewrite the text and explain to the reader how the groundwater “protection value” is used to determine groundwater PRG in context to the 5 sites or lead the reader to the location in the FS where this is explained.</p>
96	Page 29, line 12	<p>The sentence “The remedial approaches for the contaminants at these waste sites are developed for each alternative and presented in the Remedial Alternatives section of this proposed plan” should be changed to “The remedial alternatives for these waste sites are presented in the Remedial Alternatives section of this proposed plan.”</p>
97	Page 29, line 16	<p>The document states “two primary plumes” and draft A of this document presents the first plume, and shortly thereafter the second plume. In draft A.1 an organic/chromium/nitrate discussion – a good addition – was added but it disrupts the “first this...second that” structure. Consider removing the “first plume” and “second plume” statements.</p>

98	Page 29, line 21-22	The document states “The HI for groundwater noncancer COPCs is 2.4, which is greater than the EPA and WAC 173-340 target HI of 1.” This may be the first use of the hazard index and it deserves an explanation that is more than just spelling out the initialism. For a public document it may be better to remove this technical risk content and just explain it meets state and federal cancer risk limits but exceeds state and federal non-cancer toxic standards by a factor of 2.4. This general simplification discussion applies to the first paragraph on page 30 for the “second” plume, which again appears to be a collective discussion of multiple plumes.
99	Page 29 Line# 23	The groundwater point of compliance is through-out the site. The statement that contaminants occur to a limited extent and come from off-site sources is not a regulatory basis for exclusion from the remedy. The PP needs a basis for stating that contamination is from off-site sources. The contaminants must be address in the remedy. The FS should evaluate “point of use treatment” as a remedy component for the contaminants with a limited areal extent. It should be a very cost-effective alternative.
100	Page 29, Lines 25-31  FS Report Table 2-1, Pages. 2-4  FS Report Appendix F, Pages F-127 – F-154	<p>The text states: “Analysis and modeling of the tetrachloroethene disposed of in the 300 Area Trench concluded that it is feasible for the TCE to migration and partially degradation in the sediments to form the observed TCE and cis 1,2 dichloroethene concentrations in groundwater.” The text does not adequately describe the Appendix F fate and transport modeling of PCE, TCE, and cDCE. In particular, Appendix F explains that the initial modeling produced “a plume that is too narrow to result in VOC concentrations reaching well 399-1-16B.” Subsequent modeling to test the sensitivity of the dispersion coefficients resulted in “the plume reaching well 399-1-16B but at extremely low concentrations”. Yet more modeling to test the sensitivity of the dispersion coefficients resulted in “simulated concentrations which were considerably higher than those observed at well 399-1-8”. The Appendix F VOC modeling report concluded: “These findings indicate that it does not appear plausible that the source for the concentrations observed in well 399-1-16B is the 300 Area Process Trenches.” <u>The 300 Area FF-5 RI/FS modeling effort neither modeled the groundwater observations at well 399-1-5 nor addressed the possibility of a second hydrocarbon source near well 399-1-8. Therefore, data gaps regarding the 300 Area process trenches chlorinated hydrocarbons exist and conceptual site model considerations require additional characterization.</u></p> <p>The text should be re-written to acknowledge data gaps regarding the 300 Area process trenches chlorinated hydrocarbons exist and the following conceptual site model considerations require additional characterization:</p> <ol style="list-style-type: none"> <li>1. The concentration of cis-1,2-dichloroethene observed in well 399-1-16B is well below its solubility limit. This may be a result of mixing along the flow path; however, a more likely explanation is that 399-1-16B does not lie on the plume axis and that much higher concentrations exist in the vicinity.</li> <li>2. If things continue along the observed degradation path, the DNAPL plume will degrade into vinyl chloride which has a lower solubility and much lower MCL. This will result in contamination that has a longer life and that will be much more toxic. In addition, it is uncertain to what degree the cis-1,2-dichloroethene passing well 399-1-16B is degrading to vinyl chloride before it reaches the river.</li> </ol>

		3. Contaminants migrating along the bottom of the aquifer will reach the river well off shore, where the river bed intersects the Ringold lower mud. This contamination will not be detected by monitoring the top of the aquifer along the river shore.
101	Page 30 Line# 14-41	This section does not meet the NCP requirements, and is inconsistent with the EPA ROD guidance. It does not summarize the ecological risk assessment, but instead (lines 18-27) refers to a summary in a separate document. The Proposed Plan needs to add a summary of the ecological risk assessment.
102	Page 30, line 30	The phrase “nonradiological carcinogenic groundwater contaminants are less than” should be “nonradiological carcinogenic groundwater aquifer contaminants are less than.”
103	Page 30 Lines 36-38	The text states, “Even though concentrations of uranium in some pore water samples are greater than . . . benchmarks . . . based on the results of this evaluation . . . impacts to aquatic life in the Columbia River are not measurable.” This statement is not supported. These statements need to be supported in accordance with the EPA guidance for ecological risk assessment, including the risk characterization, uncertainty, and the proposed risk management decision.
104	Page 30, Ecological risk evaluation, last paragraph	The results for uranium and TCE are presented but not for DCE. DCE results should be added. Section 5.5.8.13 of WCH-398 Rev 0 contains this information.
105	Page 31, Lines 1-6  FS Report Pages 4-105 – 4-111	The text states: “Groundwater in the risk evaluation was evaluated assuming potential use for drinking water; therefore, COPC concentrations were compared to DWSs. Groundwater COPC concentrations were also compared to aquatic criteria because groundwater would discharge to the Columbia River via riverbank seeps and upwelling through the river bottom. Comparison of groundwater COPC concentrations to DWSs and aquatic criteria supports a remedial action determination.”  It is unclear how the proposed plan evaluates groundwater as an exposure pathway for current and future risk scenarios. For example, it is unclear how the comparison of COPC concentrations to DWSs supports a remedial action determination. A more meaningful comparison would be COPC concentrations to applicable action levels. Similarly, a more meaningful evaluation of analytical data would be based on the comparison of COPC concentrations to applicable action levels taking into account the total risk of all contaminants as the total cancer risk cannot exceed $1 \times 10^{-5}$ or hazard quotient of 1.  According to Table 4-22 of the FS Report, “action levels” or “concentration standards” for many analytes appear to be based on federal standards only. If state standards are considered, many analyte action levels or concentration standards are considerably lower. Note: WAC 173-340-720 method B potable groundwater cleanup levels also require protection of surface water in accordance with WAC 173-340-730. For example, Table 4-11 identifies the concentration standard for zinc to be 5,000 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for zinc per WAC

		<p>173-201A (water quality standards for surface waters of the state of Washington) is 91 µg/L, As another example, Table 4-11 identifies the concentration standard for fluoride to be 4,000 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for fluoride per WAC 173-340-720(4)(b)(iii)(A) and (B) [MTCA method B cleanup levels for potable groundwater] is 960 µg/L. As another example, Table 4-11 identifies no concentration standard for cobalt, whereas the action level or concentration standard for cobalt per WAC 173-340-720(4)(b)(iii)(A) and (B) [MTCA method B cleanup levels for potable groundwater] is 4.8 µg/L. As another example, Table 4-11 identifies the concentration standard for copper to be 1,300 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for copper per freshwater criterion continuous concentration (CCC) is 9 µg/L. As another example, Table 4-11 identifies the concentration standard for nickel to be 100 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for nickel per freshwater criterion continuous concentration (CCC) is 52 µg/L. As another example, Table 4-11 identifies the concentration standard for silver to be 100 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for nickel per freshwater criterion continuous concentration (CCC) is 5 µg/L. As another example, Table 4-11 identifies the concentration standard for carbon tetrachloride to be 5 µg/L (based on “maximum contaminant levels, federal drinking water standards [MCL, SMCL, or MCL-P]”) whereas the action level or concentration standard for carbon tetrachloride per human health for the consumption of water + organism is 1 µg/L. Requested changes: 1) Clarify the text on page 28 of the proposed plan. Clearly describe how groundwater was evaluated as an exposure pathway for current and future risk scenarios, 2) on Table 4-22 (pages 4-107 – 4-111) of the FS report, identify the lowest (i.e., most conservative) action level or concentration standard, 3) on Table 4-22 (pages 4-107 – 4-111) of the FS report, identify the action level or concentration standard basis (i.e., MCL, SMCL, MCL-P, freshwater CCC, WAC 173-340-720(4)(b)(iii)(A) and (B), WAC 173-201A, etc.), and 4) on Table 4-22 (pages 4-107 – 4-111) of the FS report, re-evaluate the COPCs which have exceeded the listed concentration standard.</p>
106	Page 31, Remedial action objectives	<p>We need to add an RAO for protection of surface exposure to contaminants at depth. This proposed plan in the risk assessment identified risk that would result from the direct exposure scenarios applied to deep soil. The proposed plan (such as the first line on page 29) identified the need for restricting exposure to deep soils. That element will need to be added to the alternatives description. Also an RAO associated with is needed because deep soil isn’t covered by the existing RAOs. An RAO something like the following should be added” RAO 9. Prevent unacceptable risk to human health and ecological receptors from exposure to contamination below 4.6 m (15 ft) using the human scenarios and both human and ecological risk thresholds in the other RAOs.” [Note alternatively we could reiterate the risk limits, and/or make</p>

		RAOs for human health and ecological protection.]
107	Page 31, Preliminary Remediation Goals	This section contains a description of waste sites and groundwater that shouldn't be part of the PRG section. The waste sites summary and groundwater summary should be in their own section.
108	Page 31, Lines 8-18	The description of the model appears to only address uranium inventory released by seasonal fluctuations of the water table. The conceptual site model, as described on page 19 of the proposed plan, does not take into consideration uranium inventory being transported via moisture from/through the surface/vadose zone. Such occurrences have on numerous occasions caused additional uranium inventory to be input into monitoring well flow paths. The text should be revised to clearly indicate such additional uranium inventory releases were not replicated by the modeling. Also, the text should be revised to incorporate this uncertainty into the UCL estimates.
109	Page 31, Lines 33-35	The sentence states: "...feasible for the TCE to migration and partially degradation in the sediments to form the observed TCE..." The wording doesn't make sense. Also, the discussion should address the degradation sequence whereby <u>vinyl chloride</u> can result. Also, the text doesn't speak to attenuation or remediation. The text should be re-written. The text should clearly identify that the trend plots for cis-1,2-dichloroethene indicate the contaminant is not attenuating and discuss the degradation products such as vinyl chloride. The text should describe groundwater remediation of the VOCs.
110	Page 31, line 36	The phrase "PRGs were used to assess the effectiveness of the selected remedial alternatives" should be "PRGs were used to assess the effectiveness of the remedial alternatives." Note that the "selected" alternative is documented in the ROD.
111	Page 32, Table 2, proposed cleanup levels	As explained in previous comments, a separate set of PRGs for groundwater protection is needed for industrial vs unrestricted areas. In addition, the groundwater protection cleanup levels presented in draft A.1 were based on a 100% vadose contamination CSM which should be changed to something like the top 70% contaminated and the bottom 30% uncontaminated for all but the very mobile contaminants. This would be a better representation of site data and what has been discovered in groundwater. When waste sites are evaluated individually in cleanup verification documents, the assumptions used to develop the cleanup numbers will need to be verified.
112	Page 32, Lines 38-41	New text states: "These contaminants either have a very limited extent, occur in groundwater in a relatively low-permeability interval that does not provide sufficient water to be used as a drinking water source, or are attributed to likely off-site sources." As commented previously, a contaminant does not have to occur as a plume to be considered a COPC or COC.
113	Page 36 Table 4.	Waste Sites to be remediated prior to the ROD signing. It is unclear what is meant by this terminology. These waste sites must still be evaluated under the final CERCLA process even if the conclusion is that the site will require no action. Also, the PRGS in the interim action may not be the same as in the final PP/FS. Evaluate all waste sites that are remediated under the interim action in the final CERCLA action to determine that they have met the final PRGS.

114	Page 37, table 4	For people who look at this table out of context, the third row “Waste Sites to be remediated prior to ROD Signing” may be confusing. Consider a change (or footnote) something like “Waste Sites Expected to Complete Interim Action Remediation Prior to ROD Signing.”
115	Page 37, lines 16-18	These several lines of text discuss how a newly discovered site would be handled. This section should be changed to read “If a newly discovered site does not meet the final cleanup levels the site will be evaluated for remediation. If the site fits within the profile of the sites evaluated in this RI/FS, the DOE and EPA may prepare an Explanation of Significant Differences to add this site to the selected remedy in the ROD resulting from this Proposed Plan. If the site does not fit the profile, DOE and EPA may prepare a ROD Amendment to select a new remedy for the site.”
116	Page 37 line 21	The Proposed Plan states that “The final COCs for groundwater are uranium and tritium.” Other parts of the Proposed Plan identify TCE, DCE, chromium, nitrate, and gross alpha at concentrations such that some action is proposed (monitoring or ICs). Therefore they need to be listed as groundwater COCs. Also the uranium isotopes should be included. Note that table 3 correctly identifies Gross Alpha at 15 pCi/L as a proposed cleanup level for groundwater. Uranium isotopes are the major contributors to gross alpha at the 300 Area, and uranium is addressed by the cleanup alternatives. Contaminants that are addressed in the remedy are COCs. “ <b>Contaminants of Concern</b> (COCs) – COCs are the chemical substances found at the site that the EPA has determined pose an unacceptable risk to human health or the environment. These are the substances that are addressed by cleanup actions at the site.” <a href="http://epa.gov/region4/superfund/qfinder/glossary.html">http://epa.gov/region4/superfund/qfinder/glossary.html</a>
117	Page 37 lines 24-27	This general description of the uranium groundwater problem has specific remedy elements that should be removed. The two sentences “Cleanup of the groundwater plume and...progress toward achieving cleanup goals” should be removed. Proposed remedies are discussed in the alternatives.
118	Page 37, 1 <sup>st</sup> paragraph for tritium starting on line 32	This section for tritium includes no information as to whether or not tritium currently reaches the Columbia River, or is anticipated to reach the river before it attenuates. That should be included here.
119	Page 37, Line 38.	The document states the “model predicts that a combination of natural radiological decay and dispersion during transport will achieve the PRG within a reasonable timeframe.” It would be good to add a sentence whether or not this modeled result is based on the assumption that 618-11 Burial Ground is no longer a source of groundwater COCs (no additional input). Also, is this estimate based on the same model that indicated MNA/ICs would be sufficient for groundwater contamination in the 1996 FF-5 OU ROD? How has this model been modified recently to improve on its evident shortcomings?
120	Page 37, Groundwater Summary section	This section needs to be restructured. After an introductory sentence there is a one paragraph long section for uranium. Next is a four paragraphs long section titled tritium but three of the four paragraphs aren’t about tritium.
121	Page 37, lines 40-42	The document states “Waste site 316-1 did not exceed the proposed soil PRGs for groundwater protection following remediation under the interim ROD, but is included for remediation because of the waste disposal history and nearby

		contaminated groundwater.” That appears to say that the document authors don’t believe the groundwater protection PRGs will protect groundwater. This is confusing.
122	Page 41 Line # 12-15	The terminology is inconsistent and confusing as to when a contaminant is a COPC and when a contaminant is a COC. The proposed plan should be clear that the COC list in this proposed plan is part of the public comment opportunity and the final COC list for contaminants will occur after the public comment period and be reflected in the ROD.
123	Page 41 Lines 19-29	DOE is responsible for all contamination on the Hanford site regardless of the origin. Nitrate must be addressed in the final ROD for the 300 Area when it exceeds PRGs. Monitoring is not a remedy. Include nitrate as a COC, and ICs in the alternatives.
124	Page 41, Lines 21-23	The text states: “Remedial alternatives were developed for the groundwater COC plumes identified for the 300-FF-5 OU.” Neither a COPC nor a COC is required to be a plume. As indicated in a previous comment, by imposing the requirement for a COPC to be a plume to be carried forward for consideration as a COC, the proposed plan inappropriately screens out COPCs. Delete the word “plumes” and make COC plural to read: “...groundwater COCs identified for the...”
125	Page 41, Line 28	The section identifies nitrate in exceedance of the DWS in the southwest portion of the 300 Area, as well as in the vicinity of 618-10 and 618-11 Burial Grounds. It states due to association with the site wide nitrate plume, nitrate near the Burial Grounds and the in the rest of the 300 Area will not be addressed by the remedial alternatives presented here. It is important to state for the public when and in what document DOE will propose a remedy for the large nitrate plume including near the burial grounds.
126	Page 41, Lines 28-40 and other places	The text highlights how the TCE and other chlorinated solvents are localized in a low permeability zone and is not an issue because of its nature and extent of the contaminants. However, it is to be noted that the localized contaminated silty layer is in contact with the aquifer and is not impermeable. Over a period of time it will release contamination to the aquifer at a very slow rate. It is important to refer the reader to a proper evaluation in the FS of the impact of this localized silty zone. The FS needs to discuss the dissolved oxygen measurements that were taken during the RI drilling and the relative concentrations of TCE and DCE, and the absence of vinyl chloride in a discussion of the degradation of the organics.
127	Page 41 Line#34	The TCE contamination above $1 \times 10^{-5}$ indicates that a remedy needs to be evaluated. DOE does not have a basis for this statement that the TCE contamination is coming from off-site. The 3 <sup>rd</sup> CERCLA Five-Year ROD Review states for the 1100 area that <u>“Previous groundwater monitoring indicated trichloroethylene contamination, recent monitoring have showed that these levels are not over the cleanup standards”</u> . DOE needs to provide a basis for the statement that AREVA facility has a TCE plume that is contributing to the 300 Area TCE plume.
128	p.41, <i>TCE Section</i>	The section identifies offsite groundwater migrating into the southern portion of the 300 Area and suggests that TCE contamination is associated with offsite sources. However, p.19 clearly states that TCE was used as a “degreasing solvent during the manufacture of nuclear fuel”. It is reasonable to acknowledge that some TCE contamination may have originated onsite.

129	Page 41	Gross alpha, nitrate, TCE, and Cis-1,2-DCE in groundwater meet the definition of a COC and should be identified as COCs. <b>“Contaminants of Concern (COCs) – COCs are the chemical substances found at the site that the EPA has determined pose an unacceptable risk to human health or the environment. These are the substances that are addressed by cleanup actions at the site.”</b> <a href="http://epa.gov/region4/superfund/qfinder/glossary.html">http://epa.gov/region4/superfund/qfinder/glossary.html</a> Note that ICs with monitoring are defined as cleanup actions (i.e. they aren’t “no action”) and this Proposed Plan proposes ICs and monitoring for these contaminants. The small transient hexavalent chromium appears to have quickly dropped from peak concentrations far higher than the river protection standard to about that standard and concentrations continue to drop. Therefore hexavalent chromium does not meet the definition of a groundwater COC. Because hexavalent chromium monitoring in groundwater down gradient of source site remediation activities can be a sensitive indicator of too much dust suppression water, it is appropriate to include hexavalent chromium in groundwater monitoring as an element of waste site remediation. That is a level of detail for remedy alternatives that doesn’t need to be in the proposed plan. It is analogous to air monitoring that we do, not because we have air contamination exceeding limits but it is a tool we use to evaluate ongoing cleanup operations.
130	Page 42, line 7	Summary of Remedial Alternatives. Please see guidance section 3.3.7 for this section which states “The alternative that is recommended as the Preferred Alternative should be identified as such at the beginning of this section.”
131	Page 42, Summary of Remedial Alternatives	Except for the no action alternative, the rest of the alternatives have common elements. It would simplify this document, make it shorter, and better illustrate to the reader the differences in the alternatives if all the common elements were addressed once. Please see guidance, page 3-6 which states “Describe components common to a number of alternatives only once.”
132	Page 42, line 36, alternative 2	The phrase “and groundwater monitoring” should be “and groundwater ICs and monitoring.”
133	Page 43, line 9	The phrase “The RAO for direct exposure” should be “The RAO for direct exposure for human health and ecological protection.”
134	Page 43, lines 12-15	There is a statement that “It is anticipated that all the RAOs would be achieved at depths of less than 4.6 m (15 ft) at many of the 300-FF-2 waste sites because records indicate that the contamination is shallow, and available characterization data suggest that migration of contaminants through the soil column has not occurred.” This should be modified to incorporate two ideas. That sweeping statement is typically true at sites without liquid waste disposal, and is true where the engineered structure is near the surface. Contamination under buildings with basements, liquid waste disposal sites, and deep pipelines with leaks are all examples where the sweeping statement is not true. Consider a rewrite such as the following: “It is anticipated that all the RAOs would be achieved at depths of less than 4.6 m (15 ft) at many of the 300-FF-2 waste sites because records indicate that the contamination and engineered structure is shallow, and available characterization data suggest that migration of contaminants through the soil column has not occurred for many sites. In contrast however there are quite a few sites with contamination known or believed to be at greater depths plus contaminated engineered structures at greater depths which will require deeper excavation to attain

		RAOs.”
135	Page 43, 3 <sup>rd</sup> Bullet, lines 22-23	The document states “RTD of contaminated pipelines (300-15) that transported the majority of uranium waste to the disposal sites...” This suggests but doesn’t explicitly state that this excavation of pipelines will occur regardless of depth. This should be stated clearly. Also the phrase “that transported the majority of uranium” suggests that pipelines that transported less than 50% of the uranium will not be part of the RTD remedy. This section needs to be just a summary of remedial alternatives, not background description of the 300-15 waste site.
136	Page 43, line 27	The phrase “until standards are met” would be better stated “until RAOs are met.” This comment applies to the other alternatives with this phrase.
137	Page 43, line 28	This alternative (and the other alternatives too) states “Temporary surface caps will be installed over the waste sites that are adjacent to the 300 Area facilities and utilities.” Are these caps described in the Proposed Plan (asphalt, evapo-transpiration vegetated cap?) plus their locations? A description and map for these areas in the FS that is referenced in the Proposed Plan would be helpful.
138	Page 43, lines 29-30	The phrase “pipelines associated with long-term facilities will be interim void filled, as necessary, for groundwater protection” should be rewritten something like “pipelines inaccessible for the RTD remedy because of their close proximity to long-term facilities, will be filled with fixative for groundwater protection.”
139	Pgs. 45-46	The term “active remedial alternatives” is repeatedly used (e.g., pg. 43, lines 26, 37, and 42). In relation to the CERCLA remedial actions, the term should not be used. Delete the word “active” in relation to remedial alternatives.
140	General for the FS and PP (p-45)	There are number of excavation technologies available for deep excavation. The FS should clarify why other excavation technologies were not considered.
141	Page 45 also applicable for the FS): sequestration technology	Provide more evidence information that the sequestration will meet the RAOs. Field demonstration of sequestration technology at the Hanford site indicates that it may take several years to implement effectively. Provide information to show that within 12 years cleanup of the site will meet the RAOs. It is also to be noted, that the uranium will stay forever, because of its half life.
142	Page 45, Lines 12	Some of the reviewers of the proposed plan thought that MNA was the proposed remedy for TCE, DCE, chromium, and nitrate. It would be good to explicitly state that MNA is not the remedy for those contaminants.
143	Page 45, last paragraph	Thank you for revising this alternative description based on initial EPA comments to this section. As part of groundwater monitoring to evaluate the technology’s efficacy, the lateral spread of phosphate within the groundwater should be included in the monitoring. This will help us best plan the well density for phase II and also make sure that during phase II, which includes treatment closer to the Columbia River, that adverse phosphate discharge to the river is prevented. This same change should be applied to the middle paragraph on page 61.
144	Page 45, line 8	The alternative includes the statement “Phased implementation of uranium sequestration.” This alternative needs a description of the phased implementation. The analysis of alternatives section needs to evaluate how it would be protective to postpone treatment of the other areas. The figures in the FS that show the size of Phase 1 compared to the size of the vadose zone

		contributing uranium shows that phase 1 needs to be larger.
145	Page 45, last paragraph (and throughout document)	The Alternatives include estimated years for uranium concentrations to decrease below DWS based on a two-dimensional groundwater model. However, it is unclear whether or not this is the same model that predicted uranium concentrations would decrease satisfactorily under MNA/ICs in the 1996 FF-5 OU ROD (a remedy that was deemed insufficient during the 2006 Five Year Review). What has been learned since then? How has the model been refined to improve accuracy and give us confidence in its estimations? Please verify that original assumptions have been reworked and additional characterization data have been added to bolster the strength and reliability of the current model.
146	Page 45, lines 22-23 and lines 25-27	The text states: “Although nitrate is considered a COPC near the 618-10 and 618-11 Burial Grounds, the origin for nitrate observed in this area is uncertain.” Nitrate is considered a COPC near waste sites covered by this proposed plan and there is uncertainty associated with the source(s). If insufficient information is available to determine the source(s) of the nitrate (and in particular to exclude 300 Area proposed plan waste sites as sources), to satisfy WAC 173-340-720 standards, nitrate should be carried forward as a COC. Re-write the text to identify that nitrate will be carried forward as a COC and delete the sentence stating: “Due to the association with the sitewide nitrate plume, nitrate...will not be addressed in the active remedial alternatives.” This proposed plan must be clear that this plume is included in the 200-PO-1 operable unit and explain how far 200-PO-1 is in the RI/FS process.
147	Page 45, lines 36 to 38	The sentence “If at the end of Phase I, both DOE and EPA determine that Phase II deployment is not appropriate, then DOE will prepare and submit a revised FS and PP to support a ROD amendment” should be changed to “If at the end of Phase I, both DOE and EPA determine that Phase II deployment is not appropriate, then evaluation of this component of the remedy will occur. DOE would prepare and submit a revised FS work plan to EPA to evaluate alternatives. A PP to support a ROD amendment for an alternative remedy would be prepared following completion of the FS work.”
148	Page 46, Lines 5-8	The text should be re-written to state that because releases of hexavalent chromium occurred from a 300 Area waste site(s) and negatively impacted groundwater quality, hexavalent chromium will be carried forward as required groundwater monitoring for RTD sites. In other words, hexavalent chromium concentration measurements from the vadose zone beneath the depth of remediation, at all waste sites where hexavalent chromium was a COPC, are needed to determine if hexavalent chromium exists in the vadose zone as a groundwater contamination source. In addition, a cursory review of 300 Area hexavalent and chromium concentrations in HEIS indicates elevated chromium was measured at a number of wells (e.g., 399-1-21B, 399-1-13B, 399-8-1, 399-3-19, 399-8-3, 399-1-2, etc.). Clearly, there are numerous elevated chromium observations in the 300 Area. Delete the sentence on page 46, lines 5-8 which states: “Since the areas of chromium exceedances are localized and attributable to...”
149	Page 46, lines 6-7	The sentence “Under Alternative 3, the timeframe for the uranium concentration in the groundwater to decrease below the DWS is estimated to take approximately 18 years (by year 2032)” may be more simply stated as “It

		is estimated that it will take approximately 18 years (by 2032) for the uranium concentration in the groundwater to decrease below the DWS if Alternative 3 is implemented.” This sentence structure should be applied to the similar statements in the other alternatives.
150	Page 46, Lines 20-34	The text should include estimates for all groundwater COCs to reach applicable groundwater protection standards. Because releases during remediation have negatively affected groundwater quality (e.g., hexavalent chromium from 618-7 Burial Ground), it is appropriate to perform compliance monitoring during remediation. Where applicable, the text should identify that COCs will also be monitored (i.e., compliance monitoring) until remediation of all waste sites (where the COC is a target analyte) has been completed and for some length of time (yet to be determined) post-remediation. Include estimates for all groundwater COCs to reach applicable groundwater protection standards.
151	Page 46, Lines 31-33, & footnote 1, Page 47, Lines 39-41, Page 52, Lines 21-24, Page 58, Lines 24-30, Page 63, Lines 19-24	The text should identify that the estimated attenuation is based on groundwater measurements that are influenced/biased by sampling date/time and well construction and therefore, may not represent the 90th or 95th percentile UCL. For all alternatives, identify that the estimated attenuation is based on groundwater measurements that are influenced/biased by sampling date/time and well construction and therefore, may not represent the 90th or 95th percentile UCL of actual groundwater conditions.
152	Page 53 Figure 16	Because testing of the emplacement of phosphate is needed, clearly state that vadose zone characterization and groundwater monitoring will be performed at and downgradient to sequestration locations (throughout testing) on the figure and overview description.
153	Page 56, lines 5-6	There is a one sentence introduction to the comparative analysis of alternatives with the NCP nine criteria. There is no reference to the corresponding section in the FS that should be much more complete. Please follow guidance section 3.3.8 which states “The reader of the Proposed Plan should be directed to the comparative analysis contained in the RI/FS Report for a more detailed explanation.”
154	Page 56 Line# 7-20	The Section on Overall Protection of Human Health and the Environment lacks a discussion on Alternative 5. Include alternative 5 in the discussion of Overall Protection of Human Health and the Environment.
155	Page 56, line 8	This section on overall protection of HH and the environment starts with alternatives 2-5 and skips alternative 1. A sentence needs to be added that alternative 1 does not meet the threshold criteria for protection so is not evaluated further.
156	Page 56, compliance with ARARs section	References to laws and regulations should identify the specific sections that are ARARs for the remedial actions. “WAC 173-340” is too general and should be removed. For MTCA there are the specific sections that should be identified as ARARs. These are WAC 173-340-360, 173-340-720 thru 173-340-745, and 173-340-750. Regarding MCLs, the phrase “and/or by the State of Washington (WAC 246-290)” should be removed. The state MCLs are numerically identical to the federal

		<p>MCLs so would not be ARARs.</p> <p>“The AWQC developed under the Clean Water Act (Section 304) and/or promulgated by the State of Washington (WAC 173-200 and WAC 173-201)” should be changed to two statements: “The AWQC developed under the Clean Water Act, Section 304(a)” and “The State’s AWQC at WAC 173-200-040, 173-201A-200, -240, and -250.”</p> <p>“The Toxic Substances Control Act (implemented via 40 CFR 761)” should be changed to “The Asbestos and PCB cleanup requirements in The Toxic Substances Control Act (implemented via 40 CFR 761)” Note that the cleanup-related requirements are scattered across many parts of TSCA so listing all the subsections would be messy. There are also many parts of TSCA that are unrelated to the 300-FF-2 cleanup (manufacturing requirements, import/export, etc.) so reference to all of TSCA generically as an ARAR would be inappropriate.</p>
157	Page 56 Line#21-41 and Page 57	<p>The section on compliance with ARARs is not a complete list of all the ARARs. The references in the back of the PP do not state all of the ARARS. Examples of missing ARARs are WAC173-340-745(5), WAC173-340-747(3)-(8), WAC173-340-730. Add the complete list of ARARs or lead the reader to the FS where the ARAR reside. Or state in the PP that this section does not discuss all the ARARs</p>
158	Page 56, line 27	<p>The document states “Following are the 300 Area project ARARs.” The “300 Area project” is a new term. The rest of this proposed plan is for remedial alternatives for 300-FF-1 uranium impacts to groundwater, 300-FF-2, and 300-FF-5. That should be consistent. Note that there are lots of other “300 Area projects” such as the Removal Action work and Battelle’s operations. Also regarding the completeness of this ARARs list, if this is presented as the complete list of ARARs, then a thorough scrub of the recent Hanford RODs and the existing 300 Area RDR/RAWP should be performed to ensure no ARARs were overlooked. Otherwise it should be identified as the “key” ARARs but the FS should be what we believe is the complete list (that is finalized in the ROD).</p> <p>An alternative to listing and discussing ARARs in the proposed plan is to replace this list with a reference to the appropriate section of the FS. The proposed plan should explicitly state that alternatives 2-5 have no ARAR waivers. Page 57 line 14 beginning with “Alternative 1 does not achieve...” is a good start to a one paragraph replacement of the ARARs section. However some modifications in addition to the ideas in the first part of this comment are necessary: The phrase “would comply with ARARs at the completion of the remedial action” suggest ARARs may be violated during the remedial action. ARARs related to end-state cleanup levels would be complied with at the end of the remedial action, but other ARARs such as for air releases, waste management, etc must be complied with during the remedial action too. The phrase “proposed remedies for Alternatives 2 through 5” should be “Alternatives 2 through 5.”</p> <p>The last sentence is “The certainty for achieving the uranium DWS across the entire plume is highest for Alternative 5, which relies primarily on expanded source removal instead of sequestration via phosphate infiltration for source control.” This calls into question whether or not the alternatives actually meet</p>

		<p>the threshold criterion for protection. Alternative 5, the big dig of the vadose zone, as presented in the FS does not include the deep vadose zone in areas lateral to the major liquid waste disposal sites. For alternative 5 to achieve the higher level of certainty stated in the proposed plan, the area of digging would need to be much larger. Alternative 3 includes injection of phosphate into the top of the aquifer in the target zone. We know from past experience at this site with injections of this chemical that some of this phosphate will move laterally to these adjacent areas and provide some level of treatment. That benefit is not a feature of alternative 5. Therefore it is not clear why the proposed plan states there is a higher level of certainty in alternative 5. Also alternative 5 is many hundreds of millions of dollars more expensive. That level of funding is not in DOE's out year planning, so there is considerable uncertainty in getting adequate funding within a reasonable time period, plus if funding became available many years of digging would be required which impacts how long it would take to remove the vadose source. The 100-C-7 site is an example of how long it can take to dig a large excavation, and alternative 5 would need to be a much larger area to remove the vadose zone source. Also such an extensive excavation would require a lot of dust suppression water, and even when care is used, it is inevitable that mobile contaminants are flushed into the groundwater. The thought in this comment apply to other places in the proposed plan such as the next section "Long-Term Effectiveness and Permanence" and table 5.</p>
159	Page 57, lines 10-12	<p>The proposed plan states "The certainty for achieving the uranium DWS (in groundwater) across the entire plume area is anticipated to be higher as the alternatives progress upward from Alternative 2 to Alternative 5." This suggests we aren't certain that all of the alternatives will be protective, certainty is low for alternative 2 etc.</p>
160	Page 57, line 34	<p>The phrase "Alternative 2 relies more on monitoring and ICs to manage the uranium groundwater plume" is not related to long-term effectiveness and permanence and should be removed or moved to short term effectiveness.</p>
161	Page 57, line 44	<p>The proposed plan states "Alternatives 2 through 5 also each include implementation of groundwater performance monitoring." It is not clear what this has to do with long term effectiveness and permanence. In this case of uranium, long term is very long term.</p>
162	Page 57, Figure 17	<p>On page 51 (lines 20-38), the text states: "The application of phosphate to sequester residual uranium in the vadose zone and PRZ will target the mass of residual contamination that provides a continuing source of uranium to groundwater, based on waste disposal history, sample data, and groundwater monitoring data (see Figure 17)." Figure 17 indicates Phase 1 uranium sequestration testing will not occur in the vadose zone of a waste site, but rather, will predominantly occur beyond the footprint of any waste site. While it is understood that significant groundwater contamination occurs in the area chosen for Phase 1 testing and that several elevated uranium concentrations were measured in soil samples (2,160 ppb at 399-1-37, 1,590 ppb at 399-1-35, and 1,340 ppb at 399-1-33), the proposed plan neither explains nor technically justifies the location of Phase 1 testing. To satisfy the stated criteria, the Phase 1 test area should be either moved or extended north so that at least half of the test area occurs at a waste site (i.e., 316-5). Phase 1 test area (Figure 17 on page 57) should be either moved or extended north so that at least half of</p>

		the test area occurs at waste site 316-5.
163	Page 58, line 5	Solidification of pipelines is mentioned. It is not clear if solidification is meant to mean treatment in the sense of LRD treatment or radionuclide mobility reduction. It is not intuitive how void filling would help retard contamination release from the pipelines. As EPA has discussed this idea with DOE, this was described as applying fixative materials to reduce contaminant release. But that idea isn't well expressed in the alternatives and should be clarified.
164	Page 59, lines 8-10	The document states "This approach will increase the certainty in the chemical delivery method or demonstrate that there is no reliable means for chemical delivery." Statements such as this suggest the FS was inadequate.
165	Page 59, line 19	The phrase "Current unacceptable risks are controlled..." is a discussion of what is happening today, but this part of the proposed plan is supposed to be evaluating the alternatives for protection. This sentence should be removed. This idea is already mentioned elsewhere in the proposed plan.
166	Page 59, line 31	Regarding alternative 5 and the RTD remedy, it states "it provides the greatest challenges because of the deep excavation." This statement is about implementability but is in the section on short-term effectiveness. This statement should be moved or else revised to better fit with short-term effectiveness. Note that digging deep enough to reach the water table is not an implementability challenge. Digging that deep in a very large area to reach all the contaminated soil in the PRZ both under the waste sites and in surrounding areas contaminated by the historical contaminated groundwater mound would be a huge volume of soil. The magnitude of that excavation is an implementability challenge.
167	Page 59, lines 34	The document states "Alternatives 2 through 5 are all considered readily implementable." This doesn't seem consistent with other discussion in the proposed plan about the need for a phased implementation, uncertainty in the chemical delivery method, challenges with deep excavation, etc. The proposed plan needs a complete review for consistency. Consider rewriting this section to the following: "Alternatives 2 through 5 are all considered readily implementable. No significant technical or administrative challenges are associated with the proposed alternatives. Actions such as RTD and surface capping have been implemented extensively at the Hanford Site. Vendors and materials for implementation of pipeline void filling and uranium sequestration activities are readily available. Although uranium sequestration has been successfully demonstrated in the laboratory and on a limited pilot scale at the Hanford Site, a phased project implementation approach for large-scale waste site treatment is anticipated. This approach will increase the certainty in delivering the chemical to the waste in the most effective and appropriate manner. Alternative 5 is ranked lower than the other alternatives because of the large quantity of soil that would have to be excavated. Alternative 3 and to a lesser degree Alternative 4 have uncertainties associated with delivering phosphate to the waste in the vadose zone and PRZ, but this would be overcome by using the phased project implementation approach. Therefore, Alternatives 3 and 4 rank better for implementability than Alternative 5. Alternative 2 is the easiest alternative to implement."
168	Page 59	This analysis of the CERCLA 9 criteria does not represent the balancing

	Table 5	<p>criteria accurately and seems to represent a bias toward the alternative that DOE wants to move forward with.</p> <p><b>#1. Reduction of toxicity and mobility, or volume through treatment.</b> The state disagrees that an Alternative 5 RTD of all the sources would perform poorly to reduce toxicity and mobility. Alternative 5 would reduce toxicity and mobility within 10 year and is a proven technology. Alternative 5 would be expected to perform very well.</p> <p>Alternative 3 and 4 use a new and unproven technology so would not expect it to perform at the highest level. The state comments that it may not perform at all. This is why the alternative states that if the sequestration does not work then a ROD amendment will be necessary. In the FS it would be good to provide a thorough description of how toxicity and mobility reduction is included in the alternatives and when this is achieved through treatment vs when this is achieved though disposal into ERDF -- a protective facility. Alternative 5 is much more expensive than the preferred alternative and there is useful guidance on this topic, EPA 540/F-96/018 located at <a href="http://www.epa.gov/superfund/policy/cost_dir/cost_dir.pdf">http://www.epa.gov/superfund/policy/cost_dir/cost_dir.pdf</a></p> <p>The EPA’s guidance states: The NCP states that the overall goal of the remedy selection process is "to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste" (40 CFR 300.430(a)(1)(i)). This goal reflects CERCLA's emphasis on treatment as the preferred method of protection. However, recognizing that CERCLA tempers its emphasis on permanent solutions and treatment through the addition of the qualifier "to the maximum extent practicable," and also contains the co-equal mandate for remedies to be cost-effective, the NCP goes on to state that, in general, “EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials”</p> <p><b>#2. Short-term effectiveness and time to achieve RAOs.</b> Alternative 5 is estimated to meet the RAO in 10 years. 10 years seems to be the best short-term and long term. The state disagrees that it performs moderately well. There is no basis presented to state that Alternative 3 would be the best in the short-term as it is basically the same as Alternative 4 which is stated to perform moderately well.</p> <p><b>#3. Implementability.</b> Alternative 3 and 4 are stated to be more implementable than Alternative 5, RTD. RTD is <u>not</u> a challenge at depths below 15 feet and is a proven technology. Alternative 3 and 4 are using an unproven technology and therefore this technology does not have a basis as to the expected performance for implementability to perform better than Alternative 5.</p> <p>Re-evaluate the alternatives without bias. Cost is a criterion that can also influence the alternative selection choice.</p>
169	Page 59, line 45	The phrase “treatment is anticipated” should be changed to “treatment is proposed.” As a global comment during revision to this document, statements of “what will be” should be changed to “what is proposed.”
170	Page 60, lines 4-7	This half paragraph of cost information could be replaced with a reference to the cost information in table 5.

171	Page 60, lines 8-10	This level of cost detail should be in the FS but is not necessary for the proposed plan.
172	Page 60, lines 11-16	This entire paragraph can be replaced with a footnote in table 5 that qualifies the cost accuracy to -30 to +50 percent.
173	Page 60, lines 17-29	This entire paragraph should be removed. It is not important information for the proposed plan to be able to present and evaluate alternatives.
174	Page 60, line 32	The phrase “Based on information currently available, DOE and EPA recommend Alternative 3...as the preferred alternative.” would be better stated “Alternative 3...is the preferred alternative. Based on information currently available, DOE believes the preferred alternative...” and continue to follow guidance page 3-7.
175	Page 60-61, Preferred Alternative	This section needs revisions to fulfill the guidance (section 3.3.9) which states: “This section of the Proposed Plan describes the Preferred Alternative, and notes what key RAOs it will achieve as well as how it addresses source materials constituting principal threats (this provides a basis for satisfying the statutory preference for treatment as a principal element of the remedy). This section should also note that the Preferred Alternative can change in response to public comment or new information. A statement explaining the rationale for recommending the Preferred Alternative over other alternatives based on the nine criteria analysis must be included.” The proposed plan needs to mention that treatment with grout and auguring of VPUs for dose reduction of principal threat waste is included in the RTD element of the alternatives. The proposed plan needs to state that the preferred alternative can change in response to public comment or new information.
176	Page 61, lines 14-32	This long paragraph is a repeat of what was stated on page 45. When the alternatives are rewritten to extract the common elements into one section, this preferred alternative should be shortened to reference the common elements and alternative 3, but include the specific topics called for in the guidance section 3.3.9.
177	Page 61, Line 29	The document states “if found to be viable.” What are the criteria for deciding whether or not the uranium sequestration technology is viable? Are there two different sets of criteria for surface infiltration and PRZ injection? Is the determination based on reduced concentration of mobile uranium in soils, groundwater, or both?
178	Page 61, line 33	The document states “The following information will be included in the ROD.” This statement should be removed. It is not necessary to state what will be in the ROD and this undermines the notion that the alternative can change in response to public input and new information.
179	Page 61 lines 35 thru 39	This paragraph should be rewritten to match the large paragraph in the middle of this page. The Proposed Plan should conclude with a statement similar to the following: [See “ROD” guidance page 3-7.] “Based on information currently available, the DOE believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The DOE expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the

		preference for treatment as a principal element.”
180	Page 61, lines 34 thru page 62 line 4	It is not clear how these follow the ROD guidance. Guidance states that this section should note “what key RAOs it will achieve.” None of the RAOs as presented on page 31 are mentioned. This section should be revised to better match the guidance.
181	Page 60-61, Preferred Alternative	Almost all of this description is for the groundwater uranium part of the remedy. Based on cost, this is only a few percent of the remedy. During the rewrite of this section to better match guidance, it should also better match the entire alternative.
182	Page 61, line 34	The Proposed Plan states “The ultimate RAO is achieving the DWS for uranium in groundwater (30 ug/L).” The RAOs are presented on page 31 of the Proposed Plan. Perhaps they could be reference on this page? None of the RAOs are the singular “ultimate” RAO.
183	Page 61, line 39	The statement “If not, groundwater monitoring and ICs, as identified in Alternative, will be implemented” should be removed. This contradicts the alternative 3 description.
184	Page 64, table 6, footnote a	The document states “Remediation of the other waste sites presented in Table 4 will be performed under the ongoing Interim Remedial Action for 300-FF-2 waste sites.” This is somewhat confusing. The row descriptions in this table and the order are different from table 4 for no apparent reason. For example the first row in table 6 is “RTD – 66 waste sites”, but on table 4 there is no row for RTD, but the second last row is for 66 sites for labeled Waste Site Required Remediation after ROD Signing. It is not clear why there would be any difference in these tables. Note that the no action sites listed in table 4 should be identified as part of this proposed plan and are proposed for no action. Since so far they have been covered by an interim action, they need to be covered by the final ROD resulting from this proposed plan.
185	Page 62, lines 7-12	This section on transition from the interim action to final ROD should be presented as part of the common elements in the alternatives.
186	Page 63, line 10	The phrase “and the conclusions will be included in the CERCLA ROD” should be removed. The proposed plan proposes but does not dictate what will be in the ROD.
187	Page 63, lines 22-24	The following sentence should be deleted because Ecology makes determinations on corrective action. “DOE and EPA agreed that the preferred alternative (i.e. remedy) would satisfy the requirements of both CERCLA and RCRA corrective action.”
188	Page 63, line 26	The phrase “Proposed Plan” should be replaced with “preferred alternative.” Page 64, lines 10-14 that provide Paula Call as the sole POC for comments should be changed to identify both Paula and Larry Gadbois for comments. Contact information for Larry is: EPA Region 10, Hanford Project Office 309 Bradley Blvd, Suite 115 Richland, WA 99352 509-376-9884 <a href="mailto:Gadbois.Larry@EPA.gov">Gadbois.Larry@EPA.gov</a>
189	Page 64 lines 15-16	The paragraph that begins “A public meeting will be scheduled to discuss this proposed plan and the alternatives within it” should be removed. The next paragraph that invites people to request a public meeting is appropriate and consistent with the Community Relations Plan within the TPA.

190	Page 64, line 19	The statement “DOE will consider the comments regarding the proposed plan and information gathered during the comment period and then make a decision” should be changed to “DOE and EPA will consider the comments regarding the proposed plan and information gathered during the comment period.”
191	Page 64, lines 23-25	The statement “This ROD will indentify the chosen alternative (i.e. remedy) and include a responsiveness summary containing agency responses to comments” should be changed to “This ROD will indentify the chosen alternative (i.e. remedy). A responsiveness summary containing agency responses to comments received during the public comment period will be made available with the ROD.”
192	Page 66, glossary “administrative record.”	This should be rewritten as “The DOE is required to establish an administrative record that contains the documents (e.g., reports, public comments, and correspondence) that form the basis for the selection of a response action under CERCLA. A list of locations where the Administrative Records for the Hanford Site are available appears in the Community Participation section of this Proposed Plan.”
193	Page 66, line 22, ARARs	The phrase “appropriate for the situation and must be met when cleaning up sites” should be replaced with “appropriate for the situation. The selected remedy must comply with ARARs except those that are waived.”
194	Page 66, Baseline Risk Assessment	The current definition should be replaced with “A study that identifies and evaluates the contaminants present at a site and assesses the current and potential threats to human health and the environment if no remedial action is taken at the site; it is also used to determine the need, or basis, for action”
195	Page 67, lines 1-2	The text “remediate sites where hazardous substances, may have been released (e.g., leaked, spilled, or dumped) to the environment” should be replaced with “remediate sites where hazardous substances, pollutants, or contaminants may have been released (e.g., leaked, spilled, or dumped) to the environment or where there is a substantial threat of such a release.”
196	Page 67, line 6	Is the phrase “adverse health effects to receptors” the standard definition? Generally we see the reference to health effects associated with human health. It isn’t clear ecological risk is included.
197	Page 67, ERDF definition	The current definition should be replaced with “The ERDF is the Hanford CERCLA approved disposal facility for most hazardous (radioactive and non-radioactive) waste and contaminated environmental media generated under a CERCLA response action, that meet the waste disposal acceptance criteria.”
198	Page 67, Lifetime Cancer Risk	The current definition should be replaced with “A numerical estimate of the incremental probability of an individual developing cancer over a lifetime as a result of a reasonable maximum site related exposure to a potential carcinogen.”
199	Page 67	Hanford Comprehensive Land Use Plan should be removed. It is not important to a proposed plan that “briefly describes remedial alternatives, proposes a preferred alternative, and summarizes the information relied upon to select the preferred alternative.”
200	Page 67, Institutional Controls	“Administrative measures” should be changed to “Non-engineered instruments such as administrative or legal measures.”

201	Page 68, line 9, MTCA	“(WAC 173-340)” should be removed. Note that only part of 173-340 provides state standards that set cleanup regulations. The specific parts of 173-340 for inclusion are identified in the proposed plan and in EPA’s comments.
202	Page 68, NEPA	The following should be added to the definition: “Federal agencies conducting CERCLA actions may rely on the CERCLA process for environmental reviews that are functionally equivalent and are not required to engage in a separate NEPA analysis such as preparation of Environmental Assessments [EAs] and Environmental Impact Statements [EISs]) (40 CFR 1500; “Purpose, Policy, and Mandate,” O’Leary, 1994).”
203	Page 68, NCP	The middle part of the definition should be rewritten as “...1968 to address potential spills in U.S. waters. Following the passage of Superfund legislation in 1980, the NCP was expanded to include the regulations covering releases of hazardous substances or pollutants or contaminants. In 1994...”
204	Page 68, NPL	The definition should be changed to “The list, compiled by EPA pursuant to CERCLA section 105, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response. Sites are included on the list because of their potential risk to human health and the environment.”
205	Page 68, Nature and Extent	The ending phrase “when contamination has moved” can be removed.
206	Page 68, No Action	The definition should be changed to “No remedial action would be conducted at a site and it would remain in its current condition. A No Action alternative is required to be considered under CERCLA. It can include monitoring.”
207	Page 69, Preferred Alternative	The definition should be changed to “The remedial action proposed after an evaluation of a range of viable alternatives. The preferred alternative must be protective of human health and the environment.”
208	Page 69, PRG	The definition should be changed to “A PRG is a risk-based value for specific contaminant and exposure pathways that establish acceptable exposure levels that are protective of human health and the environment. PRGs are established during the feasibility study based on scientific information and are used as a target for remedial cleanup goals. Alternatives are developed and evaluated based on how well they meet the goals. Final remediation goals are determined when the remedy is selected in the record of decision and are used during the remediation of a site.”
209	Page 69, Proposed Plan	The definition should be changed to “Proposed plans are prepared by the lead and support agencies to present to the public the preferred alternative and other alternatives analyzed for remedial actions at specific waste sites. Proposed plans are based on and summarize the remedial investigation/feasibility studies for specific sites.”
210	Page 69, Record of Decision	The definition should be changed to “A ROD is a legally binding public document that identifies the remedy that will be used at a group of sites and the rationale behind the selection. The Responsiveness Summary is made available with the ROD and contains the public comments received on the proposed plan and the Agencies’ responses.”
211	Page 69, Remedial Alternative	The definition should be changed to “General or specific actions that are evaluated to determine the extent to which they can eliminate or minimize threats posed to human health and the environment due to a release or threatened release of a hazardous substance into the environment, comply

		with environmental laws and regulations, and meet other selection criteria.”
212	Page 69, RI/FS	The definition should be changed to “The RI/FS process as outlined in this proposed plan represents the methodology that the Superfund program has established for characterizing the nature and extent releases or threats of releases of hazardous substances, of risks posed thereby, and for evaluating potential remedial action alternatives.”
213	Page 69. Remedial Action, and Remediation	These should be combined and the definition be changed to “Actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment, so that they do not migrate to cause substantial danger to public health or welfare or the environment.”

**EPA Comments on “Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units” DOE/RL-2010-99, Draft A**

1	General	Comments provided by EPA on the proposed plan should be applied to the corresponding parts of the RI/FS document.
2	General	The FS does not lead the reviewer through the document. Instead the document bounces the reviewer to multiple chapters, sections, and appendices. The reader is led at times to sections that do not exist in the text. Table of contents do not exist for the appendices which have multiple documents and subjects. Add a Table of Contents to each appendix.
3	General	A summary table does not exist for the input parameter used in STOMP. Provide the input parameters that were used in STOMP modeling in Appendix F.
4	General	The assumed base case recharge value is not technically justified. Recharge will not drop to 8 mm/y or less until steady-state and soil horizonation returns to the pre-disturbed condition, which would be at least 100 years (Birkeland, P.W., 1984, Soils and Geomorphology, p. 223-225). A defensible infiltration rate must be used and the basis explained. Use an infiltration rate of at least 50 mm/y for the natural recharge for post remediation and long term, based on the research of Gee et al., 2005, Vadose Zone Journal, 4:32-40 and Gee et al., 2005, Vadose Zone Journal, 4:72-78.
5	General	Institutional controls are proposed but not defined specifically. There needs to be specific detail to the ICs in the alternatives. Please follow EPA guidance for this.
6	Page xi, top of page	The list of RODs and ESDs is incomplete and should be updated.
7	Page xvi, top paragraph	This paragraph needs to be revised to match the paragraph in the Proposed Plan on page 61.
8	Page xvi, end note #20	This document does not appear to be in the administrative record. It should be added.
9	Page xxiii, line 11	The phrase “for the 300 Area” should be changed to “for the 300 Area Industrial Complex.”
10	Page xxiii lines 13-19, and page xxiv lines 1-16	These should be removed.
11	Page xxv, figure ES-5	This should be removed.
12	Page xxvii, 1 <sup>st</sup> full paragraph	This paragraph needs to be revised to be consistent with changes to the Proposed Plan.
13	Page xxvii, lines 18-20	The document states “In addition to the residential scenario and industrial scenario, PRG values were developed for the resident HRNM worker and the casual user exposure scenarios.” It would be helpful to the reader to provide a reference to the part of this very large RI/FS document that contains this information.

14	Page xxvii, lines 21-22	A “supplemental soil risk evaluation” is mentioned but no reference is given. It would be helpful to the reader to provide a reference to the part of this very large RI/FS document that contains this information.
15	Page xxxi, lines 9-12	The Proposed Plan currently states “For the 300 Area, the anticipated future land use has been identified as industrial. However, both the unrestricted land use criteria based upon the future residential scenario and the industrial land use criteria were used for the preparation of the following RAOs.” The Proposed Plan is following the interim actions for which industrial use is for the 300 Area Industrial Complex and 618-11, and unrestricted use is for the rest of the area. The document should be changed to read something like “For the 300 Area Industrial Complex and 618-11, the anticipated future land use has been identified as industrial. For the rest of the 300 Area cleanup levels are proposed that will support unrestricted land use. Therefore both the unrestricted land use criteria and the industrial land use criteria were used for the preparation of the following RAOs.”
16	Pages xxxi and xxxii	The changes in the RAOs in the Proposed Plan need to be applied to the RI/FS document.
17	Page xxxii, line 25	At the end of this paragraph, a sentence something like the following would be informative. “PRGs are calculated for single contaminants. Sites with multiple contaminants must also meet cumulative risk limits in the RAOs.”
18	Pages xxxiv and xxxv	Comments on the Proposed Plan identify several groundwater contaminants above standards for which a remedy is proposed. These contaminants need to be identified as COCs. All the related pages in the RI/FS need to be changed to match. (I.e. nitrate, TCE, DCE, gross alpha, and the uranium isotopes should be added as COCs in groundwater.)
19	Page xxxiv	The bullet that currently states “Most gross alpha is associated with uranium; therefore, it will not be carried forward as a groundwater COC and will not be included in the monitoring program” should be changed to something like “Gross alpha is carried forward as a groundwater COC. Most gross alpha is associated with uranium that can be measured as total uranium metal. The isotopic ratios of uranium in the 300 Area groundwater are known so the total uranium metal concentration can be converted to gross alpha for a more cost effective groundwater monitoring. Occasional uranium isotopic measurements will be made to verify the ratios and conversion to gross alpha.”
20	Page xxxv lines 8-9	Regarding nitrate the document states “Due to its likely association, at least in part, with the site-wide contamination, nitrate at the 618-11 Burial Ground will not be carried forward as a groundwater COC.” This should be “Due to its likely association, at least in part, with the site-wide contamination, nitrate at the 618-11 Burial Ground will be addressed in the 200-PO-1 Operable Unit. 300-FF-5 alternatives 2-5 include ICs to be protective because a 200-PO-1 remedy has not been selected.”
21	Page xxxvi, lines 4-6	The document states “Since the areas of chromium exceedance are localized and likely associated with completed remediation activities at the 618-7 Burial Ground, chromium will not be carried forward as a COC.” This should be changed to something like “Since the areas of chromium exceedance are localized, have dropped below the MCL and are dropping below the surface water AWQC, and likely associated with completed remediation activities at the 618-7 Burial Ground (so no additional chromium is expected), chromium will not be carried forward as a groundwater COC.”

22	Page xxxvi line 9	The document states “Factors considered in the evaluation include...” The factors in this list are sub-considerations of the NCP’s implementability. Since remedial alternatives are expected to be evaluated via the NCP nine criteria, it would be better to introduce these factors as considerations for implementability. For example, “Factors considered in evaluating the implementability include...”
23	Page xxxvii	The document states “bottom of an engineered structure (burial ground trench, caisson, or pipe unit).” It would be good to introduce this list of engineered structures with an “e.g.” since there are other engineered structures. Also is “pipe unit” intended to refer to the 618-10 and 618-11 vertical pipe units in addition to the miles of pipelines in the 300 Area Industrial Complex? This should be clarified. Something like the following would help clarify these issues: “bottom of an engineered structure (for example, burial ground trench, caisson, pipeline, or 618-10/11 vertical pipe unit).”
24	Page xxxvii	The following statement occurs multiple times in the RI/FS and needs to be removed. “ICs will be implemented on the entire River Corridor, and not independently for each waste site or groundwater plume.” CERCLA remedies are applied to environmental releases or threats of releases, not to areas without a risk. ICs need to be implemented for each operable unit and described in the proposed plan.
25	Pages xxxvii thru xl	The changes that are made to the alternatives presented in the Proposed Plan need to be carried into this RI/FS.
26	Page xlii, last paragraph	The last half of this paragraph needs to be removed, beginning with “Sites that do not meet the cleanup goals.” Note that sites that are not included in the selected remedy of the ROD or post ROD are determined to be better addressed via a different remedy and will need to go through an ESD or ROD Amendment.
27	Page 1-3 figure 1-2	This figure should be changed to match the proposed cleanup level areas. I.e. the 300 Area Industrial Complex plus 618-11 are industrial, the rest of the area is unrestricted. The figure title could be something like “Proposed Cleanup Level Application Areas.” The legend should be much simplified to match this.
28	Page 1-5 last paragraph and table 1-1	The paragraph beginning “DOE is the lead agency” plus table 1-1 should be removed. The first part of the paragraph is phrased differently but redundant with page 1-8 lines 37-41. The last half of this paragraph and Table 1-1 are not part of this CERCLA action and appears to overlap but contradict the RAOs set forth in the Proposed Plan and this RI/FS document.
29	Page 1-6, first two paragraphs	These two paragraphs should be removed. They are largely not relevant to this 300 Area document, and describe goals that are different than set forth in this CERCLA RI/FS and the Proposed Plan.
30	Page 1-6, lines 19-33	These two paragraphs describe expectations and objectives for the cleanup actions. This is overlapping scope with the RAOs set forth in the Proposed Plan and RI/FS, plus these two paragraphs are not consistent and should be removed.
31	Page 1-6 lines 35-36	The document states “These final decisions will provide comprehensive coverage for all areas within the River Corridor .” That is not true. The scope description for this 300-FF-1/2/5 decision specifically excludes FFTF, Hammer, the Patrol Center, Energy Northwest, 200-PO-1 groundwater plume, etc. It would be good to point out that if future discoveries indicate remedial actions are necessary within the zone marked “300 Decision Area” in figure 1-2, that any cleanup need is anticipated to be addressed via a change to the ROD.
32	Page 1-9, line 18	The sentence “The primary source of contaminants was releases and effluents related to fuel fabrication operations” should be revised to read “The primary source of

		contaminants was releases and effluents related to fuel fabrication operations, process tests, and laboratory activities.”
33	Page 1-9, lines 20-21	The document states “Operations that caused contamination within the 300 Area have ceased.” That is not entirely true. The 325 laboratory is an example. The sentence could be changed to “Many of the operations that caused...”
34	Page 1-55, lines 6-19	These three paragraphs present an appropriate land use discussion including bring up the CLUP in a reasonable context that doesn’t clash with the proposal on where to apply the different cleanup levels. Thanks.
35	Page 4-209 figure 4-62	This figure should be revised to include several years data because some tubes weren’t sampled during the times presented here. The missing data is significantly different from what is shown currently. In particular the area with the highest TCE measured, i.e. AT-3-3-D, is shown as not sampled in this figure.
36	Page 4-303 figure 4-93	This figure has been a useful depiction of the CSM for where the remaining uranium resides. In this document this figure has not been updated to include the RI/FS data. The CSM is supposed to adapt to and be updated with the most current information. This figure should be updated, and where there is some reasoned estimate of the uncertainty that could be added information.
37	Page 5-21, table 5-4	For the columns with “Period 1,” “Period 2,” and “Period 3” it would be helpful to include the years in the table. I.e. 2010-2015, 2015 to 2045, and post 2045. Also because the industrial areas will have a much lower evapotranspiration rate than the unrestricted use area, this table will need to be modified.
38	Page 5-35 Section 5.7.2.1	Could not find in any literature the method of using peak groundwater concentration to divide into MCL to calculate a PRG. This makes it difficult to validate PRGs with risk based PRGs. Explain this methodology. MCLs frequently are not risk-based and do not take into account total risk from other contaminants. This methodology does not appear to be conservative.
39	Page 5-36, line 32	This is an instance of a global comment. This line provides “ECF-300FF5-11-0153” as a reference. That is not a useful reference for the reader. That reference is not in the bibliography. In fact it is on the CD for Appendix F and there is no table of contents for the appendices. The reader should be referred to Appendix F in this document. Also, at the front of the appendix volume should be a table of contents to the appendices.
40	Page 5-76, line 19	The document states “An observation well that is screened for 4.5 m (15 ft).” In contrast Page 5-36 discusses use of a 20 ft screen. This is confusing.
41	Page 5-77, lines 15-16	The document states “and 778 ug/L surface water standard for uranium.” If this is the first mention of this standard in the document, a reference should be provided. Also this standard isn’t identified in the Proposed Plan such as in table 3.
42	Page 6-17, lines 40-41	These lines are an example that land use exposure scenarios are discussed in many areas of this massive RI/FS document including the appendices. A global electronic search through the entire RI/FS is needed using search terms such as “land use,” “monument,” “industrial,” “recreational.” The RI/FS needs to match the Proposed Plan.
43	Pages 6-204 and 6-205	These pages summarize the Columbia River Component. The EPA has very recently received the human health risk assessment document from that project and thus has no way to validate this portion of the RI/FS report.
44	Page 6-205, lines 10-11	Regarding the Columbia River Component risk assessment, the RI/FS states “Throughout the Hanford Site study area, nearly all of the risk drivers also were identified as COPCs in upstream reference areas, with the exception of Cr(VI) in the

		300 Area.” The hexavalent chromium issue identified in the 300 Area for the Columbia River Component is not addressed in the RI/FS and Proposed Plan remedies for the 300 Area.
45	Page 6-205, lines 25-26	The document states “the risks related to exposure to surface water, sediment, and island soil are very small relative to that from the fish ingestion pathway.” In a CERCLA decision document, terms like “very small” aren’t sufficient. The risk needs to be expressed as a hazard quotient and/or cancer risk, and compared to an HQ of one and cancer risk thresholds.
46	Page 6-205 lines 34-35	Regarding europium-152 the document states “soils collected from Johnson Island constituted a significant risk driver; however risks from europium-152 will decrease over time as a result of radioactive decay. As a result of radioactive decay, it is concluded that no further remedial action is warranted for Johnson Island.” How large a risk is this compared to the 10 <sup>-4</sup> to 10 <sup>-6</sup> risk range of CERCLA? How long a time is presented in that document as necessary for decay until it isn’t a “significant” risk? If radioactive decay is what DOE proposes as an alternative, this should be included in DOE’s preferred alternative. What are the other alternatives DOE has evaluated and where are those alternative presented in this FS document? Again it is impossible for EPA to do a good assessment of this section 6.4.1 which is a summary of the document that DOE has just very recently provided to EPA.
47	Page 6-208, line 34	Chromium is defined as having an action level of 65 ug/L. The basis for this standard is not identified and it is not clear why it isn’t included in table 3 of the Proposed Plan.
48	Page 6-208 to 6-209	There are several paragraphs that describe groundwater data for the contaminants DCE, chromium, TCE, and nitrate. These paragraphs explain that there are wells with comparatively high concentrations of these contaminants. But these wells were excluded from the spatial and temporal monitoring network, were excluded from the exposure point concentration calculations, and were excluded from the groundwater risk evaluation. That is not appropriate. The Work Plan DOE/RL-2009-30 on page 4-18 covers part of this topic. It states “Identify existing and/or install new monitoring wells that are spatially representative of the groundwater.” Clearly the wells with the elevated contaminant concentrations are critically important to be spatially representative of the groundwater. Each individual well is a distinct exposure point for the receptors using that well. As discussed in many places in the Proposed Plan and the RI/FS document, groundwater is evaluated as a potential drinking water source, as per the NCP and CERCLA guidance. Risk assessment doesn’t allow pooling the people exposed to the high concentration well with people exposed to lower concentration wells to statistically conclude that as a group their collective exposure is acceptable. Since MCLs are based on an annual exposure, it is acceptable to pool single well data over the year to evaluate exposure to the people using that one well for that year. [Obviously short-term acute exposures to concentration spikes would be compared to an acute toxicity threshold rather than an MCL, but for this modestly stable groundwater situation the MCL comparison is appropriate.] Therefore EPCs should be determined for each well based on the temporal data for that individual well and compared to MCLs because MCLs are set to be protective of long term exposure. Fortunately the groundwater modeling estimates for uranium to meet the MCL was done for the well with the highest uranium (see the Proposed Plan on page 28, lines 7-9). Thus the way the EPC and risk assessment was conducted will not interfere with making the correct remedial decision for these contaminants. Also earlier

		comments request DOE revise the documents to designate DCE, TCE, uranium isotopes, gross alpha, and nitrate as COCs.
49	Page 8-7 thru 8-32 Table 8.2	The ARAR table must establish the regulations that are applicable, relevant and appropriate. Throughout the text in the column <u>rationale for including</u> is the use of the word “ <b>may</b> .” This is an FS for the final cleanup action and the FS must state the contaminants and the remedy that is needed to meet the RAOs for those contaminants. With that knowledge, it should be apparent which regulations apply. The word “may” is not appropriate for a final decision. Remove the word “ <b>may</b> ” throughout the text in the column named the <u>rationale for including</u> .
50	Page 7-71, table 7-8	This is a table of COPCs that appear to be a risk to one or more ecological receptors in one or more environmental media, but there is no information given to the reader regarding where these risks will be addressed (for example in the alternatives within this RI/FS process, or in a specified different CERCLA action, or a specified non-CERCLA action). The table title indicates these contaminant issues are in the 300 Area. This table identifies uranium as a risk, and states that the 300 Area is a potential source. (Note that we know that the 300 Area is more than a “potential” source of uranium.) In the Proposed Plan it is clear that remedies are proposed for uranium contamination. But all the other contaminants in this table are left unassigned to any cleanup decision. The reader should not be presented with contamination issues in the 300 Area for which no remedies are proposed or alternative decision-making process identified.
51	Pg. 8-9, Table 8-2	The ARAR WAC173-303-64620(4) <u>regulatory requirement</u> column is not correct. The corrective action requirement takes into account more than standards for groundwater protection. Rewrite as follows: Requires Corrective Action to be “consistent with” specified sections in WAC173-340. Locate this ARAR with the rest of the WAC173-303 regulatory requirements.
52	Pg. 8-9, Table 8-2	The ARAR WAC173-303-64620(4) <u>rationale for including</u> column is incorrect. Corrective Action applies to the entire Hanford site. Corrective Action applies to all releases of dangerous waste and dangerous constituents. WAC173-303-64620(1). Although CERCLA may be the authority being used to clean up the release, that cleanup must be “consistent with” corrective action. Rewrite as follows: The substantive portions of WAC173-340 establish minimum requirements for HWMA corrective action.
53	Pg. 8-9, Table 8-2	The ARAR WAC173-303-64620(4) <u>possible application</u> column is incorrect. Corrective Action applies to the entire Hanford site. Corrective Action applies to all releases of dangerous waste and dangerous constituents. WAC173-303-64620(1). Corrective action does not apply only to groundwater. Rewrite as follows: corrective action applies to environmental media on the Hanford site where dangerous waste and dangerous constituents have been placed whether intentional or unintentional.
54	Pg. 8-14 Table 8-2	Some of the land use is not industrial and requires an unrestricted ARAR. Add the WAC173-340-740(3), Unrestricted land use soil cleanup standards.
55	Pg. 8-14 Table 8-2	This ARAR establishes applicability criteria for industrial lands. Some areas in the 300 Area may be acceptable ecological habitat and will <u>not</u> meet the criteria for industrial. Since the industrial criteria require ICs, this is acceptable for human health protection but will not necessarily protect wildlife, plants or soil biota. ADD WAC 173-340-745(1). Since the industrial criteria require ICs this is acceptable for human health protection but will not necessarily protect wildlife, plants or soil biota.
56	Pg. 8-16 Table 8-2	Terrestrial Ecological citations are not accurate. Please delete the following: “Site-Specific Terrestrial Ecological Evaluation Procedures” (WAC 173-340-7493)

57	Pg. 8-16 Table 8-2	The language under the heading <u>Description of Regulatory Requirement</u> needs to be modified because the site specific evaluation is being done. Table 749-2 is for simplified terrestrial ecological evaluations. See modification. After the paragraph that ends “site-specific cleanup standards for the protection of terrestrial plants and animals” add the following statement: Use MTCA Table 749-3 soil concentrations for protection of plants, soil biota, and wildlife. Please delete the following: “Priority Contaminants of Ecological Concern” (WAC 173-340-7494) provides for numeric concentrations of hazardous substances determined to persist, bioaccumulate, or be highly toxic to terrestrial ecological receptors. Concentrations listed in Table 749-2 are based on protection of wildlife for industrial and commercial land uses, and are protective of plants and animals for other land uses.”
58	Pg. 8-15 Table 8-2	Guidance for developing Ecological Soil Screening Levels (Eco-SSLs) (OSWER Directive 9285.7-55) does not belong under that heading of MTCA. Move the OSWER directive to a guidance section or add a different heading for this TBC ARAR
59	Pg. 8-17 Table 8-2	Guidance on Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (EPA..... This guidance does not belong under the MTCA heading. Move the EPA guidance to a section or add a different heading for this TBC ARAR
60	Appendix F, general	Conceptual model choices and paucity of calibration data. While recognizing the complexities of U transport in a system with variable boundary conditions and thus transient flowpaths, the modelers have opted to simulate this system as two 2D transects representing different times of year, and then only used one of these transects to make predictions. Page 21 says that only three wells were used to calibrate the June-North transect, and only 5 wells were used for the December-North transect. Page 53 then reports that the December-North transect was not used for transport modeling, and no results from that transect are presented. It appears that the entirety of the results presented in this report, including the transport parameters, the alkalinity mixing model, and the U transport model are thus predicated on data from only three wells, one of which contains significant data gaps, applied to one 2D transect representing conditions that only exist for one month of the year. The recognized alternative flow system that dominates at other times of the year (Figure 3-3) is thus ignored. Since no model results for the December-North transect are presented, it might be preferable to remove all references to the December-North transect from the report. Without any simulation of flow or mass transport during conditions which dominate for half of the year, assertions that this model can make long term predictions about eventual mass transport or the impact of proposed remediation strategies are difficult to justify.
61	Appendix F, general	Lack of model calibration process. The groundwater flow modeling presented here does not appear to have been calibrated. Model calibration is a standard part of all modern modeling exercises, and is defined as the mathematical comparison of model outputs with observed data for a range of model inputs. Instead, model outputs were evaluated by "visual inspection" (see for example section 3.4.5, or page 51, or several other places in the report). The authors assert that visual inspection was the only viable calibration process available to them due to the noisy nature of the EC data, but tools for data smoothing are routinely used by groundwater modelers in such situations with great success and no evidence is provided that any such attempt was made in this case. No

		metric of model misfit is provided. No sensitivity analysis was performed. Without some quantification of the degree of fit between model predictions and observed values, evaluating the utility of model outputs is impossible. The numerical model may or may not adequately capture the conceptual model envisioned, but without the inclusion of results from a rigorous mathematical model calibration process the quality of model predictions cannot be determined. The predicted values of concentration changes over the next 200 years for the various proposed remediation alternatives presented in the report thus do not represent reliable information upon which to make decisions about remediation plans.
62	Appendix F, general	Choice of parameters to calibrate. Many potentially important parameters were either ignored or fixed as a ratio to parameters that were calibrated, which would limit the ability of the calibration process to reproduce observed data if any sort of mathematical calibration process had been utilized. Parameters that were not adjusted in the model include lateral hydraulic conductivity of several units, vertical hydraulic conductivity, vertical dispersivity, longitudinal dispersivity, alpha and n and m in the van Genuchten equation, storativity and porosity. Some of these values were assigned based upon laboratory test data, some were modified from laboratory test data without justification. Assignment of these parameter values to whole units, rather than spatially varying property maps, could be justified on the grounds of parsimony if a calibration had been performed; assignment of explicit values to whole units without a calibration is more difficult to defend.
63	Appendix F, general	Choice of timestep. The model was built with a daily timestep that appears inadequate in a system with documented twice-daily flow reversals. Hourly or at least 6-hour timesteps would have done a better job of capturing this system without the need to introduce arbitrarily high dispersion values and artificial heads. Reproducing net flow is still possible in such systems by imposing artificial head boundary conditions, but calibration targets must then be adjusted accordingly, which was not done. Reproducing net concentration flow is more difficult as the reversing flow of tidal pumping mechanisms impose artificially high apparent dispersivities that are unsupported by field or laboratory studies.
64	Appendix F, general	U sorption methodology. Initial U distributions were poorly constrained, and U sorption lab tests used particles of < 2mm diameter. Page 27 reports that 20% of soil is <2mm, so values were then multiplied by 0.2. This methodology appears to assume that surface area available for sorption is proportional to soil mass when comparing particles of varying size classes, which is demonstrably false by basic geometry. Further discussion of this methodology on page 39 (1D models) and page 49 (table 3-4) did not clarify this apparent inconsistency. At best, these sections should be rewritten to better explain the methodology used if the authors feel the methodology is defensible. The choice of equilibrium sorption and the variable alkalinity model and the groundwater end-member alkalinity kinetic model are good ones, but suggests that a better alternative would have been to use a kinetic sorption variable alkalinity model. Page 59 suggests in either case, the model does a poor job of reproducing breakthrough curves in the one transect for which it makes predictions and would benefit from application of a 3D model.
65	Appendix F, general	Appendix F page 71 future modeling of U concentration is based on high river stages that do not account for the proposed changes to the Columbia Basin Treaty, which

		<p>are likely to transfer flood control responsibilities from Canada to the US and may result in higher heads for some parts of the year during the 200 year time frame over which model predictions were made. Page 76 addresses some high head years and and pages 106-17 discuss alternative future recharge scenarios, but in neither case are model results presented which might help place the earlier results in context. Such results would be especially helpful given the lack of sensitivity analysis and resultant inability to ascertain the degree of variability in model predictions.</p>
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