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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
HANFORD/INL PROJECT OFFICE
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November 14, 2011

Jonathan A. Dowell
Assistant Manager for the
Central Plateau
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

RECEIVED
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EDMC

Re: EPA Comments on Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2 and 100-KR-4 Operable Units, DOE/RL-2011-97, Draft A and Proposed Plan for Remediation of the 100-KR-1, 100-KR-2 and 100-KR-4 Operable Units, DOE/RL-2011-82, Draft A

0099042

Dear Mr. Dowell:

Attached are comments to the above-referenced documents. As indicated in the comments, the process for remedy selection for waste sites falls short of what is required by the NCP. The discussion of the post-ROD sites is troubling. This is a final action remedy and the RI/FS should collect adequate data to select a remedy. EPA recommends that the selected remedy for the majority of waste sites should be remove, treat, dispose, and the text discussing the post-ROD sites be re-examined. In addition, similar to the interim action RODS, the list of COCs should be expanded. As each waste site is remediated, the appropriate COCs can be selected and a sampling design developed to verify attainment of RAOs and cleanup levels.

Also, the reasonably anticipated future land use presentation in this document violates an agreement already reached on this topic by the Tri-Party Managers. EPA supports an unrestricted use scenario similar to the scenario used in the interim action RODs for the majority of the K Area and a casual user scenario for those areas near the Columbia River that are in the flood plain and may have cultural sensitivity. An unrestricted land use should include irrigation, but the RI/FS and proposed plan state that PRGs were calculated without irrigation. PRGs should be calculated with the irrigation scenario as was done in the interim actions.

EPA would like to schedule a meeting with the U.S. Department of Energy to work through comments in December. Please contact me at 376-9529 to inform me of your availability.

Sincerely,

Christopher Guzzetti
Project Manager

Enclosures

cc: Gabe Bohnee, Nez Perce Tribe
Stuart Harris, CTUIR
Russell Jim, Yakama Nation
Jane Hedges, Ecology
Ken Niles, ODOE
Administrative Record: 100-KR-1, -2, -4

EPA Comments on the 100-K Proposed Plan

Comment Number	Page	Line/Figure	Comment
1	General	General	This PP seems to fall short of the purpose and intent of a PP under the NCP and does not follow EPA guidance, and it is difficult to understand what is being proposed. • Section 300.430(f)(2) of the NCP requires that the lead agency identify and present to the public, via the PP, the alternative that best meets the requirements of section 300.430(f)(1). Further, it outlines that the PP shall "briefly describe" the remedial action alternatives analyzed, propose a preferred remedial action alternative, and summarize the information relied upon to select the preferred alternative. The subparts of this section of the NCP call out the requirements that the PP provide a brief summary description of the remedial alternatives evaluated, identify and provide a discussion of the rationale that supports the preferred alternative, and provide a summary explanation of any proposed ARAR waivers. • Section 7.3.7 of the Action Plan states: "The proposed plan must describe an analysis of the feasible alternatives and clearly state why the proposed remedy is the most appropriate for the operable unit, based on written EPA guidance and criteria." A PP is supposed to be a brief summary that presents information clearly to the public. This draft contains a lot of unnecessary and, in some cases, problematic language. For example: 1) pg 21 lines 20-23: tribes = government to government, not simply part of the regulatory process; ARARs?; and 2) pg 47 RCRA Corrective Action section: suggest deleting all but the first sentence (with "and HWMA" added after RCRA on line 25) as this language is not necessary and some of it is problematic (e.g., the PP doesn't fulfill the standards, it simply presents a preferred alt, etc.); Ecology has the lead on corrective action.
2	General	General	The analysis of the 9 CERCLA criteria is inconsistent in treatment of modifying criteria. Important to make the role of all 9 criteria clear and to apply them appropriately. For example: 1) the introductory language to the evaluation of remedial alternatives section (pg 40 lines) does not clearly present the role of modifying criteria (does not speak to state acceptance at all), and then the preferred remedial alternative section on pg 46 indicates that Alt 2 "meets the threshold criteria and provides the best balance of tradeoffs compared with Alternative 3 with respect to the balancing and modifying criteria." This statement is not only inconsistent with the analysis that was presented immediately preceding this section (which did not analyze modifying criteria and indicated that at least part of this analysis could only be done after the PP comment period), it is also inaccurate since community acceptance cannot be fully analyzed until after the comment period etc.; and 2) some of the criteria seem to be inadequately addressed/misrepresented. See, e.g., pg 46 lines 9-11 regarding implementability - this criterion relates to the ability of the agency to implement a given alt, whereas the language cited seems to actually be speaking to the likely "success" of the remedy overall. This really gets at how well the criterion are understood and analyzed by the authors.

Comment Number	Page	Line/Figure	Comment
3	General	General	The overall format is cumbersome and there is too much focus on the introduction. It should not take the reader until page 10 to find out the number of wastes sites to be remediated. Recently, the PW-1,3,6 PP has gone through the review process; should look to that for format.
4	General	General	The introductory language speaks only of hazardous substances, no mention of pollutants or contaminants at Hanford. It also on refers to releases, what about situations in which it is a threat of release? In the section titled "What are the contaminants at this site?" all are referred to as contaminants. The NCP defines hazardous substances as well as pollutants and contaminants. These definitions should be considered and the terms appropriately used throughout the document.
5	General	General	There is language in the PP that suggests the RI/FS is not adequate (e.g., pg 23 lines 20-24, pg 33 lines 7-11). Is there adequate information in the record to meet the requirements of the NCP and support the decision?
6	2	9	Alternative 2 should state what technologies will be applied and where. For example, RTD, Soil Flushing and Bioinfiltration for waste sites and Pump and Treat and Bioinjection for groundwater.
7	2	27-30	This is not a clear and accurate portrayal of what is required by CERCLA vs what is a preference. This issue recurs within the document. Suggested text below, assuming it is accurate to say the preferred alternative meets all statutory requirements and satisfies all statutory preferences/biases: • "This alternative meets the statutory requirements under CERCLA and the NCP to select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (ARARs) (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. In addition, this alternative satisfies the statutory preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and the statutory bias against off-site disposal of untreated wastes."
8	3	7	Title should be Background/Site Characterization or something similar. The previous section is the Introduction correct?
9	3	12	Change to: ...has been organized by DOE into three major...
10	4	8	Change to: IRAs were initiated in 1994 for River Corridor OUs to...
11	5	2	change the word "cleanup" to "control"
12	5	8-9	Delete "..and anticipates the ROD."
13	5	30	ISS for the reactors with eventual one-piece removal.
14	5	32-35	This paragraph is missing information, it makes no point.
15	5	32-35	The document states "The specific reactor path forward will be addressed in a separate CERCLA decision." If this RI/FS and PP are for a final ROD, the reactor path and decision should be included.
16	8	5	Delete "recently completed"
17	8	8-9	What does this sentence mean? Addressing environmental risk?
18	8	9-10	Need to explain that the groundwater IRA only addressed hexavalent chromium.
19	10	1-21	This section is redundant.

Comment Number	Page	Line/Figure	Comment
20	10	44	See comment above. First time the number of waste sites addressed by this PP is mentioned.
21	11	Figure 8	This figure really is not helpful.
22	12	30-31	Why does the public need to know this?
23	17	3-4	The sentence states that arsenic is not routinely detected in groundwater above naturally occurring concentration. Clarify the term "naturally occurring" by whether that is a local background concentration, or some other source of a reference concentration. Add text stating the values for arsenic, and where arsenic occurs.
24	17	6-16	Some of the waste sites described in the RI/FS could be considered principal threat waste. Soil near the reactors is over 4 million pCi/g Cs-137 (Page 4-69 line 34). Discussion is warranted.
25	17	11	10^{-3} is wrong value for the excess lifetime cancer risk (ELCR). Change value to 10^{-4} which is the value to determine if a remedial action is needed. The CERCLA cleanup has a range 10^{-6} to 10^{-4}.
26	17	22-27	What "required" an integrated 100-K ROD for soil and groundwater? Not CERCLA or the NCP. The text in this section is problematic. Is the intent to indicate that a final ROD is necessary where there have been interim RODs?
27	20	9	Burial grounds need to part of this Proposed Plan as well
28	21	2	50 USC 2582 is misrepresented, because it omits the word "plans" and omits the term "of at least 50 years". Revise as follows: "Under 50 USC 2582, DOE was assigned the authority to develop future land use plans for Hanford and Other DOE sites, for a planning period of at least 50 years."
29	21	30-33	Most of the 100 Areas are NOT part of the Monument.
30	21	38	Replace "hypothetical" with "a number of" or "several"
31	21	Pg 21 (40-42) Pg 22 (1-2)	EPA completely disagrees with the statements in this paragraph.
32	22	21	Remove the word "supplemental" from every place it is mentioned in this section.
33	22	26-40	This should explain how the data from the RCBRA was used? Does not account for back fill.
34	22	33-34	Delete last sentence. EPA disagrees
35	23	25	This section needs to be expanded.
36	29	9-16	List the sites and the basis.
37	29	34	Change to: ...by the time the ROD for this action is signed. It is confusing when the PP refers to "the ROD" is it referring to the Interim Action ROD or the final ROD that will follow from the PP?
38	29-30, 32	Pg 29 (39-44) Pg 30 Table 5 Pg 32 Table 6	A combination of this information and Tables should be used to generate a table that gives more information about each waste site and the technology to be used at the waste site. (Similar to table 9-5 in the RI/FS report)
39	31	1-11	Why is this information called out?? NHPA is just one of many important laws (or ARARs).
40	32	1-16	EPA is requiring that the Orchard Lands be carried into the FS with ICs, RTD, and a barrier (one foot clean fill as seen in other orchard impacted lands in the State) as potential remedies.

Comment Number	Page	Line/Figure	Comment
41	32	18	What does "a risk management approach" mean? Clarify.
42	32	19-21	The text states: "The groundwater COCs lie largely within the extent of the hexavalent chromium plumes. The extraction well network installed for the pump-and-treat systems for remediating the hexavalent chromium plumes will capture these contaminants." The extent of hexavalent chromium contamination migrating into 100-N Area from the 100-K Area has not been delineated.
43	36	1-15	Alternative 2 is not clear and does not seem to be adequately defined. The role of ICs should also be clear (in both alternatives 2 and 3) – what does it mean to "control 100-K access and groundwater use" and how would that be done?
44	36	9	The statement that buildings will be demolished "when necessary" is not adequate for the implementation of a remedy or to cost out the remedy.
45	37	15-16	Institutional controls are not defined in one or more alternatives as required by 40 CFR 300.430(e)(3) and the CERCLA nine criteria evaluation [40 CFR 300.430(e)(9)(iii)(C)(2)]. The institutional controls component of alternatives should be described in more detail, including the institutional controls implied (but not called out) in the PP: a. Tribal members fishing along the River will not be allowed to gather roots and berries inland from the river b. Resident rangers will not be allowed to have children live at a ranger residence c. Resident rangers will not be allowed to maintain a garden d. Irrigation will not be allowed
46	37	26-28	Language infers that the vadose zone will be flushed and monitored to determine whether contaminants are mobilized. Clarify language with how the contaminants will be captured and treated.
47	37	36-39	The text states that Alternative 2 will operate until COC plumes are less than DWS. The groundwater CULs may not be the DWS so this statement is incorrect.
48	38, 41	Figure 16 Figure 18	From figures included in the proposed plan (Figures 16 and 18) and the FS, it is apparent that extraction wells will be used for compliance monitoring. It is inappropriate to use extraction wells for compliance wells as pumping draws water from all directions from the well, which could dilute contaminant concentrations. Compliance wells should not be part of the pump-and-treat well network. Compliance wells should be monitoring wells.
49	43	4-8	As written on pg 43, it is not clear that Alts 2 and 3 are protective of human health and the environment as required by CERCLA and the NCP.
50	43-44	Pg 43 (9-17) Pg 44 (1-30)	The ARARs are incomplete in the PP. Reference the complete list of ARARs that are in table 8.2 in the FS.
51	47	9-22	EPA does not include NEPA values in CERCLA RODs. Functional equivalency applies and no NEPA is required for CERCLA actions (see e.g., pg 47). NEPA language throughout the PP should be streamlined and consistent with TPA section 5.7.
52	47	23-38	Delete section.
53	48	18	Change to DOE and EPA

EPA Comments on the 100-K Remedial Investigation/Feasibility Study

#	Page	Line/Figure	Comment
1	General Comment		The process for remedy selection for waste sites falls short of what is required by the NCP. The discussion of the post-ROD sites is troubling. This is a final action remedy and the RI/FS should collect adequate data to select a remedy EPA recommends that the selected remedy for the majority of waste sites should be remove, treat, dispose, and the text discussing the post-ROD sites be re-examined. In addition, similar to the interim action RODS, the list of COCs should be expanded. As each waste site is remediated, the appropriate COCs can be selected and a sampling design developed to verify attainment of RAOs and cleanup levels.
2	General Comment		<u>Land Use/PRGs</u> The reasonably anticipated future land use presentation in this document violates an agreement already reached on this topic by the Tri-Party Managers. EPA supports an unrestricted use scenario similar to the scenario used in the interim action RODs for the majority of the K Area and a casual user scenario for those areas near the Columbia River that are in the flood plain and may have cultural sensitivity. An unrestricted land use should include irrigation, but the RI/FS and proposed plan state that PRGs were calculated without irrigation. PRGs should be calculated with the irrigation scenario as was done in the interim actions.
3	General Comment		<u>Orchard Lands</u> The Orchard Lands need to be carried into the FS with alternatives developed including ICs, RTD, and a barrier (1-2 feet clean fill as seen in other orchard impacted lands in other parts of the State) as potential alternatives.
4	General Comment		<u>Reactor Structures</u> The document states, "The specific reactor path forward will be addressed in a separate CERCLA decision." If this RI/FS and PP are for a final ROD, the reactor path and decision should be evaluated. It is very concerning when there is text in the document that states the nature and extent of contamination under and near the reactors is still unknown (Page 4-69 lines 36-42). The FS/PP needs to develop and evaluate alternatives for the waste sites near the reactor as some of them appear to be impacting groundwater. Deferring cleanup of these waste sites until the reactor is removed is not acceptable.
5	General Comment		<u>River Effluent Pipelines</u> EPA expects these to be carried to the FS /PP for a final decision. Alternatives need to be developed such as: 1) No action 2) Leave in place (with ICs) 3) Grout in place and 4) Remove.
6	General Comment		<u>Deep Vadose Zone/Groundwater</u> It is not clear how groundwater COCs will be treated in the FS/PP. Although there is information in the FS for treatment of the

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			groundwater COCs, it is not clear if the current system will treat the COCs or if injection standards will be met by blending the water. Please clarify. It is not clear what the remedy for the deep vadose zone is. Is it RTD or chemical manipulation/soil flushing? Again, each waste site with deep contamination needs to propose a remedy and clear rationale for why it was recommended in the FS. This information should then be carried forward into the PP. The FS indicates that treatability tests will need to be performed for several of the in situ technologies. This is not appropriate at this stage of the process. EPA and DOE discussed the need for treatability tests as part of the FS several years ago, and DOE decided no tests were needed to select waste site specific technologies.
7	General Comment		ARARs The ARAR identification needs to be consistent with RODs that have recently been completed, such as 200-PW-1,3,6 and 200-ZP-1.
8	General Comment		The RI/FS document states that it is thought that the existing interim groundwater pump and treat system has proven effective in remediating groundwater contamination, but there are no wells downgradient of the extraction wells to check the effectiveness of the system. The document should acknowledge additional wells are needed to delineate the plume boundary.
9	viii	10-13	The text states that "mobile contaminants present in deeper soil are being addressed by continuing excavation where necessary to achieve interim action clean up objectives." This is not true in all cases; some sites such as the UPR under KE Basin and waste sites with C-14 have stopped excavation because the project has determined that it will undermine the reactor structure. The text should be revised accordingly.
10	ix	Figure ES-3	The font used within this graphic makes it difficult to read. Please change the font.
11	xi	Footnote 5	The reference document number is incorrect for footnote #5.
12	xvii	12-15	Cs, Pu, U, PCBs along with other contaminants found in the KE fuel storage basin were not identified as COCs but should be. It is not apparent if characterization of the UPR was sufficient to determine nature and extent of what was discharged to the vadose and groundwater; please clarify. Also, Tc99 and Antimony 125 should be COCs.
13	1-1	28-32	Were they tracked as "waste sites" back when they were originally formed as part of operations or were they known as disposals areas?
14	1-1	38-41	What "processes" were done to "ensure no waste sites will be missed?" Please clarify.
15	1-4	1	What were "priority investigations?" Please define.
16	1-4	8	All the LFI focused on was Cr(VI)? What about other COCs?
17	1-5	9	Delete "potential." Known contamination is taken to ERDF.

#	Page	Line/Figure	Comment
18	1-5	10	Need to call out ERDF. This statement makes it sound like soil is just being dumped in the Central Plateau.
19	1-18	29	Why is the 1706-KEP Test Loop mentioned? Please describe the significance.
20	1-18	37-43	Short-lived vs long-lived radionuclides is vague. Put table divided into short-lived and long-lived radionuclides and give element name and half life. E.g. | | Radionuclide | Half life | | Short-lived | | | | Long-lived | | |
21	1-29	Figure 1-14	Need amount of C-14 for red and yellow. High and Low is too vague. Also, the Carbon 14 concentration plume is larger than shown in the figure.
22	1-34	Figure 1-18	This figure appears to be inaccurate. Action Memos for facilities shouldn't flow into RODs. Please revise.
23	1-38	1 onward	Why is FYR first thing listed under Previous and Ongoing Investigations and Remediation? Should have a summary of these before FYR issues are mentioned.
24	1-43	3 onward	Need to carry pipelines into FS for evaluation. Cannot dismiss in Chapter 1. See General Comment.
25	1-45	1-32	Please explain if roof runoff from the proposed reactor ISS is taken into account.
26	1-45	43 and elsewhere in document	This is not the only ROD that laid out remediation for 100-K waste sites. See Table 1-2. This ROD is referenced in more locations as the only ROD for waste sites at K.
27	1-46	7	This says 163 waste sites, but Table 1-4 below it and in several other places it says 165 waste sites. Which is correct?
28	1-52	6-9	There are fundamental differences between the proposed actions and the remaining sites ROD. The remaining sites ROD only has one remedy (RTD). What is contemplated by this RI/FS and PP is a diverse range of remedies. It is unclear how discovery sites will be addressed. (See General Comment.)
29	1-53	27-39	This language is repeated exactly from pg 1-51. Don't need in both places.
30	1-54	27-28	What information was used to determine that reactor stack emissions were minor sources?
31	1-54	33-35	This is good supporting information- move up to line 28.
32	1-55	1-9	Not sure why this is relevant here.
33	1-68	1-3	The use of the term "hot spots" should be clearly defined or omitted.
34	1-69	29-33	Don't need disclaimer on the River Corridor Risk Assessment. All relevant information should be in this RI/FS.
35	2-3	Table 2-1 Data Gap 3	Data Need states, "Characterize around the reactor structures to assess the nature and extent of contamination in the vadose zone." There is no explanation on how this data need was obtained. Please explain how a barrier remedy could be considered protective if the text indicates the nature and extent

#	Page	Line/Figure	Comment
			of contamination is unknown.
36	2-7	Table 2-1 Data Gap 11	Remedial technologies were somewhat evaluated for groundwater; they were not investigated for contaminated soils, or excavation methods. The contaminated soil remedial technologies need to be investigated and included in additional alternatives.
37	2-34	16-18	This refers the reader to section 2.1.9.1 for data to support contaminant fate and transport modeling, but referenced section does not contain this information.
38	3-162	Section 3.10	It is not clear how cultural resources were accounted for in the RI/FS or the PP. Are culturally significant sites or areas still under the same land use? Same scenario? See General Comments.
39	4.1	Chapter 4 General	This chapter does not acknowledge that: 1) the extent of hexavalent chromium contamination migrating into 100-N Area has not been delineated, and 2) the existing extraction well network will need to be expanded to address hexavalent chromium contamination from K Area.
40	4-6	Section 4.2 General	Primary contaminants vs. Secondary contaminants: Provide adequate explanations/descriptions why primary contaminants are no longer present at this time although the type of contaminants and the nature of the released mechanism are more or less the same (e.g. discharged to the same trench, ditch, etc,) for the secondary waste as well. It seems, from the history of the disposal, it is difficult to distinguish the primary waste from the secondary waste. Please provide adequate explanation to address the issue and how the characterization approach so far is adequate to explain any differences and similarities between primary and secondary contaminants.
41	4-6	36 and throughout document	Make sure it's consistently written Cr(VI).
42	4-7	6-7	Give number of waste sites, not percentages.
43	4-7	14	Did K ever have solid sodium dichromate or just concentrated liquid? Please clarify.
44	4-9	9	Why decayed to 1986? Either give original amount (preferred) or decayed to 2011.
45	4-10	Sections 4.2.1.3-4.2.1.7	Need to make it clear that these are just for groundwater.
46	4-11	4	Why "ideally, slightly greater" when dissolved Cr is usually all Cr(VI)?
47	4-11	41	Why is this section here where groundwater COCs are discussed? Should be under vadose zone.
48	4-33	18-28	Section 4.2.2.6-There should be a map showing the location of where this borehole (well) was installed and referenced in this section. It should be explained how the data from this location applies to the areas or waste sites it's being used to characterize. It should be made clear how this information is being used in the

#	Page	Line/Figure	Comment
			RI/FS. From what is explained, it seems the borehole is being used to characterize waste sites 330 feet away, with other waste sites in between. It should be explained how this particular borehole can provide the needed information.
49	4-69	36-42	The text states that the full nature and extent of contamination under and near the reactor is still unknown. This is inconsistent with Data Gap 3 in table 2-1 which states that data need was filled. Please clarify.
50	4-86	6-42	It is unclear how nature and extent of groundwater contamination could be considered known, when waste site 116-KE-3 has not been fully characterized. 116-KE-3 is a vertical well that extends into the water table and has had discharges of radioactive waste. The COPCs evaluated do not include what could have been discharged directly to groundwater. In addition to this waste site, the UPR under the KE basin has still not been fully characterized to groundwater.
51	4-106	Table 4-26	The TCE plume is not listed.
52	4-107	1-8	The text states: "Cr(VI) is present in groundwater in 100-K and into the southwestern portion of the 100-NR-2 Groundwater OU, to the N Reactor fence line." The extent of hexavalent chromium contamination migrating into 100-N Area has <u>not</u> been delineated. Considering hexavalent chromium observations at wells 199-N-189, 199-N-74, 699-87-55, etc., the hexavalent chromium contamination from 100-K may also extend well into the eastern portion of the 100-NR-2 Groundwater OU (i.e., not limited to the southwestern portion). Although page 4-110 (lines 21-22) acknowledges the isopleths for the 100-K North plume will likely move to the east when data from well 199-N-189 is considered, the total footprint of the plume areas exceeding the 10 μg/L AWQS has likely been significantly underestimated. Any expansion of the existing pump-and-treat systems should address hexavalent chromium contamination migrating from 100-K Area.
53	4-195	Figure 4-88	Title says "Fall 2009 and Spring 2010" but Spring isn't shown.
54	4-208	Section 4.3 General	**Columbia River Studies**: The document did not include all the pertinent data gathered through the Columbia River RI and related work. The document did include some studies made earlier on the river but not the latest information reported/presented to the Agencies.
55	4-239	Figures 4-94 though 4-96	Why is there an upward trend for these contaminants in 2008? Please explain.
56	4-255	23-25 and elsewhere in document.	Remediation does NOT typically go to 15 feet. Numerous waste sites were remediated much shallow and numerous were excavated much deeper than 15 feet. This is a common misconception and the text must be fixed.
57	4-260	9	"...is the result of reduction *to Cr(III)* with some..."
58	4-261	4-12	Is this hypothesis supported by the pore water sampling?
59	5-1	Chapter 5/	Use of STOMP 1-D Modeling for the determination of preliminary

#	Page	Line/Figure	Comment
	Appendix F	ECF-Hanford - 11-0063, REV.1	remediation goals: The following needs to be clarified: • Peak groundwater concentration (section 2.4): It is not clear how the average concentration over the 5 meter thickness would give the most conservative groundwater concentration (section 2.3) • Recharge: The text mentions about three recharge periods in the post-2010 simulations. There is no rationale behind the selection of these three scenarios and the selection of those periods (section 3.2.1). • Aquifer flux: The hydraulic gradient for the 100K source area is too far off (in order of magnitudes) of the mean value (section 3.2.2). Hydraulic and transport parameters (section 3.3): Provide a better rationale for why the 100 K Horizontal saturated hydraulic conductivity for the Ringold Formation is 10 times less than Hanford formation, without any field or lab data. Please note that the numbers sometimes exceed more than two orders of magnitude.
60	5-19	26-28	Were the waste sites in fact dug to 15'? Many waste sites were shallower than 15'. Please clarify.
61	5-22	Table 5-3	Should have actual Kds. The range isn't very helpful.
62	5-29 and 5-34		Line 25 on page 5-29 says the Kd was from below 0 to 32 L/kg with a median value of 0.7 L/kg; however page 4-34 says that more than 90 percent of the values are higher than 1.2 mL/g and more than 95% are higher than 0.65 mL/g. How is this possible?
63	5-36	Figure 5-11	EPA doesn't agree that no irrigation should be used to develop PRGs. See General Comment.
64	5-37	Table 5-6	A general discussion on how the Kds in this table were determined is needed.
65	5-37	Table 5-6	Table 5-6 states the selected Kd for carbon-14 is 200 L/kg. In contrast, page xiv states that carbon-14 is highly mobile and migrates at the same velocity as groundwater. Page 5-3 lines 12-13 also present carbon-14 as highly mobile. These contradictory ideas should be clarified.
66	5-37	Table 5-6	Table 5-6, first page, presents a number of radionuclides with large Kd values but for the time to peak groundwater concentrations uses the symbol " * " which means "Radionuclides are conservatively assumed to have a time to peak groundwater concentration of less than 10,000 years." It is not clear the technical basis for assuming radionuclides with a Kd of 200 L/kg would impact groundwater much sooner than a chemical like chromium or chrysene with the same Kd. These two latter chemicals are described as reaching the groundwater in the year 48,293 and having a peak concentration in the year 115,056.
67	5-37	Table 5-6	Table 5-6 has a footnote for all the radionuclides that states that

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			there were no STOMP 1D soil screening levels. Where is the discussion in the text to why STOMP didn't calculate soil screening levels for radionuclides? Page 5-39 line 10 states that scaling computations were used for all the remaining COPCs. It isn't clear why these values were not used in table 5-6. In contrast to this table, on page F-210 the document states that STOMP modeling was used to develop PRGs for 12 radionuclides.
68	5-39	29	Need to provide justification for choosing 10,000 years as a cutoff.
69	5-39	29-30	Page 5-39, lines 29-30 state "In keeping the time and resource constraints, simulation periods were limited to 10,000 years." In contrast Page F-210 states the simulation period was 3,000 years. Such apparent inconsistencies need to be corrected.
70	5-40	4-7	Why was the 1 mg/kg contaminant concentration vadose zone distribution used when the highest concentration found in borehole data was 1.6 mg/kg?
71	5-41	12-16	No Cr(VI) sites?
72	5-50	Table 5-10	This is it for COPCs? What about post-ROD waste sites? There will be more COPCs than just the radionuclides listed here.
73	5-52	24	There should be historic river stage data from Priest Rapids dam.
74	5-54	42 onward.	Take out reference to 100-D, 100-H and 100-F.
75	5-55	28-39	Why is the ISRM referenced for 100-K?
76	5-63	4-26	Is this part of an alternative? If so, then mention in description of alternative. It's out of place where it currently is.
77	5-63	27 onward	Why is there an alternative description here? This section and Figures 5-20 through 5-40 are important to the No Action alternative and should be moved to chapter 9.
78	5-90	27	Clarify that PRGs are based on no irrigation.
79	5-90	39-40	This language suggests that characterization will be taking place post-ROD, during "remedial design activities." The FS states that these sites (100-K-30-33) will fall within the footprint of sites that will be remediated so it is unclear as to why additional characterization is needed/suggested?
80	6-1	1	Title should say something about Risk Assessment. It's the summary of the whole risk assessment to support the RI/FS, not just a supplemental evaluation.
81	6-3 to 6-14	34 on pg 6-3 to line 13 on pg 6-14	This is redundant. Table 6-4 covers all of the changes. Just make sure Table 6-4 is VERY clear as to the differences, and delete the additional text.
82	6-4	Table 6-1	Not sure what "Not Analyzed" means. Was there not a chemical risk driver at these sites?
83	6-8	Table 6-4	This Table needs to be VERY clear. This is explaining why the RCBRA has different answers than the RI/FS and the CVPs/RSVPs regarding risk and what is considered safe.
84	6-8	Table 6-4	Add another column "Method used in CVPs/RSVPs."
85	6-8	Table 6-4 and elsewhere	Do not refer to a document just by its document number (DOE/RL-96-17). Refer to it by its title.

#	Page	Line/Figure	Comment
86	6-8	Table 6-4, under Method used in RI/FS	"...but incorporates updates to reflect..." Be specific about what these updates are.
87	6-8	Table 6-4	Column under "Overall Effect on RI/FS," first row. This is very general. Needs to be specific as to how it affects the numbers.
88	6-8	Table 6-4, second row	Need to explain what this is based on (refer to specific EPA guidance).
89	6-10	Table 6-4, first row, last column	This is jumping past the alternatives to say that the results can disposition the waste sites from interim to final closure. What if there is still risk?
90	6-10	Table 6-4, second row	"The approach used to evaluate...is similar to that used for the closeout documentation." Need to state what was used in the closeout documentation.
91	6-11	Table 6-4. first row, "Methods...RI/FS"	Don't refer to section in RCBRA- needs to be in RI/FS and refer to RI/FS section.
92	6-11	Table 6-4, first row, last column	Again, need to state what is done in closeout documentation (see earlier comment re: create new column for CVP/RSVP).
93	6-11	Table 6-4, second row, last column	Methodologies are "similar"? If not the same, then describe differences.
94	6-14	Section 6.1.2.1	EPA does not agree with the reasonably anticipated future land uses.
95	6-15	Table 6-5	This table does a good job explaining the differences, but does not say WHY they were calculated differently.
96	6-16	Section 6.1.3	Need to rework- EPA doesn't view residential as an "Other Land Use Scenario."
97	6-20	1-12	Good to have this, but need a list of what actual analytes this list includes.
98	6-25	20-23	This should be the same as pg 6-20.
99	6-28	4	Say what small sample size is (<5).
100	6-30	12-22	Do not need to define contaminant sources again.
101	6-34	24	Cannot say that ICs are in place already- they are in place for the interim ROD, but need to be evaluated as part of the final Remedy.
102	6-35	28 onward	This scenario (Casual Recreational User) was to be used to develop PRGs for waste sites that are down along the river that a residential scenario is not a reasonable scenario for. This wasn't done, and needs to be done to address some waste sites in K.
103	6-56	Tables referred to	Need to pull tables from appendices that are important to RI/FS.
104	6-61	Section 6.2.6.3	Title is misleading. There shouldn't be any uncertainty that radioisotopes decay.
105	6-66	Section 6.3.2	COPC selection for groundwater was already covered in section 4.2.6.4. Only need all the information in one place.

#	Page	Line/Figure	Comment
106	6-102	12-22	Contaminant sources has been covered numerous times by now.
107	6-111	8-9	There is a state requirement for Cr (VI). Please add.
108	6-112	7	CCC is not common term used. AWQC is more common at Hanford.
109	General Chapter 7	Chapter 7	The statements about how many sites were included in the RCBRA do not appear to be consistent. Several examples: Page 7-1 states "The RCBRA used multiple measures of exposure, ecological effect, and ecosystem/receptor characteristics to evaluate risks at 20 study sites across the River Corridor associated with remediated waste sites (10 excavated/backfilled sites and 10 surface removal/native soil sites) and 10 reference areas." Page 7-2 (line 18) states "Sixteen waste sites from the 100-K Source OUs were evaluated in the RCBRA." Page 7-3 "The RCBRA included evaluation of 20 waste sites and CVP data from 16 waste sites. Of the 20 waste sites directly evaluated, only 2 were from within the 100-K OUs." A global search through the document would be appropriate to ensure accuracy.
110	7-1	41-42	The document states, "The study design of the ecological risk assessment in the RCBRA provided risk conclusions that applied across the entire 100 Area." This should be "...the entire 100 and 300 Areas."
111	7-4	30-42	Should also refer to table of what these analytes are.
112	7-5	35	CSM should refer to Chapter 2, not Appendix L.
113	7-6	4	Document states "the 100 Area is predominantly developed and use of this area by wildlife is expected to be minimal." In fact most of the 100 Area is undisturbed or partially/fully recovered from pre-Manhattan era farming community activities. There is extensive wildlife in the 100 Area, and the wildlife is not exclusive to the habitat rich areas.
114	7-6	39	This section, "Simplified Ecological Exposure Model" would be more accurately named "Simplified Ecological Exposure Model for upland sites." The first paragraph of that section emphasizes that the scope is the upland environment. With that the case, another section needs to be added for a "Simplified Ecological Exposure Model for riparian and near-shore river areas." Note that the 100-K ROD scope includes these areas and is to have a baseline ecological risk analysis, including the exposure model.
115	7-7	21-32	Lines 21-32 list organism groups and which were evaluated at the community level verses which were evaluated at the population level. An explanation of why the different levels were used for the different organism groups would be a good addition.
116	7-8	1-2	Document states "endpoint species should preferably be ones that have ecological relevance, are of societal value, are susceptible to chemical stressors at the site, and allow risk managers to meet policy goals." he last "and" should be an "or" to be clear that endpoint species do not have to satisfy all of these criteria.

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117	7-45	17	Document states "both dermal and inhalation exposure were assumed negligible." This should be explained. In the RCBRA, some receptors were specifically selected because their activities (such as mice which burrow in the soil of waste sites) suggest a high dermal exposure.
118	7-45	18	Document states "exposure pathways associated with water were not addressed because drinking water sources for wildlife are not available at the 100-K Source OUs waste sites." Clearly most wildlife utilizing upland 100-K waste site areas can and do move down to the river shore and ingest water. The risk assessment should also show what the combined risk would be to support selection of protective cleanup levels for upland soil and groundwater/seeps (similar to RCBRA)..
119	7-49	20-21	In the discussion of estimating doses from external exposure, lines 20-21 state, "The exposed organism is very small; consequently, 100 percent of the radionuclide energies are absorbed." This should be changed to just the latter part of the statement, i.e. "100 percent of the radionuclide energies are absorbed." The DOE Graded Approach takes a conservative tack in the calculation by assuming all the radionuclide energies are absorbed DESPITE THE FACT that the organism is very small.
120	7-49	41	Regarding the statistical evaluation in closeout documentation, the document states, "For small data sets (N<10), the calculations were performed assuming a nonparametric distribution, so no test for distribution was performed (i.e., the maximum detected concentration was used as the EPC)." In reality, the waste site closeout documentation for different waste sites is not always consistent regarding handling small data sets. Typically there was not a calculation involved. So it would be good to remove the "calculations" part of the statement. An accurate replacement statement would be, "For small data sets, typically the maximum detected concentration was used as the EPC."
121	7-82	35	Document states, "no life history data specific to the Hanford Site were available..." It is understood that this data is available. Please clarify.
122	7-83	4	Document states, "no site specific data on COPC concentrations..." It is understood that this data is available. Please clarify.
123	7-85	35-36	Regarding the interim actions, the document states they "did not directly address risks to ecological receptors." In fact the interim actions did have a limited qualitative ecological risk assessment. For example, the interim action ecological risk assessment for 100-K concluded that hexavalent chromium posed a risk to aquatic organisms within the river bottom, and an interim action pump-and-treat remedy to capture hexavalent chromium before it enters the river bottom has been operating since the 1990s.
124	8-6	24-29	Should know at this point is these types of waste will be

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			encountered. Cannot just say DOE order will be followed if waste needs to be disposed of differently.
125	8-8	Table 8.2 General	The ARAR table must establish the regulations that are applicable, relevant and appropriate for the 100-K operable unit. Throughout the text in the column rationale for including is the use of the work "**may.**" 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.
126	8-9	State ARARs Table 8-2	The ARAR WAC173-303-64620(4) regulatory requirement 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.
127	8-9	State ARARs Table 8-2	The ARAR WAC173-303-64620(4) rationale for including 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."
128	8-9	State ARARs Table 8-2	The ARAR WAC173-303-64620(4) possible application 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."
129	8-40	34	Needs to be based on residential scenario.
130	8-42	29 onward	How is the "and risk-based thresholds" met by just using federal and state standards?
131	8-45	18	Why just $1x10^{-4}$ instead of range defined in RAO?
132	8-46	9	Does containment = capping?
133	8-47	8	Need to be specific. Decay to what? Nothing or below risk levels? Which site is 10 years and which is 140 years?
134	8-47	23-34	This process is not clear.
135	8-54	6-18	Why is this NEPA language under an IC section?
136	8-54	23	How is soil segregation automated?
137	8-54	29-32	The language regarding shallow and deep excavation being at 20 ft is very confusing, considering shallow has always been referred to as 15' in the past. Either change to 15' or give new labels.
138	8-55	25-26	There have to be more advantages than just worker safety (e.g. less disturbed vegetation).

#	Page	Line/Figure	Comment
139	8-67	Table 8-7	Table 8-7, middle of first page, "Chemical Reduction/Softening and Precipitation" for C-14. Regarding using water softeners for C-14 removal (which this document assumes is as a bicarbonate which is what water softeners are designed to remove), this table correctly states that vendors and equipment are readily available. But it is puzzling that the table also states that there is no experience with the technology at Hanford. Are there really no water softeners at Hanford, and if that is true, does that raise concerns as to the implementability of this technology? Note that C-14 is in a limited part of the 100-K groundwater, so only a portion of the water being extracted for hexavalent chromium treatment would need pretreatment for C-14 removal. This table states that the relative capital cost is moderate/high. Is that a fair assessment for water softeners which are mass-produced for household consumer use? The water softener technology was not retained. The table states that "For C-14, not retained in favor of air stripping due to large volume of sludge generated." Note that dig-and-haul is a retained technology for waste site remediation despite the large volume of waste it generates, especially in comparison to the volume of sludge that would result from a parallel bank of water softeners. On the second page of table 8-7 is the description of air stripping. Implementability is rated "high" but it states testing is required for C-14. It is not clear why implementability would be rated "high." Both air stripping and softening need to be proven effective for C-14 removal.
140	8-73	Table 8-8	ICs are a very important part of the alternatives. Cannot just refer to existing ICs and assume that they will be kept in place.
141	8-74	Table 8-8	Engineering controls are not ICs as defined by EPA.
142	8-78	41	ERDF provides for treatment (if necessary) and disposal, not removal.
143	8-79	29	There is no existing ISRM at K.
144	8-80		Typical excavation is NOT 15 ft.
145	8-80	This page and elsewhere in following figures.	"Extent of excavation required ~~can~~ *will* be determined.."
146	8-81		More specific examples- B-27, C-7, etc.
147	8-82		If cannot dispose at ERDF, then need to identify disposal in alternative.
148	8-82		Why no O&M cost for ERDF?
149	8-83		Examples- 100-N has this in ROD.
150	8-84		Any treatability tests that need to be performed to decide if a technology is viable should be completed by the RI/FS stage. It

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			cannot be proposed to be done after the ROD. Need to decide if there is already enough information to support this technology or cannot use.
151	8-85		"Results of the study are pending." See previous comment.
152	8-86		This isn't a technology, it's a delivery method.
153	8-87		Same as above- not a technology.
154	8-89		Cannot lump all surface barriers together. Need to evaluate separately and recommend one specific type in the proposed alternative.
155	8-90		Tables are not good examples. Summarize how effective has been under the interim action.
156	8-93		Not a technology.
157	8-94		Need summary of example of how this has been successful (not just refer to Appendix).
158	8-96		Why is this in here for 100-K?
159	9-2	26	What about GW sites?
160	9-2	34-36	Any modification to a ROD needs to follow the NCP as outlined in EPA-540-R-98-031, OSWER 9200.1-23P.
161	9-3	25-27	Need to determine what needs to be done at these sites when reactor is removed and look at alternatives to remove them now (soldier piles?)
162	9-3	39-40	Clarification is needed on how the carbon 14 will be treated. How many wells will require an air stripper?
163	9-4	1-2	How will tritium meet DWS? Please explain.
164	9-9	29	Cannot defer decision until reactors are moved. Need to make decision now on these waste sites.
165	9-9	33	Design samples should have been collected in time for the RI/FS report.
166	9-11	Figure 9-1 and others	Does this take into account the possibility of continued source? If not, that is a big assumption and should be made clear.
167	9-13	No Action	"...are expected to confirm..." How will this be verified?
168	9-13	Institutional Controls	Need to clearly lay out here, cannot just refer to what is already done.
169	9-13	RTD HH	"Other approved disposal facility." What would this be?
170	9-13	RTD GW	Or is not cost efficient to do another alternative.
171	9-13	Table 9-2	To meet requirements of the NCP, a remedy needs to be selected for each waste site/groundwater. It is not appropriate to perform a cost/benefit post-ROD to select the remedy. Please remove.
172	9-14	Soil Flushing	How long will it be monitored?
173	9-14	Soil Flushing	Calls for air stripping for C-14, but what about the other COCs?
174	9-14	Biological Infiltration	Need to be specific. Is this just for Cr(VI)? Monitoring until when?
175	9-15	Groundwater components	Need to be specific about what COCs are treated in each part of the operation.
176	9-15	ICs	Be very specific about ICs.
177	9-23 to 9-24		Same comments as made in Table 9-2.

#	Page	Line/Figure	Comment
178	9-28	25	What about other GW COCs?
179	9-31		Same comments as those for Alternative 2.
180	9-42	23	This section should be part of 9.2.2 and then the parts that are the same in Alt 3 can refer to Alt 2. It's very confusing to go through the details of the alternatives, and then have a following section with more details.
181	9-43	8	Change to "extent of removal is increased."
182	9-43	34	Again, need to be specific about barrier type.
183	9-44	18	Table 9-4 shows current conditions, but the paragraph above says the system would build on it. How would it need to be expanded?
184	9-49	29	This section should be combined with 9.2.2.
185	9-55	Table 9-5	Need COC list.
186	9-55	Table 9-5	Sites near reactor. Need to do confirmation/verification sampling first before capping.
187	9-56	116-K-3	How will soil flushing on a liquid waste site work? How much water has already been disposed of at this waste site?
188	10-14		Implementability should be high for deep RTD. It has been successfully performed at Hanford at numerous waste sites.
189	10-14		Annual O&M for alternative 3 should be lower because with RTD it's more definitive that the source was removed. With soil flushing or other technologies, there will probably need to be more money spent verifying that the contamination was flushed/removed.
190	10-15	22	RTD should rank higher here. One of the biggest concerns for soil flushing or bioinfiltration is how to determine if all of the affected areas were reached.
191	Appendix F		EPA does not support developing PRGs with no irrigation. They should be developed using an irrigation scenario and if they fail with irrigation, but pass without, then do an alternative with ICs to prevent irrigation at those specific waste sites (not just no irrigation at Hanford).
192	Appendix F	General ECF-100KR-1-0073	The Kds as listed in Table 4-1 are, for the most part, taken directly from those used in the Interim Work Plan (DOE-RL 96-17, Rev 6, App E). This Kd documentation contains numerous errors including incorrect references and incorrect values. New Kd values have also been issued for Hanford-specific sites since the references used in the work plan. Many Kds reference to Ames & Serne (1991). Kincaid (1998) is in some cases but not other, with no explanation. Newer references include PNNL-16100 and PNNL-18564. 1. Justify why old Kd values were used when newer Hanford-specific values are available. 2. Justify why some of the new values are lower (i.e., more conservative) such as Co-60 which is listed as 50 mL/g in Ames & Serne (1991) and PNNL-18564 which lists values between 4.8 and 10 mL/g (Table 6-9). Justify the value used. 3. Explain why a Kd for beryllium of 790 mL/g is used (Ecology,

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			2009) when Hanford specific values are available which are an order of magnitude lower (e.g., Ames & Serne (1991) lists a value of 20 mL/g). 4. The Kd for Ni is incorrect. It is listed as 30 mL/g for Ni-63 and 65 mL/g for Ni metal. DOE-RL 96-17 lists the reference as Ames & Serne (1991) for both values. Ames & Serne (1991) lists one value, 30 mL/g for Ni (not specific to Ni-63). Explain or correct this value. 5. The Kds for U (U-233/234, U-235, U-238) all equal 2 mL/g. The reference given in DOE-RL 96-17 lists Serne and Woods (1990) which does not contain those values. Newer references such as PNNL-18564 show Kds varying between 0.26 and 4 mL/g depending on the assumed soil composition. Correct that reference and justify the values.
193	Appendix F	ECF-100KR1-11-0063, p. 2	In Section 2.5, the text states "K_D is constant in time and space." This statement is not true. K_D varies with very slight changes in soil or sediment characteristics and the concentration of the contaminant, all of which vary in space. K_D is also dependent on water content, which varies in both time and space.
194	F-7	Section 4.1	The text states, "Those non-radionuclide analytes with a time to peak groundwater concentration of greater than 10,000 years are removed from further consideration." Table 4-1, however, gives both minimum and maximum times until peaks. The text does not indicate which were used.
195	F-13	Table 4-1	No references for the Kd values in this table are provided.
196	F-116	Table 4-3	Several of the values in the Fixed-Parameter Three-Phase column do not match values that would be calculated with the CLARC default values. The regulations allow for use of other values calculated using site-specific parameters. However, in cases where the defaults are not used, the method is the Variable Parameter Three-Phase model.
197	F-94	Section 1	The use of "Alternatives" here is confusing since they don't align with the alternatives in the FS.
198	F-98	Second paragraph	All the pertinent details about the modeling should be in the RI/FS, not in another document not approved by the Tri-Parties.
199	F-100	Figure 3-1 and others	All of the figures from Appendix F that show groundwater modeling need to be in the FS itself, not an appendix. This can be done effectively if 6 figures are put on one large sheet.
200	F-110	Figure 3-8	Expand. Cannot see new injection wells.
201	F-123	Alt 1	Why does the river stage vary until 2037 and then switch to a constant rate?
202	F-123		It would be very helpful to have a table identifying each COC and what date each COC would be below cleanup level at the river and in the main plume.
203	F-129	Figure 5-7	Good figure. Would be good to have for other COCs also. Extend out to when Cr (VI) would clean up to 10 ppb at river. Also, why does river stage change at 2037?

#	Page	Line/Figure	Comment
204	F-130	Figure 5-8 and other similar figures	Good figure, but need to expand low concentration so it is possible to see when Cr(VI) drops below 10 ppb.
205	F-134	Figure 5-13	Big jump between 20-37 and 2087. What year does tritium meet the DWS?
206	F-139	Figure 5-18	Still showing Sr-90 above cleanup level. What year would it meet the DWS?
207	F-144	Figure 5-23	Still showing nitrate above cleanup level. What year would it meet the DWS?
208	F-151	Figure 5-30	Still showing TCE above cleanup level. What year would it meet the DWS?
209	F-154	Figure 5-33	Need more information regarding bioinfiltration. When, where and how often?
210	F-165	Figure 5-46	Still showing Sr-90 above cleanup level. What year would it meet the DWS?
211	F-190	Figure 5-73	Still showing Sr-90 above cleanup level. What year would it meet the DWS?
212	F-211	Section 1.0	The last paragraph of section 1.0 on page F-211 should be removed. Equivalent paragraphs elsewhere in the document should be removed.
213	F-213		All equations are missing.
214	F-215	Table 1 and rest of the document	This should be specific to 100-K. Remove information regarding D and H unless is has a specific purpose.
215	F-225		Page F-225 states that bare soil was assumed to be the land cover above the waste site during the first recharge period, which spanned 2010 to 2015. That is reasonable for many of the 100-K waste sites governed by Tri-Party agreement milestone M-016-143. It would be appropriate to model the remaining 100-K waste sites based on the M-016-00C milestone for those sites to be completed by the year 2020. Interim actions are being performed to support future irrigation. That should be one of the scenarios following the 2015/2020 period. For land that does not receive irrigation water, past history at Hanford and for this part of central Washington show that the brush fire cycle is too frequent for establishment of mature shrub steppe. Therefore what the document terms the "second recharge period" should be forecast indefinitely into the future along with the irrigation scenario. The preceding change will eliminate odd calculations of changing infiltration rates under irrigation such as on page F-225 which states "For example, the irrigation scenario for the Ephrata soils set the recharge rate to 17 mm/yr from 2010 to 2015, 71.4 mm/yr from 2015 to 2045, and 69.9 mm/yr from 2045 to 5010." Irrigation is for crops so there isn't a transition from "grasses and shrubs covering bare soil" to "mature shrub steppe" in irrigated crop land.
216	F-240		Page F-240 states "PRG values calculated for the 100-0 source

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			distribution model with irrigation represent the "worst case" estimate of potential impacts and were adopted to serve as a screening tool for preliminary site screening. PRGs for the 100-0 source distribution and base case recharge were selected for use in the RI/FS document process." Since this entire document is part of the RI/FS document process, the last part of this statement is confusing. Do the authors mean to state that remedial alternatives were NOT evaluated to be protective if there is irrigation? If so, that is not appropriate. The first bullet on page 5-89 should be changed so the PRGs are protective of groundwater with irrigation.
217	F-259	Figure 1	Need an explanation of how Kd for Cr(VI) was calculated. Not clear.
218	Appendix G	Document ECF-HANFORD-10-0429	This contains RESRAD calculations of PRGs including radionuclide transport to groundwater. It can be confusing to have this document include calculations to protect groundwater from leaching using the RESRAD code, but the Graded Approach document explains that STOMP will be used for this task. Please clarify.
219	G-124	Section 1	Section 1 on page G-124 states, "that exposure assumptions have been updated to reflect current EPA guidance. Exposure assumptions that were updated include the external gamma shielding factor and the outdoor time fraction." For the interim action, the outdoor time fraction was 0.2 (i.e. 20 percent of the time). In this RI/FS the outdoor time fraction is 0.12. What is the reference for this change? Also, it is good that section 1 alerts the reader to two changes from the interim action. Unfortunately the reader is apt to think those are the only changes. In fact soil ingestion is cut in half, reduced from the interim action of 73 g/yr to 36.5 g/yr.
220	G-124		Page G-124 states "This Environmental Calculation documents assumptions and methods for development of radiological soil Preliminary Remediation Goals (PRGs) for the Interim Action Record of Decision (IAROD) exposure scenario for use in the 100 Areas and 300 Area Remedial Investigation/Feasibility Study (RI/FS) Reports." EPA supports that approach. But elsewhere in the RIFS and proposed plan it states that PRGs were calculated without the irrigation scenario. PRGs should be calculated with the irrigation scenario as was done in the interim actions.
221	G-129	Table 7-1	Table 7-1 provides PRGs for a longer list of radionuclides than presented in the proposed plan. The 100-K proposed plan needs to have a more complete list of PRGs. Just because some radionuclides such as Tc-99, I-129, or U-238 weren't identified as COCs doesn't mean they aren't likely contaminants that will be encountered during the remaining remediation of the 100-K Area. The list should be similar to the list of PRGs (RAGs) in the 100 Area RAWP.