REVIEW COMMENT RECORD (RCR)			1. Date: 3-24-11 (comment) 1a. Date: 10-17-12 (response)	2. Review No.
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5. Document Number(s)/Title(s) Remedial Investigation Report for the 200-PO-1 Groundwater Operable Unit DOE/RL-2009-85, Draft A	6. Project Name: 200-PO-1 Groundwater OU	7. Reviewers Name: Nina Menard, Kim Welsch and Cheryl Whalen	8. Reviewers Organization: Washington Department of Ecology	9. Location/Phone:

10. Comment Submittal Approval (optional)	11. Agreement with indicated comment disposition(s)		12. Closure Approval	
Date Organization Manager (Optional)	Date	Reviewer/Organization	Date	Reviewer/Organization
	Oct. 17, 2012 Date	W.R. Faught/CHPRC Author/Organization	Date	Reviewer/Organization

Item	13. Page/Line	14a. Comment/Discrepancy	14b. Recommended Change	15. Accept or Reject	16. Disposition
		MODELING COMMENTS			
1	General	The modeling approach failed to implement agreed upon concepts and understanding as discussed in the DQO process and issues associated with the following major topics: o The non-incorporation of vadose zone sources of contamination in the fate transportation. o The fundamental concept of dealing with the boundary conditions and associated splitting of the site into a near field and a far field. o Dimensionality I1D, 2D or 3D) of modeling o Use of multiple codes o Calibration (hydraulic heads vs. concentration, depth profiling, etc.) and non incorporation of transport calibration to historic calibration. o Recharge o History matching o Modeling using the current contamination as initial contamination to define the model domain o Associated DQOs	Please rewrite the RI to include the modeling with the prior agreed upon concepts and understanding.	Accept w/Mod	The 200-PO-1 RI text was revised as suggested and the most current version of the F&T model and Far-Field tool will be used in the 200-East FS document. Additionally, the most current waste inventory information available to DOE at this time has been incorporated into the revised RI document (Rev. 1). The modeling approach for 200-PO-1 OU is consistent with the 200 Area groundwater operable unit approaches that preceded this RI (namely, the ZP-1 and UP-1 RIs) and is consistent with Work Plan commitments. Regarding the major topics identified: o *"The non-incorporation of vadose zone sources of contamination in the fate transportation"* The 200-PO-1 RI/FS Work Plan DOE/RL-2007-31 Rev.0 states the vadose zone will be addressed by the overlying source operable units in the 200 Area. The Central Plateau Groundwater Model does account for historical and future estimated liquid volume contributions to groundwater from natural and artificial recharge sources. However, detailed vadose modeling of contaminant transport has not been conducted to provide input beyond current assumptions. The overlying source and vadose operable units will assess nature and extent of waste site contamination, human health and ecological risk and consider potential remedial alternatives that would be protectiveness of 200-PO-1 groundwater. Once the RI/FS is complete, the information will be available to undertake a more detailed modeling effort that could consider vadose zone contributions. o *"The fundamental concept of dealing with the boundary conditions and associated splitting of the site into a near field and a far field* The use of multiple models to simulate groundwater flow and transport processes in the 200-PO-1 OU is appropriate given the extensive area of this OU and the intended use of each model in its respective domain; (e.g., the far field computational tool (as stated in the report, is limited to the evaluation of the baseline risk and is not intended for use in evaluating remedial action alternatives. o Dimensionality (1D, 2D or 3D) of modeling The Central Plateau Groundwater Model is fully three dimensional, so the implication is one of concern with the one-dimensional far-field computational tool. This dimensionality was demonstrated to be appropriate in this portion of the OU and an environmental calculation file (ECF-200PO1-0393

					Rev 0, *Evaluating Adequacy of One-Dimensional Transport Calculation in the Saturated Zone of the Far-Field Portion of the 200-PO-1 Operable Unit*) demonstrated the adequacy of this tool. This ECF is presented in Appendix E of the RI Report (Rev. 1). o Use of multiple codes Assuming this topic refers to the use of MODFLOW and MT3DMS for the Central Plateau Groundwater Model, it is noted that the MODFLOW code only solves for water flow and must be coupled with a transport code to provide the capability to simulate contaminant transport. If referring to the use of MODFLOW+MT3DMS for the Central Plateau Groundwater Flow Model for the near field and GoldSim Pro for the far field, these are each appropriate codes that are well suited to the nature of the applications in these respective regions of the Central Plateau. o Calibration (hydraulic heads vs. concentration, depth profiling, etc.) and non-incorporation of transport calibration to historic calibration Calibration of the Central Plateau Groundwater Model currently utilizes hydraulic head data, and while future development of this model will likely include contaminant concentration measurements as well, DOE does not consider this necessary at this time to support the RI. o Recharge The Central Plateau Groundwater Model does account for historical and future estimated liquid volume contributions to groundwater from natural and artificial recharge sources. o History Matching The Central Plateau Groundwater Model does include a historical calibration and information is provided on the predictive ability of this model to match historical hydraulic heads in monitoring wells. o Modeling using the current contamination as initial contamination to define the model domain This comment implies a preference for the model to begin with a pre-Hanford condition and simulate all vadose zone sources contributing to contaminant plumes since commencement of Hanford Site operations in the 1940s, rather than starting with the current plumes as an initial condition for contaminant mass. Such an approach is inconsistent with the Work Plan and unnecessary to meet the RI objectives. o Associated DQOs The 200-PO-1 OU RI/FS Work Plan DQO (SGW-34011) supported the 200-PO-1 RI/FS Work Plan (DOE/RL-2007-31 Rev. 0) which provided the basis for the RI. There was no other DQO conducted.
2	General	Modeling of specific plumes-especially for uranium in the 200 East Area does not match with the observed site conditions. Also the concept of non-simulation of the "replenishment of the plume by continuous source" is not acceptable. Avoiding that concept in the 200 East Area where known multiple sources are continuously adding contaminants makes the entire simulation meaningless to move forward with any future feasibility studies and associated remediation plan to clean up the site. The concept is contrary to any cleanup mission of a site.	Rerun the model	Accept w/Mod	The initial plume conditions for uranium will be verified in the modeling to be performed for the 200 East FS. The waste inventory information DOE has available at the time has been included in the revised RI Report document (Rev. 1). The 2008 annual monitoring report (GW data from 2007) was used to define the initial dissolved phase plume conditions for uranium on the south side of the Purex facility and associated Purex cribs. The model is used to project future fate of contaminant plumes currently present in the aquifer. To the degree that future flow conditions (predicted using this model) differ from past flow conditions in the unconfined aquifer, then future contaminant plume fate will also differ. Further contribution from vadose zone sources will be addressed separately through source OUs. Once the waste site RI work is complete, the model will be revised and vadose zone impact simulations can be performed. Until the RI task is complete, there is no reliable model input information.
3	General	There seems to be fundamental issues with the flow and transport of non-advective vs. advective transport. Contaminants with short half-life with more or less advective transport seem to remain at the lot longer at the site compared to highly adsorptive (with higher Kds) with long half life. Some of the contaminants of later type vanish within short period of time.	Rerun the model.	Accept w/Mod	The Kd values used in the RI Report for each contaminant have been verified. The F&T model will be updated to use the most current version of the 3D site-wide model when the 200 East FS is prepared. The appearance of incongruence in these results is only due to comparing very different distributions of these respective contaminants. Uranium, for example, exhibits higher sorption and attenuates to less than the MCL in less than 300 years. In contrast, iodine-129 is less sorptive but requires longer (>1000 years) to attenuate to concentrations below its MCL. However, these contaminants do not share the same initial conditions; the uranium plume is much smaller and hence, more subject to attenuation through advection than the very expansive iodine-129 plume. Moreover, these contaminants are initially present in different locations and hence subject to different advective forces, as a function of the hydrologic units present.

					Advective transport is considered for all contaminants. The results have been checked to verify that radioactive decay-rates are properly calculated. The perception that short half-life contaminants persist longer compared to highly adsorptive contaminants with long half-life's is likely due to the varying concentration magnitudes considered for the purpose of developing figures. Also, bear in mind that only the maximum concentration (over each model layer), for each grid block are shown. Once the concentrations drop below half-MCL the concentrations are not plotted for the purpose of the presentation. This can give an artificial impression that there is no mass.
8	General	In addition to MCLs for radionuclides in drinking water (e.g., 4 mrem/y limit for beta/gamma emitters, 5 pCi/L for Ra-226/Ra-228, 15 pCi/L for gross alpha, 30 ug/L for U), a 15 mrem/y limit for all radionuclides from all pathways should also be evaluated for human receptors (see OSWER 9200.4-18, http://www.epa.gov/oerrpage/superfund/health/contaminants/radiation/pdfs/radguide.pdf). *Not Accepted. There are other possible exposure pathways for radionuclide and chemical exposure, besides drinking water. For example, a groundwater/irrigation/food ingestion pathway is potentially complete and is supported by Q11 in OSWER 9200.4-31P, as well as by 40CFR300.430(4)(d). Q11 notes, "inclusion or deletion of exposure pathways should be based upon site specific conditions." In addition, the CFR citation (CERCLA/RI) explicitly includes contaminants bio-accumulating in the food chain."*	Add these pathways.	Accept	An irrigation scenario and related analysis has been performed and added to the document. Table 6-16 presents the results of this analysis.
10	General	Although past EPA exposure guidance (EPA, 1992) may have recommended the 90th percentile for EPC, more recent 2010 EPA guidance recommends a UCL95 approach (http://www.epa.gov/esd/tsc/ProUCL_v4.00.05/ProUCL_v4.00.05_tech_guide(draft).pdf). *Reject. EPA (2010) ProUCL (version 4.1) makes the following statements: "A UCL represents an average value that should be compared with a threshold value also representing an average value (pre-established or estimated), such as a mean cleanup standard. It is re-emphasized that only averages should be compared with the averages or UCLs, and individual site observations should be compared with UPLs, upper percentiles, or UTLs." This argues for using UCL95 as an estimate of EPC, rather than a 90th percentile, to compare against a mean cleanup standard.*	Please modify using the UCL 95 approach.	Accept	The 90th percentile concentrations that were originally calculated using version 4.00.04 have been recalculated as the 95 percent UCL using the most recent version of the ProUCL software (version 4.00.05) and the information presented in the revised RI Report. ECF-200PO1-2027 and the uncertainty analysis in Chapter 6 were revised to incorporate these results.
11	General #4 (p. iii, para 3 and p. vii para 3)	It is noted that the scope of this RI does not include contaminant sources nor vadose zone contamination. In particular, modeling of future impacts to groundwater does not consider contributions by contaminants in the vadose zone. Text indicates that these sources are to be addressed in separate OU RI/FS processes. It is concerning that fragmenting contamination by administrative groupings (e.g., OUs) may obscure key relationships among contaminants, thereby impeding progress on developing the most efficient cleanup method.	Revise the modeling to include contributions from the vadose zone.	Accept	The vadose source inventory estimates have been incorporated into Rev. 1 of the RI Report and those known and quantified source of vadose impact to groundwater will be included in the 200 East FS modeling. The modeling approach for 200-PO-1 OU is consistent with the overall 200 Area groundwater approach that preceded this RI (e.g ZP-1 and UP-1 RIs). The work plan states the vadose zone will be addressed by the overlying source operable units in the 200 Area. The Central Plateau Model does account for estimated liquid volume contributions to groundwater. However, detailed vadose modeling output has not been conducted to provide input beyond current assumptions. The overlying source and vadose operable units are responsible for assessing protectiveness of groundwater.
12	General #5 (p. viii, para 3)	In addition to aquatic biota in the Columbia River, note that terrestrial (riparian) biota may also be exposed at seeps where groundwater discharges into the river. BCGs address this exposure for rads, but AWQC do not address this for nonrads.	Please modify the AWQC to address riparian biota for non-rads.	Reject	No change to the text. The scope of the 200-PO-1 Groundwater OU is to evaluate groundwater and its discharge to the Columbia River. As such, the media encompassed by this evaluation is groundwater and its effect on aquatic organisms. The protection of riparian biota (i.e. terrestrial receptors) along the Columbia River is being addressed by the River Corridor BRA (DOE/RL-2007-21).

13	p. ix, Table ES-1	List EPC in a separate column. Explain why future years of attainment are specified for near field Sr-90 (2034) and far field U (2209) when these COPCs do not exceed their respective groundwater standards. Analogous to decay rates for rads, please describe degradation rates for nonrads that contribute toward estimating the future year COPCs will attain their groundwater standard.		Accept	The text has been revised, as suggested and the years to attain DWSs removed for COPCs that currently do not exceed the DWS. Discussion of the degradation rates for non-rads has also been added to the Central Plateau model discussion in the ECF. Radioactive decay is accounted for in the simulation of radioactive COPCs. Two non-radioactive COPCs, carbon tetrachloride and chloroform, were simulated with degradation rates based on information reported in PNNL-13560, *Assessment of Carbon Tetrachloride Groundwater Transport in Support of the Hanford Carbon Tetrachloride Innovative Technology Demonstration Program*. The degradation rates used are reported as most-probable values that represent natural process that affect chloromethane contamination in groundwater at Hanford including abiotic hydrolysis of carbon tetrachloride and chloroform, biotic and abiotic transformation of dichloromethane, and sorption of these compounds to the soil matrix.
14	p. x, footnoted	For TCE, the year the concentration achieves the groundwater standard is given in terms of the MCL (5 ug/L), rather than the lower MTCA groundwater CUL (0.49 ug/L). If TCE is allowed a risk of 1E-5 (4.9 ug/L), other carcinogens must be at zero risk, per MTCA *rejected 9-19-11* *The CUL for TCE should be the MCL adjusted to 1E-5 risk per MTCA (4.9 ug/L). If this strategy is adapted, other carcinogens must be at zero risk to meet the 1E-5 MTCA site risk limit.*	Please clarify.	Accept	TCE is a single COPC in a group of multiple carcinogen's, so a 1 in 100,000 (10^{-5}) is used. The footnote on Table ES-1 has been revised. TCE is represented as meeting the 0.49 ug/L standard in year 2059. The footnote now reads: *The year the MCL is achieved will be recalculated for the supplement. In the feasibility study, a complete evaluation of future concentrations of COPCs and all applicable cleanup standards will be conducted.*
15	p. x, footnote 2	Rather than estimating EPC with a 90th percentile value for each groundwater COPC, EPA recommends a 95% UCL (estimated with EPA's ProUCL methods). Other recent risk assessments (e.g., RCBRA) have used a 95% UCL for EPC, as well. *See response to Comment 10.*	Please change to the 95% UCL	Accept	The 90th percentile concentrations that were originally calculated using version 4.00.04 have been recalculated as the 95percent UCL using the most recent version of the ProUCL software (Version 4.00.05) and the information presented in the revised RI Report (Rev. 1).
17	Pg. 1-1, 1st Para	The RI states "Contributing source (surface Soil and vadose zone) information and its effects on the groundwater will be presented as separate source area OU RIs using the CERCLA process." *Reject: Table 5-1 lists the tasks for the RI and characterization tasks. Task E states compile and summarize the inventory data available for the waste sites that may contribute to the 200-PO-1 Groundwater. Table 2-2 of the RI Report summarizes the status. For Task E, the status refers the reader to Table 3-2 for references to other documents. This really does not qualify as meeting the task. This data should be in the RI report. Also Table 3-2 of the RI report is the estimated groundwater velocity.*	It is stated in the 200-PO-1 Work Plan (Pg. 1-1, 3rd Paragraph) that "Although this Work Plan does not directly address vadose zone (VZ) concerns within the 200-PO-1 Groundwater OU, VZ information will be considered as part of the remedy decision process. The Waste Site Remediation Project and Tank Farms Project address the potential groundwater impact of VZ contamination from HWMA treatment, storage and disposal (TSD) units and Resource Conservation and Recovery Act of 1976 (RCRA) paste-practice (RPP) waste sites." Please explain why the remedial investigation did not follow the approved work plan.	Accept	The 200-PO-1 Groundwater OU RI followed the 200-PO-1 work plan and complies with the requirements presented in Table 5-1 (DOE/RL-2007-31).The status of the required tasks is presented in Table 2-2 of the RI Report. See response to comment #11. The RI Report has been revised to include the quantified vadose zone inventory information that DOE has available at this time. Additionally, other known and quantified contributing sources of vadose zone to groundwater contamination will be included in the 200 East FS modeling and related FS Report. Reference to Table 3-2 has been corrected to now refer to Table 4-2 in the RI Report, Rev. 1. The 200-PO-1 RI followed the 200-PO-1 Work Plan and complies with the requirements presented in Table 5-1 (DOE/RL-2007-31).The status of the required tasks is presented in Table 2-2 of the RI Report.
19	Pg 2-2, line 17	The PRGs from the 100 Area RI/FS was used.	Provide the rationale for why the PRGs from the 100 Area are used.	Accept	Because of where 200-PO-1 groundwater is predicted to reach the river, we used the preliminary remedial goals (PRGs) from the 100 Area to support evaluation of similar conditions (i.e. the Hanford Town site).
21	Section 3.6.7, General	The description of the CSM is not very clear. It is not clear •what the CSM is,		Accept	Section 3.6.7 focuses on the geologic and hydrogeologic CSM. Figures 3-37 and 3-40 presents the release scenarios. There is a prominent hydrogeologic feature, a paleo flood channel complex that is filled with Hanford sediments that trend northwest to southeast across the 200 East area. The paleo

		•if it is different for different locations, •what alternative CSMs are considered or exist, •How, if at all the CSM is used in fate and transport modeling. ECF-200PO-1-09-2007 doesn't seem to mention it			flood channel complex cuts through the Ringold LMU in the 200-PO-1 OU, resulting in direct contact of the Hanford and lower Ringold sand and gravel sediments. The lower Ringold Fm aquifer merges with the upper unconfined aquifer (Hanford fm/Cold Creek) and commingles in the vicinity of the paleo flood erosional channel complex. The flow and transport model includes both the semi-confined and unconfined supra-basalt aquifers which are described in Chapter 5.
22	Pg 3-60, line 7-14	Is this an alternative CSM? Pg 3-58, lines 8-12, state that there are 2 aquifers. How will it be modeled?	Please clarify	Accept	The text has been revised for clarify. See response to comment #21 above. The flow and transport model includes both the semi-confined and unconfined supra-basalt aquifers.
23	Pg 3-60, lines 36-39	Is this an alternative CSM? How will it be modeled?	Please clarify	Accept	The text has been revised for clarity. This is not an alternative CSM; it is included as part of the CSM and the model construct reflects such. See Table 3-1 and Figures 3-1 to 3-5 in ECF-200PO-1-09-2352 for the detail of construction. The use of the word additionally, rather than alternatively (on line 36) could have been used, as well.
25	Pg 3-65, lines 41-46	Since it states it is an interpretation, are there alternative interpretations?	Please describe the alternative interpretations and evaluate or discuss in depth including potential impacts if the alternative proves true. If there are no other interpretations, please explain why.	Accept	No other interpretations are defined because only limited data is available for most of the far field and river exposure areas. The 300 Area hydrogeologic conceptual model provides the most comprehensive and defensible dataset and interpretation available. This 300 Area analogy is consistent with the far-field interpretations based on the limited data available.
37	Pg 5-1, lines 11-14	Impacts from WMAs is not in the list of sources for residual contamination	Include WMAs in the list of sources for residual contamination	Accept	The text will be revised to include reference to WMA A-AX.
38	Pg 5-1, lines 15-16	"The potential for future, or continued, contaminant contribution to the groundwater plumes due to residual vadose zone sources" does not just introduce uncertainty into the estimated groundwater concentrations, it may swamp it completely. The Draft TC&WM EIS shows significant contamination reaching the groundwater over the next 100 years from contamination in the deep vadose zone.	Describe how and where that contamination and associated risk will be addressed	Accept	Vadose zone contaminant fate and transport will be addressed as agreed upon in the TPA Tentative Agreement. The contributing source impacts and associated risk will be addressed in 200-EA-1 and 200-DV-1 operable units and the 200 East Area baseline risk assessment and RCRA Closures. The known and quantified source areas contributing to groundwater contamination will be included in the 200 East FS fate and transport model simulations when the project is completed.
41	Pg 5-3, section 5.1.2	Why is K_d the only parameter discussed? What about other important factors such as dispersion, advection, and dilution, release rates from sources, geochemistry?	Provide a discussion of the limitations on K_ds, including estimation limitations (i.e., uses single constituent and does not look at interactions from other constituents), estimation methods including how EPA concerns about use of generic K_ds are addressed (EPA 402-R-99-004A),	Accept	The text has been revised to discuss sorption of COPCs to aquifer materials in addition to Kd. Sorption is considered to be the primary process that impacts the relative mobility of COPCs in groundwater; hence the emphasis on this model parameter. Solubility of COPCs is also briefly discussed but it is not considered a limiting factor because the maximum observed concentrations of COPCs are below their apparent solubility limits in water. A full presentation of model inputs is provided in the appendices.
42	Pg 5-4, lines 18-26	Kd is also: •constituent concentration dependent, dependent on contact time, dependent on chemical properties (e.g., pH, Eh), (see PNNL-14576), and •must be site-specific (EPA402-R-99-004A)	Explain in this document, how all these issues are addressed.	Accept	The dependences cited are valid with regard to a Kd-based modeling approach (such as addressed in PNNL-14576), but are mostly an issue for the near field environment (such as in vadose zone modeling near the source term). In near-neutral conditions in the unconfined aquifer, these limitations to the Kd approach are far less important. Site-specific values were used for the modeling (see the detailed model calculation documented in the appendices). Although a large set of parameters and borehole data was used to build the models, some of the key model inputs identified are the hydraulic conductivity of HSUs, spatial and vertical extent of HSUs, contaminant-specific K_d, and effective porosity. Some of the key modeling assumptions are: (a) no continuing source of contamination from the vadose zone, (b) zone of contamination extends into the top three model layers for setting up the initial conditions for transport calculations, (c) homogeneous hydraulic properties of the HSUs that are spatially invariant, (d) constant contaminant-specific K_d, and (e) no changes to the planned operation of the site in the future. A table of key parameters such as porosity, bulk density, and hydraulic conductivity and their references, will be added to the supplement to this ocument.
43	p. 5-4, Table 5-2	Kd ranges should also be specified for each COPC.	Please add.	Accept	Table 5-2 has been revised to present the minimum and maximum reference ranges of K_d for each COPC listed.
44	Pg 5-4, Table 5-2	ECF-200PO-1-09-2007 is listed as the source for these values. That calculation indicates it is only for far-field (i.e., not on Central Plateau) evaluations. *9/19 Comment 7- if true add sentence "This assumption applies to both techniques described on page 5-1" to page 5-6 last paragraph (addressing original comment #44)*	Identify what is used for near field K_d estimation?	Accept	The ECF footnoted in Table 5-2 (ECF-200PO1-09-2007) is correct for the Far-Field GoldSim model Kd information. Similar information for the Central Plateau Groundwater Fate and Transport model is presented in ECF-200PO1-09-2352 (Appendix E to the RI Report).

47	Pg 5-5, Section 5.1.3	There is no summary of the fate and transport modeling.	Present a summary of the fate and transport modeling, including at a minimum: 1) Key assumptions 2) Key parameters Compliance with regulations (i.e., WAC 173-340-747(8)	Accept	The text has been revised to add Section 5.2.1.1 "General Observations of Simulated Transport" within the broader Section 5.2.1 "Simulation of Contaminant Migration for the 200-PO-1 Groundwater OU within the Central Plateau model domain". Section 5.2.1.2 through 5.2.1.8 presents the contaminant specific fate and transport modeling results. A summary of results for that portion of the groundwater that is located off the Central Plateau is presented in Section 5.2.2 "Simulations of Contaminant Migration in the Distal Portion of the 200-PO-1 OU". The key assumptions used in both the Near-field and Far-Field models are presented in Chapter 5 and the model specific supporting documents in Appendix E of the RI Report. There is both a link to and a disk of this information in the report.
48	Pg 5-5 to 5-6	A clear delineation of the near and far field is not included. Each is very different. The material in 5-5, lines 9-13 doesn't apply to the far field modeling. No information is provided summarizing the approach used in far field modeling using Gold Sim.	Please divide the discussion into near and far field.	Accept	Section 5.1.3 "Fate and Transport Models and Approach to Simulations" has been revised to clarify the modeling domains used for transport calculations and a series of summary paragraphs added at the end of the section. Information summarizing the GoldSim Pipe Pathways modeling approach is described in Section 5.2.2.and the domains are presented in Figure 5-2.
49	Pg 5-6, line 26	A "pipe pathway" is not defined in the document.	Define what a Pipe Pathway is in this document, not just in the reference.	Accept	A discussion has been added to Section 5.1.3 and Figure 5-2 presents the link between the Central Plateau model and the Far-Field pipe paths.
50	p. 5-12, para 2	Text states, "Measurements of contaminant concentration tend to be located where contamination occurs at levels of concern." This bias could be reduced by employing a sampling design where locations are more randomly selected (as opposed to judgmental or nonrandom sampling). *Reject: Address the random vs. judgmental sampling design issue* *Accept with an additional explanation of how wells, emplaced for purposes other than determining extent of contamination, provide random sampling.*	Nondetects should be handled according to methods in EPA's ProUCL (e.g., Kaplan Meier), rather than with simple substitution methods (e.g., half detection limit).	Accept	The sentence stating "Measurements of contamination concentration tend to be located where contamination occurs at levels of concern." applies to interpolating between measurement locations and extrapolation beyond those data. As suggested by Ecology, The following text has been added to this paragraph. "A significant number of wells that have been sampled for contamination, however, were emplaced for purposes other than determining the extent of contamination. These wells do provide random sampling of the contaminant distribution. Measurements of contaminant concentration tend to be located where contamination occurs at levels of concern. Hence, contaminant measurements at the scale of the groundwater OU are biased towards large values, and regions of low concentration have relatively sparse measurements.
51	p. 5-18 – 5-42, tables and figures	The figures and tables generally show concentrations of contaminants decreasing with time at most wells. It appears in some cases that contaminants decrease in place without moving (see Figure 5-7 for nitrate) or the contaminants appear to scatter in multiple directions over time (see Figure 5-4 for I-129). The cause of these trends, and the relative lack of flow toward the river, requires discussion. *Reject: The disposition does not explain why nitrate decreases in concentration with minimal migration toward the river, and I-129 appears to scatter in multiple directions. Please explain the mechanisms that cause the nitrate decrease and I-129 dispersion in multiple directions. Based on the explanation, we may ask that the explanation be placed in the document.*	Please add text discussing these trends.	Accept	The text has been revised. Discussion has been added to Chapter 5 (Section 5.2- Groundwater Impacts). Note that when the concentrations drop below one-half MCL they are not shown (given a white color). The rate of concentration reduction varies spatially based on which HSU the concentration was initially present in and the flow and transport characteristics of that HSU. As the text in Section 5.2.1.5 indicates, the concentration of nitrate drops below one-half the MCL except for a localized area where the plume is trapped in the Ringold mud unit. Section 5.2.1.2 has been expanded regarding the discussion of I-129 transport. The rate of concentration changes and migration depend on the transient flow field. These transient conditions can be accessed through an evaluation of the model calibration and assumed future recharge rates. The mechanisms involved are all related to the hydraulic system (and in some respect on hydrodynamic dispersion) which is a complex function of the model calibration and future recharge rates. The most current version of the Central Plateau model will be used for transport simulations in the 200 East FS project.
56	p. 5-69 and 5-76, Sections 5.3.4 and 5.3.5.3	The document only considers groundwater for the near field, without considering its flow to the river.	Please add text that addresses the flow of groundwater from the near field to the river.	Accept	The text has been added. Chapter 5, Section 5.3.4 and Section 5.3.5.3 presents a discussion of each of the exposure areas (Near-field, Far-field and Columbia River).
57	p. 5-73, para 3	Note that external radiation does not need a transport medium per se.	Please add this to the explanation of Conceptual Exposure Model for Human Health and the Environment.	Accept	Noted. As with direct contact, the receptor moves to the contaminant. A note has been added to the bulleted text to indicate this.
58	p. 5-75, Figure 5-21	Re the Conceptual Exposure Model (CEM), several pathway designations ("C," "I," "N") appear incorrect. For example, under "Near Field Monitoring Wells" and "Far Field and River Monitoring Wells," "I" for "External Radiation" should be "C" for humans (exposure to contaminated well water). Under "Far Field and River Monitoring Wells," "C" and "I" for "Fish Consumption" should be "N" for humans	Please verify all the pathway designations and add other exposure routes.	Accept	The external radiation route designations are assigned correctly for each exposure area (i.e. exposure is insignificant due to the shielding effects from water). Fish consumption is complete for human use in the far-field and river (human health plus fish consumption AWQC). Fish consumption is incomplete for native American scenarios as these scenarios consider direct contact with groundwater and sweat lodge exposure.

		(no fish in groundwater). Under "Columbia River," "I" for all exposure routes should be "C" for all receptors (exposure to contaminated river water), "N" for "Inhalation" should be "C" for fish (COPC uptake at gill), and "N" for "Fish Consumption" should be "C" for fish (piscivores). Also, in addition to other exposure routes, an irrigation/food pathway is missing for humans for all 3 potential exposure areas (Near Field Wells, Far Field Wells, Columbia River). *Reject: Under "Far Field and River Monitoring Wells," "C" and "I" for "Fish Consumption" should be "N" for humans (no fish in groundwater). Under "Columbia River," "I" for all exposure routes should be "C" for all receptors (exposure to contaminated river water), "N" for "Inhalation" should be "C" for fish (COPC uptake at gill in water), and "N" for "Fish Consumption" should be "C" for fish (piscivores). Re an irrigation/food pathway, see response to Comment 8.*			Inhalation pathway for fish is incomplete as fish exposure occurs from water to gills instead of air to gills. Fish consumption for aquatic receptors should be "N" as standards evaluate bioaccumulation in the individual and not bioaccumulation through the food chain. Irrigation and food-chain pathways are considered secondary transport mechanisms and are not required to be addressed under CERCLA. This evaluation considers the exposure pathways as required in 40 CFR 300.430 (d)(4) and exposure routes recommended in risk assessment guidance for Superfund. Note inclusion of irrigation and food-chain pathways are requirements for performance assessments. The following revisions have been made to the figure. 1. Under "Far Field and River Monitoring Wells – change C & I to "N" for fish consumption as suggested by the reviewer. 2. Under "Columbia River" – A. Leave the external radiation row as "I" for the reason stated above (i.e., the external dose rate is expected to be insignificant due to the shielding effects of water at the low predicted concentrations). B. Change the remaining "I"s to "C" s as suggested by the reviewer, with the exception of the "I" for fish consumption by a drinking water user which should remain an "I" (i.e., fish consumption is not part of a drinking water exposure scenario). Please keep in mind that the receptor keys as used in this figure are: C = Potentially Complete Pathway N = Incomplete Pathway I = Potentially complete pathway with insignificant exposure
77	p. 6-10, para 3-5	The following statement lacks support, "However, experience at the Hanford Site indicates that averages and UCLs cannot be reliably calculated for groundwater data sets." *Reject: See response to Comment 10.*	Provide support for this statement	Accept	The RI Report (Rev. 1) elaborates on this subject and the dataset has been recalculated using ProUCL Version 4.00.05. Chapter 6 presents the EPC data (as the 95%UCL), and Appendix F present an analysis of the contaminant location and frequency of occurrence within the OU.
78	p. 6-10, Section 6.1.5, lines 18-41	The use of a 90th percentile for exposure point concentrations appears to be based on 1992 EPA guidance. EPA has more recent software, ProUCL, that allows calculation of 95% UCLs. 95% UCLs were calculated in ECF-200PO1-09-2027, Rev. 1 by various methods.	Provide in this section an explanation of why the 90th percentile was selected rather than the 95% UCLs previously calculated. Ecology may ask that 95% UCLs be used instead of the 90th percentile.	Accept	The revised 200-PO-1 RI Report (Rev. 1) presents the contaminant EPCs as the 95 % UCL using ProUCL Version 4.00.05.
81	p. 6-12, Table 6-2	With a Kd range that includes 0 mL/g, please explain why Tc-99 is not included in Far Field and River exposure areas, given its high mobility (see Table 5-2). Also, explain how all nonrad metals (e.g., As, Cd, Cr+6, Zn) dropped off the final COPC list for groundwater. *Reject: Provide rationale for Tc-99 (Far Field and River), As, Cd, and Cr+6 (all 3 areas) to be excluded as groundwater COPCs (compare Tables 6-1 vs. 6-2).*		Accept	The groundwater data has been reevaluated and is presented as EPCs (95% UCL) based on use of ProUCL Version 4.00.05. Chapter 6 has been revised to this basis and the associated risks per contaminant and total risk recalculated/quantified. Table 6-8 summarizes the Final COPC list and Section 6.1 presents a discussion of the exclusion criteria for each COPC. If the contaminant met the exclusion criteria it was not carried forward. If it did not meet the exclusion criteria, it was kept for further evaluation. All initial COPCs in the dataset were included in the EPA Tap Water Analysis using both 5 years and 10 years of data wherein the individual contaminant risk and total risk (cancer and non-cancer) were calculated. Final COPCs were identified by comparing statistical EPC estimates to action levels for each detected COPC and exposure area. EPCs are calculated as the 95 percent UCL for each COPC from the existing groundwater data set (i.e. the last 5 years). The MDL is used as the concentration for non-detect results in the UCL calculations. Results of the statistical calculations are summarized in Tables 6-9, 6-10, and 6-11 for COPCs detected in the Near Field, Far Field, and River exposure areas, respectively. A COPC discussion is presented below: ***Near Field-*** Six COPCs (arsenic, hexavalent chromium, iodine-129, technetium-99, trichloroethene and Tritium) have been detected at least once in groundwater in the Near Field and have EPCs greater than their respective action levels (Chapter 6, Table 6-9). Of these six COPCs all but arsenic and hexavalent chromium are identified as final COPCs for the Near Field. The EPC for arsenic is 5.8 µg/L, which is

					greater than the action level of 0.058 µg/L, but only 6 percent of the samples are reported above the EPC. Arsenic concentrations observed within the entire OU are generally at or near the EPC value and are considered to be naturally occurring; therefore, arsenic is not identified as a final COPC. There are three hexavalent chromium measurements within the entire OU. Of these three measurements, 191 µg/L of hexavalent chromium was detected at Well 299-E25-236 (B1XJH8) in October 2008. No other hexavalent or total chromium analyses were performed at this well. Further sampling will be conducted for hexavalent chromium in the Near Field. ***Far Field-*** Seven COPCs have been detected at least once in groundwater in the Far Field exposure area and have EPCs that are greater than their respective action levels (Chapter 6, Table 6-10). Of these seven COPCs, all but arsenic, cadmium, silver, and tributyl phosphate are identified as final COPCs for the Far Field. Arsenic is naturally occurring and is not identified as a final COPC. The EPC for cadmium is 4.5 µg/L, which is greater than the action level of 0.25 µg/L. The national recommended water quality criteria developed for chronic exposure to freshwater species is the basis for the action level. Cadmium is analyzed by two analytical methods including EPA Method 200.8 (ICP-MS) and EPA Method 6010 (ICP). All samples analyzed by EPA Method 200.8 were reported with non-detected concentrations less than the action level. All groundwater samples analyzed by EPA Method 6010 were reported with non-detected concentrations greater than the action level with one detected concentration near the MDL. The results of this evaluation indicate that EPA Method 6010 cannot achieve an MDL less than the action level. Therefore, cadmium is not identified as a final COPC for the Far Field. New cadmium data will be evaluated in the supplement to this RI Report. ***River-*** Five COPCs have been detected at least once in groundwater in the River exposure area with EPCs that are greater than their respective action levels (Chapter 6, Table 6-11). Of these five COPCs, tritium is identified as a final COPC, and four analytes are eliminated as final COPCs (arsenic, iron, thallium, and carbon tetrachloride). Arsenic is not identified as a final COPC as it is naturally occurring. The EPA Tap Water Analysis (Chapter 6, Table 6-41) evaluated the individual HI contaminant risks as well as the total risk. Arsenic equaled 49 percent, cadmium no measurable risk and hexavalent chromium no measurable risk. The cancer risk was also calculated using the Tap Water Analysis (Chapter 6, Table 6-42) and Arsenic equaled 99 percent of the risk, cadmium none and hexavalent chrome none. For radionuclides, tritium was 90 percent of the risk and Tc-99 was 7 percent. Strontium-90 was 3 percent. The EPC for Tc-99 in the Near field did exceed the action level and did not in the Far Field and River Areas. Arsenic exceeded in each of the three areas and was carried forward. The EPC for hexavalent chrome exceeded only in the Near field and the cadmium EPC exceeded only in the Far Field. Additionally, an EPA Tap Water analysis was performed to evaluate the initial and final COPC lists based on individual contaminant risk contribution using a 5 year and 10 year dataset. This analysis was used to indicate if the initial and final COPC lists were suitable, based on quantified risk calculation. Further details on the fate and transport of these contaminants can be found in Chapter 5 and the modeling support document (ECF 200PO1-2018) located in Appendix E.
82	p. 6-12 to 6-13, Section 6.2.1	Missing from this section on exposure assessment are a description of external radiation and irrigation/food pathways for humans, as well as citation of Washington state surface water quality standards (WAC 173-201A) and USDOE rad BCGs for protection of aquatic/riparian biota. *Reject: See response to Comment 8.*		Accept	The text has been revised to include these citations (i.e. WAC 173-201A and DOEs BCGs). The food chain pathway was evaluated using an irrigation scenario.
114	p. 6-38, para 2	This limitation in modeling future groundwater concentrations of CCl4, tetrachloroethene, and TCE should be noted in the uncertainty analysis (Section 6.2.4).	Please add	Accept	Section 6.2.4- *Uncertainties in Risk Assessment* has been revised to reflect the future fate and transport modeling constraints. Additionally, limitations in modeling future groundwater concentrations of all contaminants are discussed in Chapter 5, Section 5.2.3- *Uncertainty in Simulated Future Conditions*. Section 6.2.3.11- *Far Field Exposure Area*, states "*As shown in Table 6-32, the total risk from all carcinogenic COPCs could not be calculated due to the constraints of the fate and transport model. The HI for the Far Field area could not be calculated due to the constraints*

					of the fate and transport model". This section is located immediately prior to Section 6.2.4- *Uncertainties in Risk Assessment*.
115	p. 6-39 and 6-40, Tables 6-16 to 6-19	Summing dose, risk, or HQ (e.g., sum of fractions for rads, adding cancer risk or HQ for nonrads) is valid only for COPCs that coexist in a defined time/space domain. Summation of these endpoints for COPCs in different years makes little sense.	Change the summing doe, risk and HQ to be in the same year.	Accept	The summation of risks for contaminants in different time periods has been deleted from the text.
116	p. 6-40, Table 6-19	There should be no entries under HQ for tetrachloroethene and under ELCR for tetrachloroethene and TCE, since there are no projected concentrations for these COPCs. Also, the MTCA Method B groundwater CUL (cancer) for CCl4 (0.34 µg/L) is missing.	Please add	Accept	The table has been revised.
119	p. 6-41, para 7	Rather than using simple substitution methods, nondetects should be evaluated with methods presented in EPA's ProUCL (http://www.epa.gov/esd/tsc/ProUCL_v4.00.05/ProUCL_v4.00.05_tech_guide(draft).pdf).	Please evaluate using EPA's ProUCL.	Accept	See response to general comment # 10.
120	p. 6-42, lines 6-10	Ecology is interested in the actual ground water contributions to the surface water, rather than the amount of river dilution that occurs inland of the river. This paragraph seems to take credit for the dilution that occurs prior to the river. We stress that we will not give credit for the river dilution, based on WAC 173-340-730(6)(b). *Reject: This comment is to communicate to USDOE that we will not give credit for river dilution. Also, PO-1 reaches the river. This cannot be deferred to the 100 Areas work. The disposition is unclear.*	Please review to describe the actual groundwater contributions to the surface water.	Accept	The text in Section 6.2.4.2 has been revised to indicate that no credit for dilution will be considered for near-river wells.
121	p. 6-42, para 2	Note that MTCA does not allow dilution of groundwater contaminants when discharging to surface water (WAC 173-340-730[6][b]).	Please change.	Accept	The text in Section 6.2.4.2- *Uncertainties Associated with Aquifer Tube Data* has been revised to indicate dilution from the river is not being accounted for in this analysis. The section is discussing possible uncertainties. This text indicates that exposure is likely overestimated because groundwater concentrations do not account for how and where groundwater and river water mix. This text does not discuss application of a dilution factor.
122	p. 6-42, para 4; p. 6-46, Table 6-21	It is stated, "…experience at the Hanford Site indicates that averages and UCLs cannot be reliably calculated for groundwater data sets…." However, data in Table 6-21 appear to argue otherwise. *Reject. It is unclear if text will be changed.*	Please change the text to agree with what is in the table.	Accept	The dataset has been reevaluated using ProUCL Version 4.00.05 to generate EPCs as 95%UCL, as well as a 10 year dataset rather than 5 years, as was originally delivered. It should be noted that with few exception, the 90th percentile value is consistently greater than the 95%UCL concentration and that the 5 year dataset provided comparative results to the ten year.
123	p. 6-43, lines 1-5 and p. 6-46, Table 6-21	Ecology is concerned about the small data sets. There is much greater uncertainty in small data sets (wells with samples sets of less than 20 samples).	Add discussion about the comparison of the 90th percentile with the 95% UCL for small data sets.	Accept	See response to comment #122.
128	p. 6-49, para 1	In addition to exposure at the river, terrestrial eco receptors might be exposed via an agricultural scenario that pumped contaminated groundwater to the surface for irrigating crops.	Please add	Reject	No change to the text. The scope of the 200-PO-1 Groundwater OU is the evaluation of groundwater and its discharge to the Columbia River. As such, the media encompassed by this evaluation is groundwater and its effect on aquatic organisms. The protection of riparian biota (i.e. terrestrial receptors), along the Columbia River was not included in the scope and are being addressed by the River Corridor BRA (Near Shore and Riparian).
131	p. 6-49, para 6	Provide support for the following statement: "Use of groundwater to irrigate crops and water livestock is not evaluated in this risk evaluation because those exposure pathways, although potentially complete, are considered insignificant and secondary to the drinking water and sweat lodge exposure pathways." *Reject: See response to Comment 8*	Please explain	Accept	The text has been expanded to include Section 6.2.2.4- *Evaluation of Bioaccumulation,* as well as additional discussion in Section 6.4- *Summary of the Native American Risk Assessment.* Text was also added.
132	p. 6-50, para 2; p. 6-54, para 1; p. 6-59,	Re sweat lodge exposure, inhalation may also include I-129 and C-14 (in addition to H-3). Dermal contact with vapors may include H-3. Given the unique pathways associated with sweat lodge exposure, describe differences in final COPC selection (e.g., Co, Be, Ni, Cd) for	Please add	Accept	The text in Section 6.4- *Summary of Native American Risk Assessment* has been revised to include: inhalation of tritium, iodine-129, carbon-14, volatiles, and semi-volatiles as vapors while in a sweat lodge. However, I-129 and C-14 are not defined as volatiles, but were included in the vaporized steam. The text has been revised to provide additional summary of differences in final COPC

	para 1	Native American scenarios vs. non-Native American scenarios. *Reject: I-129 (as I2) can sublimate to a gas and C-14 (as CO2) is a gas at ambient temperature and pressure. Therefore, these COPCs are available for inhalation.*			selection. The same dataset was used for both risk scenarios: Domestic use or Non-Native American and the Native American (sweat lodge). However, the sweat lodge scenario assumes that metal COPCs are vaporized with the stream and are available for exposure through inhalation pathway, whereas as the Non-Native American scenarios assume that metals are not volatile and therefore the difference in final COPCs. Potentially complete exposure routes for adult tribal members associated with the use of groundwater as a source of steam in a sweat lodge are as follows: • Inhalation of tritium, I-129, C-14, volatiles, and semi-volatiles as vapors while in a sweat lodge • Inhalation of aerosolized non-volatiles while spending time in a sweat lodge • Dermal contact with vapors from volatile and semi-volatile compounds while in a sweat lodge • Dermal contact with vapor and aqueous condensate while in a sweat lodge
133	p. 6-50, para 5; p. 6-55, para 5	Dermal contact should be evaluated for lipophilic nonrads, as well as H-3. *Reject: Dermal contact is a significant exposure route for H-3 (as H2O vapor) (see RAGS, p. 10-26).*		Accept	Footnote states dermal contact exposure route was evaluated for non-radionuclide COPCs and dermal contact is not a significant exposure route for H-3. A complete description of tribal use exposure scenarios is provided in Appendix E (ECF-200-PO-1-09-2115).The cited RAGS explain that dermal contact is not significant for H-3. The footnote on Table 6-35 has been revised to include the language below: *Potential exists for dermal contact exposure to tritiated water vapor. Since this pathway is not included, calculated ELCR values in Table 6-23 can underestimate risk levels.*
143	ECF-200PO1-09-2007 Figure 1	Figure ES-1 shows a different OU boundary (DOE/RL-2009-85)?	Please justify and correct.	Accept	The OU boundary figure has been revised in the ECF to match Figure ES-1.
144	ECF-200PO1-09-2007 Pg 10, ¶ 1	• What is the justification for using the hydraulic conductivity values? • It is stated that the mean varied from 5 m/d to 450 m/d with a geometric mean of 61.98 m/d and a standard deviation of 7.36. Then the distribution was truncated at 5 m/d to 450 m/d, leading to a mean of 97.16 m/d. How did the mean change when the truncation occurred at the limit of the range and no data would have been dropped? • Why is the adjusted mean used for 2 Pipe Pathways, while a different one used for the 3rd? There is some justification provided for the 3rd but none for the others. State how the number(s) used was validated or calibrated. • Well 690-11-21(?) shows a conductivity of 20.4 m/d. Explain why 120 m/d was used. Is it more conservative?	Please provide the requested information.	Accept	Additional information has been provided in Rev. 2 of the ECF. The hydraulic conductivity is based on available information. The fitted normal (and log-normal distributions) are unbounded at the upper and lower ends. In order to bound them to a realistic range, the upper and lower bounds were specified. This truncation changes the statistics of the distribution as the initial unbounded mean and standard distribution is normalized. More details can be found at http://en.wikipedia.org/wiki/Truncated_normal_distribution The flow rate in the first segment of the Pipe Pathway is needed. Since no specific hydraulic conductivity measurement was available in the first two Pipe Pathways, the geometric mean was used. In the third Pipe Pathway however, a pump-test based value of 124.48 m/day was available and used for the first pipe segment. This value was rounded to 120 m/day. These values are representative of Cold Creek unit and consistent with the values used in the Central Plateau model (100 m/day) based on calibration. Well 699-18-21 has a calculated hydraulic conductivity of 20.4 m/day. This value is part of the log-normal distribution indicating spatial variability. But this value is not deemed to be representative of the first segment of the Pipe Pathway. In the pipe segments the velocity changes as a function of saturated thickness (as shown in Figure 2).
145	ECF-200PO1-09-2007 Pg.44 Table 2	The PNNL reference states specifically that the K_d values are for sediments not impacted by waste solutions or for low organic/low salt/ near neutral wastes. The PNNL reference gives 4 other categories of contaminated sediments for which Table 6.9 cannot be used.	Justify the use of K_ds for "uncontaminated vadose sediments" from Table 6.9, PNNL-18569.	Accept	Most of the transport simulated is in areas distant to the source of contamination. Therefore, the chemistry of the groundwater (pH, ionic strength, etc.) is expected to be similar to the ambient conditions. Note that the relative concentration of contaminants is small compared to the total dissolved solids. Applying a Kd value for sediments impacted by very acidic waste or very basic waste or high salt waste is not appropriate.

146	ECF-200PO1-09-2007 Pg.44Tb 2	The calculations for PCE and TCE are missing.	Provide the calculations for PCE and TCE	Accept	The references to the calculations are given in the footnote.
147	ECF-200PO1-09-2007 Pg.44 Table 2	Table 5.5, PNNL-16100, Rev 1, does not list a value of 3 x 10^{-3}. It has 3 values all slightly less than that for slow phase and values 10x less for fast phase. Explain 1) How the value of 3 x 10^{-3} was chosen 2) Why the slow phase was used 3) Why the values used were for UP-1 and not ZP-1, which were considerably different.	Explain the value for CCl_4.	Accept	The three values have been rounded up to 3× 10^{-3} L/kg, which is also discussed in Section 6 (PNNL-16100, Rev 1). The values from the slower sorption phase are taken because they are based on experiments run over five days and therefore more useful for transport simulations. The most likely reason for larger K_d values for UP-1 sediment samples compared to the ZP-1 sediment samples is the duration of the experiments. As noted in Section 4.3 the batch sorption experiments for the 200-UP-1 sediments were performed for five days compared to three days for the 200-ZP-1 samples. A K_d based on the longer duration experiment is preferred.
148	ECF-200PO1-09-2007, Pg 12, 1st Paragraph	Why is the concentration from only 1 well used for the tritium, ^{129}I, and nitrate concentration history? Was the uncertainty associated with the single well selection evaluated?	Please explain.	Accept	Well selection was based on the availability of long-term monitoring record of I-129 concentrations. Nearby wells have limited concentration histories.
149	Pg 21, 2nd paragraph	"The tritium concentration in the down gradient		Accept	No response offered.
150	ECF-200PO1-09-2352 Near Field F&T General	The modeling approach failed to agree upon concepts and understanding as discussed in the DQO process and issues associated with the following major topics: • The non-incorporation of vadose zone sources of contamination in the fate transport • The fundamental concept of dealing with the boundary conditions and associated splitting of the site into a near field and a far field • Dimensionality (1D, 2D and 3D) of modeling • Use of multiple codes and its integration • Calibration (hydraulic heads vs. concentration, depth profiling, etc.). and non-incorporation of transport calibration to historic calibration. • Recharge • History matching • Modeling using the current contamination as initial contamination to define the model domain • Associated DQOs	Remodel. Including the bulleted topics.	Accept w/Mod	The most current version of the CP model will be used for the 200 East FS project. The topics presented in this comment will be addressed when that work is performed.
151	ECF-200PO1-09-2352 Near Field F&T General	Modeling of specific plumes-especially for uranium in the 200 East Area does not match with the observed site conditions. Also the concept of non-simulation of the "replenishment of the plume by continuous source" is not acceptable. Avoiding that concept in the 200 East Area where known multiple sources are continuously adding contaminants makes the entire simulation meaningless to move forward with any future feasibility studies and associated remediation plan to clean up the site. The concept is contrary to any cleanup mission of a site.	Please remodel to include continuing sources from the vadose zone.	Accept w/mod	The waste inventory data that is quantified and available to DOE has been included in the 200-PO-1 RI Report (Re. 1) and the quantified contribution from vadose sources will be included in the 200 East FS model.
152	ECF-200PO1-09-2352 Near Field F&T, General	There seems to fundamental issues with the flow and transport of non-advective vs. advective transport. Contaminants with short half-life with more or less advective transport seem to remain a lot longer at the site compared to highly adsorptive (with higher Kds) with long half-life. Some of the contaminants of later type vanish within short period of time.	Please explain this discrepancy.	Accept	Same as response #3.

153	ECF-200PO1-09-2352 Near Field F&T Pg 3,	Text states "The contaminants of potential concern that were simulated using this model for the P0-1 remedial investigation are: carbon tetrachloride, 1,1 dichloroethene, trichloroethene, tetrachloroethene, tritium, strontium-90, iodine-I 29, technetium-99, nitrate, and uranium." ECF-200PO1-09-2018 lists 44 starting COPCs.	What was the rational used to select the COPCs evaluated?	Accept	The text has been revised to say… "The COPCs that were simulated using this model for the 200-PO-1 Remedial Investigation (RI) is: carbon tetrachloride, trichloroethene, tetrachloroethene, tritium, strontium-90, iodine-129**,** technetium-99, nitrate, and uranium. Selection of the COPCs is described in Chapter 6 of the RI Report (DOE/RL-2009-85).
154	ECF-200PO1-09-2352 Near Field F&T Pg 23, Table 3-3	There is no basis for the DCE K_d value. No references are listed. Is this a conservative estimate?	What is the basis for the DCE K_d value?	Accept	DCE has been removed from Table 3-4 (was Table 3-3 in Rev. 1 of ECF) since DCE is not considered a final COPC.
155	ECF-200PO1-09-2352 Near Field F&T Pg 92, (g)	"Uncertainty from Neglecting Future Contribution from Vadose Contaminant Sources to Groundwater". Because the vadose zone has been ignored, this impact will likely render the results of this RI valueless within a couple of years.	Remodel to include sources from vadose zone.	Reject	The waste inventory of known/quantified vadose sources has been included in the RI Report (Rev. 1) and the 200 East FS project will include simulate the known and quantified continuing vadose sources when the work on that project is performed. The RI work plan states the vadose zone will be addressed by the overlying source operable units in the 200 Area. The Central Plateau Groundwater Model accounts for historical and future estimated liquid volume contributions to groundwater from natural and artificial recharge sources. However, detailed vadose modeling of contaminant transport will not be performed until the FS stage of the project.
		COPC Comments			
6	General	If screening occurs to determine the contaminants to be used for a baseline risk assessment, then $1x10^{-6}$ should be used for the individual contaminants.	See EPA Memorandum April 17, 2007. Recommendations for Human Health Risk-based Chemical Screening and Related Issue at EPA Region 10 CERCLA and RCRA Sites. Change screening to match this EPA recommendation.	Accept	No change to text. The initial COPCs were identified by comparison of maximum detected concentrations to the lowest overall chemical-specific ARAR. The chemical-specific ARARs included the WAC 173-340-720 groundwater cleanup levels ***that are based on a target risk of 1 x 10^{-6}.***
9	General	All relevant human and ecological benchmarks for both nonradionuclide and radionuclide COPCs should be tabulated in a systematic manner in the document.	Please add: For humans, in addition to state and federal MCLs (rad and nonrad) and state groundwater cleanup levels (WAC 173-340-720), tabulate federal ambient water quality criteria (AWQC) for protection of human health (consuming organisms and water). For ecological receptors, tabulate federal ambient water quality criteria (AWQC) for protection of aquatic life (freshwater chronic criteria), state surface water quality criteria for protection of aquatic life (WAC 173-201A), and USDOE rad Biota Concentration Guidelines (BCGs) for protection of aquatic and riparian animals (DOE-STD-1153-2002).	Accept w/mod	Risks from the water dependent plant, meat, and milk exposure pathways, calculated using RESRAD, were added to the risk assessment and are presented in Table 6-16. These are compared with the risks associated with MCLs, which are depicted in Table 6-34. Chapter 6, Table 6-3 – *Summary of Federal and State Water Quality Criteria and Action Levels for the 200-PO-1 Groundwater Operable Unit* lists the following sources of the chemical-specific ARARs for COPC evaluation and related risk quantification: • MCLs, secondary MCLs, and nonzero MCLGs established under the *Safe Drinking Water Act of 1974* (SDWA) • AWQC established under Section 303 or Section 304 of the *Clean Water Act of 1977* • DOE-STD-1153-2002, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota.* The following sources identify chemical-specific ARARs obtained from Washington State regulations: • WAC 173-340-720 • WAC 173-340-730 • WAC 246-290-310, "Group A Public Water Supplies," "Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs)" • WAC 173-201A, "Water Quality Standards for Surface Waters of the State of Washington" The action level selected for the initial COPC selection process represents the lowest of the available chemical-specific ARARs protective of human and aquatic receptors if more than one chemical-specific ARAR exists for a certain analyte. Section 6.2.2 discusses the health basis for the chemical-specific ARARs used both as action levels and later for characterizing health risks. The action level selected for the final COPC selection process represents the lowest of the available chemical-specific ARARs for the exposure area. The determination that a COPC poses a risk to human or ecological receptors and warrants remedial action is based on comparison with the appropriate ARAR and is not determined solely on the ARAR with the lowest value. For example, groundwater in the Far Field and

					River exposure areas has potential for use as a future drinking water source and as discharge to the Columbia River. Therefore, the action level selected for the final COPC selection process represents the lowest of the available chemical-specific ARARs protective of human and aquatic receptors if more than one chemical-specific ARAR exists for a certain analyte. Groundwater in the Near Field exposure area is not likely to move outside the boundaries of the OU within the 1,000-year fate and transport simulation period, thereby limiting the potential to a future drinking water source only. Therefore, the action level selected for the final COPC selection process represents the lowest of the available chemical-specific ARARs protective of human receptors if more than one chemical-specific ARAR exists for a certain analyte. A detailed description of the derivation of action levels is provided in an environmental calculation (ECF-200PO1-09-2026).
20	p. 2-2 – 2-3, Section 2.1, Step 2 and Table 2-1	Ecology does not accept the approach used to select contaminants of potential concern. We have provided input in this process and in meetings during the preparation of the RI. It is apparent that a great deal of our input was not used, as detailed in several of the following comments. Ecology will need the following so that we can then provide a list of contaminants to add into the risk assessment: A list of contaminants (the original 339) in a table with the following information: a. Contaminant b. Number of samples analyzed for the contaminant c. Dates of sampling for the contaminant d. Dates of detection of the contaminant e. Concentration of each detect of the contaminant f. Location of each detect of the contaminant g. Detection limit (mean and standard deviation for the contaminant) *Reject:* *The data requested in this comment have not been provided to Ecology. The data provided in hard copy and on the CD associated with this document are summary level data, rather than the actual individual contaminant results for each well over the time period considered in this document.* *Please provide Ecology with a list of contaminants (the original 339) in a table with the following information:* *a. Contaminant* *b. Number of samples analyzed for the contaminant* *c. Dates of sampling for the contaminant* *d. Dates of detection of the contaminant* *e. Concentration of each detect of the contaminant* *f. Location of each detect of the contaminant* *g. Detection limit (mean and standard deviation for the contaminant)* *Additionally, the data presentation given to Ecology in the July 22, 2009 meeting was not what Ecology had requested in the email from B. Rochette to D. Morgans on June 4, 2009 (see Comment 73). Ecology specifically wanted to see the screening process end after determining if contaminants were detected and determining if the contaminants had toxicity information (or not). That was not what was provided to Ecology in the July 22, 2009 meeting and Ecology stated so in that meeting. We had not agreed to the screening process that was used in this document in that meeting or any prior meetings. Furthermore, Ecology does not have adequate access to data, so it is not possible to give additional contaminants to include. We requested a change in the*	Please add this information as a appendix to the RI Report. Also provide these data electronically in an Excel file to Ecology as requested in Comment 67.	Accept	Chapter 6 and the Appendix F of the Rev. 1 RI Report have been revised to address this comment and other COPC and risk assessment related comments. The 200-PO-1 groundwater dataset was also issued to Ecology (based on this comment) as part of the comment disposition process leading up to the RI Report being finalized (Rev. 1). The final COPCs that were defined through the disposition of comments and the related risk quantification steps are presented in Chapter 6 of the report and additional information on contaminant location and frequency of detections are presented in Appendix F (a new appendix) of the 200-PO-1 RI Report Rev. 1. The disposition of the comments was defined through a series of working group meeting between DOE and Ecology. It was agreed that any residual comments or concerns Ecology has regarding the COPC selection process, final COPCs, and risk quantification would be addressed in a Supplement to this RI Report that will be prepared as part of the 200 East FS. With regard to the request for a list of the original 339 contaminants, please see the 200-PO-1 Groundwater OU RI/FS Work Plan (DOE/RL-2007-31 Rev.0), Sections 4.2.2 and 4.2.3 and Appendix E Tables E1-2 and E1-3 for a summary of 18 years of data queried from November 1, 1988 to November 1, 2006. The work plan preparation process started in 2006 and culminated in 2007. Tables 4-2 and 4-3 in the work plan provided an initial list of 339 non-rad and rad contaminants that were evaluated in 189 groundwater wells and were included in the data download. CDs of the data were provided to Ecology as part of the work plan review process. The selection process in the work plan resulted in the 44 COPCs (work plan Table 4-5) carried forward for use in the RI characterization effort and SAP. Based on a lack of comment on this data set and overall process, the report moved forward.

		process that may have lead to a different list of contaminants for the risk assessment, and now (and in our comments) we are requesting the data also.			
26	Pg 3-69, line 28	Why is U not a COPC? The rest of the document indicates it is (see section 4.3.1 and Table 5-2).	Please add where appropriate	Accept	The EPCs resulting from the Baseline Risk Assessment (Chapter 6- *Section 6.1.5.3 and Table 6-13*) indicate the uranium EPC is not above the action level. Uranium was retained as a final COPC in the Near Field exposure area based on localized contamination (Hot-Spots). It is not a COPC in the Far Field or river areas. Of 33 initial COPCs, 21 have been detected at least once in groundwater and have EPCs less than their respective action levels (Table 6-9). Of these 21 initial COPCs, nitrate, strontium-90, and uranium are retained as final COPCs.
27	Pg 3-99, lines 35-39	Since PO-1 is considered contaminated at greater than MCLs, what is the basis for allowing sanitary and potable water use?	Please justify.	Accept	Groundwater is not currently withdrawn for industrial, sanitary, or potable uses in the Near Field Area. It is withdrawn for dust suppression in the 600 Area and for backup sanitary use at Columbia Generating Station. The PO-1 OU is a large area and contains groundwater of variable water quality, depending on location and depth. There is no regulation prohibiting sanitary or potable water use, except for WAC 173-160-171(3)(b)(vi) that prohibits water supply wells within 1000 ft. of landfills. These water supply wells are primarily for sanitary and potable use and most were in use prior to the existence of the 200-PO-1 OU. Wells where the water could be used for human consumption (e.g. 400 Area) are deep within the lower portions of the Ringold Formation or basalt sequence where the groundwater is known to be free of potential contaminants. Any water to be used for human consumption is thoroughly tested.
28	p. 4-8, para 2	Text states that CCl4 exceeds its risk based concentration (WAC 173-340-720), but Table 4-3 shows otherwise (max=0.13 ug/L vs. WAC=0.337 ug/L).	Please clarify.	Accept	The text will be corrected. The mention of CCl4 is an error. The discussion is intended to be focused on "1,1-DCE."
29	p. 4-32, lines, 12-15	The document states that the K_d for uranium ranges from 0.2 to 4.0 ml/g.	Please correct the text to: The Kd for uranium ranges from -1.5 to 1000 mL/g depending on soil or groundwater characteristics (PNNL-13895; PNNL-11800; PNNL-14702). PNNL-13895 is Cantrell, K.J., R.J. Serne, and G.V. Last, 2003, Hanford contaminant distribution coefficient database and users guide.	Accept	The text has been updated to add a wider range for uranium Kds, but will also retain the narrower range and stated that it is more typical of the aquifer where uranium is likely to be transported in the subsurface.
30	p. 4-37, Figure 4-24	The WAC action level for TCE listed in Figure 4-24 should be 0.49 ug/L (not 0.081 ug/L).	Please change.	Accept	The figure has been corrected. See response to comment #14.
31	p. 4-39, lines 12-13	The text states "Toxicity values for 1,1-dichloroethene were eliminated in late 2009, and the compound is, therefore, not considered further as a COPC."	IRIS still has reference doses for 1,1-dichloroethene. Use the IRIS reference doses and include 1,1-dichloroethene in the risk assessment.	Accept	The text has been revised. The sentence referenced regarding toxicity values for 1,1-dichloroethene has been removed.
32	Pg 4-39, lines 33-34	Why aren't filtered samples screened out from the initial COPC list? (WAC 173-340-720(9)(b))		Accept	Only total metals concentrations were used in the initial COPC screening process and related risk assessment. No text change needed. The procedure used for analyzing samples includes both filtered and unfiltered samples for metals. The RI Report (Chapter 4 and the associated dataset) presents both filtered and unfiltered samples for metals. The risk assessment does not use filtered samples as that could bias low the results.
33	p. 4-39, para 3	Text states that toxicity values for 1,1-dichloroethene were eliminated in 2009. However, IRIS currently lists RfD and RfC values for this chemical (http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=0039).	Please change.	Accept	The text has been revised.
34	p. 4-39, para 4	The following sentence is incorrectly stated: "The background level (at the 95 percentile) of arsenic (0.0583 ug/L WAC 173-340-720 limit) was exceeded at 33 of the 41 wells sampled." Replace "background level (at the 95 percentile)" with "risk-based level."		Accept	The sentence will be corrected by making two sentences. The first will say that none of the results exceeded the 11.8 ug/L Hanford Site background level at the 95 percentile. The second sentence will say that *33 of the 41 wells sampled had arsenic results exceeding the WAC 173-340-720 limit of 0.0583 ug/L.*
35	p. 4-39, para 6	Note that MTCA generally requires unfiltered groundwater samples, except for Fe, Mn, in cases of high turbidity, or where unfiltered samples do not provide a representative measure (WAC 173-340-720(9)(b)).	Please add that samples will be unfiltered.	Accept	The RI Report (Chapter 4 and the associated dataset) presents both filtered and unfiltered sample results for metals. However, the risk assessment used only unfiltered samples

36	p. 4-39 to 4-40	The sub groups of metal COPCs appears arbitrary. For example, all metals are "naturally occurring," Cd and Pb are not the only "heavy metals," Cr, Ni, and Zn can exhibit toxicity (despite being present in casings/screens), and "other metals" appears to be a miscellaneous group. A single metal group is simpler and may be more defensible.	Please group all metals together.	Accept	The selection of sub-groups of metal COPCs was designed to separate "naturally-occurring" metals (in Hanford groundwater) from the more-highly toxic heavy metals and the metals typically found in monitoring well screens and casings.
40	p. 5-3, Table 5-1	Please clarify the COPC selection process. For example, in addition to the 9 COPCs in Table 5-1, Table 4-3 lists other analytes which exceed both background and either MCL or MTCA limits. Explain why these analytes (Co, F, Pb, Mn) are not included as COPCs in Table 5-1. *Reject: Please include transport evaluation in text.*	Explain why these analytes (Co, F, Pb, Mn) are not included as COPCs in Table 5-1.	Accept	To evaluate the final COPC list, DOE performed an EPA Tap Water Analysis of the initial COPCS (Section 6.7). This analysis used 5 years and 10 years of data (Table 6-39) and provided the needed EPC information for each of the three exposure areas to be able to review contaminant risk contribution (Table 6-41) for all the contaminants of interest in the dataset. Cobalt was a 9 percent contributor to overall risk in the near field and zero percent in the Far Field and River areas. The background level of cobalt is 1.29 ug/l (EPC, 95th percentile) with a maximum value of 14.3 ug/L. Table 6-39 reports the cobalt EPC for the exposure areas as 4.5 ug/L. Cobalt was not simulated as a risk driver. Fluoride ranged from 3 to 12 percent risk contribution for each area with an EPC reported of about 300 ug/L and a background EPC of 1,298 ug/L. Fluoride was not modeled as a risk driver. Lead and manganese were both zero risk and were not simulated. Constituents listed in Table 5-1 were selected for transport evaluation due to their presence in this OU in discernible, broadly distributed groundwater plumes. This indicates that these COCs have exhibited mobility in the past, and are present in the aquifer in developing groundwater plumes with known elevated potential for migration. The constituents listed in Table 4-3 that are not listed in Table 5-1 do not have these characteristics
54	p. 5-45, para 2	Although text indicates that future concentrations of several COPCs are presented in Table 5-11 through Table 5-18 at the end of each pipe segment in the East Pipe Pathway, these tables show concentrations in all 3 pipes (E, NE, SE).	Please reconcile text and tables.	Accept	The text and tables have been reconciled.
65	Pg. 6-2 Line 22-24	It appears that screening of contaminants is using the NCP risk range. Also the text indicates HI but it seems it should state HQ.	Change process for determining which contaminants to carry forward. See comment #3. Comment #3 is no longer relevant to this question, they may mean #6?	Accept w/Mod	The COPC selection process has not been changed, but it has been reviewed in light of the additional work performed for the COPC screening (Tap Water Scenario) and frequency of occurrence and detection presented in Appendix F. Same as the response to comment #6. The text is referring to the cumulative non-cancer HI and cumulative cancer risk 1 x 10^{-5} risk levels. The tables in this chapter list both the individual HQ and the total HI, so it is clear which is the individual risk (per contaminant) and which is the cumulative or total HI risk.
69	p. 6-3, Section 6-1, lines 11 - 22	Ecology did not agree to the process used to eliminate COPCs and now must examine all results of sample analysis to determine which COPCs must be added back into the risk assessment. *Reject: Ecology needs the data as indicated in Comment 20. Summary data of minimum and maximum values without the individual sample results have previously been provided in hard copy to Ecology.*	Please provide all of the results of sample analysis as described in Comment 18. Ecology will require additional time to evaluate the missing data.	Accept	The dataset has been issued to Ecology.
70	Pg. 6-4 Section 6.1.2	The MTCA citings are coming from the corrective action in WAC 173-303.	Add WAC 173-303-64620(4) and state specifically the action levels in WAC 173-340-720 and WAC 173-340-730.	Reject	No change to the text. WAC 173-303-64620 is a location-specific or action-specific ARAR, it is not a chemical-specific ARAR as this citation points back to WAC 173-340-720 and 730 for cleanup levels.
71		p. 6-5, Figure 6-1. *Reject: We do not need the same data as provided on July 22, 2009. We need the data specified in Comment 20.*	Please provide the 55, 975 records that resulted from the process on this flow chart.	Accept	The dataset has been provided to Ecology.
72	p. 6-6, para 2	Bullet 1 is missing specific exclusion criteria, filtered data, and confined aquifer data.	Specify exclusion criteria in bullet 1 (e.g., pre 2004 data, filtered data, confined aquifer data). Add additional bullets to correspond to "Final Screening" diamond in Figure 6-2 (i.e., infrequently detected contaminants, common lab contaminants) and provide rationale for these exclusion criteria.	Accept w/Mod	Figure 6-2 has been revised to reflect the numbers of records and analytes carried forward. No change to the text. Exclusion of pre-2004 data, filtered data, and confined aquifer data are considered data reduction/data processing steps and are not steps that are used to identify COPCs. The text in Chapter 6 has been revised to elaborate on the COPC selection process and rationale for exclusion. ECF 200PO1-2018 provides additional details for eliminating analytes that are infrequently detected or are common laboratory contaminants. In general, infrequently detected analytes were evaluated over a 10-year period to determine if the detection was sporadic or associated with a long-term trend. Common laboratory contaminants are flagged with a "B" indicating the analyte was detected in both the sample and the method blank.

73	p. 6-7, Figure 6-2	In discussions about this flow chart during the RI scoping meetings, Ecology asked that the process end after determining if a constituent was detected, and after determining if toxicity data are available for the constituent. This request was also sent by email from Beth Rochette to Donna Morgans on June 4, 2009 (see attached). The email stated: Donna, Thanks for your presentation at yesterday's meeting. I took a look at the COPC selection process for PO-1 and am requesting a change. After the Constituent Detected diamond, when the answer is "yes", it can point to a diamond asking if the contaminant has an action level (which addresses whether or not there is toxicity information for that contaminant). If the answer to that is "yes", then the contaminant is a COPC, and the process ends. If the answer is "no", then the contaminant is not a COPC and the process ends. This way there is no comparison with action levels in the COPC selection process, though if there is no action limit, then the contaminant drops out. As an aside, we would need to compare action levels with the 95 UCL unless a maximum value is larger than the 95 UCL. With the modification I've asked for we don't need to be concerned about whether or not the 95 UCL is greater than the maximum or not. Also, in the previous PO-1 meeting Alaa mentioned that you could provided the list of original contaminants entering the process, and give the step in the process at which each drops out. That would be very helpful. If you have any questions about this just let me know. This input is only for 200-PO-1, and not for 100-D/H. We are dealing with 100-D/H separately because in that case we are looking at a work plan, rather than an RI. Thanks. Beth	Please end the process after determining if a constituent was detected, and after determining if toxicity data are available for the constituent.	Accept w/Mod	The final COPC list was defined by DOE and Ecology in the comment disposition phase of the project. Added to the final RI was an EPA Tap Water Analysis, a frequency of location/detection analysis (Appendix F), an irrigation scenario (Section 6.2.2.4) and the EPC information was revised from a 90th percentile to 95%UCL basis. The final COPC list was not changed as a result of working through this process. DOE agreed that an updated analysis of the COPCs using current groundwater data would be performed as a supplement to the FS.
74	p. 6-8, Table 6-1	Ecology cannot accept this list of pre-COPCs at this time. We require all of the data requested above to perform our own evaluation, and will then provide our schedule for submitting a list of contaminants for the risk evaluation. *Reject: Same as Comment #73*	Please provide the requested data	Accept	The data was provided to Ecology as part of the comment disposition process leading to the Final RI Report (Rev. 1). See response to comment #73
75	p. 6-8, para 1; Table 6-1	Text indicates 35 groundwater analytes were selected as initial COPCs, whereas Table 6-1 lists only 34.	Please reconcile.	Accept	The text and Table 6-1 have been revised to indicate there are 44 Initial COPCs. Chloroform has been added to reconcile Table 6-1.
76	p. 6-9, Figure 6-3 and p. 6-11, Figure 6-4	This process in Figure 6-3 is not accepted. See prior comment about ending the elimination process on Figure 6-2. The process in Figure 6-4 is unnecessary, and would not be needed if the screening process was shortened. Ecology does not accept the excessive screening performed for this OU. It is likely that a shorted screening process will save overall effort. *Reject: Same as Comment #73*	Please delete these two figures	Reject	The figures have not been deleted, but the final COPC list was agreed to with Ecology during the comment disposition period. See response to comment #73.
79	p. 6-11, Figure 6-4	Please clarify how evaluating "Constituents Eliminated During Final COPC Identification" (figure input box) constitutes "Final COPC Verification" (figure title). Figure 6-4 appears to evaluate additional criteria, rather than performing a verification exercise.	Please clarify the evaluation and please provide number of COPCs retained/excluded for each exposure area (similar to Figure 6-3).	Accept	Figure 6-4 was revised to include a footnote for COPCs retained due to localized contamination. Details of this analysis have been added to Chapter 6 and are also provided in Appendix E (ECF 200PO1-2018).
80	p. 6-12, Table 6-2	Ecology has not accepted the process that produced the list of contaminants on this table. We cannot accept this table at this time. The	Once this has been done, Ecology will determine a set of COPCs for analysis of risk.	Accept	The data was provided to Ecology as part of the comment disposition process leading to the Final RI Report (Rev. 1). See response to comment #73.

		sample data must be provided as part of this primary document. *Reject: Same as Comment #73*			
89	p. 6-17, para 3	Some standards are missing from the bulleted list. *Reject: An HI or sum of fractions (considered an HI approach) can be calculated for surface water criteria or BCGs. In this sense, these standards are "risk-based."*	Please add WAC 173-201A and DOE-STD-1153-2002 (USDOE rad BCGs) to these bullets.	Accept	WAC 173-201A and DOE-STD-1153-2002 have been added to the text, as requested
90	p. 6-17, para 6	Although a "risk evaluation" of radionuclide COPCs may not be applicable, a "dose evaluation" is warranted.	Please clarify that although a "risk evaluation" of radionuclide COPCs may not be applicable, a "dose evaluation" is warranted for these radionuclides (since calculated dose is compared to a dose limit, not a risk limit).	Accept	The text has been revised to clarify that the risk evaluation is applied to non-radioligical contaminants and that the dose evaluation methodology for rads is also presented in this section. Chapter 6, Section 6.2.3.2- *Risk Evaluation* and the subsection *Estimating the Sum of Fractions and 4 mrem/yr. Dose Equivalent* presents a discussion and results of the dose based evaluation along with Tables 6-18, Table 6-21 and Table 6-24.
91	p. 6-19, para 4	Federal regulations state, "If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year" (40 CFR 141.66). This restricts the sum of fractions methodology to radionuclides that impact the total body or the same organ.	Please correct.	Accept	The text has been revised to clarify text as suggested. The text in the subsection "*Estimating the Sum of Fractions and 4mrem/yr. Dose Equivalent*" states that… "An annual cumulative dose equivalent of 4 mrem to the total body or any internal organ is considered protective of human health". The text has been revised to add an additional reference to the total body or any internal organ.
92	p. 6-20, para 1	The 2nd sentence should read, "Each fraction is converted to a dose equivalent by multiplying the fraction by 4 mrem/yr."	Please change.	Accept	The text has been revised to clarify, as suggested.
93	p. 6-20, Table 6-3	Re: nitrate, note the MCL here is expressed in terms of nitrate (45000 µg/L), whereas the MTCA level is in terms of nitrate-nitrogen (25600 µg/L, based on an RfD=1.6 mg/kg-d nitrate-nitrogen). In terms of nitrate-nitrogen, the MCL is 10000 µg/L. This same error is repeated in other tables, as well (e.g., Table 6-19). Point out (via table footnote) that 90th percentile values of Sr-90 and U do not exceed listed limits (as explained in the text).	Please correct.	Accept	The presentation in this report and the appendix for nitrate (as N and NO_3) has been revised with regard to how the State/Federal and WAC Cleanup values are referenced. The suggested footnote has been added regarding the EPC for strontium-90 and uranium being less than their action levels.
94	Pg. 6-20 Tables 6-3, 6-9 6-11,7-2 et. al.	The nitrate values are not using the same expression. The 45,000 is using the NO^{-3} and the 25600 is expressed as N.	Change through-out the document the nitrate values appropriately so they are expressed either as NO^{-3} or as N. Also state in the text and table which expression is being used.	Accept	The presentation in this report and the appendix for nitrate (as N and NO_3) has been revised with regard to how the State/Federal and WAC Cleanup values are referenced.
95	Pg. 6-21 and elsewhere	The RI states that ….the remedy selected for the near field area should address strontium 90 at wells 299-E17-14, Well 299-E-24-16. What is DOE's intent by calling out specific wells that need remediated?	Change to state that DOE goal is to remediate the 200-PO-1 OU to meet 4mrem/yr through-out the operable unit.	Accept	Although the EPC is less than the MCL, the risk evaluation identifies specific wells (or locations in the OU) that exceed the MCL because the remedial goal is to achieve 4 mrem/yr throughout the operable unit. DOEs intent in the risk assessment is to be clear what the overall impact of the contaminants are OU-wide and expressing the results as EPCs is one way of doing that. It is also important to understand where hot spot are and what impact they may have on the cleanup strategy and if they need to be included in the strategy directly or indirectly. DOE may or may not elect to remediate smaller hot spot areas if such can be captured with a broader approach, but knowing where they are and their relative impact is important in setting the cleanup strategy. The text has not been revised.
96	Pg.6-21,	If screening occurs to determine the contaminants to be used for a baseline risk assessment, then $1x10^{-6}$ should be used for the individual contaminants. [e.g. This page shows TCE being removed as a COPC at the MCL not the $1x10^{-6}$ value.]	See EPA Memorandum April 17, 2007. Recommendations for Human Health Risk-based Chemical Screening and Related Issue at EPA Region 10 CERCLA and RCRA Sites.	Accept	Section 6.2.3 characterizes the risk associated with the COPCs identified in Section 6.1. Two comparisons are conducted; 1) to the MCL and 2) to risk based values. The following paragraph refers to the risk comparison using 1×10^{-6}." *The ELCR associated with exposure to TCE as a drinking water source is 1.2×10^{-6} which is slightly greater than the lower EPA threshold and the WAC 173-340 individual carcinogen threshold of 1×10^{-6}"*
97	p. 6-21, lines 18-20	Ecology considers performing a comparison with action levels to be beyond the necessary steps in screening COPCs for a risk assessment. Errors, such as using a 10^{-5} risk level (in this case essentially the MCL) for TCE, rather than a 10^{-6} level, are likely to arise. Performing this step, and verifying that it has been correctly performed, is not a valuable use of time.	Please do not screen against action levels.	Accept w/Mod	See response to comment #73. The project dataset was provided to Ecology during comment disposition and the final COPC list was agreed to.

		Reject: Please provide the data requested for Comment 20 so that Ecology can perform a comparison against ARARs.			
98	Pg.6-21, Last para	The document states uranium should be addressed at wells 299-E24-23 and well 299-E25-36. The cleanup standards and remedy selection are for the operable unit, entire plume, or wherever contaminants are found. This text sounds like remedy and contaminants will be established well by well. CERCLA ROD requires a remedy for the operable unit. Wells monitor in specific areas but it does not necessarily mean that the contaminant is only in that location. What is DOE's intent?	Explain this language and intent.	Accept	The text has been modified to refer to EPCs instead of the 90th percentile concentration and is the basis for defining a remedial strategy. However, the presence of hot spots (isolated concentration above the CUL on an individual contaminant basis, not EPC based) warrants consideration in an overall remedial strategy.
99	p. 6-22, para 2	It is stated, "TCE is the only carcinogen identified as a final COPC in the Near Field exposure area." Note that rads (Table 6-4) and uranium (Table 6-3) are also carcinogens.	Please modify to include the rads and uranium.	Accept	The text has been revised to clarify that TCE is the only nonradiological carcinogen detected. No change to Table 6-3, metallic uranium is considered a non-carcinogen.
101	p. 6-22, para 4	Re: the Far Field exposure area (Table 6-6), revise text to indicate that all COPCs (including CCl4) exceeded a limit.	Please change.	Reject	No change to the text. CCL4 exceedances are already described in the sections that follow the introductory paragraph.
102	p. 6-22, Table 6-5, p. 6-23, Table 6-6, p. 6-24, Table 6-8, p. 6-25, Table 6-9, p. 6-27, Table 6-11, p. 6-39, Table 6-17, p. 6-40, Table 6-19	The WAC 173-340-720 level for nitrate is 25.6 mg/L N.	Please perform calculations with this value.	Accept	The WAC value for nitrate has been revised in each table of the final report (Rev. 1).
103	p. 6-24, para 3	Although 4 of 9 exceedences above the MCL for nitrate in the Far Field area are near the Burial Grounds and will be addressed in the 600 Area RI/FS, the remaining 5 exceedences for nitrate should be addressed in this 200-PO-1 RI.	Please address these exceedances.	Accept	The text has been revised regarding nitrate in the Far Field. Recalculation of the EPC, as a 95%UCL versus the 90th percentile, has removed nitrate from the list of COPCs with MCL exceedances. When the EPC was reported as the 90th, the concentration was just slightly above the MCL (46,500 ug/L vs.45, 000 ug/L MCL). The Far Field text and tables have been modified accordingly.
104	p. 6-25, para 1	The human health AWQC for CCl4 (for the consumption of water plus organisms) is 0.25 µg/L (National Toxics Rule) with an ELCR of 1E-6 (not 2.3E-6).	Please change	Reject	No change. The AWQC for water + organism is 0.23 ug/L. The risk associated with this is (0.50ug/L/0.23ug/L) x 1 x 10^{-6} = 2.2 x $10^{-6.}$
105	p. 6-25, para 3	Although 7 of 29 exceedences above the MTCA groundwater CUL for nitrate in the Far Field area are near the Burial Grounds and will be addressed in the 600 Area RI/FS, the remaining 22 exceedences for nitrate should be addressed in this 200-PO-1 RI.	Please modify to address these exceedances	Accept	See the response to comment #103
106	p. 6-25, para 4	Relevant AWQC for protection of aquatic receptors (freshwater chronic criteria) should be listed for the river exposure area.	Please list	Accept	The text has been revised to present and evaluate the BCG for tritium in the Far Field. These criteria are also provided in Appendix E (ECF-200PO-1-2018, Table 5-1).
107	p. 6-26, lines 14-19	The HI values are incorrect because of the incorrect nitrate values. Also, exceeding an HI of 1 indicates a potential for adverse health effects.	Please correct the HI values involving nitrate after correcting its WAC 173-340-720 value to 25.6 mg/L N. Delete the last statement of the paragraph.	Accept	Nitrate has been removed as a COPC for the River exposure area. The text has been revised to indicate that there are no non-radiological carcinogenic or noncarcinogenic COPCs identified for the River exposure area.
108	p. 6-26, para 4	It is stated, "there are no carcinogenic COPCs identified for the river exposure area." However, H-3 is carcinogenic.	Please add as a carcinogen	Accept	The text has been clarified that there are no nonradiological carcinogens identified in the river exposure area.
109	p. 6-26, para 5	Contrary to what is concluded, an HQ=1.4 for nitrate (Table 6-11) does indicate a potential for adverse effects.	Please modify.	Accept	See response to comment #107.

110	p. 6-27 – 6-41, Section 6.2.3.7 – 6.2.3.11	The steps given in these sections are not accepted. A case has not been made that all COPCs have been considered. Several prior comments have been made with more details. Therefore, the associated conclusions in these sections also cannot be accepted. *Reject: This comment requires resolution of Comment 20.*	Please modify these sections as necessary.	Accept	The risk assessment section (Chapter 6) of the final RI Report (Rev. 1) has been revised. Also, see response to comment #73.
111	Pg. 6-28, Table 6-12	It appears that the wrong action level was used for the nitrate should be 10 ppm as N.	Please correct.	Accept	The value for nitrate in this table (now Table 6-25) has been revised to 45,000 ug/L.
112	p. 6-30, Table 6-13	Re the second to last column heading, the MTCA Method B groundwater CUL for tetrachloroethene is 0.081 µg/L (not 0.49 µg/L).	Please change.	Accept	The CUL for tetrachloroethene in this table (now Table 6-26) has been revised to 0.081 ug/L
113	p. 6-36 to 6-37, Table 6-15	In addition to MCLs and MTCA groundwater CULs, also list AWQC (humans and aquatic biota) and MTCA surface water CULs (WAC 173-201A) for nonrads, as well as BCGs for rads (aquatic/riparian biota). *Reject. Although the response indicates that AWQC are higher than values listed in Table 6-13, this is not true for CCl4 (i.e., AWQC=0.23 ug/L vs. WAC 173-340-720=0.34 ug/L).*	Please add.	Accept	The change to Table 6-13 has been made to reflect the 0.23 ug/L AWQC for CCL_4.
117	p. 6-41, para 3	Risk may also be underestimated if COPC selection is too narrow.	Please add to paragraph	Accept w/mod	Text states that there are uncertainties associated with COPC selection. Additionally, this concern has been addressed through comment disposition process described above. No change to text required.
118	p. 6-41, lines 16-20	Please see a prior comment regarding the 5-year sampling period. More data are needed. 5 years does not provide a picture of the contaminants in the aquifer, because the range of current weather conditions is not represented in a 5 year period. Furthermore, the statements "The groundwater data set for the COPCs is over 1500 samples available from more than 177 wells that were routinely sampled over many years. Therefore, the groundwater data set is considered adequate for risk assessment" does not make the case that an adequate data set is available. The numbers of samples and wells alone do not indicate that the wells and samples represent the aquifer in time and space. *Reject: Ecology stated no agreement at the July 2009 meeting. We did not have actual sample data for confirmation, and now we are requesting those data*	Ecology requests that a minimum of 10 years of data be used (and is likely still too short to be representative of current conditions). Please delete the statement "The groundwater data set for the COPCs…"	Accept	An EPA Tap Water analysis has been performed and EPCs have been calculated using both a 5 year and 10 year dataset. The information has been added to Section 6.7 of the final RI Report (Rev. 1). See Table 6-39.
124	p. 6-43, para 1; p. 6-46, Table 6-21	Text indicates that 4 COPCs in Table 6-21 have a max concentration more than 1 order of magnitude larger than the 90th percentile. However, only 1 COPC (Tc-99 in Near Field exposure area) shows this.	Please review the data in the table and make the numbers correspond to each other.	Accept	The subsection in question has been renamed. It is now entitled 6.2.4.3- *Uncertainties Associated with Exposure Assumptions* (rather than EPCs) and Table 6-21 has been removed and the text revised to address this comment.
125	p. 6-48, para 2	This paragraph seems misplaced. CalEPA recommends an oral slope factor of 0.0059 $(mg/kg\text{-}d)^{-1}$ for TCE (http://rais.ornl.gov/cgi-bin/tools/TOX_search).	Combine the 1st and 2nd paragraphs.	Accept	The text has been revised.
126	p. 6-48, para 4	In addition to assuming no interaction among nonrad chemicals (i.e., dose addition for noncarcinogens or response addition for carcinogens), the combined effects of rads and nonrads are not evaluated (albeit this is uncertain too).	Please evaluate the combined effects of rads and nonrads.	Accept	Individual contaminant HI/HQ, ELCRs and dose (sum of fractions and cumulative annual) are provided in various steps in the risk assessment process for each type of contaminant. The full cancer effects (ELCR) are then compared for the rads and non-rads as an end result (sum all the ELCRs) and are then further confirmed through the EPA Tap Water Analysis (Section 6.7) where the percent risk contribution is presented for all the detected contaminants.
127	p. 6-48, para 5	After specifying drinking water dose limits for rads, text states, "At this time, there are no additional federal or state standards associated with evaluating effects of exposure to radionuclides." However, at CERCLA sites, EPA has recommended 15 mrem/y, as a total human dose (OSWER No. 9200.4-18). This dose limit would apply to all pathways (e.g., irrigation/food, drinking water). MTCA equations cannot be used (without modification) to calculate rad risk. For example, ELCR at the MCL for I-129 (1 pCi/L) is calculated by the following (assuming 2 L/d water ingestion and 70 y lifetime):	Please modify to incorporate this information.	Accept	The guidance that is being referred to is superseded by OSWER Directive 9200.4-31P. This policy indicates that cleanups should generally achieve a cumulative risk within the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure. The response to Q32 in this directive provides more direction for cleanup levels. The need to evaluate exposure from irrigation of food chain pathways is not a requirement of CERCLA. An evaluation of irrigation and food chain pathways has been performed and added to the final RI Report as Section *6.2.2.4 Evaluation of Bioaccumulation*. The equation provided by Ecology indicates that the equation can be modified to evaluate risk. The reference for evaluating risk equations can also be modified in accordance with EPA *Risk Assessment Guidance for Superfund Part A.*

		(1 pCi/L)(1.48E-10 risk/pCi)(2 L/d)(365 d/y)(70 y)=7.6E-6 risk. *Reject: See response to Comment 8.*			
129	p. 6-49, para 4	In addition to AWQC (nonrads) and water BCGs (rads) for contaminated surface water, river sediment could be evaluated with benchmarks for freshwater sediment (e.g., sediment BCGs for rads).	Please add	Reject	No change to the text. The scope of the 200-PO-1 Groundwater OU is the evaluation of groundwater and its discharge to the Columbia River. As such, the media encompassed by this evaluation is groundwater and its effect on aquatic organisms. The protection of terrestrial and aquatic receptors from exposure to sediments has been addressed by the River Corridor Baseline Risk Assessment (Near Shore and Riparian and the Columbia River Component).
130	p. 6-49, para 5	Please add Harris (2004) and Harris (2008) to the References section. Note too that Harris (2004) should be Harris and Harper (2004).	Please add	Accept	The 2004 reference has been revised. The 2008 Harris reference was not used.
134	p.6-51, lines 15-20	Regarding small data sets, an example is the following "Although antimony and hexavalent chromium are reported with HQs greater than 1, they are not considered contributors to the HI…….Hexavalent chromium was only analyzed in three groundwater samples and was not identified as a preliminary COPC in the 200-PO-1 OU work plan (DOE/RL-2007-31)." Hexavalent chromium is a site-wide contaminant, and its omission from the work plan was oversight. It is very unfortunate that we are missing these data for the PO-1 OU. *Reject: The text states: "Hexavalent chromium was only analyzed in three groundwater samples and was not identified as a preliminary COPC in the 200-PO-1 OU work plan (DOE/RL-2007-31)." The disposition indicates that the number should be 6 samples instead of 3, so the text needs to be corrected. However, 6 samples are way too few for a site-wide contaminant like hexavalent chromium. The disposition also refers only to a groundwater PRG of 48 µg/L. PO-1 releases to the river. The PRG should be the ambient water quality criteria of 10 µg/L.* *Please make the changes requested in this comment and correct the text to state the correct number of samples.*	Please add hexavalent chromium to the quarterly monitoring analyses to determine if it will be above levels of concern. Also discuss hexavalent chromium in the uncertainty analysis.	Accept w/Mod	Section 6.5.1.1 of the text has been revised to indicate that additional sampling and analysis will be performed to supplement the risk analysis performed during the FS and steps have also been taken to change the sampling frequency for this contaminant. The action level for hexavalent chrome has been revised to 10 ug/L (WAC 173-201A). Hexavalent chromium was noted as one of the initial 339 contaminants evaluated in the work plan (Table 4-2 and E1-2 both identify antimony and hexavalent chromium). It was noted in Table E1-2 that 6 wells yielded 6 hexavalent chromium results with zero detects and zero non detects exceeding the MTCA B Non-Carc. PRG of 48.0ug/L and therefore it was not retained as one of the 44 preliminary COPCs. In addition, while analyzing for chromium (one of the 44 preliminary COPCs carried forward into the PO-1 RI), the total chrome analysis was used and filtered and unfiltered results were recorded in HEIS. If there were hex-chrome in the samples, it would be detected, too.
135	p. 6-51 to 6-65, Tables 6-23 to 6-28	Note that there is uncertainty with summing ELCR from rads and nonrads, due differences in methodologies (e.g., rad slope factors are central estimates of mean vs. nonrad cancer slope factors are UCL95 of mean).	Please correct	Accept	Acknowledged. There are uncertainties associated with the summation of risks from radiological and nonradiological analytes. EPA methodologies were followed in summing multiple contaminants and multiple pathways. Uncertainties associated with the methodologies used to develop cancer slope factors are minor when compared to uncertainties associated with the assumptions used to estimate exposure. No change to text.
136	p. 6-51, para 2; p. 6-56, para 2; p. 6-61, para 2	Given that Arsenic exceeds risk and HQ limits and its 90th percentile (9.1 µg/L) is nearly at the MCL (10 µg/L), it should be considered a contributor to risk and HI.	Please correct	Accept w/Mod	With the data set expressed as the 95%UCL (as requested), the EPC for Arsenic is 5.8 ug/L and is well under the regulatory limit of 10 ug/L. The text has been revised in this section of the report (Section 6.5.1.1- Near Field Exposure Area).
137	p. 6-51, para 3; p. 6-56, para 3; p. 6-61, para 3	The rationale for excluding Sb and Cr+6 as contributors to HI (i.e., unreliable analytical method and small sample size, respectively) appears weak, especially considering that HQ>1 for both COPCs. *Reject: Text needs to be changed to include Sb and Cr+6 as contributors to HI for Near Field exposure.*	Please change	Accept w/Mod	Both contaminants will be addressed in the supplement to this RI. The text has been revised to indicate that additional chrome samples will be collected. The presence of antimony is associated with the analytical method reporting false positives and thus provides an unreliable estimate of hazard. Similarly, hexavalent chromium was carried forward into the analysis even though it is not identified as a preliminary COPC in the work plan. This analyte was not characterized, resulting in an unreliable estimate of the hazard.
138	p. 6-53, Table 6-24 and p. 6-55, Table 6-25	Ecology is asking that screening of COPCs not go beyond comparison with background and determination of presence/absence of toxicity information. Therefore, the selection process we are asking for could also be used for Native American scenarios. However, if action levels based on non-Native American scenarios were used for selecting the COPCs to use in the Native American risk assessments, then the risks are likely underestimated. Yet there are risk values greater than 1E-03, and HI values as high as 16.	Please include the COPC selection process for the Native American scenarios in this document. Also, please add discussion of this to the Executive Summary.	Accept w/Mod	The COPC selection criteria are the same, but the outcome can change based on the exposure scenarios. That is, the final COPCs are selected based on the exposure scenarios and the comparison to action levels. The Native American sweat lodge assessment generates different COCs than did the drinking water assessment. Again, this assessment will be confirmed in the supplemental analysis.

139	p. 6-54, para 4; p. 6-59, para 4	Given HQ>1 for Mn, this COPC should be considered a contributor to HI.	Please change	Accept w/Mod	Manganese was evaluated in the risk assessment and the 95%UCL concentration of 6.2 ug/L was found to be less than the Hanford site background level of 86.4 ug/L.
140	p. 6-54, para 7; p. 6-59, para 7	Given HQ>1 for Cd, this COPC should be considered a contributor to HI. *Reject: Text needs to be changed to include Cd as a contributor to HI for Far Field exposure.*	Please change	Accept w/Mod	Section 6.7, Summary of the EPA Tap Water Equations in the final RI document presents an HI analysis for this contaminant via the EPA Tap Water analysis. That analysis indicates the HQ for Cd is 0.17, 0.27 and zero for the Near Field, Far Field and River areas, respectively. Although the individual ELCR value for cadmium is within the EPA range of 1 × 10-4 to 1 × 10-6, cadmium is not considered to be a contributor to the ELCR. Cadmium was detected three out of 373 samples at concentration ranging from 2.6 to18 µg/L. All of the results were qualified with a laboratory qualifier of "B" indicating the presence of cadmium is likely attributed to laboratory or field contamination. No text change. Cadmium is not considered a contributor to risk or HI because the analytical method used to measure cadmium is unreliable and retaining cadmium as a COPC for FS evaluation would be equally as unreliable.
141	p. 6-62, para 8	The total ELCR for CTUIR in the Near Field exposure area is 3.2E-3, according to Table 6-28 (not 8.0E-4, as stated in the text).	Please change	Accept	The text has been revised.
142	p. 6-63, para 2	The next to last sentence (HI=3.6) should refer to River exposure area (not Near Field exposure area).	Please change	Accept	The text has been revised, as suggested.
156	ECF-200PO1-09-2018 p. 7, 2nd paragraph	The text states "The COPC defining process presented herein will serve as the baseline risk assessment for the 200-PO-1 OU." The baseline risk assessment must be given (not simply summarized) in the RI for PO-1. *Reject: The disposition says that this comment has been accepted. However, it has not been accepted. This comment specifically stated that the baseline risk assessment must be given in this document. Providing it by reference is not acceptable. Include the baseline risk assessment in this RI.*	Please add this information or ECF-200PO1-09-2018 to the RI.	Accept	Chapter 6 of the document has been full revised to add the detail to the main text that the comment is requesting. The ECF is attached in Appendix E on CD for reviewer convenience.
157	ECF-200PO1-09-2018 COPC Selection p. 7, 2nd paragraph and p. 8, Table 1-1	The text states "Any COPC with an exposure point concentration that is above an action level (e.g., Federal or State maximum contaminant levels [MCLs] or non-zero maximum concentration level goals [MCLGs]) or water quality criteria established under section 304 or 303 of the Clean Water Act (where groundwater may impact surface water quality), will be maintained as a final COPC." Furthermore, the State uses risk-based concentrations when they are more stringent than MCLs; this was omitted from the quoted statement. Additionally, Ecology must determine if there are sufficient data in time and space for each contaminant in order to accept any COPC elimination. The data for this determination must be placed in the RI. Until this has been done and Ecology has had adequate time to evaluate the data, Table 1-1 is not accepted.	Please delete this step in the screening process. See prior comments indicating that Ecology has asked that the screening process end after determining which COPCs exceed background and which have toxicity information.	Accept w/Mod	The COPC screening process described in this report has not been revised from the Draft A to the Rev. 1. However, the final COPC list was defined by DOE and Ecology in the comment disposition phase of the project. See response to comment #73.
158	ECF-200PO1-09-2018 COPC Selection p. 9, 1st paragraph	The text states "The methodology used in this evaluation was presented to the Tri-Parties (U.S. Department of Energy, U.S. Environmental Protection Agency, and Washington State Department of Ecology) in a series of informal briefings conducted over the course of the evaluation and was modified at several stages to incorporate recommendations from the Tri-Parties."	Please delete this statement. Ecology made specific requests in meetings and through email for the COPC elimination process. The requested changes were not made.	Accept	The text has been revised and the statement deleted.
159	ECF-200PO1-09-2018 COPC Selection p. 45,	The action level of nitrate is 10 mg/L as N and are the MCLs and are lower than the values given in the table. Also, the nitrate and nitrite values, based on WAC 173-340 (25,600 µg/L and 1600 µg/L), are N values.	Please change the action level of nitrate to 10 mg/L as N. Also, please change the action level of nitrite to 1 mg/L as N. Please modify the table to indicate that the values are nitrate-nitrogen.	Accept	Nitrate values have been revised throughout the environmental calculation.

	Table 6-1				
160	ECF-200PO1-09-2018 COPC Selection p. 49, Table 6-1	Oil and grease do have an action level: 2000 mg/kg based on WAC 173-340 Method A for heavy oils.	Please add the oil and grease action levels.	Accept	The action level of 500 ug/L has been added for O&G to Table 7-4- Summary of Groundwater Analyses that Exceed an Action Level for the 200-PO-1 Groundwater OU (WAC 340-900, Table 720-1). .
161	ECF-200PO1-09-2018 COPC Selection p. 49, Table 6-1	Uranium-238 and -234 have concentration action levels (30 µg/L). For any well missing a total uranium value, convert isotope values when available to concentrations and include uranium (all isotopes) in the risk assessment. *Reject: The comment is asking that measured uranium values for isotopes be converted to their masses. All that is required for this are the specific activities of the isotopes, which are known. The MCL is for the metal, but the metal is present even when it has not been analyzed as a metal – the isotopes are the metal. Please make the conversions and use the data when ICP or other total uranium methods were not used.*	Please add the Uranium-238 and -234 action levels and use converted isotope values when available and include uranium in the risk assessment.	Accept w/Mod	For wells that are missing a total uranium analytical result, the isotopes and their specific activities are used to calculate total uranium. Table 6-1 only lists the individual analytical results for which no promulgated action level is available. Table 6-7 lists uranium (total) as exceeding the action level and uranium is identified as a COPC in the Near field area. The MCL of 30 ug/L is for uranium metal; a promulgated MCL is not available for isotopic uranium. Naturally occurring isotopic uranium ratios in groundwater must be known before it can be converted to total uranium and vice versa.
162	ECF-200PO1-09-2018 COPC Selection p. 53-54, Section 6.2, 2nd sentence of 1st paragraph	The text states "Analytes that have been collected from appropriate locations have adequate detection limits, and that have not been detected in any of the groundwater samples within the 5-year time frame are eliminated as COPCs." Ecology specifically requested in briefings that a minimum of 10 years of data be used instead.	Use a minimum of 10 years of data.	Accept w/Mod	The final version of the 200-PO-1 RI Report (Section 6.7) presents the results of the EPA Tap Water Analysis that uses 5 years and 10 years of data for EPC calculation.
163	ECF-200PO1-09-2018 COPC Selection p. 55, Tb 6-2 and, p. 106, Sect. 8 (Uncer.)	Dioxins and furans have been eliminated from the risk assessment because they were not detected. However, only 7 samples from 1/5/07 – 1/16/07 were taken. These contaminants could be present in PO-1.	Please add discussion in the Uncertainty section, and in section 6.2.4 of the RI, on the dioxins and furans at the beginning of the table.	Accept	An analysis was performed during the comment disposition period for each of the Ecology identified additional contaminants of interest and their potential locations and this analysis added to the Appendix F of the RI Report, Rev. 1. Table F-1 presents a summary of the contaminants and the locations evaluated. DOE has agreed to prepare a supplement to this RI Report (during the 200-PO-I FS project) which will review additional data collected after the data date for this report and will update Appendix F.
164	ECF-200PO1-09-2018 COPC Selection p. 56, Tb 6-2 and , p. 106, Sect. 8 (Uncer)	Aroclors have been eliminated from the risk assessment because they were not detected. However, only 16 samples (for 2 of them only 1 sample was taken) over a period of less than 2 years, and the MDLs are somewhat above their action levels. These widespread site contaminants could be present in PO-1. Sampling for PCBs in PO-1, using a congener-specific method, should begin and continue on a regular basis.	Please add discussion in the Uncertainty section, and in section 6.2.4 of the RI, on all of the aroclors	Accept	See response to comment #163.
165	ECF-200PO1-09-2018 COPC	DDD, DDE and DDT have been eliminated from the risk assessment because they were not detected. However, the MDLs are far above the action levels.	Please add discussion in the Uncertainty section, and in section 6.2.4 of the RI, on DDD, DDE and DDT.	Accept	See response to comment #163.

	Select. p. 56-57, Tbl. 6-2 and, p. 106, Sect. 8 (Uncert.)				
166	ECF-200PO1-09-2018 COPC Select. p. 59-61, Tbl 6-2 &, p. 106, Sect 8 (Uncert)	A number of PAHs have been eliminated based on a small number of samples (19), and MDLs much higher than action levels. Of particular concern are benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, 7,12-dimethylbenz(a)anthracene, ideno(1,2,3-cd)pyrene, chrysene, dibenzo(a,h)anthracene, and 3-methylchloranthrene.	Sampling of PAHs at PO-1 wells along with analysis by a more sensitive analytical method should begin and continue until sufficient data have been collected to indicate whether or not PAHs are in the groundwater. PAHs are very common soil contaminants in river corridor waste sites. Furthermore, discuss these contaminants in the Uncertainty section and in section 6.2.4 of the RI.	Accept	See response to comment #163.
167	ECF-200PO1-09-2018 COPC Selection p. 62, Tbl 6-2 & p. 106, Sect. 8 (Uncert)	Hexachlorobenzene has been eliminated based on a small number of samples (19), and MDLs much higher than action levels.	Please add discussion in the uncertainty section, and in section 6.2.4 of the RI.	Accept	See response to comment #163.
168	ECF-200PO1-09-2018 COPC Selection p. 63, Tb 6-2 & p. 106, Sect. 8 (Uncert)	Various nitrosoamines have been eliminated based on a small number of samples (19), and MDLs much higher than action levels. These are very mobile and toxic contaminants and some have been detected on the Hanford site. *Reject: The RI should include a baseline risk assessment that addresses total risk. These contaminants can be easily added to determine total risk. Please provide what the comment has requested.*	Discuss these contaminants in the uncertainty section and in section 6.2.4 of the RI.	Accept	See response to comment #163.
169	ECF-200PO1-09-2018 COPC Selection p. 69, Section 6.3	This step, and all subsequent steps, in the screening process must be eliminated. As examples of problems that begin to develop here, note that 1,2-Dichlorobenzene has been eliminated from consideration based on only 18 samples, and TPH eliminated based on only 16 samples. At the very least these are sources of uncertainty. However, their risk can be added in with others having similar toxic effects quite easily. This is true for all of the contaminants on Table 6-3. There is no value in going further with screening.	Include all of the contaminants in Table 6-3 in the risk assessment for all of the portions of the OU	Accept w/mod	The COPC screening process described in this report has not been revised from the Draft A to the Rev. 1. See response to comment #73.
170	ECF-200PO1-09-2018 COPC Selection p. 77-79, Table 6-4	Screening to this point and beyond is not called for. *Reject: Please provide what the comment has requested.*	Include all of the contaminants in this table in risk assessment for all sections of the OU.	Accept w/Mod	An EPA Tap Water Analysis has been conducted and added to Section 6.7 of the final report. See response to comment #73.
171	ECF-200PO1-09-2018 COPC Selection	These screening steps are not called for. Additionally, a great deal of subjective analysis is included in this section. Furthermore, the statement in the first paragraph "Whereas, the groundwater in near-field exposure area will not likely move outside the boundaries of the exposure area resulting in the potential as a drinking water source only"	Please delete this section.	Accept	The recommended text has been deleted. Chapter 6 of the RI report and ECF-200PO1-09-2018 have been revised and reorganized. The COPC selection process has not been substantively changed. However, the Ecology requested additional analyses of contaminates of interest have been performed as well as evaluations of contaminants using the EPA Tap Water Analysis and additional extended data periods (5 years and 10 years).

	p. 84, Section 7	is not defensible. That groundwater will migrate toward the river. This is even acknowledged for groundwater under the tank farms in the 200 East area.			
		ALL OTHER COMMENTS			
4	General	It is unclear what DOE's is intending with dividing the operable unit into three different areas and then calling out that remediation only needs to occur in specific wells for specific contaminants. Is DOE planning to have several operable units with several remedies? Therefore multiple RODs.	Explain intent.	Accept	DOE is not planning on multiple RODs for the 200-PO-1 OU. The Near Field, Far Field, and River exposure areas use the existing groundwater monitoring framework established for the Annual Groundwater Monitoring Report and as prescribed by the approved Sampling and Analysis Plans. The RI Report is used determine nature and extent of contamination and to quantify risk (determine if there is a need to prepare a feasibility study). It does not prescribe that remediation needs to occur in any particular area. The Risk assessment presents results on an EPC basis as well as a hot spot basis for completeness. The remedial strategy will address the OU as a whole, considering all the information.
5	General	Key information necessary in order to review your logic must be presented in the primary document.	Please place required information from secondary documents into this document for regulatory approval.	Accept	The supporting information will be included on CD in the decision document as Appendix E. The document has been expanded in a number of chapters to incorporate key information from the supporting documents, in particular Chapter 6. Additionally, the supporting information has been moved onto CD and placed in Appendix E. The calculation briefs are also in the administrative record.
7	General	200-PO-1 RI states that RCRA TSD will use 200-PO-1 OU to determine impacts to groundwater and then points to the DOE-RL-2009-81, Central Plateau Strategy. Unless the Site-wide Permit indicates that alternative authority will be used for the TSD, DOE does not have a basis for this text.	Remove this language.	Accept	Text has been revised. The text in Section 1.2.4- *Regulatory Basis and History*- has been revised to remove reference to the Central Plateau Strategy document (DOE/RL-2009-81).
16	Pg. 1-5	Objectives are missing the protection of the environment.	Add objective.	Reject	The objectives provided are for the RI Report, not for remedial actions in an FS, which address protection of the environment. The objective of an RI is to determine nature and extent of contamination and whether the observed groundwater contaminant conditions require evaluation in an FS. The 200-PO-1 RI Report conclusion (Section 7.2) states that the RI provides a basis for an FS and that the objectives stated in the RI Work Plan have been met.
18	Pg. 1-6, Section 1.2.1, 2nd Para	The RI states "Consistent with the Tri-Party Agreement; DOE/RL-2007-20, *Hanford Integrated Groundwater and Vadose Zone Management Plan*; and DOE/RL-2009-81, *Central Plateau Cleanup Completion Strategy*, the remediation of waste sites and impacted vadose zone soils overlying the four Central Plateau groundwater OUs will be addressed as discrete CERCLA OUs with their own accompanying record of decision (ROD). The 200-PO-1 Groundwater OU addresses the contamination already present in the aquifer, within the OU." *Reject: Which Tri-Party agreement? And although you "understand" that Ecology did not comment or approve of the Central Plateau Cleanup Strategy does this mean that all references to the document will be removed? Also there is no Table 2-2 in the Work Plan.*	Ecology did not review or approve of the Central Plateau Cleanup Completion Strategy (DOE/RL-2009-81). Please remove all references to the Central Plateau Strategy and where elements of the Central Plateau Strategy changed the RI from the approved Work Plan, please correct so that the RI follows the WP.	Accept	The table references have been corrected. The waste site inventory currently available and quantified has been added to the final RI Report (Tables 3a and 4b) and the 200 East FS project will include modeling of quantified vadose contributing sources. The 200-PO-1 remedial investigation was conducted in accordance with the approved work plan requirements as presented in Table 2-2.
24	Pg 3-65, line 1	Text states "sufficient effluent volumes were disposed… to result in additional … recharge."	1) State how much and include references. 2) Is this included in the CSM or historic model calibration work?	Accept	The text has been revised to add the volume of waste liquid discharged and reference to the data. This information is included in the CSM and historic model calibration. The flow model inputs and calibration discussion are presented in Chapter 5- *Contaminant Fate and Transport Conceptual Exposure Model*, as well as Appendix E (ECF-200PO-1-09-2007) of the RI Report, Rev. 1.
39	Pg 5-1, line 21	The statement needs a reference.	Provide a reference for the "CHPRC-approved" process	Accept	The text has been revised to delete "CHPRC approved versions" and to reference the model as being the "Central Plateau Model".
45	Pg 5-4, Table 5-2	ECF-200PO-1-09-2007 reference provides only a table with references,	Please copy that table into this document along with the references.	Accept	The text has been revised, as suggested. Chapter 5, Table 5-2 has been revised to add the information from ECF-200PO1-09-2007.
46	Pg 5-4, Table 5-2	See comments on supporting documents for comments on ECF-200PO-1-09-2007. (Note: these comments are at the end of this RCR)	Provide answers for the comments on this ECF in the RI.	Accept	The ECFs have been included via hyperlink in Chapter 8- References, and on CD in Appendix E of the RI Report, Rev. 1 and additional relevant information has been included in the subject chapters.

52	p. 5-36, Table 5-8	Looks like "Near Field" is missing in table title for Sr-90.	Please add.	Accept	The table heading have been revised. For clarity, Tables 5-3 through 5-9, each of which presents the maximum concentration information for contaminants for selected points of calculation at selected time steps from the Central Plateau Model have been retitled.
53	p. 5-45, lines 30-33.	The text states "The results of the Far Field transport calculations demonstrate that the peak concentrations which currently exist in the Far Field region generally decline with distance and time. For the COPCs that do not currently exist in the Far Field region, but are injected at the upstream boundary, the peak concentrations in the Far Field remains lower than those at the boundary suggesting decreasing risk." However, Figures 5-16 – 5-19 show that uranium and chlorinated hydrocarbon concentrations in groundwater are generally increasing through time.	Please add further explanation to clarify the meaning of "suggesting decreasing risk."	Accept	The text has been revised to indicate that DOE has agreed to prepare a supplement to this RI Report during the FS phase that will elaborate on this discussion and the FS itself will use an updated Fate and Transport model with available source/vadose contribution data.
55	Pg. 5-66	Ecology does not agree with DOE's interpretation of the CLUP concerning land use.	Remove text.	Accept w/Mod	The text in Section 5.3.1-*Current and Reasonably Anticipated Future Land-Use* has been revised.
59	p. 5-77, para 1	Note that MTCA Groundwater Cleanup Standards (WAC 173-340-720) do not discuss dermal uptake and that the specified WAC citation is incorrect. Dermal uptake may be significant for lipophilic COPCs in water (e.g., CCl4, tetrachloroethene, TCE-see p. 6-47, para 2), as well as H-3 in water.	Provide support for claiming that dermal uptake and external radiation are insignificant exposure pathways.	Accept	The text in Section 5.3.5.3 - *Potentially Complete Exposure Pathways and Receptors (Near Field Area)* has been revised to read "Washington State regulations do not include the dermal contact exposure route in the equations for calculation of potable groundwater cleanup levels. Whereas Federal regulations consider dermal contact exposure a complete, but insignificant groundwater contaminant exposure pathway. Elimination of the dermal contact exposure route from chemical-specific ARARs may result in an underestimation of the cleanup level. Uncertainties associated with exclusion of this exposure route are addressed in Section 6.2.4.5. External radiation exposure is also considered an insignificant exposure pathway due to the shielding effects of water as defined in Chapter 10 of EPA/540/1-89/002." EPA considers the dermal contact route to be significant if it contributes at least 10 percent of the exposure derived from the oral pathway. These results are based upon comparing two main household daily uses of water: a source for drinking and a source for showering or bathing (EPA/540/R-99/005, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment): Final, OSWER 9285.7-02EP). Exhibit B-3 and Exhibit B-4 of EPA/540/R-99/005 provide a screening tool to focus the dermal risk assessment on those chemicals that are more likely to make a contribution to the overall risk. Exhibit B-3 indicates that dermal exposure exceeds 10 percent of drinking water for carbon tetrachloride, tetrachloroethene, and TCE.
60	p. 5-77, para 4	Text states, "Similar to the Near Field exposure area, the Far Field and river exposure areas do not include the dermal contact and external radiation exposure routes." However, Figure 5-21 indicates otherwise.	Please reconcile.	Accept	Figure 5-2 has been revised to replace "C" with an "I" for dermal contact route for near field and far field exposure areas.
61	p. 6-1, para 1, bullet 1	Please note that nondetected contaminants are also identified, since both detected and nondetected contaminants are identified with analytical measurement data.	Please add that both detected and nondetected contaminants were identified.	Accept	The text has been revised
62	p. 6-2, 1st bullet, lines 8-10 and 2nd paragraph, 22-24	For total risk for nonradionuclides, Ecology will only accept a comparison with the WAC 173-340 threshold of 1E-05 or a lower threshold. The NCP range goes to 1E-04.	Please modify lines 8-10 to indicate the WAC 173-340 total risk threshold, and modify lines 22-24 as follows: exposure point concentrations (EPCs) exceed a hazard index (HI) greater than one or ~~the upper end of the NCP risk range~~ 1E-05 for cumulative carcinogenic site risk…..	Accept	The text has been revised
63	p. 6-2, 2nd bullet	Second bullet does not include risk-based levels and the requirement to use whichever are lower.	Modify the text as follows: For groundwater actions, maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) or risk-based levels, whichever are lower, will generally be used….	Accept	The text has been revised
64	p. 6-2, lines 16-17	Sentence does not include risk-based levels and comparing to the total site risk and the site hazard index.	Modify the text as follows: For purposes of the 200-PO-1 OU, protectiveness of human health is evaluated by comparing groundwater concentrations to existing federal or state MCLs, nonzero MCLGs, or risk-based levels, whichever is lower, and by comparing total site	Accept	The text has been revised

			risk with 1E-05 and site hazard index with the goal of 1.		
66	p. 6-2, para 5	In addition to direct contact/ingestion and fish consumption, external radiation is also a complete pathway for gamma and high energy beta emitting radionuclides in groundwater.	Please include.	Reject	No change to the text. EPA/540/1-89/002 states that external radiation exposure due to submersion in water is possible; however because of the shielding effects of water and the generally short durations of exposures, immersion in water is typically of lesser significance. Additionally, EPA does not publish equations for evaluating the external radiation route for groundwater.
67	p. 6-2, lines 40-41.	"As a result, the risk assessment does not identify the need to develop cleanup levels that are more protective than ARARs." The site risk goal of 1E-05 is an ARAR. It is not clear if cleanup levels have been adjusted downward or not to meet it. Additionally, Ecology does not accept the reduced COPC list used in this assessment, and cannot accept the conclusion that downward adjustment is not necessary when potential risk contributors have been excluded from the analysis. *Reject: Delete the text quoted in the comment, since it implies that the risk assessment adhered to ARARs. The total risk ARAR under WAC 173-340 (the site is not to exceed 1E-05 risk and not to exceed a hazard index of 1) was not followed. Include all of the detected contaminants in the risk assessment and sum the hazard quotient and risks of all nonradionuclides*	Please delete or modify the statement	Accept	The statement has been removed. Cleanup levels were not adjusted downward to meet ARARs of 1 x 10^{-5}. Potential risk contributors greater than 1x 10^{-6} were not excluded from the analysis. The only risk contributors excluded were those less than 1x 10^{-6} ,as described in Chapter 6 (Section 6.1-*Selection of Contaminates of Potential Concern)*, and Appendix E (ECF-200PO1-09-2018) regarding COPC Selection. The COPC screening process described in this report has not been revised from the Draft A to the Rev. 1. However, the final COPC list was defined by DOE and Ecology in the comment disposition phase of the project. DOE performed an EPA Tap Water Analysis, a frequency of location/detection analysis, an irrigation scenario and revised the EPC information from 90th percentile to 95%UCLs. The final COPC list was not changed as a result of working through this process, but DOE has agreed to perform a supplemental COPC analysis during the 200-PO-1 FS project to ensure the COPCs have not changed. The EPA Tap Water Analysis (Section 6.7) and the location specific contaminant analysis presented in Appendix F evaluated the 200-PO-1 data over a 10-year period. The results are presented in Appendix F.
68	p. 6-3, para 1	Re the CTUIR scenario, Harris and Harper (2004) represents an update of Harris and Harper (1997).	Please add the 2004 reference (Harris, SG and BL Harper. 2004. Exposure scenario for CTUIR traditional subsistence life ways. CTUIR, Pendleton, OR). For greater transparency, results for Native American scenarios should be presented in this document, rather than in a separate calculation (ECF-200PO1-09-2115).	Accept	The text will be revised to include 2004 reference for Harris and Harper. The 1997 reference was not used. The Native American results are discussed.
83	p. 6-15 to 6-16, Section 6.2.2.3	This section does not include the Washington State surface water quality standards for protection of aquatic biota.	Please include Washington state surface water quality standards (WAC 173-201A) in this section for protection of aquatic biota.	Accept	The text has been revised to include the descriptions of state surface water quality standards (WAC 173-201A)
84	p. 6-15, para 5	The WAC citation given is for TEFs for dioxins/furans. The WAC citation for TEFs for carcinogenic PAHs is WAC 173-340-708(8)(e)(iii)(A).	Please correct the citation. Furthermore, please explain why this citation is provided, given the absence of dioxins and PAHs in the COPC discussion for 200-PO-1.	Accept	The text will be revised to include the citation. The citation is provided as needed for calculation of groundwater and surface water cleanup levels. These constituents were analyzed for, but were not detected.
85	p. 6-15, para 6, bullet 1	In the first sentence, clarify that this bullet relates to TCE.	Modify the sentence to read "The oral cancer potency factor of 0.089 $(mg/kg\text{-}day)^{-1}$ for TCE published…."	Accept	The text has been revised for clarity.
86	p. 6-16, para 1, bullet 1	IRIS also currently lists an oral RfD=0.06 mg/kg-d for fluoride, so this should be the preferred value (Tier 1), according to EPA's tox value hierarchy (Cook, 2003).	Please correct	Accept	No changes to the text. The value of 0.06 mg/kg-day was used.
87	p. 6-16, para 3	While the upper end of the NCP risk range is 1E-4, it should be noted here that the site risk limit for MTCA is 1E-5 (10x lower).	Please correct	Accept	No correction needed. This limit is described in Section 6.2.3.2.
88	p. 6-17, Section 6.2.3.2, lines 24-28	EPA /540/R-92/003 states "That is, an appropriate point of departure for remediation of carcinogenic risk is a concentration that corresponds to a risk of 10^{-6} for one chemical in a particular medium." Therefore, the point of departure should be considered the low end of the CERCLA risk range, rather than the whole range.	Please revise the first and second sentences to: ELCR values are compared to the CERCLA risk range of 10^{-6} to 10^{-4} and the WAC 173-340 cancer risk limit of $1x10^{-5}$ for multiple hazardous substances.	Accept	The text bullet has been revised.
100	p. 6-21, lines 21-26	It would help the reader if maps were referenced here.	Please refer to a map showing the well locations (such as Figure 5-20 or another with all well locations).	Accept	A reference to Figure 5-21 has been added to this paragraph.
		9/19/11 ADDITIONAL COMMENTS- NEW			

1	Executive Summary/ Page iii	The redline reads, "200-PO-1 boundary follows the tritium contour. It seems the boundary does not include some areas within the 2,000 pCi/l (not the 20,000 pCi/l) contour." Check the validity of the boundary.		Accept	The comment is correct in that the observed figure map boundary does not include some areas within the Tritium 2,000 pCi/L contour. Because plume extents are dynamic and change annually, the OU boundary for the purposes of the RI was established in the DQO for the Work Plan. The boundary in the RI is as presented in the 200-PO-1 DQO, Work Plan, SAPs, and Hanford Annual Groundwater Monitoring Reports. Differences in the OU boundary outline in relation to plume extent and geographic extent has been the subject of numerous inter-agency discussions that have not resulted in an inter-agency agreement with regard to groundwater OU boundaries on the Central Plateau.
2	Executive summary/ page v	The redline reads, "As 200 East Area source/vadose zone remedial investigations are completed and the sources contributing to groundwater are identified and quantified, DOE plans to incorporate that information into future fate and transport simulations and related Feasibility studies." USDOE must incorporate all **available/known** information on vadose sources in the FS irrespective of whether 200 East Area vadose zone RI is completed or not.		Accept	This statement has been removed from the ES to Chapter 5.
3	Chapter 5/page 5-1	The modified redline reads, "The fate and transport modeling activities performed for this the 200-PO-1 Groundwater OU are limited to evaluation of existing groundwater plumes. Therefore, no continuing contribution from known or suspected vadose zone sources (including WMA A--AX) is included in this evaluation. There remains considerable uncertainty in the occurrence and magnitude of continuing contributions to groundwater from residual vadose zone contamination. In some instances, sufficient information from observations and measurements exists to indicate that historical vadose zone contributions have stopped. At other locations, existing data are inconclusive regarding the magnitude of potential for ongoing vadose zone contributions to groundwater. The potential impact of vadose zone sources, therefore, is not incorporated into this groundwater OU RI and will instead will be addressed under the decisions that will accompany the new 200 East Inner Area and the new Deep Vadose Zone OUs identified in the Tentative Agreement TPA." This is not acceptable. Please see the comment above comment (comment #2). Besides, the DV-1 and inner area vadose zone modeling are not necessarily going to address fate and transport modeling all the way to the Columbia River/Eastern edge of the PO-1 boundary. The scope of the work plans of these tasks are either on hold or yet to be determined due to various reasons. Ecology believes that there are data available on the vadose zone sources (also been used in EIS's). A fate transport modeling must be done in the FS to see the cumulative impact coming from various sources (based on available data with uncertainties).	Modify the text according to reflect the above comment.	Accept	Text modified to read: *"The fate and transport modeling activities performed for the 200-PO-1 Groundwater OU are limited to evaluation of existing groundwater plumes. Therefore, no continuing contribution from known or suspected vadose zone sources (including WMA A-AX) is included in this RI evaluation. There remains considerable uncertainty in the occurrence and magnitude of continuing contributions to groundwater from residual vadose zone contamination. In some instances, sufficient information from observations and measurements exists to indicate that historical vadose zone contributions have stopped. At other locations, existing data are inconclusive regarding the magnitude of potential for ongoing vadose zone contributions to groundwater. However, as sources believed to be contributing to groundwater are identified and quantified, DOE plans to incorporate the available/known vadose information into the future 2 00 East FS Report".*
4	Chapter 5	Fate and transport modeling: Over all approach for the FS is not clear. As per the discussion, USDOE will follow a consistent site wide approach in modeling the contaminant fate and transport by choosing MODFLOW, STOMP and the related applicable tools, etc., without breaking the sites into different parts (no near site and far site concept) and will use uniform dimensionality (1D vs. 2D vs. 3D) in the FS. Prior approval from the lead regulator must be obtained for detail evaluation process.		Accept	No text change requested or needed. It was agreed during comment resolution meetings that no changes were required to the RI modeling approach. DOE agreed to follow a consistent site wide modeling approach and intends to seek approval of the lead regulator for the evaluation process to be used in the FS.
5	p. 5-3 and 5-4, bullets 2-6, new text	Bullet 1 on p. 5-4 states "No non-aqueous liquids have been identified within the 200-PO-1 OU and, therefore, groundwater contaminants are assumed to exist as dissolved solids." There are organics present that are not derived from solids but instead from liquid solvents. Also, Bullet 2 on p. 5-4 is completely speculative, as TBP and hydrocarbons have been used as a solvent and complexation system in Hanford processes. TBP and hydrocarbons are more likely co-solvents with water and one		Accept	The section has been revised. Please understand that solubility, contaminant interactions, diffusion, specific geochemical interactions and partitioning have not been evaluated but may significantly influence contaminant mobility.

		another. TBP is also known to complex various metals. Instead of these bullets there should just be a statement that solubility, contaminant interactions, diffusion, specific geochemical interactions and partitioning have not been evaluated but may significantly influence contaminant mobility.			
6	p. 5-5, Sect. 5.1.3 (address original comment #47)	A summary of the key assumptions and parameters has been requested, and they were added, sort of, for the assumptions, but not the key parameters. If there are any other key parameters used in the calculations, they need to be discussed, presented, etc. This is a regulatory requirement of WAC 173-340-747(8).		Accept	Nothing to add
7	p. 5-6, last paragraph (addressing original comment #44)	Please add the sentence in highlight **if it is true**: Contaminant-specific Kd values for the 200-PO-1 Groundwater OU COPCs are summarized in Table 5-2. The contaminant Kd values used for this study were selected from published reports describing experimental determination of Kd values for specific COPCs conducted on samples of aquifer materials that represent aquifer conditions within the 200-PO-1 Groundwater OU. The Kd value estimation is based on the assumption of dilute concentrations in groundwater that interacts with the largely uncontaminated sandy gravel sediments. Because of large transport distances considered in the model and where the ratio of available sorption sites to the dissolved mass of COPC is expected to be very large, the Kd values reported for the uncontaminated sandy gravel sediment type is deemed reasonable. The chemical conditions in the aquifer are near ambient conditions and are not expected to change in the future. This assumption applies to both techniques described on page 5-1. NOTE: The following comments are closed out – 19,21,22,23,24,25,26,27,31,32,37,38,39,41,42,45,46,48,49,144,145,146, 147,148,149,153,154,and155.		Accept	The referenced paragraph of Section 5.1.2 has been revised.
8	p. 5-51, lines 26-30	For comment 53 text was to be provided explaining "decreasing risk" in light of Figures 5-16 – 5-19 that show increasing concentrations of uranium and chlorinated hydrocarbons through time. The text was not provided. To close comment 53, please delete the paragraph (lines 26-30).		Accept w/Mod	The text has been revised for clarity. Also, see response to comment #53.
9	p. 5-81, Section 5.3.5.3, Far Field and River Exposure Areas	For comment 56 text was to be provided that addresses the flow of groundwater from the near field to the river. No text was added. Therefore, comment 56 is open and unresolved.		Accept w/Mod	See response to comment #53 above. As presented, Chapter 5, Section 5.3.4 and Section 5.3.5.3 presents a discussion of each of the exposure areas (Near-field, Far-field and Columbia River).
10	p. 6-4, Table 6-1; p. 6-47, Table 6-8	The Rev. 0 redline version of this document has a different Table 6-1 than did Draft A. The revised Table 6-1 is from the PO-1 work plan, and is not consistent with the former (Draft A) Table 6-1 in this RI, which is now Table 6-8. The revised Table 6-1 has only 4 of the contaminants given in my review of the PO-1 data, while 30 other contaminants from my data review are not included. Table 6-8 is basically an unrevised version of the prior Table 6-1, with no consideration of my data review. I cannot accept either of these as a list of COPCs. I continue to advise that the process for selecting COPCs be based on detects, availability of toxicity information and published background values when available, and not on comparisons with action levels.		Accept	Acknowledged. See response to comment #73 above.
11	p. 6-12, lines 14-	Based on my Draft A comments of 20, 69, 73, 74 and numerous associated comments, I cannot accept the use of screening levels in the		Accept	Significant additional screening work was conducted to support resolution. No further effort will be conducted for this RI report. Unresolved issues will be addressed in the supplement to the RI done

	21	COPC selection process. Consequently, Draft A comments 20, 67, 69, 73, 74, 76, 80, 97, 110, 138, 157, 158, 169, 170 and 171 remain open and unresolved.			during the 200-PO-1 RI/FS project.
12	p. 6-13 – 6-24, Table 6-3	This table is completely new and was not shown with redline as an addition. While it appears that this table may be from ECF-200PO1-09-2018, it is not clear that this is the source. Changes that may have been made since Rev. 1 of the ECF document do not appear as revisions. Due to the time constraints (a week for review of the revisions), it is not possible to check the values in this table. Therefore, there could be errors that will not be detected in this review.		Accept	Acknowledged.
13	p. 6-26 – 6-44, Tables 6-4 – 6-7	These tables are completely new and not shown with redline as added tables. They are each multi-page tables that present a great deal of summary data (rather than actual sample data). While it appears that they may be from ECF-200PO1-09-2018, it is not clear that this is the source. Changes that may have been made since Rev. 1 of the ECF document do not appear as revisions. Due to the time constraints (a week for review of the revisions), it is not possible to check the values in these tables. Therefore, there could be errors that will not be detected in this review. Furthermore, some of these tables represent steps in the COPC screening process that I do not agree with.		Accept	Acknowledged. See response to comment #11 and comment #73
14	p. 6-56 – 6-58, Tables 6-9 – 6-11	These tables are completely new and was not shown with redline as an addition. Due to the time constraints (a week for review of the revisions), it is not possible to check the values in this table. Therefore, there could be errors that will not be detected in this review. Furthermore, this represents a step in the COPC screening process that I do not agree with.		Accept	Acknowledged. See response to comment #11 and comment #73
15	p. 6-60, lines 30-31	The new text states "If the recommended 95 percent UCL is greater than the maximum detected concentration then the maximum detected concentration is selected." Ecology has frequently disagreed with using a maximum in place of a 95 percent UCL that exceeds the maximum. This is often the case for small data sets with variability. This disagreement has been expressed in meetings for several years and most recently in discussions about the "graded approach" for contaminant screening (an assignment from the senior executive committee). Please delete this statement.		Accept	Acknowledged. See response to comment #73
16	p. 6-62, Table 6-13	This new table appears to disagree with Table 6-7 for at least chloroform. Therefore, the lack of review of these tables is a potential source of significant error. This is an additional disadvantage of making a comparison with action levels.		Accept	Acknowledged. See response to comment #11 and comment #73
17	p. 6-64, lines 25 – 29	The argument on hexavalent Cr is pretty weak and needs to be revised. There are a total of three hexavalent chromium measurements within the entire 200-PO-1 groundwater OU. Of these three measurements, there was a single detection of hexavalent chromium of 191 µg/L at well 299-E25-236 (B1XJH8) in October 2008. No other hexavalent or total chromium analyses were performed at this well. Hexavalent chromium was not identified as a proposed COPC in the work plan and is therefore not identified as a final COPC for the near-field exposure area. The hex-Cr Action Level (Table 6-9) is 48, so this sample of 191 is way over. Make the following change in the paragraph: There are a total of three hexavalent chromium measurements within the entire 200-PO-1 groundwater OU. Of these three measurements, there was a single detection of hexavalent chromium of 191 µg/L at		Accept	Acknowledged. See response to comment #11 and comment #73

		well 299-E25-236 (B1XJH8) in October 2008. No other hexavalent or total chromium analyses were performed at this well. ~~Hexavalent chromium was not identified as a proposed COPC in the work plan and is therefore not identified as~~ Further sampling will be conducted in other wells to determine if hexavalent chromium should be a final COPC for the near-field exposure area.			
18	p. 6-101, Section 6.2.4.2	Draft A comment 120 stated "Ecology is interested in the actual ground water contributions to the surface water, rather than the amount of river dilution that occurs inland of the river. This paragraph seems to take credit for the dilution that occurs prior to the river. We stress that we will not give credit for the river dilution, based on WAC 173-340-730(6)(b)." The disposition stated that the text would be revised to indicate no credit for dilution will be considered for near-river wells. This text was not included in the revised document. Therefore, comment 120 is open and unresolved.		Accept	Text has been revised.
19	p. 6-67, Sect. 6.2, 1st par.	The first sentence of this paragraph makes reference to Appendix E. The new or revised Appendix E has not been provided and cannot be accepted under the circumstances. Furthermore, redline versions of any appendices that have been added to the document or revised since Draft A have not been provided and cannot be approved under the circumstances. Comments were made on ECF documents that may be added as appendices. Revised versions of the ECF documents have not been provided.		Accept	Acknowledged. See Appendix E of the final RI Report, Rev. 1.
20	p. 6-107, line 5	The COPC selection process continues to use a 5 year period for data. This leaves comment 118 open and unresolved.		Accept	The final RI Report does not present an amended process, but it does present significant efforts to respond to Ecologies concerns. See response to comment #73.
21	Appendices or supporting documents	Comments 156-171 pertained to a supporting document, ECF-200PO1-09-2018. Ecology expects that this document will be an appendix to the RI. However, it has not been provided in a revised form, and it is not clear if it has become an appendix of the document or not. Therefore, comments 156-171 are open and unresolved.		Accept	The supporting documents are presented inside the main document (Appendix E) of the final RI Report (Rev. 1) on CD and via live link in Chapter 8.
22	Appendix F1, General	The addition of this appendix is appreciated. It is informative and a good addition to the document.		Accept	No Action. Thank you.
23	Appendix F1, General	Barium and strontium are present in groundwater throughout the OU. If they are below background, indicate where this is discussed in the document. Otherwise, please add them as COPCs for all of PO-1.		Accept	Chapter 6 of the final document has been revised and a reference added to refer the reader to Chapter 4 (Section 4.1) where the background values for the Hanford Site are listed (see Table 4-4).
24	Appendix F1, Figure F1	The map with water table information and flow lines is very helpful and appreciated.		Accept	No Action. Thank you.
25	Appendix F1, p. F-5, Section F2.1.1 and General	The text states "Since 2005, all detected values of 1,1,1-trichloroethane have been limited to the wells immediately adjacent to the Central Landfill." Please discuss the down gradient monitoring of this contaminant after 2005 and others found in wells associated with the Central Landfill. For all contaminants on Table F-1, discuss the down gradient monitoring and observations of the contaminants.		Reject	Significant additional screening work was conducted to support resolution of this comment. Unresolved issues will be submitted for future effort in the supplement to this RI.
26	Appendix F1, p. F-7, Section F2.1.4, Section F4.1.3, Section	Chloroform is a likely contributor to risk for the Central Landfill, south of 200 East, the area around the A-AX Tank Farm, and down gradient of these areas. Add it as a COPC for these areas (including down gradient areas).		Reject	See response to comment #25 above.

	F6.1.2 and General				
27	Appendix F, Section F2.1.9	The text states that cyanide was not detected for the Central Landfill. It did show up in my evaluation, though possibly for one of the wells that was not used in this appendix. Due to time constraints I cannot check this, but will follow up on it in the future.		Reject	See response to comment # 11 and #73
28	Appendix F1, Section F3.1.10	Bis(2-ethylhexyl)phthalate is a likely contributor to risk. Please add this contaminant as a COPC for TEDF and down gradient of TEDF.		Reject	See response to comment #11 and comment #73
29	Appendix F1, Section 4.1.2	1,2-Dichloroethane is a likely contributor to risk. Please add this contaminant as a COPC for the area south of 200 East and down gradient of 200 East.		Reject	See response to comment #11 and comment #73
30	Appendix F1, General	Total organic halides were very widely observed in PO-1. However, it does not appear that very many observations were followed up with specific analyses of VOCs. Please add discussion regarding any subsequent analyses to determine the sources of the organic halides throughout PO-1.		Reject	See response to comment #11 and comment #73