STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

3100 Port of Benton Blvd • Richland, WA 99354 • (509) 372-7950

July 3, 2006

Mr. Larry D. Romine
United States Department of Energy
P.O. Box 550, MSIN: A6-33
Richland, Washington 99352

Re: The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)
Milestone M-015-39C: 200-CS-1 Chemical Sewer Group Feasibility Study (FS), and
Milestone M-020-39: 216-S-10 Pond and Ditch Closure/Post-Closure Plans

Dear Mr. Romine:

Enclosed are the review comments from the Department of Ecology on the draft FS for the 200-CS-1 Chemical Sewer Group. Based on the number and significance of the comments, Ecology believes that the draft FS does not fulfill the intent of the Tri-Party Agreement milestone M-015-39C. The United States Department of Energy (USDOE) will revise and resubmit the FS within 45 days of the receipt of this letter, in accordance with Figure 9-1 of the Tri-Party Agreement.

The April 26, 2006 Ecology letter informed USDOE that Ecology would not review and comment on the draft Proposed Plan for the 200-CS-1 Chemical Sewer Group. Therefore, USDOE does not need to revise and re-submit the Proposed Plan at this time.

The 200-CS-1 FS supports the closure plans for the 216-S-10 Pond and Ditch, the 216-B-63 Trench, and the 216-A-29 Ditch. Ecology could not review those closure plans because of the number and significance of the comments on the FS. Therefore, Ecology has not determined whether or not the M-020-39 milestone has been met. Ecology will review and comment on those closure plans after USDOE revises and re-submits the FS.

If you have any questions, contact Jennie Stults at 509-372-7956 or me at 509-372-7921.

Sincerely,

John B. Price

John B. Price
Project Manager
Nuclear Waste Program

pll
Enclosure
cc: See next page

cc w/enc:

Craig Cameron, EPA
Hanford Natural Resource Trustee Council (c/o Dana Ward)
Stuart Harris, CTUIR
Gabriel Bohnee, NPT
Russell Jim, YN
Todd Martin, HAB
Ken Niles, ODOE
Administrative Record: 200-CS-1, 216-A-29, 216-S-10, 216-B-63
Environmental Portal

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Comment Number	Section/Page	Comment
1.	General	There are a number of instances where information presented in table format are incomplete, units are incorrectly reported or not reported, and screening values are incorrectly reported. These errors make the document difficult to review and may have an effect on the outcome of the screening process. Please review the content of all tables to ensure accuracy and completeness. Noted instances include: • Groundwater protection value for lead is listed in the tables as 3000 mg/kg, in the CLARC database is listed as 270 mg/kg. • Nitrate as N is listed twice in Table 2-7. • Units are not given for organics but appear to be ug/kg. • Groundwater protection value listed for benzo(a)anthracene is listed as 85.7 ug/kg in the tables, but is listed in CLARC as 856 ug/kg. • Groundwater protection value for chrysene is listed in the tables as 95.6 ug/kg, but is shown in CLARC as 95.6 mg/kg. • Groundwater protection value for 2-butanone is listed as 21,800 ug/kg in the table, but is shown in CLARC as 19,600 ug/kg. • Groundwater protection value for aroclor-1254 is listed as 989 ug/kg in the table, but is listed in CLARC as 66.4 ug/kg. • Table 2-12 lists the maximum value for selenium as 18.5 in Area 8, but this value cannot be found in the table in Figure 2-15. • Footnotes c, d, e, f are missing from Table 2-14.
2.	General	The text repeatedly makes claims concerning the nature and extent of contamination (i.e. contamination is not widespread, not particularly elevated, localized, limited to discrete locations, etc.) and on the type and quality of the data (i.e. the data are artifacts of analytical method, outliers, spurious, erroneous, anomalous, etc.) without adequate justification. The limited quantity of data and use of a non-statistical sampling approach (judgmental design) does not allow for site-wide inferences (beyond the sampling location). Additionally, when making comparisons with screening levels, the choice of statistical value is inconsistent throughout the document (i.e. the text sometimes compares with the maximum value, mean, 95% UCL, or median).

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3.	General	The expanded assessment of potential constituents in the vadose zone that may threaten groundwater is being used to inappropriately remove contaminants that exceed groundwater screening values. The "Phase 1" assessment includes evaluation for exceedance of the 95% UCL, removal based on spatial and data aggregation considerations ("localized hot spots"), and elimination based on K_d > 40 kg/L. The use of a judgmental sampling approach rather than a statistical design ensures that the data will not be representative of site conditions and precludes the use of the necessary statistical analyses. Additionally, Ecology does not agree with the removal of contaminants based on a K_d > 40 kg/L. If concentrations exceed screening values they must be treated as contributors to risk and cannot be eliminated from further consideration on this basis.
4.	General	The expanded assessment of potential constituents in the vadose zone utilizes the SESOIL model to determine the impact of contaminants on groundwater. Fate and transport modeling of contaminants in the vadose zone must be depth and concentration specific. The use of an averaged concentration value (the 95% UCL) located between 0-15 ft does not accurately represent the nature and extent of contamination in the vadose zone, and will therefore not correctly predict groundwater impacts.
5.	General	The FS does not acknowledge or address past groundwater impacts from the 200-CS-1 waste sites. Effluent volumes exceeded soil pore volumes by orders of magnitude at all of the waste sites, suggesting that groundwater impacts are probable. Evidence (monitoring well data) for groundwater impacts from disposal practices has been presented in other documents for the 216-A-29 Ditch, 216-S-10 Ditch, and 216-S-10 Pond (i.e. PNNL-14070, PNNL-15670).

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6.	General Comment	When characterizing media contaminant concentrations, use of the 95% UCL is more appropriate than the maximum observed concentration. In particular, this is required when comparing nonradionuclide contaminant concentrations to MTCA cleanup levels for human health. Here are quotes from EPA sources, supporting use of the 95% UCL: 1) Dec 2002 OSWER 9285.6-10 (http://www.hanford.gov/dqo/training/ucl.pdf) "It is important to note that defaulting to the maximum observed concentration may not be protective when sample sizes are small, because the observed maximum may be smaller than the population mean . . . The use of the maximum as the default EPC is reasonable only when data samples have been collected at random from the exposure unit and sample size is large" (p. 20). 2) ProUCL Ver. 3.0 (Singh et al, 2004) (http://www.epa.gov/nerlesd1/tsc/images/proucl3apr04.pdf) "It is recommended that the maximum observed value NOT be used as an estimate of EPC....It should be noted that for highly skewed data sets, the sample mean indeed can even exceed the upper percentiles (e.g., 90%, 95%), and consequently, a 95% UCL of the mean can exceed the maximum. This is especially true when dealing with lognormally distributed data sets of small sizes" (p. 55). A recent MIS performance assessment (4/13/06, draft revised) for the 100/300 Areas RCBRA provides an example of comparing UCL vs. max. It was demonstrated (via an array of sample combinations) that UCL>max for Cr+6 in 24/26 cases and UCL>max for Pb in 21/26 cases. Therefore, these MIS data support the comparison of a calculated UCL (rather than the max value observed) to a cleanup level, re small contaminant data sets at Hanford soil waste sites.
7.	General Comment	Although a groundwater pathway does not currently exist at 200-CS-1, MTCA Method B groundwater cleanup levels (and soil values protective of Method B groundwater) apply, since groundwater is (or is connected to) a potential future source of drinking water.
8.	General comment	The land use in the 200 Areas Core Zone is industrial for the "foreseeable future" (2002 Tri-Party response to HAB Consensus Advice #132). However, after 150 years, unrestricted exposure scenarios (e.g., residential, intruder, Native American) should be evaluated to provide information should institutional controls fail. This is a consideration required by 40 CFR 300.430(e)(9)(iii)(C)(2).
9.	General Comment	Re the "extended analysis" of the BRA (Sections 2.11-2.15), there is excessive redundancy in the text and corresponding tabled data. This becomes cumbersome to an effective review. This extended analysis sometimes appears more biased (e.g., omitting COPCs due to insufficient data) than iterative, in terms of characterizing risk.

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10.	General Comment	Re PCB analysis, risk can be evaluated with individual congener data, in addition to Aroclor data. Aroclor analysis is inherently uncertain, due to environmental transformation of the congener mixture over time. Aroclors can be evaluated for noncancer toxicity, PCB mixtures can be assessed for cancer, and dioxin-like PCB congeners can be evaluated with the dioxin toxic equivalency factor (TEF) method (see p. 2-63 to 2-66 in http://www.epa.gov/epaoswer/hazwaste/combust/finalmact/ssra/05hhrap2.pdf).
11.	Section 1.0, 1st paragraph, last sentence	Define out 200-CS-1 operable unit as the first mentioned in the document instead of in the 3rd paragraph
12.	iii, line 16	Insert section describing the Vadose zone
13.	iii, line 16	Insert section describing the surface water, even if it is just to acknowledge little runoff or NA because…
14.	iii, line 25	There should be a section describing the Nature & Extent of Contamination and also one describing a Summary of Groundwater Quality somewhere in this section. Please clarify to state where these are to be found.
15.	iii, general, In 2.7	Please clarify to state where one can find a comparison of results to Air Clean-up levels & an Alternative Exposure Scenario-Native American.
16.	v, line 33-35	Include a section on ARARs
17.	v, lines 37-38	Add additional text to title…Nonradioactive Contaminants "for all pathways" and do the same for line 39.
18.	vi, line 27	Please clarify to state how concerns about RCRA performance standards were considered.
19.	vi, general	Please clarify to state whether a sensitivity analysis was done. Please clarify to state the level of uncertainty used in evaluations of alternatives. Please clarify to state how this figured in cost estimates.
20.	viii, general	Please clarify to state where the contaminant fate & transport model information is located. Please clarify to state where are the pathways of migration are defined.
21.	xiii, general	Please clarify to state where the crosswalk table between RCRA TSD Closure Plan requirements and CERCLA documentation is located. If none, develop table.
22.	xiii, general	Please clarify to state where a table showing Maximum Concentration of Detected Contaminants Compared to Background Concentrations is located. If none, please develop table.
23.	xiii, general	Please clarify to state where a table Summing of Ecological Hazard Quotients for Terrestrial/Avian Wildlife is located.
24.		Please clarify to state where the table summing of Application of Alternatives to Waste Sites for Industrial, Recreational, and Residential land-use scenarios is located. If none, please develop table.
25.	Section 1.0, 1st paragraph, last sentence	Define out 200-CS-1 operable unit as the first mentioned in the document instead of in the 3rd paragraph
26.	1.1, general	Add the characterization pathway for the 216-S-11 Pond, the RPP site (i.e. it is evaluated via analogous site approach)

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27.	1.1, general	Detail conclusions made from the RI report (i.e. that data concludes remediation is needed for several of these sites)
28.	1-1,line 12	Please verify # of waste sites. I have seen differing #s in other FS
29.	1-2, lines 37-40 & pg 1-3, lines1-8	Move text to page 1-1, Insert on page 1-1, between lines 21 & 22
30.	1.2 general, 2nd paragraph	This section may need to be altered to support the proposed regulatory pathway, closure via a permit and no ROD issued. See comment #34 below.
31.	1.3 general	Add a statement that says coordination of the source units and the groundwater units will occur
32.	1.3 general	Define where the groundwater operable units listed are located
33.	1-3, line 24	Insert the TSD names
34.	1-3, lines 31-34	Rewrite text as follows: The closure will be documented in a proposed WA 7890008967, Hanford Facility Resource Conservation and Recovery Act, Dangerous Waste Portion, Revision 8, Permit modification. The permit modification will incorporate the TSD units along with their associated closure plans into Part V of the Permit. The TSDs and the RPP unit shall be closed pursuant to WAC 173-303-610. The Part V permit shall reflect this and will include any conditions necessary to coordinate or explain the relationship between the TSD unit closures and the OU documentation. If changes are needed to the permit, they will be subject to the WAC 173-303-830 modification process.
35.	1-3,line 37	Because the groundwater status has not been evaluated, "clean closure" as proposed is without basis.
36.	1-3, lines 40-42 cont'd thru lines 1-3 on pg 1-4	Delete text
37.	1-4, line 5	Rewrite text: "The waste sites identified as TSD units are included in the Hanford Federal Facility Agreement and Consent Order (HFFACO) as a land-disposal unit, and shall be subject to closure as Surface Impoundments."
38.	1-4, line 6	Change "plans" to "plan."
39.	1-4, line 7	General question: Are there any groundwater monitoring plans that may provide information or maybe cited? Other documents, studies, or annual reports by PNNL that may provide information or maybe cited?
40.	1-4, line 34	Identify the RI document by adding its # (DOE/RL-2004-17)
41.	1-5,line 1	Why only 7 criteria and not the 9?
42.	1-5, lines 1-7	Please clarify to state where the evaluation of the remedial alternatives against the performance standards for TSDs is located.
43.	1-5, line 10	Why only 7 criteria? See previous comment.
44.	1-5, lines 18-19	Add following text to sentence: "and compliance with ARARs."

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45.	1-5, lines 26-30	Ecology will need in depth review of Appendix F. Currently this approach is not approved
46.	1-5	Please identify where the vadose zone modeling is shown.
47.	1-5	Please identify where the ecological data is located.
48.	1-7	Add to References: WAC 173-303, "Dangerous Waste Regulations," Washington Administrative Code, as amended, Washington State Department of Ecology, Olympia, Washington.
49.	2.1 general	State that there is only one analogous site not characterized
50.	2-2, line 25	Insert text at end of paragraph: "Waste inventories for the 200-CS-1 OU waste sites are not well documented because there were no known requirements for sampling of nonradioactive contaminants."
51.	2.1.2, pg 2-3 top sentence and 2nd paragraph first sentence	Provide reference to this statement
52.	2.1.2.1, pg 2-5 3rd paragraph	Provide reference to this statement
53.	2-6, line 14	Insert reference from WP at end of sentence…218-E-12B Burial Grounds: (RHO 1979).
54.	2-6, line 36	Insert following text from WP after first sentence: "The only documented hazardous effluent discharged in the past consisted of regeneration solutions from the B Plant demineralizers (271-B Building)."
55.	2-6, line 40	Please clarify to state why Iodine-129 is not included in the discussion of radiological inventory at the trench. The WP states it exceeds drinking water standards.
56.	2-7, line 9	Insert following text after 216-S-11 Pond.: "This unplanned release is referenced as UPR-200-W-34."
57.	2-7, line 7	Should the overflow should be in meters cubed (m^3)?
58.	2-7, line 30	Please clarify.if there are any wells that monitor the sides of the ditch
59.	2-8, line 24	Add following references: DOE/RL-2004-17, Rev 0, DOE/RL-98-28, WMP-17755, DOE/RL-99-44, BHI-01651, and PNNL-13198. Please clarify to state why data from the Hanford Site GW Monitoring for the Fiscal Years 2002 forward was not included.
60.	2.1.2.4, pg 2-8	Change title to include all 3 sites discussed in this section
61.	2-9, line 19	Insert text from DOE/RL-99-44 Section 2.1.1: "The buried former river and floor channels may provide preferential pathways for groundwater and contaminant movement."

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62.	Section 2.2.3, pg. 2-9, last sentence	Change text to, "The basalt is overlain by the Ringold Formation, except at the 216-B-63 Trench and the northern portion of the 216-A-29 Ditch, where the basalt is directly overlain by the Hanford Formation…"
63.	2-10, line 16	Insert text after Cold Creek: "(Plio-Pleistocene unit)"
64.	Section 2.2.4, para 2, pg.2-11	The text states that, "At the 216-A-29 Ditch, the vadose zone is predominantly Hanford Formation sediments, with a thin section of Ringold Formation sediments above the water table." Borehole data for the 216-A-29 Ditch (200-CS-1 Operable Unit Field Summary Report for Fiscal Year 2003) indicate that 50 ft of the Ringold Formation (Unit 5) are present within the borehole drilled for this waste site. Please clarify in the text.
65.	2-11, line 29	Insert the word "about" in front of "82.4 m"
66.	2-11, line 30	Insert ranges with in the pareses: (270.2-174 ft)
67.	2-11, line 35	Insert text following 216-S-10 Ditch: "(including 216-11). Add at end of sentence: "with groundwater flow generally to the east-southeast."
68.	2-12, line 2	Insert text after However, moisture content: "and downward flux of moisture… At end of sentence add following text: from DOE/RL-99-44: "Artificial recharge occurred when effluent such as cooling water was disposed of to the ground. Zimmerman et al. (1986) report that between 1943 and 1980, 6.33 X 10^{11} L (1.67 X 10^{11} gal) of liquid wastes were discharged to the soil column. Most sources of artificial recharges have been halted. The artificial recharge that does continue is largely limited to liquid discharges from sanitary sewers; 2 state-approved land disposal structures; and 140 small-volume, uncontaminated, miscellaneous streams."
69.	2-12 line 5	Add sentence (from WP) to end of paragraph: "Estimates of recharge from precipitation range from 0-10 cm/yr (0-4 in/yr) and are largely dependent upon soil texture and the type and density of vegetation."
70.	Section 2.2.4, pg. 2-12, para 5	The text states that, "The aquifer extends from the water table to the top of the basalt or, in some areas, the lower mud (Unit 8) of the Ringold Formation." Unit 8 is not present beneath the 216-A-29 Ditch, and nor are Ringold Units 9A and 9B. Unit 9C is present under most of the ditch (except the northern portion). Please clarify in the text.
71.	Section 2.2.4, pg 2-12, para 5 to para 7.	Please update the groundwater flow direction and velocity data within these paragraphs to reference the most recent Hanford Site Groundwater Monitoring Report (FY 2005). The information in these paragraphs is dated (2002).
72.	2-13, line 2	Add paragraph: "Additional hydrostratigraphical information maybe found in DOE/RL-2002-69, Section 2.1.4.:
73.	2-13 general question for section 2.3.1	Would there be any applicable information that could be cited from the "Ecological and Cultural Resources Review for Construction of Fire Breaks Around the 200 North Area Bldg, 00-ER-020? Please insert relevant text.

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74.	2-15, line 17 general question for section 2.3.3	Are there any plants, invertebrates, amphibians, reptiles or mammals on the Federal or State of WA threatened and endangered species list in the area? If not, state so.
75.	2-15, line 18	Insert after 'Several': "State" threatened…
76.	2-15, line 22	Insert after primrose: (Camissonia pygmaea)
77.	2-15, line 25-	Text error: Chg to "CS" Also, if any Level 3 habitat is to be disturbed, please clarify how effects will be mitigated. If it is already explained, just cite page & line.
78.	2-16, lines 24-29 general question	Were any such reviews conducted? If so, include information.
79.	2-17, line 22	Overall approximately how many Tri-City jobs (give # and %) of nonfarm jobs are directly or indirectly supported by the Hanford site payroll, procurements or contracts Please clarify.
80.	2-18, line 11	Insert following text from DOE/RL-99-44 at beginning of first sentence. "The concept of using analogous sites to reduce the amount of site characterization and evaluation required to support remedial action decision making is discussed in the Implementation Plan (DOE/RL 1999). The use of this approach relies on first grouping sites with similar location, geology, waste site history, and contaminants, then choosing one or more representative sites for comprehensive field investigation, including sampling. Findings from site investigations at representative sites are extended to apply to other waste group sites that were not characterized. The analogous site approach is applied to RPP sites only; all TSD sites are characterized separately." Follow with rest of paragraph.
81.	2-18, line 11	Insert following text from DOE/RL-99-44 at end of first sentence. "These sites were created to dispose of the chemical sewer waste streams from the separation/concentration processes (e.g., PUREX Plant, REDOX Facility and B Plant cesium/strontium recovery operations). The 200-CS-1 OU consists primarily of waste sites that received unknown but probable dilute quantities of inorganic and/or organic chemicals. Radionuclide inventories are very small to negligible, although several sites have a Uranium component particularly the 216-S-10 ditch which received 215 kg of Uranium in an unplanned release."
82.	2-18, line 15	Add this reference to end of sentence: "and DOE/RL-99-44."
83.	2-18, line 18	Insert text following "RI:" "Sites within the OU that best represent worst-case and typical conditions are identified as representative sites, in terms of effluent volume and contaminant inventory."
84.	2-19, lines 12-32	Please clarify to state where all this information documented.

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85.	2-19, line 14	Delete sentence: "By taking large amounts of soil from the 216-A-29 Ditch banks, not only were the stream sediments safely covered, but the surrounding banks were likely to be uncontaminated."
86.	2-19, line 37	Insert text from WP in front of the word 'Dangerous': "Accidental spills and disposal of out-of-tolerance chemical makeups were discharged to the chemical sewer. The most significant spill was an unplanned release UPR-200-E-51, which occurred in May 1977 and released 15 kg of cadmium nitrate (D006)." Adjust following sentence as necessary for clarity.
87.	2-19, line 41	Please clarify & insert text to discuss the Hydrazine Contained-in somewhere within this section.
88.	2-21, line 24	Identify the UPR: (UPR-200-W-34).
89.	2-21, line 14	Please clarify to state the basis of the amount 68,100,000 kg/yr.
90.	2-22, line 27	Please clarify and clearly define where the section "Nature and Extent of Contamination" is to be found."
91.	2-22, line 38-40	Please delete the last sentence of the paragraph.
92.	2.1 and 2.4 general	This information is duplicative. Delete repetitive information or one of these sections
93.	2.4.2, p 2-22, 2nd paragraph 1st sentence	All 4 sites are TSDs.
94.	2-23, line 23 & 2.4.2 pg 2-23, 3rd paragraph	Please clarify to state how the results indicate that contamination could or could not have spread beyond the historical boundaries of these units. What about the lateral extent of contamination? Clarify to state how you defined this.
95.	2.4.2.1, p 2-23	RI report says B8826 went to 82.9 m (272 feet). Please check this
96.	2-24, line 44	General question: Please develop a section on "Summary of Groundwater Quality" similar to Section 2.3.4 of DOE/RL-20002-69, Draft A, (Feasibility Study for the 200-CW-1 and-CW-3 OUs).
97.	2.4.2.2, p 2-24	Add borehole B8079 from 1998 if using data (used in RI report)
98.	2.4.2.3, p 2-24	Add year sampled
99.	2.4.2.3, p 2-24	RI reports data only to 222 ft. Please verify depth

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100.	2.4.2.4, p 2-24	Add depth
101.	2-25, line 21	Please add a bullet for "Method of discharge and purpose of waste site."
102.	2.5 p 2-25	Add DOE/RL 98-28 since it defines 200 area analogous site approach
103.	2.6, p. 2-27, para 2	Briefly describe the method used to select representative sites.
104.	2-28	Please clarify to state were the waste sites evaluated under "Industrial-exclusive" for the first 150 years and then under "Industrial" and "Intruder" (residential farmer scenario and construction worker/trenching scenario) after 150 years were evaluated.
105.	2.6, p. 2-29, para 2	A complete groundwater pathway exists for future drinking water use.
106.	2.6, p. 2-29, para 4	Re Figure 2-14, "X" should appear in the 6 receptor boxes linked to groundwater, since a future drinking water pathway exists. Dermal exposure should be included for soil and groundwater pathways. Intruder and Native American receptors are also possible. Why does footnote "a" specify only radionuclides for ingestion of foods (rather than both radionuclides and nonradionuclides)?
107.	2-30, line 14	Please clarify to state where this quote begins and where it is from.

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108.	2-30, line 15 thru paragraph, general comment	When characterizing media contaminant concentrations, use of the 95% UCL is more appropriate than the maximum observed concentration. In particular, this is required when comparing nonradionuclide contaminant concentrations to MTCA cleanup levels for human health. Here are quotes from EPA sources, supporting use of the 95% UCL: 1) Dec 2002 OSWER 9285.6-10 (http://www.hanford.gov/dqo/training/ucl.pdf) "It is important to note that defaulting to the maximum observed concentration may not be protective when sample sizes are small, because the observed maximum may be smaller than the population mean . . . The use of the maximum as the default EPC is reasonable only when data samples have been collected at random from the exposure unit and sample size is large" (p. 20). 2) ProUCL Ver. 3.0 (Singh et al, 2004) (http://www.epa.gov/nerlesd1/tsc/images/proucl3apr04.pdf) "It is recommended that the maximum observed value NOT be used as an estimate of EPC....It should be noted that for highly skewed data sets, the sample mean indeed can even exceed the upper percentiles (e.g., 90%, 95%), and consequently, a 95% UCL of the mean can exceed the maximum. This is especially true when dealing with log-normally distributed data sets of small sizes" (p. 55). A recent MIS performance assessment (4/13/06, draft revised) for the 100/300 Areas RCBRA provides an example of comparing UCL vs. max. It was demonstrated (via an array of sample combinations) that UCL>max for Cr+6 in 24/26 cases and UCL>max for Pb in 21/26 cases. Therefore, these MIS data support the comparison of a calculated UCL (rather than the max value observed) to a cleanup level, re small contaminant data sets at Hanford soil waste sites.
109.	2.6, p. 2-31, para 1	A figure illustrating a conceptual site model (CSM) for ecological pathways and receptors would be helpful.
110.	2.6, p. 2-31, para 2	Inhalation of volatiles (e.g., CCl4) and olfactory uptake of metals (e.g., Mn, Cd) or semivolatiles (e.g., PCBs) may be important with burrowing animals in shallow subsurface soils (e.g., Carlsen, 1996, Risk Anal 16:211; Apfelbach et al, 1998, Arch Toxicol 72:314; Bench et al, 2001, ES&T 35:270).
111.	2.7, p. 2-35, para 1	Please clarify that Figure 2-15 is in the RI BRA (DOE/RL-2004-17), assuming this is the case.
112.	2.7, p. 2-35, para 4	Screening data are available for TBP from RAIS (http://risk.lsd.ornl.gov/cgi-bin/tox/TOX_select?select=nrad). An oral CSF=5.4E-3 $(mg/kg\text{-}d)^{-1}$ yields a MTCA soil/direct contact value of 185 mg/kg (Method B) and a soil/protection of groundwater value of 6.2 mg/kg (Method B). Therefore, It would be appropriate to compare the 95% UCL for soil TBP to 6.2 mg/kg.

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113.	2-36, line 3 thru paragraph	Ecology does not agree with this approach for Kd values less than or greater than 40. Table 2-3 data indicate that all 20 of these COPCs exceeded the MTCA soil cleanup level for protection of groundwater (3 phase model) at one or more of the four waste sites. The 3 phase model does not specify a Kd threshold (e.g., >40 L/kg), where the model no longer applies. An alternative model would need to be proposed to make that case (WAC 173-340-747[8]).
114.	2.7, p. 2-36, para 2	Re Table 2-4, Kd for TBP is 1.89 L/kg, based on Koc=1888 L/kg (http://risk.lsd.ornl.gov/cgi-bin/tox/TOX_select?select=nrad), foc=0.001 (WAC 173-340-747), and their relationship, Kd=Koc*foc. Re Table 2-4, note that benzo(g,h,i)perylene is not listed in Table 2-3.
115.	2.7, p. 2-36, para 4	Table 2-3 data indicate that all 20 of these COPCs exceeded the MTCA soil cleanup level for protection of groundwater (3 phase model) at one or more of the four waste sites. The 3 phase model does not specify a Kd threshold (e.g., >40 L/kg), where the model no longer applies. An alternative model would need to be proposed to make that case (WAC 173-340-747[8]).
116.	2.8 and 2.11, general comment	The format of the human health risk assessment consists of an initial screening analysis followed by an extended analysis. This type of iterative approach is common for risk assessment. However, in the case of this FS, the combination results in significant amounts of repetitive information that renders the analysis cumbersome for a reviewer. In addition, section 2.11 is written in a way that leaves the reviewer feeling that most anything that fails the screening analysis will somehow pass the extended analysis. To this reviewer, the human health risk assessment would be improved by simply using the extended analysis. For example, why not start off using the 95% UCL of the mean for EPC values, as this is the more appropriate metric anyway?
117.	2.8.3, 2-38, 5	All Hanford Site risk assessments should be consistent as to what contaminant concentrations are used in radiological dose/risk calculations. Many reports use the 95% UCL of the mean (for example, the recent 116-N-1 CVP report), while this FS uses maximum detected concentrations. Please provide an explanation and justification as to why maximum detected concentrations are used in this human health risk assessment.
118.	2.8.4, 2-38, 19-21	Please provide in the text an explanation of the regulatory significance of each of the exposure scenarios. For example, the Industrial Scenario is the regulatory agencies agreed upon intended future land use, while the Unrestricted Scenario is for information purposes. This will help clarify the significance of the RESRAD findings summarized in the remainder of the section.

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119.	2.8.4, 2-38, 25-27	The text on line 25 summarizes that radiation doses are below 15 mrem/y. However, text further along, as well as Table 2-5, indicate doses above 15 mrem/y for several cases (Industrial-No Cover and Unrestricted Use). Please clarify the sentence on line 25.
120.	2.8.4, 2-38, 34	Clarify the sentence by changing it to read "No dose or risk exceedances for the Industrial-Cover scenario".
121.	2.8.4, 2-38, 35	Clarify the sentence by changing it to "There is an exceedance in dose, but not in risk, for the Industrial-No Cover scenario.
122.	2.8.4, 2-38, 39	If the FS is going to declare a RESRAD dose result as "insignificant", then the FS should define what constitutes an "insignificant" dose.
123.	2.8.4, 2-39, 4 and other places in the text	The text states that the dose exceedance disappears by year 100. Actually, the dose exceedance disappears much sooner than 100 years, but the year that the dose falls to 15 mrem/y is not indicated. If the intent of the FS is to indicate at what year the exceedance disappears, then the year at which the dose falls to 15 mrem/y should be indicated.
124.	2.8.5	Clarify the first sentence of this section to read " . . . pose little human health threat under the Industrial-Cover scenario."
125.	2.8.5	It would be useful to include quantitative information from Table 2-5 in this section for the cases where radiation dose exceeds target levels. In the 3rd paragraph, when discussing the Industrial-No Cover, indicate that the maximum dose is 35 mrem/y and that the dose will exceed 15 mrem/y for the entire 1000 year modeling period. Also in the same paragraph, when discussing the unrestricted-use scenario, indicate that the maximum dose is 307 mrem/y and that the dose will exceed 15 mrem/y for the entire 1000 year modeling period.
126.	2.8.5	Referring to Table 2-8 in the FS and Tables 4-18 and 4-28 in the RI report, it appears that the primary contributor to dose exceedance for the Industrial-No Cover scenario and the Unrestricted-use scenario is localized high concentrations of Pu-239/240 relatively near the surface. Please include this information in the text of this section, as otherwise it is not transparent to the reader. This information is important with respect to decisions about whether to excavate the source material responsible for the dose exceedances.
127.	2.9, p. 2-40, para 5	If a non-industrial land use is evaluated (e.g., unrestricted land use) for information purposes, all eco soil values in MTCA Table 749-3 (i.e., plants, soil biota, wildlife) are applicable (WAC 173-340-7490[3] [b]).

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128.	2.9, p. 2-41, para 3 and 4	Note that soil concentrations in MTCA Table 749-3 (which are protective of wildlife) are derived with a term (i.e., $P_{SB\ (shrew)}$ or $P_{SB\ (robin)}$) which allows for <100% of contaminated food in diet (MTCA Table 749-4).
129.	2.9, p. 2-41, para 6	"Maximum" misspelled in Equation 1
130.	2.9, p. 2-42, para 1	For nonradionuclide ecological screening values for unrestricted land use, all values in MTCA Table 749-3 should be used (WAC 173-340-7490[3] [b]).
131.	2.9, p. 2-42, bullet 3	HQ between 1 and 2 does not necessarily imply non-significance. Rather, it implies that more data are needed to resolve the issue.
132.	2.9.3 and 2.10, Table 2-7	This comment refers to Tables 2-6 and 2-7 that are discussed in these sections. In Table 2-6, the hazard quotient for Sr-90 at 216-B-63 is 1.5, which comes from the ratio of the maximum Sr-90 concentration of 29 pCi/g to the BCG of 20 pCi/g. However, the Ecological screening level for Sr-90 listed in Table 2-7 is 14.1 (not 20) pCi/g. Please clarify why the radionuclide screening levels in Table 2-7 do not correspond to the BCGs.
133.	2.10, p. 2-43, para 1	Re Table 2-7, "Organics in ug/kg" is missing as a subheading in the table (and "Inorganics" appears incorrectly as a subheading on the second page of the table). The MTCA soil value for groundwater protection for acetone (2.18E4 ug/kg) should be 2.89E4 ug/kg. Please check all table values for accuracy. The 11 nonradionuclides with ecological screens as the limiting value are not shaded. Another column is needed for unrestricted land use eco-screening (i.e., consideration of plant, soil biota, wildlife values in MTCA Table 749-3). Re industrial eco screening, why are plant protection values in MTCA Table 749-3 listed for B, Ag, Tl, U, and V? There are no wildlife values for these COPCS in MTCA Table 749-3. The entries, "Diesel range TPH" and "Kerosene range TPH," are repetitive for MTCA, since both are MTCA diesel range organics (MTCA Table 745-1, footnote "s"). The soil wildlife value (MTCA Table 749-3) for diesel range organics is 6E6 ug/kg (not 6.5E6 ug/kg). Re Table 2-7 radionuclides, why are columns blank (except for ecological screening levels)? For example, Hanford site background values are available for all of these nuclides, except for Th-238 and Th-230. What is the basis for assuming Th-232 for Th-238 and Th-230? The soil BCG for Th-232 is 1510 pCi/g (not 405 pCi/g).
134.	2.10, Table 2-7	Why is background concentrations not listed for radionuclides in Table 2-7? They ARE listed in Table 4-18 of the RI report. So why not in the FS?

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135.	2.10, Table 2-7	Why are Industrial and Groundwater screening concentrations not listed in Table 2-7? Is it not a simple task to use RESRAD to back-calculate concentrations that correspond to 15 mrem/y under an Industrial scenario? Alternatively, to back-calculate concentrations corresponding to a groundwater dose of 4 mrem/y?
136.	2.11, general comment	The extended analysis appears not to consider an unrestricted use scenario. Even though this scenario is for "information purposes", it is important to consider for assessing future impacts should institutional controls fail (for time periods beyond 150 years). In at least one case, radiation doses for this scenario would still exceed target dose levels even under the extended analysis, but this case is not mentioned (see specific comment below).
137.	2.11, p. 2-43, para 3	Re eco risk, cite MTCA Table 749-3 for nonradionuclides and cite BCGs for radionuclides. Re impacts to groundwater, cite WAC 173-340-747 for nonradionuclides and cite RESRAD for radionuclides.
138.	Section 2.11.1, page 2-44, line 9	Editorial; correct the word "identity" to "identify".
139.	Section 2.11.1, page 2-44, line 30	The text states "A summary of the COPCs for the four 200-CS-1 OU representative sites is provided in Table 2-8 (DOE/RL-2004-17). Please delete the reference (DOE/RL 2004-17). It is not accurate since Table 2-8 is actually included within this FS (DOE/RL-2005-63).
140.	2.11, p. 2-45, para 1	If Table 2-9 is identical to Table 2-7, why repeat it, and why not simply refer to Table 2-7? Also, the comment for p. 2-43, para 1 (for Table 2-7) would apply to Table 2-9. In addition, clarify why the ecological screening values for SR-90 are different in these two tables, and again, clarify why the values are not equal to the BCG.
141.	2.11, p. 2-45, para 3 and p. 2-46, para 1	All uncertainties are not necessarily false positives (e.g., organics as artifacts, outliers, low background values, immobile COPCs). These types of data indicate the potential for risk, until shown otherwise. On the other hand, uncertainties may also be false negatives, re risk (e.g., inadequate site characterization, incomplete COPC list, chemical interactions, nonconservative exposure assumptions, toxicity data gaps). Also, Please clarify & explain if these could be decomposition products.

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142.	Section 2.11, page 2-45, lines 25-27	The text states: "The occurrence of several organic COPCs…throughout the data may be artifacts of the analytical process and do not correlate well with the waste site process history." It appears that this statement is attempting to eliminate COPCs. In order for this to occur, it will be necessary to support this assumption with facts. Simply stating that detected constituents are artifacts of the analytical process is not sufficient. Please provide a substantial explanation to support this finding.
143.	Section 2.11, page 2-45, lines 28-30	The text states: "Additionally, a review of the analytical records suggests that some of the organics data may have been misreported and resulted in the inclusion of constituents that are not actually present at the site(s)." Please provide facts to substantiate this statement.
144.	Section 2.11, page 2-45, lines 30-32	The text states: "If these constituents are artifacts of the analytical process, and not actually waste activity-related COPCs, they should not be included as candidates for remedial actions." In order for Ecology to approve the elimination of any COPCs as candidates for remedial action, all findings will need to be presented and evaluated.
145.	Section 2.11, page 2-45, line 36- page 2-46, line 1	The text states: "The RI indicates that there may be a number of localized areas where elevated residual constituent concentrations exist, but constituent concentrations in the bulk of the potentially affected environments are not appreciably elevated." What remedial actions have been planned for the localized areas of elevated concentrations?
146.	2.11.1, 2-45, 12, Table 2-8	Table 2-6 indicates that Sr-90 exceeds screening levels (Hazard Quotient of 1.5) at the 216-B-63 Trench, yet the text here and Table 2-8 do not list it. Specifically, it appears that Table 2-8 should have a check mark to indicate that Sr-90 exceeds the Eco screening level for 216-B-63.
147.	2.11, p. 2-46, footnote 6	Re soil values for groundwater protection, see comment for p. 2-36, para 4. Re Table 2-10, this is a repeat of Table 2-4. Again, why not simply refer to Table 2-4 here? Also, the comment for p. 2-36, para 2 (for Table 2-4) would apply to Table 2-10.

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148.	Section 2.11, page 2-46, lines 10-13	The text states: "However, considering additional information outside the screening protocol could reveal that their inclusion as COPCs is more an artifact of the evaluation method than their existence at the site at elevated concentrations." Firstly, please provide specific evidence of how some of the 200-CS-1 data is merely an artifact of the evaluation method, as opposed to being actual and representative of the sample. Secondly, if in fact certain COPC data are proven an artifact of the evaluation, will those COPCs be eliminated from future site evaluation?
149.	2-46, line 14 thru paragraph	Ecology does not agree with this approach starting at "This premise is counter to the RI findings that constituent concentrations in the bulk of the potentially affected environment are not significantly elevated. ETC.ETC." Also see footnote 6. Ecology made the following related comment for p. 2-46, para 1 (same as comment immediately above): All uncertainties are not necessarily false positives (e.g., organics as artifacts, outliers, low background values, immobile COPCs). These types of data indicate the potential for risk, until shown otherwise. Screening can also produce false negatives for risk (e.g., inadequate site characterization, incomplete COPC list, chemical interactions, nonconservative exposure assumptions, toxicity data gaps).
150.	Section 2.11, page 2-46, second bullet	Based on the text, it is unclear how the dissimilar findings of the RI BRA and the RI will be addressed. The RI BRA results indicated that the groundwater is at significant risk of being impacted by constituents in the vadose zone soils; and the RI results are to the contrary. For what constituents will RAOs be developed, and please provide a technical basis for the constituents which will not receive RAOs.
151.	2.11, p. 2-47, bullet 4	In addition to an intruder exposure scenario, please include residential and Native American scenarios.
152.	2.11, p. 2-48, #3	For "information purposes," benchmarks should also include residential direct contact and unrestricted land use for ecological exposures.
153.	2.11, p. 2-48, footnote 7	One consequence of "process residuals" is that these COPCs increase the uncertainty in the risk assessment, since their effects are not summarized in a screening level benchmark.
154.	Section 2.12, pg. 2-46, bullet 4	The text states, "The site is not highly contaminated and contamination is not widespread. Reported concentrations are not particularly elevated and those that are higher are found in localized hot spots." These statements are unsubstantiated. The choice of a non-statistical sampling approach (judgmental design) does not allow for inferences beyond the sampling location.

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155.	Section 2.12, pg 2-46, bullet 6	Editorial error – Change text from "Nitrate/nitrate" to "nitrate/nitrite".
156.	Section 2.12, pg. 2-46, bullet 6	The maximum concentration of nitrate exceeds the drinking water standard by 40% of the MCL. Change text to, "…which ~~marginally~~ exceeds the Federal primary drinking water standard of 10 mg/L."
157.	Section 2.12, pg 2-46, bullet 7	Change text, "In one sample, the concentration of Aroclor 1254 (9,400 ug/kg) exceeds the ecological screening value (650 ug/kg). ~~The single occurrence of Aroclor 1254 is at a depth of 5 ft below the surface, which suggests that the threat to ecological receptors is actually very small~~." This claim is unsupported. It has not been demonstrated that the hazardous substance poses a "very small" threat to ecological receptors.
158.	Section 2.12.2, pg. 2-50, bullet 1	The text notes that the RI BRA presents reasonable scientific rationale that offsets the concern that Bismuth and TBP pose a potential threat through direct contact, and thus Bismuth and TBP will be omitted for further consideration. Please present the rationale in the text.
159.	Section 2.12.2, pg. 2-50, bullet 2	$K_d > 40$ L/kg cannot be used to eliminate contaminants exceeding groundwater screening values. See general comment. Retain arsenic, cadmium, 1,2-dichloroethnane, mercury, methylene chloride, nitrate, nitrate/nitrite, silver, sulfate, uranium.
160.	2.12.3, 2-55, and the following pages	Include a discussion of Pu-239/240, which appears to be missing.
161.	Section 2.12.4, pg. 2-58	Methylene chloride and 1,2-dichloroethane must be retained as COPCs until support is provided to substantiate claims that the data result from analytical methods or misreporting. Additionally, the data for these compounds should be included in Figure 2-15.
162.	2.12.4, 2-57, 27-37	The analysis indicates that most of the contamination is localized and is near the surface, and further that when the site is considered as a whole the EPCs are low (using 95% UCL) and therefore dose and risk is low. While this is true, it may be worthwhile to recognize that removal of this localized contamination may be relatively simple, and would likely eliminate doses exceeding the target dose limit for the Industrial-No Cover and Unrestricted Use scenarios.

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163.	Section 2.12.5, pg 2-58	The text and footnote 16 identify sixteen constituents that pose a threat to groundwater. Lead is not included in this list, but is included in the evaluation on the following page. Please add lead to this list.
164.	Section 2.12.5, pg 2-58	Borehole and test pit data for several contaminants listed in footnote 16, including bismuth, 1,2-dichloroethane, methylene chloride, and tributyl phosphate, cannot be found in the data tables in this chapter. Please present the data for these contaminants.
165.	Section 2.12.5, pg. 2-60	SESOIL – Change modeling inputs to incorporate the actual concentrations and depth ranges of the contaminants present. The use of an averaged concentration value (the 95% UCL) located between 0-15 ft does not accurately represent the nature and extent of contamination in the vadose zone, and will therefore not correctly predict groundwater impacts.
166.	Section 2.12.5, pg. 2-61, bullet 1	Elevated arsenic concentrations are present above background in the deep zone (i.e. 6.7 mg/kg at 270 feet). Therefore, modeling the impacts of arsenic concentrations present only to 15 ft is not appropriate.
167.	Section 2.12.5, pg. 2-61	Please use $K_d = 0$ as listed in the CLARC database for nitrate, nitrate/nitrite, and sulfate. Additionally, nitrate is present below 15 feet. Please model concentrations below 15 feet.
168.	Section 2.12.5, pg. 2-62, para 1	Change text, "The maximum nitrate/nitrite concentration of 14 mg/L is ~~slightly~~ in excess of the Federal drinking water standard, which is 10 mg/L."
169.	Section 2.12.5, pg. 2-62, para 2	Remove this paragraph. Although groundwater is not currently be used for consumptive purposes, there is always the possibility of future groundwater consumption, so regulatory standards must still be met.
170.	Section 2.12.5, pg. 2-62, para 2	It is inappropriate to say that there is no governing MCL for nitrate/nitrite. Although a state standard does not explicitly exist for nitrate/nitrite, the Federal standard does apply.
171.	Section 2.12.5, pg. 2-62, last para	Remove this paragraph. The use of $K_d > 40$ kg/L is not an appropriate way to screen contaminants. See previous comments.
172.	2.12.6, 2-63, 29	Concerning Pu-239/240 discussed in the text here and Table 2-15: The results for the unrestricted use scenarios should also be discussed, as these results will still exceed the target dose limit even when 95% UCL EPCs are used.

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173.	2.12.6, 2-63, 29	Pu-239/240 is the only radionuclide that is discussed for the 216-A-29 Ditch. However, section 2.8.2 on p. 2-37 identifies several radionuclides for further evaluation. The text should clarify why these other radionuclides are not discussed in the extended analysis. For example, although it may be that Pu-239/240 is the largest contributor to radiation dose, several other radionuclides are significantly above background or are at high concentrations in the shallow zone, i.e. such as Am-241 and Cs-137 (see Table 4-18 in the RI), yet there is no discussion of them in the extended analysis. This comment applies to the other sites as well.
174.	2.12.8, 2-70, 34	Please include the fact that the radiation dose still exceeds the target dose limit under the unrestricted use scenario, and that this will be the case out to 1000 years. For example, using the 95% UCL concentration of the mean for Pu-239/240, the unrestricted use dose will go from 307 mrem/y (as listed in Table 2-5) to 92 mrem/y.
175.	Section 2.12.8, pg. 2-70, #4	Remove this paragraph. Ecology does not recognize the "K_d immobility benchmark of 40 kg/L". Retain mercury, benzo(a)anthracene, chrysene, aroclor-1254, uranium, and lead.
176.	Section 2.12.8, pg 2-70, #5	See general comment on SESOIL.
177.	Section 2.13	The RI/FS Work Plan and SAP (DOE/RL-99-44) states that the 216-B-63 Trench was only drilled to a depth of 103 ft, because an existing borehole is located in the vicinity of the trench. Data from this borehole should be included in the discussion and tables so that the nature and extent of contamination can be fully assessed.
178.	Figure 2-15	The units listed in this table for uranium are in ug/kg, whereas the units listed in later tables (i.e. Table 2-12) are in mg/kg. Please correct where necessary.
179.	Figure 2-15	The maximum value shown for selenium in Table 2-12 for is 18.5 mg/kg (Area 8). This value is not shown in the table in Figure 2-15. Please correct.
180.	Figure 2-15	Include the data for all of the contaminants listed within the text on pg. 2-50 within the table.
181.	2.13, p. 2-71, para 3	The three screening criteria (i.e., direct industrial exposure, protection of groundwater, eco risk for an industrial setting) should be expanded by adding residential direct contact and unrestricted land use for ecological exposures.
182.	2.13, p. 2-72, para 2	Since Table 2-22 is a condensation of Table 2-8, Table 2-22 is unnecessary. Re Sr-90 in 216-B-63 Trench, why does Table 2-22 indicate HQ>1 for the eco screen, while Table 2-8 does not?

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183.	2.13, p. 2-72, para 3	Although Bi may lack screening criteria, Bi compounds have been associated with nephropathy and proteinuria (Goyer and Clarkson, 2001, in Casarett and Doull's Toxicology). As such, Bi should be retained and discussed as an uncertainty. Sulfate is mentioned in the text as a potential threat to groundwater but is not listed in Table 2-22.
184.	2.13, p. 2-72, para 4	Re Figure 2-24, sulfate is not listed. Why?
185.	Section 2.13.2, pg. 2-72	The text includes sulfate as a contaminant that was identified as posing a threat to groundwater, but sulfate is not discussed in following sections. Please include sulfate in the extended analysis.
186.	Section 2.13.2, pg. 2-72	Editorial – Correct text from 216-A-10 to 216-A-29
187.	Section 2.13.4, pg. 2-73, bullet 2	Please provide additional explanation on the inconsistent results for the borehole cadmium sample (17.5-19.0 ft) and split. Were the sample and split sent to the same or to different laboratories for analysis?
188.	2.13, p. 2-73, para 1	Reference to "Figure 2-23" should be to "Figure 2-24."
189.	2.13, p. 2-73, bullet 1	Boron should not be omitted, since both max and mean concentrations (Table 2-23) exceed the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
190.	2.13, p. 2-73, bullet 5	The text indicates that the mean nitrate concentration does not exceed background. However, Table 2-23 data do not agree with this, since the mean is 30.1 mg/kg, while background is 12 mg/kg. Furthermore, the 95%UCL exceeds the governing screening level for groundwater protection.
191.	Section 2.13.4, pg. 2-74, bullet 2	The text states that the detection of benzene is doubtful based on waste history. The RI reports that numerous organic compounds were detected at the site (including, toluene, xylene, methyl chloride, acetone, and pthalates).
192.	2.13, p. 2-74, bullet 1	Re nitrate/nitrite, the 95%UCL exceeds the governing screening level for groundwater protection.

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193.	2.13.4, 2-74, 22, and 2.13.8, 2-77, 33	The 95% UCL of the mean concentration for Sr-90 may potentially result in doses above the target dose limit for an Unrestricted Use scenario with no cover. Although the value depends on the specific site, a typical Sr-90 concentration corresponding to 15 mrem/y under an unrestricted use scenario in the 100 Area is about 4 pCi/g. Please investigate if the 95% UCL of the mean for Sr-90 would exceed 15 mrem/y for an unrestricted use scenario at this site. The unrestricted use scenario is important information to assess the impacts should institution controls fail for time periods beyond 1000 years.
194.	Section 2.13.5, pg. 2-75, para 1	The text states that clarification will be provided on the degree to which benzene poses a threat to groundwater, but modeling results for benzene have not been presented in this section.
195.	2.13, p. 2-75, para 1	Re Table 2-24, should source concentration (95%UCL) for nitrate/nitrite be 84.6 mg/kg (Table 2-23)? Note that Kd for nitrate and nitrate/nitrite is zero in Table 2-10.
196.	2.13, p. 2-75, para 2	Re nitrate and nitrate/nitrite, some of the data in this paragraph differ slightly from data in Figure 2-25 (max groundwater concentration) and Tables 2-23 through 2-25 (soil 95%UCL).
197.	Figure 2-24	Please include the data for sulfate in the table.
198.	Section 2.13.5, pg. 2-75, para 3	The model predicts that nitrate/nitrite reaches groundwater at a concentration equal to the 10 mg/L federal drinking water standard, indicating that nitrate/nitrite does pose a threat to groundwater. See comment below.
199.	2.13, p. 2-75, para 3	Figure 2-25 indicates that nitrate/nitrite may pose a threat to groundwater in model yr 785 (i.e., max>benchmark).
200.	2.13, p. 2-76, para 2	Ecology agrees that the 95%UCL of the mean concentration is the most appropriate estimate of the EPC for comparison to the benchmark (see General Comment #1).
201.	2.13, p. 2-76, para 3	Why wouldn't an unrestricted land use scenario be considered in the remediation decision process, since it provides useful information, should institutional controls fail at some future point? The consideration of consequences if institutional controls should fail, is a required criteria in the feasibility study. Reference to Section 2.12.6 should presumably be to Section 2.12.7 for the intruder analysis.

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202.	2.13, p. 2-76, para 4	Re Table 2-26, why do 95% UCL values for Cd, nitrate, and nitrate/nitrite differ from those in Table 2-23? WDOH (1997, WDOH/320-015) lists a residential (i.e., unrestricted use) soil screening concentration for Sr-90 of 4.5 pCi/g (which corresponds to 15 mrem/y), calculated with RESRAD. The 95% UCL (17.4 pCi/g) exceeds this screening level. This information could be added to Table 2-26.
203.	2.13, p. 2-77, #2	Re Bi, see comment for p. 2-72, para 3.
204.	2.13, p. 2-77, #3	Boron should not be omitted, since both max and mean concentrations (Table 2-23) exceed the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
205.	2.13, p. 2-77, #4	Figure 2-25 indicates that nitrate/nitrite will exceed its groundwater benchmark at model yr 785.
206.	2.13, p. 2-78, #6	Figure 2-25 indicates that nitrate/nitrite will exceed its groundwater benchmark at model yr 785. Re boron, both max and mean concentrations (Table 2-23) exceed the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
207.	Section 2.14.3, pg. 2-79	Please provide additional explanation on the inconsistent results for the borehole sample and split. Were the sample and split sent to the same or to different laboratories for analysis?
208.	2.14, p. 2-79, para 2	Since Table 2-29 is a condensation of Table 2-8, Table 2-29 is unnecessary. Re Aroclor 1254 in 216-S-10 Ditch, why does Table 2-29 indicate HQ>1 for the eco screen, while Table 2-8 does not? Also, Table 2-8 specifies benzo[b]fluoranthene, whereas Table 2-29 specifies benzo[a]fluoranthene. Please reconcile.
209.	2.14, p. 2-79, para 3	Re Bi, see comment for p. 2-72, para 3.
210.	Section 2.14.3, pg. 2-80, bullet 1	Arsenic concentrations equal or exceed background at two locations in the borehole. Retain arsenic for further analysis.
211.	2.14.3, p. 2-80, bullet 2	Boron should not be omitted, since the max concentration (Table 2-30) exceeds the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
212.	2.14.3, p. 2-80, bullet 3	Note that the 95% UCL for chromium exceeds industrial eco screening value.
213.	2.14.3, p. 2-80, bullet 5	Note that 2.09 mg/kg is the groundwater protection level for Hg (not the eco screen), and that the 95% UCL slightly exceeds this groundwater protection level.

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214.	Section 2.14.3, pg 2-80, bullet 7	Note that concentrations of silver at SD-2 exceed the groundwater protection standard (13.6 mg/kg).
215.	2.14.3, p. 2-81, bullet 1	No 95% UCL is presented for Tl in Table 2-30. Using the 3 B-qualified values (0.59, 0.68, 0.99 mg/kg), the 95% UCL is 1.27 mg/kg which exceeds the listed eco screen (1 mg/kg). Therefore, Tl should not be omitted, based on this observation. The Remark in Table 2-30 refers to 95% UCL and background, but these values are not provided. Reference to "Table 28" in the text should be to "Table 2-30."
216.	2.14.3, p. 2-81, bullet 4	Summary statistics could be calculated for Aroclor 1254 by using 0.5*MDL for non-detects.
217.	2.14.3, p. 2-81, bullet 5	Summary statistics could be calculated for these 4 PAHs by using 0.5*MDL for non-detects. Also, max J-qualified values exceeded the groundwater protection levels for all 4 PAHs.
218.	Section 2.14.3, pg. 2-81, bullet 5	Editorial – Correct units: "530 ug/kg (benzo(b)fluoranthene) to 680 ug/kg (chrysene)."
219.	Section 2.14.4, pg. 2-82, bullet 1	Correct text – SD-2 was not sampled at 6 to 7 ft: "…notably SD-2 and possibly the 1.8 to 2.1 m (6 to 7 ft) bgs strata at SD-2…"
220.	2.14.4, p. 2-82, bullet 2	Note that the B max>eco screen and Tl 95% UCL (calculated)>eco screen.
221.	2.14.4, p. 2-82, para 3	Groundwater protection levels are described as "impracticable." Although MCLs may consider pragmatism, MTCA Method B groundwater values (and soil values protective of groundwater) do not.
222.	Section 2.14.5, pg. 2-83	Ecology does not agree with elimination of contaminants based on Kd > 40 kg/L. Retain mercury, aroclor-1254, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene.
223.	2.14, p. 2-83, bullet 1	Re Ag, 95% UCL>GPC.
224.	2.14, p. 2-83, bullet 2	Re Hg, Aroclor 1254, and the 5 PAHs, 95% UCL or estimated max exceed GPC. Therefore , these COPCs should not be omitted.
225.	2.14, p. 2-83, para 3	The text and Figure 2-28 title indicate that Figure 2-28 illustrates the impact of Ag, but Figure 2-28 does not include Ag data.
226.	2.14, p. 2-83, para 4	The conclusion that none of the Table 2-31 COPCs pose a threat to groundwater is not supported. For example, 95% UCL for Hg>GPC, 95% UCL for Ag>GPC, max Aroclor>GPC, and max PAHs>GPC.

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227.	Section 2.14.5, pg 2-83	Modeling must be depth and concentration specific (see general comment).
228.	Section 2.14.5, pg. 83	The statement that none of the contaminants pose a threat to groundwater is unsubstantiated as several contaminants exceed groundwater protection values.
229.	2.14, p. 2-84, para 1	Why wouldn't an unrestricted land use scenario be considered in the remediation decision process, since it provides useful information, should institutional controls fail at some future point?
230.	2.14, p. 2-84, para 3	Re Table 2-35, Aroclor 1254 should also be evaluated for cancer risk with an IRIS CPF=2 $(mg/kg\text{-}d)^{-1}$. This CPF is recommended for congeners with >4 chlorines that comprise >0.5% of total PCBs. Therefore, this CPF would apply, since approximately 77% of Aroclor 1254 is comprised of PCB congeners with >4 chlorines (see p. 2-65 to 2-66 in http://www.epa.gov/epaoswer/hazwaste/combust/finalmact/ssra/05hhrap2.pdf).
231.	2.14, p. 2-84, para 5, #2	Re Bi, see comment for p. 2-72, para 3.
232.	2.14, p. 2-84, para 5, #3	Because the max for boron and a 95% UCL (calculated) for Tl exceed their eco screens, these COPCs should not be omitted.
233.	2.14, p. 2-84 to 2-85, #4	The MTCA 3 phase model includes Kd but does not specify an immobility threshold (e.g., Kd>40 kg/L).
234.	2.14, p. 2-85, #5	Re Ag, please show SESOIL transport analysis results over a 1000 yr period.
235.	2.14, p. 2-85, #6	Boron should not be omitted, since its max concentration (Table 2-30) exceeds the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
236.	2.14, p. 2-85, #7	Bi represents an uncertainty with respect to direct exposure (see comment for p. 2-72, para 3). Based on the MTCA 3 phase model, soil concentrations of Hg, Aroclor 1254, and PAHs pose a risk to groundwater. Aroclor 1254 cancer risk should be evaluated for the intruder scenario.
237.	2.15, p. 2-85, para 2	Reference to "Table 2-36" should be to "Table 2-37." Also, since Table 2-37 is a condensation of Table 2-8, Table 2-37 is unnecessary.
238.	2.15, p. 2-86, para 1	Reference to "Table 2-26" should be to "Table 2-37."
239.	2.15, p. 2-86, bullet 1	Re Bi, see comment for p. 2-72, para 3. The basis for the dismissal of methylene chloride and vinyl chloride is unconvincing. Collection of additional data could resolve the issue.

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240.	2.15, p. 2-86, para 3	Add reference to Table 2-38 (in addition to Table 2-37).
241.	2.15, p. 2-86, para 3, bullet 1	Boron should not be omitted, since the max concentration (Table 2-38) exceeds the eco screen for unrestricted land use (0.5 mg/kg for protection of plants, MTCA Table 749-3).
242.	2.15, p. 2-86, para 3, bullet 2	The most appropriate comparison of Se soil concentrations is with Hanford background (0.78 mg/kg), not background concentrations in the literature at large. Note that a calculated 95% UCL for Se (using Figure 2-29 data and 0.5*MDL for non-detects) is 0.58 mg/kg which less than Hanford background. Also, the governing value in Table 2-38 for Se is GPC (not eco, since eco<background).
243.	Section 2.15.3, pg. 2-86	Editorial – Figure 2-29 should refer to the 216-S-10 Pond, not ditch.
244.	2.15, p. 2-87, bullet 1	Re Ag in Figure 2-30, although 8.3 mg/kg is an outlier, it may be real. This Ag soil concentration at 9-10 ft bgs may be marginally available to deep rooting plants. Since the eco screen (2 mg/kg) is the 93rd percentile (interpolated from Figure 2-30), then 93% (not 95%) of soils should have Ag concentrations<eco screen.
245.	2.15, p. 2-88, para 1	Ag should not be omitted, since 95% UCL (2.8 mg/kg)>eco screen (2 mg/kg), as shown in Figure 2-30.
246.	Section 2.16, pg. 2-88, bullet 1	Until sufficient justification for removal is provided, contaminants at the 216-A-29 Ditch that pose a threat to groundwater include arsenic, cadmium, nitrate, nitrate/nitrite, sulfate, bismuth, methylene chloride, and 1,2-dichloroethane.
247.	Section 2.16, pg. 2-88, bullet 2	Until sufficient justification for removal is provided, contaminants at the 216-B-63 Trench that pose a threat to groundwater include bismuth, cadmium, nitrate, nitrate/nitrite, and sulfate.
248.	Section 2.16, pg. 2-89, bullet 1	Until sufficient justification for removal is provided, contaminants at the 216-S-10 Ditch that pose a threat to groundwater include Aroclor-1254, Ag, As, Bi, Hg, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene.
249.	2.15, p. 2-88, para 2	COPCs at 216-S-10 Pond should include B, Ag, methylene chloride, and vinyl chloride.
250.	2.16, p. 2-88, para 3	Reference to Table 2-38 should be to Table 2-39.
251.	2.16, p. 2-88, bullet 2	COPCs at 216-B-63 Trench should include Bi, B, and nitrate/nitrite. Because it lacks screening criteria, Bi should be retained and discussed as an uncertainty.

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252.	2.16, p. 2-89, bullet 1	COPCs at 216-S-10 Ditch should include Bi, B, Hg, Cr, Ag, Aroclor 1254, and PAHs. Because it lacks screening criteria, Bi should be retained and discussed as an uncertainty.
253.	2.16, p. 2-89, bullet 2	COPCs at 216-S-10 Pond should include B, Ag, methylene chloride, and vinyl chloride.
254.	2-107, Fig 2-12	Please clarify to state how the "boxes" for dealing with significantly different sites come from. (e.g., characterize & evaluate as independent site, etc)
255.	2-121 Fig 2-24	Please clarify to state why Ni-63 & Np-237 & Tc-99 listed on the table.
256.	2-125 Fig 2-27	Please clarify to state why Lead & Barium are not listed on the table.
257.	2-131, Table 2-2	For the 216-S-11 Pond: Please provide the reference to support statement that the pond was free from radioactive contamination. Also, convert effluent volume (L) to m^3 so a comparison can be done between these two values. NOTE: please do this for the other tables as appropriate.
258.	2-133, Table 2-3	Footnote b: Please identify where rationale can be found in RI & clarify to state what is meant by "do not pose a significant threat.."
259.	2-137, Table 2-7	Identify where Organics in ug/kg begin.
260.	2-139, Table 2-8	Clarify why the following were eliminated as COPCs: Acetone, Fluoranthene,Pyrene, Bis(2-ethylhexylphtalate), Butybenzyl-phthalate, Tetrachloroethylene, TPH-Kerosene range, cyanide, the Uranium series, Am-241, Tc-99, Zinc-65, Co-60, Barium, Beryllium, and Nickel.
261.	2-139	Please clarify text to explain why volatile organics were not considered.
262.	3-11, line13, Section 3.3.2	RAO 1; Please clarify to state how you chose concentrations above industrial use and not unrestricted (WAC 173-304-7490). Re eco receptors, an unrestricted land use should be evaluated for information purposes. In this case, all soil values in MTCA Table 749-3 (i.e., plants, soil biota, wildlife) are applicable (WAC 173-340-7490[3][b]).
263.	3-11, Section 3.3.2	There is still a pathway to groundwater for humans. Please clarify to state how you evaluated this. Although a groundwater pathway does not currently exist at 200-CS-1, MTCA Method B groundwater cleanup levels (and soil values protective of Method B groundwater) apply, since groundwater is (or is connected to) a potential future source of drinking water.

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264.	3-13, line 3	Please clarify what regulation cites the risk range.
265.	3-13, line 11	Ecology requests inclusion of text similar to Sections 3.5.11 & 3.5.12.1 & Table 3-1 of DOE/RL-2002-69, Draft A included here. Also note, the groundwater pathway remains a pathway.
266.	3-19, Table 3-1	Please explain how info in Tables 1 & 2 of DOE/RL-2004-17 are reflected in Table 3-1, 3-2, & 3-3 of this report.
267.	3-21, Table 3-3	Please format this similar to Table 3-2 of DOE/RL-2002-69, Draft A Please Note: Please clarify in text & explain how you got the Selenium value.
268.	4.2. general	Add the problems with these remedial alternatives if failure should occur
269.	4.2.1.2, pg 4-3	Add assumptions that are standard with Hanford about institutional control failures (i.e. 150 years)
270.	4.2.1.6, pg 4-9 1st paragraph	Not all contamination is less than 10 feet
271.	4.2.1.6 pg 4-9 2nd paragraph	Delete last sentence and state alternative is kept
272.	5-2, line 13	Please clarify to state how concerns about how 'No Action' be a viable alternative if there's a table in Chapter 2 which list COPC for groundwater for the 216-S-10 unit.
273.	6-3, line 7	The CERCLA cancer risk range (1E-6 to 1E-4) encompasses the MTCA site risk limit (1E-5). The MTCA limit should be met if MTCA applies. Soil contaminant concentrations that protect groundwater should be based on EPA's Maximum Contaminant Levels (MCLs) or MTCA Method B groundwater concentrations MTCA inputs these groundwater concentrations into the 3 phase model to estimate the soil concentration which is protective of groundwater (Equation 747-1 in WAC 173-340-747[4]). Please adjust text accordingly as needed.
274.	6-4, line 26	Add bullet & explain how it was met: "The degree of expected reduction in toxicity, mobility, or the volume measured as a percentage of reduction (or order of magnitude). (from EPA/540/G-89/004 guidance)
275.	6-7, line 1	This does not seem to correlate with what is said on the previous page. Please clarify.
276.	6-8, line 20	Ecology disagrees with statement and method of calculating 95%UCL for these pathways.
277.	6-26, line 30	Explain the shaded text.

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278.	6-27	Are the MCLs & MCLGs included in 40 CFR 141? If not their citation should be noted. Please clarify to state where did you note Water Quality Criteria .
279.	Sections 5, 6, 7	Ecology did not complete a review of these sections due to the significant amount of comments and concerns about the risk assessment and evaluation of the data. These sections will have to be revised pending resolution of Ecology's comments and then evaluated by Ecology.
280.	8-2, line 2	Ecology disagrees with the first 2 sentences. There is a potential pathway to groundwater for humans. This will need to be addressed in a postclosure permit condition.
281.	8-2, line 8	Ecology disagrees, as noted in previous comments. This will need to be addressed in a postclosure permit.
282.	8-2, section 8.2	Please rewrite this section to reflex that the document prepared will be a "Statement of Basis" and to reflect the path forward will be issuance of permit documents not a ROD.
283.	Chapter 6	Please clarify to state how a chemical-specific ARAR which addresses groundwater standards past the site boundary for any of the units was considered.
284.	8-3, line 9	Delete this section. Ecology does not anticipate the use of the plug-in approach for this operable unit.
285.	8-4, line 27	Please clarify to state how concerns about sites where contaminants exceed RAOs and are in the vadose zone at deep levels was addressed.
286.	8-5, line 15	Institutional controls are cited at 500 years, but the conceptual model cites 150 years. Please clarify to state how concerns about this discrepancy were addressed.
287.	8-6, lines 7-41	Clean closure may or may not be accepted, depends on determination of whether or not any COCs will reach groundwater from the –A-29, S-10 or –B-63 units. The units are subject to WAC-650(6) regs (which lead to WAC-610(7)(8)(9) & (10).
288.	8-2, line 8	Section 8.14 - Rewrite this section to reflect confirmatory sampling being a condition of the permit chapter for closure of the TSDs.
289.	8-2, line 14	Section 8.2 - rewrite this section to reflect the Ecology letter reflecting closure of all 6 waste sites, via modification to the Hanford site-wide RCRA permit.
290.	8-3, line 9	Section 8.2.1 - it appears that the plug-in approach will not be required due to the small number of waste sites in this operable unit. Also, it is unlikely that other waste sites would "plug-in" to the conceptual models for these types of waste sites (chemical sewers/ditches). Also, it is unlikely that the plug-in approach would be used, given the regulatory pathway (closure of all of the waste sites). Therefore, delete this subsection.

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291.	General	Data present reflects filtered samples. Ecology disagrees with this approach per: State Requirement Model Toxics Control Act 173-340-720 (9)(b): Analysis shall be conducted on unfiltered ground water samples…. Federal Requirement In accordance with 40 CFR 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule, Section 40 CFR Part 136.3, Table IB, Note 3, states a sample collected "for the determination of total metals…is not filtered before processing." RCRA Guidance SW-846 11.4.3(c): Samples containing less than 5 N.T.U. turbidity are acceptable for analysis when the analytic method is sensitive to turbidity (such as the analysis of metals)…. Please resubmit information accordingly.
292.	8-4, Section 8.2.1.1	How does this section address the following concerns: 4th bullet: Please clarify to state how concerns about the groundwater were addressed. 5th bullet: Please clarify to state how concerns about migration routes were addressed. Please clarify to state how concerns about potential human and ecological receptors were addressed.
293.	8-4, Section 8.2.1.1, line 18	Institutional control period is not limited to 150 years. Adjust this site model to reflect longer period of time. Alternative #2 sites 500 years. Ecology understands that impacts to the groundwater may occur even past this date. Please clarify to state how you propose to deal with this possibility.
294.	8-4, Section 8.2.1.1, line 22, 3rd bullet	There is apparently no conceptual site model that includes everything in this bullet, but the scenario is one where the PRGs were exceeded for the groundwater. Please clarify to state how was this possibility considered and resolved. Please identify the unit specific modeling approaches used.
295.	8-5, Section 8.2.1.3	Delete this section. Ecology does not anticipate use of "plug-in" approach for this operable unit. Ecology anticipates permit requirement for submittal of a SAP for RPPs.
296.	Appendix C, p. C-2, para 1	State that the NARA assessed both radionuclides and nonradionuclides.
297.	Appendix C, p. C-2, para 3	The assumption that soil COPCs will not affect the river is nonconservative.

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298.	Appendix C, p. C-3, para 2	Re the CSM, delete "and Garden" in the title of Figure C-1. Please add dermal exposure from surface soils.
299.	Appendix C, p. C-3, para 2, bullets 2 and 3	Re Figure C-1, all of the groundwater pathways should be complete, since Native American scenarios may represent a blend of traditional (e.g., ingesting game) and contemporary practices (e.g., ingestion of well water). For example, Harris and Harper (2004) specify that drinking water may come from both groundwater and surface water. Please add sweat lodge use to the Columbia River box (Figure C-1), since water for the sweat lodge may also come from surface water. Although low in surface water, COPCs may bioaccumulate in the aquatic food chain (including edible fish)..
300.	Appendix C, p. C-4, #2	It is possible that future Central Plateau Native Americans would obtain a significant part of their protein intake from fish, since they may reside within 10 km of the river and fishing may expend less energy than hunting.
301.	Appendix C, p. C-4, para 2	Re the infant breast milk pathway, please refer to Figure C-2 and add this pathway to Figure C-1. Re Figure C-2, the EPA (1993) reference has been updated (see http://www.epa.gov/epaoswer/hazwaste/combust/finalmact/ssra/05hhrapcover.pdf). Units for C (concentration of dioxins in milk fat) are mg COPC/kg milk fat. The value for h (half-life of dioxin in adults) is 7 yr (2555 d) and for f2 (maternal body fat fraction) is 0.3 (see p. C-42 in http://www.epa.gov/epaoswer/hazwaste/combust/finalmact/ssra/05hhrapapc.pdf).
302.	Appendix C, p. C-4, para 4	EPA (1990) is not listed in the references.
303.	Appendix C, p. C-5, bullet 4	Note that most game also ingests incidental soil and omnivorous game ingests animals (in addition to plants).
304.	Appendix C, p. C-5, para 4	Why not model adult and child separately, rather than as a theoretical hybrid receptor? Also, re Table C-1, it is unlikely that there would be no fish consumption.

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305.	Appendix C, p. C-5, para 5	Re Table C-2, please check all values for accuracy. For example, RAGS Part E lists dermal absorption fraction (ABS_d) from soil for As as 0.03 (not 0.001, see p. 3-16 in http://www.epa.gov/oswer/riskassessment/ragse/pdf/chapter3.pdf). Re Table C-2, are "Soil and Plant to Animal Tissue Transfer" numbers the same as "Biotransfer Factors" (with units, d/kg), as listed in the updated HHRAP companion database (http://www.epa.gov/epaoswer/hazwaste/combust/riskvol.htm#volume2)? This database lists 4 types of soil to plant transfer factors (aboveground, forage/silage, belowground, grain) and 5 types of animal biotransfer factors (milk, beef, pork, poultry, eggs). Please specify which transfer factors are listed in Table C-2, and check these values against the updated HHRAP database (if this is the data source). For example, the HHRAP database lists the biotransfer factor for beef (Babeef) for Aroclor 1254 as 0.031 d/kg (not 3.097). Re Table C-2, the rationale provided for using the same transfer factors for As and sulfate is weak, since these COPCs have very different physical/chemical properties (e.g., valence).
306.	Appendix C, p. C-6, para 2	Re Table C-3 footnote "c," 95%UCL should be used (rather than max), even if 95%UCL>max. Please see General Comment #1. Re footnote "b," why were H-3 and Ni-63 excluded from analysis?
307.	Appendix C, p. C-6, para 3	Re Table C-4, the oral RfD derived in Section 2.12.7.2 is 7.8 mg/kg-d (not 7.8E1 mg/kg-d). Also, on what basis is oral to inhalation and oral to dermal extrapolation performed for the oral sulfate RfD? Although the oral and dermal CPFs for all PAHs are listed as 7.3 $(mg/kg\text{-}d)^{-1}$, MTCA allows use of the TEF method for PAHs (WAC 173-340-708[8][e]). TEFs are BaA (0.1), BaP (1), BbF (0.1), BkF (0.1), and Chr (0.01). CLARC does not list dermal CPFs for PAHs but does list an inhalation CPF for BaP (6.1 $[mg/kg\text{-}d]^{-1}$).
308.	Appendix C, p. C-7, bullets 3 and 4	Note that dose and risk limits conflict in that 15 mrem/y approximates 3E-4 risk, although EPA has stated that "3E-4 is essentially equivalent to the presumptively safe level of 1E-4" (http://www.epa.gov/superfund/resources/radiation/pdf/radguide.pdf).
309.	Appendix C, p. C-7, bullets 4 and 5	EPA (1990) is not listed in the references.
310.	Appendix C, p. C-7, para 3	Re the last sentence, please clarify that "soil" refers to soil ingestion (assuming this is the case).

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311.	Appendix C, p. C-8, para 2	Re Table C-6, even if ELCR and HI are "overestimated," these values may still exceed benchmarks, since exceedances are so large.
312.	Appendix C, p. C-8, para 4	Nonrad COPCs at 216-B-63 Trench should include Bi, B, and nitrate/nitrite. Because it lacks screening criteria, Bi should be retained and discussed as an uncertainty.
313.	Appendix C, p. C-8, para 6	In addition to Aroclor 1254 and PAHs, nonrad COPCs at 216-S-10 Ditch should include Bi, B, Hg, Cr, and Ag. Because it lacks screening criteria, Bi should be retained and discussed as an uncertainty.
314.	Appendix C, p. C-9, para 1	Re Table C-9, even if ELCR and HI are "overestimated," these values may still exceed benchmarks, since exceedances are so large.
315.	Appendix C, p. C-9, para 2	Re Table C-10, the text incorrectly states that the maximum dose (11 mrem/y) exceeds the 15 mrem/y target at yr 0.
316.	Appendix C, p. C-9, para 3	Nonrad COPCs at 216-S-10 Pond should include B, Ag, methylene chloride, and vinyl chloride.
317.	Appendix C, p. C-9, para 4	Use of probabilistic methods or sensitivity analysis could better characterize uncertainty. It looks like "no carcinogenic" should have been "noncarcinogenic."
318.	Appendix C, p. C-9, para 5	COPC selection, retention, and elimination criteria contribute to uncertainty.
319.	Appendix C, p. C-9, para 6	Re nonrad organics, transformation products are not considered, resulting in uncertainty.
320.	Appendix C, p. C-10, para 4	Uncertainty in toxicity assessment includes lack of screening data for some COPCs (e.g., Bi).
321.	Appendix C, p. C-10, para 5	Re uncertainty in noncancer effects when HI>1, RAGS recommends that HI be segregated by effect and mechanism of action in a subsequent iteration.
322.	General, D appendix	Expanding the estimated cost values from two to seven significant figures give the allusion of precision, yet estimate is only accurate to +50%, -30% in accordance with the stated guidelines. This is misleading and all values presented need to reflect (by rounding) the accuracy of the estimate.

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323.	General, D appendix	Normalizing cost estimates by an estimated number of "Sites" leads to inaccuracy as to deployment and repositioning costs. Also, the number of significant figures is also incorrect for this type of cost estimate. Correct.
324.	General, D appendix	State how actual operational costs are being incorporated into the cost estimates. Provide the process by which actual costs of work elements are being used to update/improve the cost estimates of this and other projects.
325.	General, D appendix	Provide the basis for each of the many "generalized" unit cost values expressed in the assumptions and other parts of the estimate. For example, the unit cost of $8.95/CY for material and transportation costs.
326.	D-1	Provide the justification for the use of a 25% contingency in the cost estimates when the cost estimate basis is according to EPA guidance of +50, -30%.
327.	D-2, lines 3 & 4	The sentence should read, "These assumptions are necessary to provide the level of detail for independent review."
328.	D-5, lines 11 & 12	Provide the basis for assuming the 3.5% of FP direct craft labor for small tools, etc.
329.	D-5, lines 15 & 16	Provide the basis for the 26.5% overhead, profit, etc. rate.
330.	D-5, lines 17 & 18	Provide the basis for the 16.5% FH G&A.