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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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July 26, 1996

Arlene C. Tortoso
100 Area Groundwater Project Manager
U.S. Department of Energy
P.O. Box 550 H0-12
Richland, WA 99352

RE: EPA Comments on "Remedial Design Report and Remedial Action Work Plan for the 100-HR-3 and 100-KR-4 Groundwater Operable Units' Interim Action", BHI-00765 Draft A

Dear Ms. Tortoso:

44777

Enclosed are the U.S. Environmental Protection Agency's (EPA's) comments on the subject document which EPA received on July 11, 1996. The EPA has provided these comments in an expedited review in order to facilitate implementation of this remedial action. Our efforts were severely hampered, however, by the liberties the U.S. Department of Energy (DOE) has taken to change the requirements established in the Record of Decision, and failure to adequately address many of the Record of Decision requirements. This is absolutely unacceptable. If you have any questions, please contact me at (509) 376-9884.

Sincerely,
Laurence E. Gadbois
Laurence E. Gadbois
100-KR-4 Project Manager

Enclosure: As stated.

CC: Tony J. Knepp, BHI
Linda K. McClain, DOE
Wayne W. Soper, Ecology
K. Mike Thompson, DOE
Administrative Record, 100-HR-3 and 100-KR-4



Arlene C. Tortoso

July 26, 1996

Enclosure:

EPA Comments on "Remedial Design Report and
Remedial Action Work Plan for the 100-HR-3 and 100-KR-4
Groundwater Operable Units' Interim Action", BHI-00765 Draft A

General Comments

1. Within the RDR/RAWP the DOE is not authorized to make unilateral changes to the requirements set forth in the ROD. Implementation of the work identified in this document could not be expected to meet the requirements set forth in the ROD. Constrained by DOE's request to conduct an expedited review of this document, EPA was not able to identify all the mis-representations of ROD requirements stated in this RDR/RAWP document. Even more numerous were the actions proposed which would not fulfill ROD requirements. We expect DOE to do an item-by-item review of this document against the ROD before re-submittal of this document. The EPA will not be able to approve the 100-HR-3 & 100-HR-4 RDR/RAWP without significant changes.
2. There is little reason to believe that the extraction network at the 100-H area is adequate to capture the northern extent of the chromium plume that is coming across the horn from 100-D area. The ROD requires capture of the chromium plume in 100-HR-3 where it exceeds 22 ppb in near-river on-shore locations.
3. The DOE has chosen to define the apparently localized chromium plume at the western edge of the 100-D area as outside the scope of the pump-and-treat interim action. The scope and requirements of the interim action are defined in the ROD. The ROD requires capture of the chromium plume in 100-HR-3 where it exceeds 22 ppb in near-river on-shore locations. Therefore the ROD requires interim action at this plume.
4. A milestone change package was not submitted with this document, contrary to the requirement in the Tri-Party Agreement, Section 11.4, 1st paragraph:
 "The work plan schedule shall identify completion dates for major tasks and deliverables as interim milestones". "A change package shall be submitted with the work plan which identifies the interim milestones."
 DOE had been reminded of this requirement in meetings prior to receipt of this document. We require prompt delivery of this change package, which should include, at the minimum the following:
 - * Operations and Maintenance Plan. (RDR/RAWP Section 3.1.3).
 - * Treatment Plan for Protection of Cultural Resources for the 100-KR-4 Pump-and-Treat Project. Since activity began in 100-KR-4 on July 22, this item is already overdue. (RDR/RAWP section 3.1.3 and page 4-1, last sentence.)
 - * Mitigation Action Plan. Since activity has begun in all three reactor areas, this is already overdue. (RDR/RAWP section 3.1.3)
 - * Waste Management Plan. This must be in place before any waste-generating activities begin. A temporary one was established prior to 100-HR-3 and 100-KR-4

activities. These both must be included in the next submittal of the RDR/RAWP. (RDR/RAWP section 3.1.3).

- * Performance Monitoring Plan. (RDR/RAWP Section 3.1.3).
- * 100-HR-3 System Operating. 1 July 1997. (RDR/RAWP Figure 6-1 and the last line of section 4.1.1).
- * 100-KR-4 System Operating. 1 October 1997. (RDR/RAWP Figure 6-1 and the last line of section 4.1.1).
- * Review compliance data for recommended changes to the target treatment area. (RDR/RAWP Section 3.3.1.1, 2nd paragraph, last sentence.)
- * Note that a milestone for the compliance monitoring plan is not requested, because the ROD requires this to be part of the RDR/RAWP (see ROD, section X, first paragraph of the 5th and 6th bullets).

Specific Comments

5. Executive Summary, 1st paragraph (and throughout the document)
 - A) The document variously refers to the ROD as an "interim record of decision". This is incorrect. It is an interim action, not an interim ROD. It can be referred to as an "interim action record of decision (ROD)", or simply as a ROD.
 - B) Also a few times in the document it is referred to as an interim remedial measure (IRM). This document should be consistent with itself and the ROD by using the term "interim action".
6. Executive Summary, page ix, last paragraph
The document identifies two types (brands) of resins under consideration for use. Identification of resins anticipated for use is appropriate, however this document should retain (and specifically state so) flexibility to use an alternate resin given regulatory concurrence identified at any time in the future. The regulatory process for involvement in the final selection of the resin to use is not identified, but should be.
7. Executive Summary, page x, last paragraph
This paragraph misstates the requirements set forth in the ROD regarding the so-called "stopping criteria". During drafting of the ROD, these were extremely important criteria for DOE, and worded very carefully. This document MAY NOT change those criteria.
8. Executive Summary, Table ES-1
The idea of having this summary table is very good. It needs to be reviewed to ensure exact compliance with the requirements set forth in the ROD. It has been selective in the reiteration of requirements, and has taken creative liberties with some of them.
9. Executive Summary, Table ES-1
Of the requirements identified in this table (note that there are other ROD requirements not identified in this table), the "How Met" column in numerous instances does not fulfill the requirement. For example:
 - A) Requirement #10, item f states:

"Sites with cultural resource significance should be avoided during remedial design activities if avoidance is possible. Where avoidance is not possible a data recovery/mitigation plan must be prepared in consultation with the affected resource trustee".

"How Met" states:

"A Mitigation Action plan describing revegetation activities will be prepared during the interim action implementation phase".

- 1) The wells in the 100-H and 100-D area have already been drilled, yet to date, we have not received even a draft mitigation action plan. To our knowledge neither have any of the natural resource trustees.
- 2) The first few words of the requirement are "sites with *cultural* resource significance", yet *revegetation* is all that is addressed in the document.

B) Requirement #10, items a & b state:

"The extraction and treatment system shall run on an essentially continuous basis" and "the system shall be winterized".

"How Met" states:

"A 90 percent operating efficiency has been established as an initial goal, with an incremental increase to 95 percent." And "Exposed PVC piping and tanks are heat traced. Buildings are insulated. HDPE conveyance piping not susceptible to freezing while in operation."

- 1) Continuous does not mean 90 percent.
- 2) The requirement "The system shall be winterized" is not satisfied by using "piping not susceptible to freezing while in operation" when the operating goal is 90 percent.

10. Page 1-1, Section 1.2, 1st line
Suggest removing "speed up actions to" better match the 1st and 3rd remedial action objectives set forth in the ROD (section VII).
11. Page 1-2, 2nd paragraph, 3rd line
Either change the beginning of the sentence to read "This **interim action** will achieve three remedial action objectives..." or else remove the second bullet (as it is part of the whole interim action, but not addressed by the pump-and-treat portion of the interim action).
12. Page 1-3, section 1.4, 1st paragraph.
Pump-and-treat is also written as "pump and treat". This document should be consistent with use of the hyphens.
13. Page 1-5, figures 1-1 and 1-2.

The operable unit boundaries are shown to end at the river's edge. In fact, the operable unit boundary is the extent of the plume of groundwater, which includes out into the river where groundwater upwells into the river. This concept is depicted in the Work Plan for 100-KR-4 (DOE/RL-90-21, Rev 0).

14. Page 2-1, Section 2.1, last sentence and Section 2.1 first paragraph. The document is inconsistent in use of "chromium" as the shorthand for "hexavalent chromium". For example the document states:

"For convenience, hexavalent chromium is simply referred to as 'chromium' in the text unless noted otherwise.

"Hexavalent chromium was introduced...most widespread chromium was...maximum hexavalent chromium concentration...".

Consistent terms should be used.

15. Page 2-2, 2nd full paragraph, last sentence
There is a typographical error: "and provide a basis for to optimize".

16. Page 2-3, Section 2.2.2, 1st paragraph.
The document states that "Chromium contributions from local 100-H Area sources have likely been dispersed by now, and the large 100-D plume is now dominant". This being the case, the extraction network should be designed to capture a large plume. As it is, the current design focuses on the piece of the plume that has intersected the wells established to monitor 100-H facilities. This artifact of the historic well distribution in the 100-H area to monitor 100-H area facilities has biased the extraction system.

The most upstream (relative to the river) well is 199-H4-10 which is depicted in figure 2-1 as having a chromium concentration of 33 ppb. In fact the most recent data in HEIS is the following:

Date	Concentration	Method
10-Feb-94	38.3 ppb	CLP
10-Feb-94	45.5 ppb	CLP
28-Jul-94	108 ppb	CLP
28-Jul-94	56.1 ppb	CLP
7-Mar-95	51 ppb	SW846-3
21-Jun-95	15 ppb	SW846-3
28-Jun-95	12.7 ppb	CLP
28-Jun-95	9.2 ppb	CLP

In the near river environment, it is not surprising to see this data fluctuation. Obviously this well exceeds the ROD capture zone requirement of 22 ppb, and modeling for the 100-H area system indicates water in this area is on the periphery of being captured (figure 3-4). Water upstream would not be captured. Because there are no wells located upstream of 199-H4-10, the remedial design was based on an assumption that chromium is not above the 22 ppb standard. Is that a valid assumption?

- * Upgradient wells 97-43 and 96-43 do not indicate that current well coverage has even begun to delineate the upstream portion of the incoming plume from 100-D.
- * The transect with the second highest river substrate pore water chromium in the 100-H area (73 ppb) was upstream of the capture zone.

Section 3.3, first bullet, last sentence states that the most recent groundwater data as well as the results of river substrate sampling were used to define the geographic area to be addressed by the interim action. The RDR/RAWP does not appear to have considered the upstream pore water data from the 100-H area.

To confound this issue, the injection of water at 100-H will create a mound (see figure 3-4) that will deflect the incoming plume even further north, away from the extraction wells. And since there are no compliance wells upstream of the capture zone, there will be no way to document compliance or non-compliance with the ROD. The ROD requires that "monitoring shall be conducted at sufficient locations to evaluate the performance of the remedial action."

17. Page 2-3, Section 2.2.2, 3rd paragraph
The document states that "discharge of chromium-contaminated groundwater to the Columbia River was established by riverbank seepage data (Peterson and Johnson 1992)". In fact, this phenomenon was known many years before this. Environmental monitoring programs have been monitoring springs and seeps and have been detecting chromium for many years prior to Peterson and Johnson, 1992.
18. Section 2.3.1, (and general comment throughout document).
The document discusses "the 116-D-1A and 116-D-1B Storage Basin Trenches" but does not show these in figures 2-7 or 2-9. In general, waste sites and wells discussed in the text should be shown in a figure. Recommend that the text be reviewed against the figures for consistency.
19. Section 2.3.1
In discussing sources of chromium, the document states that "other potential sources of chromium are identified in the 100-D/DR Area Technical Baseline Report". This is extremely relevant information to this RDR/RAWP and should be recapitulated here.
20. Section 2.3.2, 2nd paragraph, 1st line.
Discussing the 100-D area, the document states: "Groundwater flows both toward the river and to the east toward the 100-H Area". This is in contrast with section 2.3.4, 1st line that also discusses the 100-D area: "Groundwater flows to the northwest toward the Columbia River, to the north parallel to the river, and to the northeast toward the 100-H Area". These should be consistent.
21. Page 2-6, Section 2.3.2, 3rd paragraph
Discussing the 100-D area, the document states: "In the area of the interim action, the maximum observed concentration in river substrate pore water was 85 ug/l...". The ROD dictates the area of the interim action, not this document. The ROD dictates the area of the interim action:

"The first remedial action objective for the 100-HR-3 and 100-KR-4 Operable Units is to prevent the discharge of hexavalent chromium to the Columbia River substrate at concentrations exceeding those that are considered protective of aquatic life in the River and riverbed sediments. Prioritization of areas to be addressed by the remedial action will be based on suitable salmon habitat."

While DOE with regulator concurrence have the option to prioritize areas (eg. the upstream plume at the 100-D area), this area IS included "in the area of the interim action". The sentence in the document, therefore should be changed to read something like: "~~In the area of the interim action,~~ In 100-HR-3, the maximum observed concentration...", and update this with the highest value observed in the 100-D area (ie. 10 times higher than stated in this document). (Note: the last sentence of this paragraph and the next paragraph will then need significant modification to identify how the selected remedy in the ROD will be implemented in this area.) Note also that section 3.3, first bullet discusses using the most current groundwater data "integrated with the results of the river substrate sampling where available, to define the geographic area to be addressed by the interim action".

22. Figures 2-1 and 2-2

These figures depict approximately the same areas, but it is extremely difficult to compare their information because they are drawn so differently. (For example, try to find the island shown in figure 2-1 near well H4-10 on figure 2-2. And vice versa for the retention basins shown on figure 2-2 but not on figure 2-1.) Using the same base drawing would help tremendously.

23. Page 3-5, Section 3.3.1, 1st line

Suggest changing to read "The 100-HR-3 Operable Unit includes groundwater under the former 100-H and 100-D Reactor areas.

24. Page 3-5, Section 3.3.1.1, 2nd paragraph, last sentence

This should be changed to read: "Based on the response of the aquifer to pump and treat and the measured effectiveness of the interim action on chromium ~~in the river substrate in near-river on-shore locations,~~ the initial target area will be revised accordingly". Also, a milestone should be established to ensure that this happens in a timely manner. The ROD requires that "compliance monitoring will include analysis of results in a timely manner to support modification to the treatment system in order to meet the remedial action objectives."

25. Page 3-5, last paragraph

As stated in comment #21, the interim action as defined in the ROD for 100-HR-3 is based on anywhere chromium exceeds 22 ppb in groundwater at near-river on-shore locations. Not some selected portion of that impacted area. The identified paragraph is confusing and the last sentence "The interim action addresses only that portion of the chromium plume contribution to the elevated chromium concentrations detected in the river substrate" is wrong. If, however, DOE did use this incorrect basis for remedial design, why was the upstream portion of the 100-D area -- which has the highest levels of chromium detected anywhere in the Hanford Reach -- considered outside the target area for the interim action?

26. Page 3-7, first 2 lines.
The document states "rates may be adjusted during startup to increase the rate of mass removal or expand the area of hydraulic gradient control". We expect starting with higher extraction rates to more rapidly establish the capture zone and expedite protection of the Columbia River. Initial high extraction rates also benefit from withdrawing 100% groundwater derived water, rather than a substantial percentage of river water.
27. Page 3-7, 5th full paragraph
The document states "Well H4-12C, where chromium concentrations ranging from 270 to 290 ug/L have been detected, will not be connected to the groundwater extraction network". Why it will not be connected needs to be explained.
28. Page 3-11, 2nd line
Typo: "100-HR-4" should be "100-HR-3".
29. Page 3-12, section 3.3.3.3, 1st paragraph
Under extended high river stage conditions, it may in fact be appropriate to shut-down or reduce the extraction rate from certain near-river wells, as drawing in more river water may not be worthwhile. On the other hand, if inflowing river water that is then drawn into extraction wells is flushing the near-river aquifer, continued pumping may be valuable. In either case, when the river recedes, there will be an increased groundwater flow towards the river and pumping rates should be increased commensurate with the increased flow.
30. Page 3-15, section 3.4.4, 1st sentence
The 100-HR-3 groundwater treatment system is described as consisting of four 100 gal/min or two 200 gal/min modular units. This latter option has not been discussed with the regulators, and results in a significant loss in flexibility. If it turns out that 100 gal/min capacity would be better moved to 100-KR-4 or the 200-Area, this flexibility is lost. Unless the initial cost is dramatically less, this is not a good option.
31. Page 3-15, section 3.4.4, 5th paragraph
The document indicates that spent resin is not expected to exceed the TCLP for chromium. It should be noted, however, that it will be tested, and a testing schedule provided in the compliance monitoring plan.
32. Page 3-15, section 3.4.4.1, 1st paragraph
Suggest changing to read: "Valves for aligning the vessels in different all potential operating configurations...". This provides the necessary flexibility to use any vessel in any order, depending on the available capacity of the resin in the vessel.
33. Page 3-16, section 3.4.4.2 through 3.4.4.4
It needs to be stated that the various steps involved in changing resins must allow the system to continue to operate.
34. Page 3-17, last sentence

The document states "Air and drain valves located at any[sic] high and low elevation points would enable the pipeline to be drained manually if desired." This should be changed to read "Air and drain valves will be located at any high and low elevation points to enable the pipeline to be drained manually. The conditions for when the pipe will be drained will be defined in the operations and maintenance plan".

35. Figure 3-19

This figure is deceptive. The view should "pan" slightly upstream so as to not truncate the upstream end of the pore water data set.

36. Figure 3-22

We do not believe the lateral extent of the capture zone is realistic.

- 1) With the extraction wells located so close to the river, a drawdown in the water table sufficient to exert such a lateral influence is not realistic given the tremendous influx of river water that would result. The planned extraction rate (total of 80 gpm) grossly under-estimates what would be needed to maintain this gradient under the river influx that would occur.
- 2) Previous discussions on the geology and hydraulic properties of this area have indicated that the planned extraction wells likely are sited in an area of conductive gravels that interface with the river. If so, this will enhance river influx to these wells as opposed to lateral flow that would broaden the capture zone.

Utilization of other inland wells (such as the existing treatability test wells) for extraction would help, as would locating the extraction wells further apart.

37. Figure 3-7.

We understand that the downstream extent of the chromium plume has not been characterized. Well 199-K-37, the most downstream well appears to still be in the heart of the plume. Thus the chromium contours drawn at this downstream end should be "dashed", indicating high uncertainty. Regardless, if the indicated contours were used to plan the interim action, it is clear that planning the capture zone extended to the 50 ppb contour rather than the 22 ppb requirement of the ROD. The portion of groundwater plumes above 22 ppb in the near-river on-shore area must be in the capture zone.

38. Table 3-1.

The symbol "NT" is used in the table but is not defined in a footnote, or on page *vii*. It needs to be defined.

39. Page 4-1, section 4.1.1, 1st paragraph

Considering much of the drilling has already been performed, this paragraph relative to well drilling should be updated to a brief "as built" when this document is revised.

40. Page 4-1, last sentence

In discussing cultural resources protection, it states that "this plan will address protection of cultural resources in the 100-KR-4 Operable Unit during the drilling, construction, and operations phases of the interim action". Field activity has already begun at 100-KR-4, yet

we have not even received a first draft of this plan. Once again, this critical path item is overdue.

41. Page 4-2, 2nd paragraph, last sentence
The document states that "injection wells will be tested by injecting potable or *raw* water...". What is meant by "raw" water? Is this river water, and if so is it to be trucked or pumped to the site?
42. Page 4-3, Section 4.1.4, 3rd paragraph, last half
The ROD requires "that the land will be revegetated following construction in those areas that are not needed for operation and maintenance of the treatment system and where the land is also not expected to be re-disturbed *within the next few years* by other site activities". The concept of *the next few years* needs to be added to this section.
43. Page 4-3, section 4.1.4, last sentence of 3rd and 4th paragraphs
The inconsistent statements "restoration of the area *will* be postponed", and "restoration of the *disturbed* areas *may* be postponed" need to be corrected consistent with the ROD.
44. Page 4-3 to 4-4, section 4.1.4, last sentence
The discussion of restoration needs to state that this will be in accordance with the mitigation action plan.
45. Page 4-5, section 4.4.2, last sentence
The document states "continuous operation is defined as full-scale operation (i.e. with all applicable extraction wells) 90% of the time". The ROD requires that "the extraction and treatment system shall be designed to run on an essentially continuous basis." 90% is not essentially continuous.
46. Page 4-6, second paragraph.
The document states that "in the event that flow is stopped for an extended period of time during extremely cold weather, undrained water in the water transfer lines may freeze". It does not take an *extended* period of time during *extremely* cold weather to freeze stagnant water in pipes that are above ground and fully exposed.
47. Page 5-1, section 5.1
This document rewrote the three remedial action objectives from the ROD. The DOE is not authorized to change the remedial action objectives in this document. (Note that the rewrite of the third remedial action objective did not change the meaning, but the rewrite of the first two *did* change the meaning.)
48. Page 5-2, sections 5.1.1 and 5.1.2
These sections rewrote and significantly changed the requirements of the ROD. This section must be rewritten to match the ROD.
49. Page 5-4, section 5.2.1, first paragraph

Monitoring wells are described as being screened through the entire aquifer. We concur with this design to allow the flexibility to use these wells for extraction, and also to allow packers to isolate vertical sections of the aquifer for monitoring as required in the ROD: "chromium compliance monitoring will be conducted at multiple depth intervals."

50. Page 5-5, 1st paragraph

The document identifies that routine monitoring for hexavalent chromium will be done in the field at a detection limit of 5 ug/l. We concur. The document also identifies split samples to be tested at a detection limit of 2 ug/l. We concur. Regarding using 10 percent field duplicates and 5 percent sample splits with a laboratory, the following would be more appropriate:

- (A) Initially 10 percent duplicates and spikes for field analysis as well as 10 percent splits for laboratory analysis.
- (B) Upon satisfactory review of the results by the Tri-Parties, these requirements may be lowered to 5 percent field duplicates and spikes, and 5 percent laboratory splits; or alternate requirements determined by the Tri-Parties.
- (C) If subsequent review of quality assurance results supports increasing these requirements back to the levels specified in (A) above, any of the Tri-Parties may make this request.

51. Page 5-5, 4th paragraph

The document states that "the groundwater extraction system has been designed to minimize infiltration from the river". As indicated in other 100-D area comments, EPA does not consider this a valid statement.

52. Page 5-5, section 5.2.2

The ROD has additional monitoring requirements, such as the height of the water table in order to estimate capture zone. The ROD should be reviewed for all monitoring requirements against this section of the RDR/RAWP to ensure that all requirements will be met.

53. Page 5-5, section 5.2.3, 3rd paragraph

The reader might guess that this paragraph discusses sampling for chromium. If so, it should be explicitly stated. Suggest the following modification: "...will be tested monthly for chromium to provide...".

54. Page 5-6, 1st paragraph

The document states that "sampling for co-contaminants will be performed semi-annually at each of the extraction well locations and from the GTS influent and effluent. This frequency will be maintained until an alternate frequency is determined". Provided the first of these sampling events occurs at start-up, we concur. Monitoring for the interim action should also be integrated with other monitoring in the operable units.

55. Page 5-6, section 5.2.4, 1st paragraph

Use of a 10' packer during vertical characterization of the aquifer to too broad an interval near the top of the aquifer. About half that would be more appropriate. Also for 100-KR-4,

this should span the entire portion of the upper aquifer, for example 0-5', 5-10', and 10-15'. Only if contamination in the 10-15' zone is a significant fraction of an overlying zone would sampling at greater depths, such as 15-25' or the bottom of the aquifer be appropriate.

56. Page 5-7, 1st full paragraph
The document states that "during the startup period, GTS effluent sampling and analysis will be conducted weekly". We concur. "The weekly data will be used for comparison with the 50 ug/l standard". The treatment standard is to the **maximum extent practicable**.
57. Page 5-7, last paragraph
Regarding testing the spent resins, we concur with the document -- provided one additional idea is added. If influent or effluent monitoring indicates a change in the groundwater being treated that may result in changes to the characteristics of the spent resin, resins will be retested relative to ERDF waste acceptance criteria.
58. Page 5-8, section 5.4.1, 1st paragraph
We concur with demonstrated compliance for one year as a basis to begin shutdown. However, how that is performed should be decided when the time arrives and with regulatory concurrence. We do not support prescribing shutdown at quarterly intervals, or the *apriori* determination to shutdown perimeter wells first. Also, a more likely scenario would be intermittent operation with progressively longer down times such that one of the down times becomes permanent. We support monitoring the wells during shutdown to determine when the system should be restarted.
59. Page 5-8, section 5.4.1, 3rd paragraph
Regarding revisiting the 50 percent dilution ratio, DOE or the regulators may initiate a request to modify the dilution ratio.
60. Page 5-8, section 5.4.2.1, 1st paragraph, and top of page 5-9
If the wells become asymptotic at or above 22 ug/l, if the hydraulic gradient is maintained away from the river the interim action is still protective of the river. Therefore concentration in the wells is not a basis for cessation of the interim action based on technical impracticability.
61. Page 5-9, section 5.4.3
What level of risk assessment will be conducted in association with selection of the final remedy will be determined at that time, relative to what is appropriate to be protective of human health and the environment, natural resource trustee interests, the CERCLA statute at that time, funding and political realities... This RDR/RAWP does not dictate what will happen at that future time. The interim action will provide information that will lead to the final remedy.
62. Page 5-9, section 5.4.3, 2nd paragraph
The administrative record is the decision documentation basis. The various other documents mentioned are part of but not the full content of the administrative record.

63. Page 5-9, section 5.5, 1st paragraph
Add "...and both average and maximum influent and effluent chromium...".
64. Page 5-10, last line
A performance evaluation should be timed to support the 5-year review.
65. Page 5-16, Table 5-1, 100-HR-3...
This should be table 5-2, 100-KR-4. Also the dates are wrong.
Also "quaterly" is misspelled.
66. Figure 6-1.
This schedule needs much more detail, and TPA milestones should be identified.
67. Page A-3 through A-6, sections A1.1 through A1.3
These ARARs are different than in the ROD. They need to be changed to match the ROD.
A few examples are provided:
- (A) 40 CFR 144, Subpart B from the ROD was left out of the RDR/RAWP.
 - (B) The RDR/RAWP states that "the treatment system is designed to reduce chromium in extracted groundwater to concentrations of less than 50 ug/l on average". NO. The ROD states it "will reduce the effluent chromium concentrations to the maximum extent practicable". The 50 ug/l maximum, and the average less than 50 ug/l requirements are supplemental to the "maximum extent practicable" requirement.
 - (C) The RDR/RAWP states "To facilitate removal of the chromium, small quantities of chemicals...might be reinjected with the treated groundwater". Introducing and reinjecting new chemicals is a new concept to the regulators which EPA does not approve. Also, how does reinjection of these chemicals facilitate removal of the chromium.
 - (D) The Clean Water Act ARAR has been dropped from the RDR/RAWP.
 - (E) "The goal of the treatment system is to reduce levels of chromium in the groundwater that discharges to the river" needs to be changed to "one of the goals of the treatment system is to reduce levels of chromium in the groundwater that discharges to the river to meet these standards".
 - (F) Regarding well construction the RDR/RAWP states "construction, operation, and abandonment" whereas the ROD states "location, design, construction, and abandonment". And following that, the RDR/RAWP states "resource protection (i.e., monitoring) wells", whereas the ROD states "extraction, reinjection, and monitoring"
 - (G) The RDR/RAWP states that the DOW was received and approved by the regulatory agencies. In fact we provided conditional approval to proceed with procurement activities for the well drilling in order to initiate this critical path work element and to complete this initial well construction with available Fiscal Year 1996 funding (Letter from Wayne W. Soper, Ecology and Laurence E. Gadbois, EPA to Arlene C. Tortoso, DOE; dated May 16, 1996). We did not approve the DOW as stated in the RDR/RAWP, and object to DOE documents making untrue statements about the regulators.
 - (H) Regarding LDR, resins wastes that presumably will meet LDR requirement will require dewatering. Hence "no further treatment" is incorrect.

- (I) The RDR/RAWP states that "the requirements of WAC 173-303-460 are not applicable for design" needs to be changed to something like "the requirements of WAC 173-303-460 are not applicable for ~~did not impact the~~ design". The WAC 173-303-460 is already identified as an ARAR in the ROD. This document cannot declare that it is not applicable.
- (J) Tank system standards apply to the resins as well as the water. This ARAR is discussed relative to the water, but not the resins.
- (K) On page A-5, it states that "a culturally sensitive area was identified" in 100-KR-4. In fact, essentially the whole interim action occurs in a culturally sensitive area.
- (L) The National Historical Preservation Act (16 USC 470, 36 CFR Part 800) was dropped from the ARAR discussion in the RDR/RAWP, but was listed in the ARARs of the ROD.
- (M) Relative to the Bald and Golden Eagle Protection Act the ROD states that "consultation with the U.S. Department of Interior will occur as needed". This requirement was dropped from the RDR/RAWP.

68. Page B-4, section B2.4

In the numerical modeling, "the river stage was assumed to be constant". Regarding the proximity of many of the wells to the river, with known fluctuations of several feet over an annual cycle in the area of the interim actions, this is an amazing assumption. It reinforces concerns already expressed that the extraction wells at 100-D will be inundated with river water without having the desired (planned) lateral effect.

69. Page B-5, section B3.1, 1st paragraph

This discussion of the 100-H area states "the saturated thickness of the Hanford formation decreases to less than 1 m (3.28). Elsewhere, the saturated thickness ranges between 3 to 5 m". This contradicts section 5.2.4, second paragraph which states that this is a "relatively thin aquifer (<3 m [10 ft])". These statements need to be consistent and correct.

70. Page B-5, section B3.1, 1st paragraph

It is stated that the Ferris analysis was used to determine the average hydraulic conductivity for use in modeling. EPA has previously expressed concern with how the Ferris analysis has been used at Hanford. (EPA letter from Laurence E. Gadbois to Steven H. Wisness, DOE; November 24, 1992.)

71. Page B-5, section B3.1

The RDR/RAWP states that "the gradient of the modeled data appears greater than the gradient determined from the well level measurements". What this could indicate is that the conductivity is greater than used for the design basis for the extraction system, resulting in an underestimation of the water that needs to be extracted to attain the desired plume capture. Hence further support to initially pump at higher rates than DOE has suggested in this document. The rates proposed by DOE in the Proposed Plan documents and identified in the ROD may be more appropriate.

72. Page B-6, 1st full paragraph

The RDR/RAWP states that "transmissivity estimates based on pump-and-treat data...112 to 204 m²/day"... the transmissivity in the model is 75 m²/day". This indicates another example in which the model parameters were set in such a way that the model would underestimate the extraction rate needed for plume capture.

73. Page B-6, 1st full paragraph
The RDR/RAWP states that "except in the vicinity of wells D8-55 and D5-17, the transmissivity in the model...". The document does not state what transmissivity value was used in this vicinity.
74. Page B-6, 1st full paragraph
The document states that in the 100-D area, "the hydraulic conductivity of the Ringold Gravel Unit E is 15 m/day". On the next page, for 100-KR-4, it states that "the hydraulic conductivity of the Ringold Gravel Unit E was 7.4 m/day". Is there adequate data to justify using different values for this same geologic unit?
75. Page B-6, section B3.3 100-KR-4
The RDR/RAWP states that "testing was performed in wells installed during the limited field investigation and in wells installed in 1994". This contradicts earlier discussions wherein DOE stated that all the wells along the mile-long trench were tested, and which concluded that 199-K-20 was the only well with adequate construction and production capacity to be a useful extraction well.
76. Page B-8, 3rd line
The RDR/RAWP states a concept of "practical treatable levels" was used in the modeling, but does not define what those levels were. For months, the treatability test in the 100-D area has been removing about 98 to 99.5 percent of the extracted chromium. Is this the value that was used?
77. Page B-9, section B4.2 100-D Area
The RDR/RAWP states that "the capture zone of the two wells extends laterally across the entire plume area". See a number of previous comments on EPA's doubt that the lateral capture will be what DOE anticipates. See also previous comments where we express concern that the amount of river influx is underestimated. In fact Figure B-6 indicates the extraction wells would be in a conductive area that interfaces with the river. These wells would have a conductivity ten times higher with the river than laterally into the plume.
78. Page B-9, section B4.3
It is gracious to acknowledge response to Ed Prych's suggestion, however reference to which portions of this effort were done in response to suggestions by which individual is not appropriate.
79. Figure B-4
Where Steve Hope and company did pore water work at the 100-H area, he judged the most downstream station (with the 130 ppb Cr) as poor salmon habitat due to fine grain / silty conditions. This would be low transmissivity material. Further upstream his stations were

described as appropriate salmon gravel (i.e. high transmissivity). This figure in the RDR/RAWP shows just the opposite.

80. Figure B-10
This capture zone plot for the 100-H area shows that the 50 ppb contour would not be captured by the extraction system, least of all the 22 ppb contour required by the ROD. Also see previous comments regarding the actual location of the northern edge of this plume.
81. Tables B-4, B-5, B-6
The second column of these tables uses the phrase "per 12 total per well". This would indicate maximum values in that column of 12. In fact, this column is used as the sum for all the wells in that extraction network.
82. Page C-3, section C1.1
Change to read "Washington State Water Quality Criteria Standards".
83. Page C-6 and C-7
Wells 199-H4-12A, 199-H4-12C and 199-H4-11 are characterized as anaerobic. This is in a table labeled "Waste Indicator Constituents". Assuming that these are wells affected by the redox treatability test, these data tables are misleading. Either dissolved oxygen should be removed from the table, or the data should be footnoted to explain what this data means.
84. Table C-13, Well 199-K-18
As low as the dissolved oxygen was in the three wells identified in the previous comment, this table lists dissolved oxygen in 199-K-18 as 503 mg/l. My guess is that the units are wrong and also that it should be 5.03.
85. Page D-3
Remediation waste also includes water from slurry pumping resins and gravity draining the resins. (This water must be sent back though the treatment system.)
86. Page D-4, section D1.2
The RDR/RAWP states that "spent resins will be sampled". The sampling schedule should be stated. (See previous comment on this topic.)
87. Page D-4, section D1.3, 1st paragraph
In addition to the waste management plan for the 100-HR-3, 100-KR-4 should be included as well.
88. Page D-9, section 1.0, last line
The RDR/RAWP states that "this document will be superceded by the Remedial Design/Remedial Action Work Plan". This needs to be corrected.
89. Page D-10, top of page

In discussion of the soil and groundwater produced during drilling, the RDR/RAWP states that characterization will not be performed. It then states what the clean criteria for soil and groundwater are. This is confusing.

90. Page D-10, last paragraph

In reference to waste drums the RDR/RAWP states that these drums "will be assessed during routine waste storage site inspection and maintained as required". Required by whom? Where are these requirements specified? References should be provided.